



New South Wales Government



Tintenbar to Ewingsdale

Upgrading the Pacific Highway

Environmental Assessment
Submissions Report and
Preferred Project Report

May 2009



Tintenbar to Ewingsdale

Upgrading the Pacific Highway

**ENVIRONMENTAL ASSESSMENT SUBMISSIONS REPORT
AND PREFERRED PROJECT REPORT**

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I Introduction and background

I.1 The proposal

The proposed upgrade of the Pacific Highway between Tintenbar and Ewingsdale is part of the Pacific Highway Upgrade Program, being implemented by the NSW Roads and Traffic Authority (RTA).

The length of the proposed upgrade would be approximately 17 km starting at Ross Lane in Tintenbar and extending north to the existing Ewingsdale interchange, near the settlement of Ewingsdale. At Ross Lane, the proposed upgrade would connect to the north end of the Ballina bypass. Generally the proposed upgrade would be in close proximity to the existing highway corridor from Ross Lane to the existing Bangalow bypass. The existing highway would be maintained for local and regional traffic.

From Bangalow, the proposed upgrade would diverge away from the existing Bangalow bypass to the northeast through Tinderbox Creek valley. From there, the proposed upgrade would avoid the steep grades of St Helena Hill by way of a tunnel approximately 340 m long and 45 m below the ridge line. North of the tunnel, the proposed upgrade alignment would be located immediately to the east of the existing highway before tying into the Ewingsdale interchange.

A more detailed description of the proposed upgrade is provided in Part B of the *Tintenbar to Ewingsdale Environmental Assessment* (RTA August 2008).

A number of changes to the proposed upgrade described in Part B of the *Tintenbar to Ewingsdale Environmental Assessment* are proposed as part of this submissions report to reduce the environmental impact of the proposed upgrade. These changes are:

- > Removal of the Ivy Lane interchange
- > Addition of a landscaped mound adjacent to the Clover Hill Estate at Bangalow.

Details of these changes are provided in Section 4, preferred project report.

I.2 Statutory context

The Minister for Planning declared by Order published in the Government Gazette on 5 December 2006 that the proposed Tintenbar to Ewingsdale upgrade is a project to which Part 3A of the *Environmental Planning and Assessment Act, 1979* (EP&A Act) applies. By a separate order on the same day, the Minister also declared the proposed upgrade under section 75C of the EP&A Act to be a “critical infrastructure project”, the Minister having formed the opinion that the project is essential for the State for economic and social reasons. In accordance with the requirements of the EP&A Act, an environmental assessment was prepared to assess the potential impacts of the proposed upgrade.

I.3 Environmental assessment exhibition

The environmental assessment was on display for 65 days from 27 August 2008 to 31 October 2008. The public exhibition was extended beyond its original closing date of 29 September 2008, in response to requests from the community.

The environmental assessment was made available on the Department of Planning web site (www.planning.nsw.gov.au), on the project web site (www.rta.nsw.gov.au/pacific [click on Tintenbar to Ewingsdale]) and was exhibited at the following locations:

- > RTA Pacific Highway Office, 21 Prince Street, Grafton.
- > Ballina Motor Registry, Ballina West Shopping Centre, Ballina.
- > Lismore Motor Registry, Carrington Street, Lismore.
- > Ballina Shire Council, corner of Cherry and Tamar streets, Ballina.
- > Byron Shire Council, 70-90 Station Street, Mullumbimby.

Information panels were also available at:

- > Newrybar Hall, Old Pacific Highway, Newrybar.

Staffed displays were held at the following locations:

- > Ewingsdale Hall, Old Pacific Highway, Ewingsdale (Friday 29 August 2008).
- > Bangalow Memorial Hall, Station Street, Bangalow (Saturday 30 August 2008).
- > Newrybar Hall, Old Pacific Highway, Newrybar (Thursday 4 September 2008).

A toll free project information line was available throughout the exhibition period – 1800 882 787.

Consultation with key stakeholders continued through and in some cases beyond the exhibition period. This included ongoing discussions with Rous Water and meeting with specific resident groups

1.4 Purpose of the document

During the exhibition of the environmental assessment, 364 submissions were made. The Director-General of Planning provided copies of the submissions to the RTA. In accordance with Section 75H(6) of the EP&A Act, the Director-General required the RTA to address the issues raised in the submissions. If the response requires changes to the project to minimise its environmental impact, the Director General requires a preferred project report to be prepared and the statement of commitments to be revised.

This report includes the RTA's responses to issues raised in submissions (Chapter 2), information regarding additional studies carried out since the exhibition of the environmental assessment (Chapter 3), a preferred project report (Chapter 4), and a revised statement of commitments (Chapter 5).

2 Response to submissions

2.1 Respondents

A total of 364 submissions were received in response to the environmental assessment during the exhibition period. The last submissions were received by the Department of Planning on 31 October 2008. Of the total submissions received, ten were from local and State Government agencies, 13 were from community groups and 341 from individuals and businesses. The 341 submissions from individuals and businesses included a form letter that accounted for 122 of the submissions received.

Each submission has been examined individually in order to understand the issues being raised. These issues have been extracted and collated, and a response has been provided to the issues raised. Where similar issues have been raised in different submissions, only one response is provided.

A table is included in Appendix A listing each submission by number and cross-referencing the section of this report where the issues raised are addressed. Submissions are numbered according to the numbering system from the initial Department of Planning logging process. This process logged 16 duplicates as separate submissions and four that provided supporting background information to another submission. There are therefore 384 submissions listed in Appendix A despite 364 distinct submissions being received. The duplicate submissions are highlighted in Appendix A.

2.2 Overview of issues raised

Submissions were received from the following state and local government agencies:

- > Department of Environment and Climate Change.
- > Department of Primary Industries.
- > Ministry of Transport.
- > Heritage Council.
- > Northern Rivers Catchment Management Authority.
- > Ballina Shire Council.
- > Byron Shire Council.
- > Lismore City Council (two submissions).
- > Rous Water (Rous County Council),

A summary of the main issues raised by each agency is provided below:

2.2.1 NSW Government agencies

Five NSW Government agencies made submissions, which predominantly focused on their particular discipline areas. Recommendations for conditions of approval were also made. The issues raised by each of the agencies is summarised below.

Department of Environment and Climate Change

The Department of Environment and Climate Change raised a number of issues related to environmental management including water quality, groundwater, ecology, noise and air quality issues, as well as issues relating to Aboriginal heritage.

Northern Rivers Catchment Management Authority

The catchment management authority raised issues regarding the need to provide local habitat compensation, rehabilitation and maintenance of riparian areas, and the need to maintain wildlife corridors.

Department of Primary Industries

The Department of Primary Industries identified a number of issues regarding agricultural impacts, land use and aquatic habitats.

Ministry of Transport

The Ministry of Transport raised issues about the potential impact of the proposed upgrade on existing public transport operations and the opportunity to improve public transport through the implementation of facilities.

NSW Heritage Council

The NSW Heritage Council supports the proposed management measures identified in the environmental assessment, and suggests conditions of approval which would help strengthen those measures.

2.2.2 Local government

Submissions were received from Ballina Shire Council, Byron Shire Council, Rous Water and Lismore City Council. Particularly detailed submissions were received from Rous Water and Byron Shire Council.

Rous Water is the water supply authority for the Byron, Ballina, Lismore and Richmond Valley local government areas. Rous Water's primary area of concern is the potential impact of the proposed upgrade on drinking water quality, due to its alignment traversing two separate drinking water catchment areas. Rous Water's submission raised a range of issues relating to protection of drinking water quality and the environmental values of the drinking water catchments as a whole. The Department of Planning requested an early response to the issues raised by Rous Water. Because of the nature of the issues raised and the Department of Planning's request for early advice, the RTA arranged meetings with Rous Water to attempt to resolve these issues. A meeting between the RTA and Rous Water was held on 9 January 2009 to discuss outstanding issues before the RTA submitted a draft early response to the Department of Planning and Rous Water on 23rd January 2009. An additional meeting was held on 3 February 2009 between the RTA and Rous Water, where Rous Water presented a letter identifying outstanding issues. Opportunities to resolve these remaining issues were discussed. An amended early response was provided to the Department of Planning and Rous Water on 9 February 2009. Agreement has now been reached between Rous Water and the RTA on most issues. The RTA's response to each of the issues raised in Rous Water's original environmental assessment submission are included in this submissions report with commentary as to the level of agreement subsequently reached between Rous Water and the RTA.

Byron Shire Council's submission addressed many aspects of the environmental assessment, however included a particular focus on traffic management issues, specifically the volume of traffic remaining on the St Helena Hill section of the existing Pacific Highway. Section 2.11 of this report responds to these issues.

Ballina Shire Council's submission indicated general support for the proposed upgrade and the route selection and environmental process undertaken to date.

Two submissions were also received from Lismore City Council. The submissions related to the potential southern bypass of Bangalow. Section 2.18.1 of this report responds to these issues.

2.2.3 Community groups and individuals

The most common issue raised by the community (community groups and individuals) related to the proposed interchanges at Ivy Lane and Bangalow. A total of 255 of the submissions received related to the Ivy Lane interchange and these issues are addressed in section 2.6.5 of this report. There were 172 submissions that raised issues in relation to the Bangalow interchange, which are addressed in section 2.6.4 of this report.

The other major issues raised were water quality, noise, visual amenity and traffic.

Form letters

There was a standard form letter that accounted for 122 of the submissions received. The issues raised in this letter and where they are addressed in this report are as follows:

- > Water quality - section 2.8
- > Ecology - section 2.10
- > Noise impacts at Bangalow - section 2.13
- > Air quality - section 2.17
- > Visual impact - section 2.16
- > Route selection - section 2.3.5
- > Traffic at Bangalow - section 2.11
- > Bangalow interchange - section 2.6.4
- > Ivy Lane interchange - section 2.6.5

Some of the form letter submissions included additions to and/or deletions from the original text. Additional issues raised are addressed in the relevant sections of this report.

2.3 Strategic and project need

2.3.1 General support for the project

Submission numbers

038, 040, 042, 118, 174, 222, 324, 373 - Ballina Shire Council

Summary of issues

- > Pleased to see that this section of the Pacific Highway is to be upgraded.

- > Support the proposed upgrade of the Tintenbar to Ewingsdale section of the Pacific Highway as the current highway is well below optimal standards.
- > Upgrade is of significant importance to the North Coast and those who travel along it.
- > Applaud the RTA's efforts to improve the Pacific Highway's safety and efficiency.
- > Support in particular the water conservation measures taken for Emigrant Creek and Byron Creek catchment areas.
- > In agreement to the proposed route and environmental assessment and support the positive work the RTA is doing for the Tintenbar-Ewingsdale bypass.
- > Ballina Shire Council expresses its full support for the justification of the upgrade. (373 - Ballina Shire Council)

Response

Comments are noted.

2.3.2 General opposition to the proposed upgrade

Submission numbers

115, 167, 362, 379

Summary of issues

- > Total objection to the current proposal. Short-term / low cost fix that does not take into consideration future projections or address current noise issues.
- > Against upgrade to Pacific Highway - object lack of consideration, loss of privacy, peace, quality of lifestyle, negative impacts on property value
- > Strongly object to the overdevelopment. This proposal is only for the trucks and the trucking industry.

Response

The need and justification for the proposed upgrade are documented in the environmental assessment. Responses to specific issues raised in relation to noise and amenity are provided in sections 2.13, 2.15 and 2.16 of this report.

The benefits of the proposed upgrade include:

- > A safer section of highway.
- > Greater transport efficiency and safety for intra-state and inter-state movements.
- > Supporting growth and the long-term sustainability of the regional economy.
- > Improved access and connectivity for the local community.
- > Improved amenity along the existing Pacific Highway.
- > Reducing financial costs associated with travel on the Pacific Highway.
- > Reducing greenhouse gas emissions in the longer term and energy consumption relative to the base case of 'no upgrade'.

The above benefits reinforce the reasoning behind the entire Pacific Highway Upgrade Program and demonstrate that the proposed upgrade is not for the benefit of one particular sector of the community.

2.3.3 Program and project objectives

Submission numbers

349 - Byron Shire Council

Summary of issues

The following submission relates to the objectives for the proposed upgrade.

- > The project does not meet Pacific Highway Upgrade program and specific project objectives because of the proportion of traffic that would remain on the existing highway between Ewingsdale interchange and Bangalow. (349 - Byron Shire Council)

Response

The RTA believe that the objectives of the Pacific Highway Upgrade Program as well as those of the proposed upgrade are effectively met with the current concept design. The level of use of the proposed upgrade that would occur in the section between Ewingsdale interchange and Bangalow justifies the project in terms of the objectives questioned by Byron Shire Council, despite a proportion of traffic remaining on the existing highway.

2.3.4 Use of Pacific Highway by heavy vehicles

Submission numbers

012, 049

Summary of issues

The following submissions relate to the use of the Pacific Highway by heavy vehicles.

- > Has the RTA considered 'truck only' roads? 012
- > Why are trucks not on the other highway? Leave the Pacific Highway for cars. 049

Response

Given the strategic need of the Pacific Highway Upgrade Program to service all road users, not just heavy vehicles, and the significant capital costs of this type of infrastructure, developing a separate network for heavy vehicles, or 'truck only' roads cannot be justified.

The AusLink 'Sydney – Brisbane Corridor Strategy' (2007) identifies the Pacific Highway as the key transport mode in the Sydney – Brisbane transport corridor. The proposed upgrade is consistent with the objectives of the Pacific Highway Upgrade Program and would adequately cater for both heavy and light vehicles. Separation of carriageways, improved horizontal and vertical alignment and separation of through and local traffic would create a safer driving environment for all road users.

2.3.5 Alternatives considered

Study area definition

Submission numbers

333

Summary of issues

The following submission relates to the inclusion of Bangalow in the study area.

- > Bangalow was not included within the boundary of the study area, despite significant length of the proposed corridor being immediately adjacent to Bangalow's residential areas and within the Bangalow (or Byron Creek) Valley, with concomitant environmental, visual amenity and noise effects. (333)

Response

The study area represented the boundary of potentially feasible routes. It did not represent the extent of community consultation or assessment of impacts. Community consultation and the assessment of environmental impacts both included the Bangalow township. Specific responses to issues in relation to visual amenity and noise impacts are provided in sections 2.16 and 2.13 respectively in this report.

Route selection process

Submission numbers

034, 193, 315, 322, 337, 338, 340, 346, 349 - Byron Shire Council, 352, 365, 381

Summary of issues

The following submissions question the route selection process.

- > The community was not asked which route they preferred. (315, 034)
- > The detailed cost analysis of the four initial routes being considered has never been released. Request that the RTA is required to publish the financial cost details to allow for public scrutiny. (193)
- > There appeared to be a bias in the Community Liaison Group, with high value placed on agricultural land, and wasted land not counted in some route options. The community consultation leading to the preferred route was biased with two-thirds of the Community Liaison Group having connections to Route D. (346, 381)
- > Route A was selected 'behind the scenes' while Route D represented the cheapest option with the least impact on farmers and local residents. (034)
- > The preferred route is a hybrid of Options A and B and was not the subject of specific consultation. (349 - Byron Shire Council)
- > The environmental assessment does not recognise land in Newrybar and Knockrow zoned 7(c) under Ballina Shire LEP is for the storage and harvesting of water. Therefore route is flawed and cannot be approved. (299, 322, 337, 338, 340, 352, 365, 381)

- > In the RTA's decision-making process there would appear to have been undue acceptance of the population expansion needs for housing in Ballina Shire (the Far North Coast Strategic Plan looks to Ballina as the 3rd biggest regional centre) but scant respect for the requirements for safe drinking water for such population expansion. (299)
- > Route selection process is fundamentally flawed. The environmental assessment represents the first time the preferred route and its comparison with alternatives has been subject to peer review outside the RTA. (315)
- > In the RTA's determination of the preferred route, published in the environmental assessment, it lists 20 factors that contributed to that decision, the majority of which would be applicable to any selected route option. (299)

Response

The process for selecting the preferred route is clearly detailed in the *Tintenbar to Ewingsdale – Upgrading the Pacific Highway: Preferred Route Report* (RTA September 2006), which was displayed for community comment from 26 September to 3 November 2006. Thirteen submissions were received from this display. The preferred route report is available on the project web site (www.rta.nsw.gov.au/pacific [click on Tintenbar to Ewingsdale]).

The process for selecting the preferred route is also outlined in section 2.7.3 of the environmental assessment. It was based on three independent assessment streams that were developed to identify the environmental costs and benefits, as well as economic cost and value for money. These three streams were:

- > Community and agency submissions on the route options display.
- > The outcomes of the value management workshop for the short listed route options.
- > A technical assessment that included refinement of the short listed route options as well as updated engineering, environmental and economic investigations.

An overall assessment of the short listed route options was carried out by comparing the outcomes of the three streams.

The RTA has consulted extensively with the local community over several years, with community values being fundamental to the identification of route options and the selection of a preferred route. Two of the three streams identified above involved extensive community input, one being community and agency submissions on the route options display, and the other being the outcomes of the value management workshop for short listed options, which included the participation of the community liaison group. The RTA would continue to consult with the community through the development of the detailed design and construction.

The RTA considers that having the flexibility to combine short listed alternatives enabled a more effective response to community concerns and values.

The RTA considers that the proposed upgrade is consistent with the objectives of zone 7(c) of the Ballina Local Environment Plan. This is discussed in more detail in Section 2.8.4.

There were two main stages of multi-criteria analysis that led to the selection of the preferred route (referred to as sieve 1 and sieve 2). Sieve 1 was undertaken with the primary purpose of enabling a shortlist of options to be developed. Sieve 2 was a more detailed technical assessment undertaken after the completion of the Route Options Development Report, and involved a preliminary concept design for each option being assessed against refined criteria. The length of the highway within the Emigrant Creek dam catchment was given a greater weight in the sieve 2 (the detailed second stage alternative assessment) process than the impacts on future planned residential areas. As well as the length of corridor through the catchment, two additional criteria added weight to the drinking water supply issues in the route selection process. These were the length of a route option within 40m of Emigrant Creek and the proximity of a route option (at its closest point) to Emigrant Creek dam. These criteria together comprised a weighting of 6.1 percent ascribed to potential impacts on the Emigrant Creek dam drinking water quality, compared with a 1.2 percent weighting applied to potential impacts on future planned residential areas.

A small number (not a majority) of the 20 factors listed in section 2.8 of the environmental assessment that were successfully achieved by the preferred route, could arguably be applied to any of the options. These points were included to reaffirm that the proposed upgrade meets fundamental requirements. Other points distinguish some options from other options, (particularly coastal options versus plateau options), while others relate specifically to the preferred route. These points when evaluated in their entirety provide a clear justification for the selection of the preferred route.

Assessment detail during the route selection process

Submission numbers

333

Summary of issues

The following submission was concerned with details provided on route options during the route selection process.

- > The full implications of route option A1-B1 have only now become evident through the content of the EA. If such information had been available to participants in the early stages of consultation and liaison, there can be little doubt that the weightings placed on the various functional assessment criteria would have been very different. (333)

Response

The evaluation of route options was undertaken to a level of detail that enabled the relative merits/impacts of route options to be determined and to clearly identify a preferred route. It is typical and appropriate to undertake more detailed assessment once a preferred route has been chosen. The results of this more detailed assessment would not have altered the choice of the preferred route.

Comparison of options

Submission numbers

333

Summary of issues

The following submission was concerned with the comparative assessment of options A, B, C and D undertaken during the route selection phase.

- > The full implications of route option A1-B1 have only now become evident through the content of the EA. If such information had been available to participants in the early stages of consultation and liaison, there can be little doubt that the weightings placed on the various functional assessment criteria would have been very different. (333)

Response

The cost estimates used in the selection of the preferred route and documented in *Tintenbar to Ewingsdale Preferred Route Report* (RTA September 2006) did not allow for the Bangalow or Ivy Lane interchanges. Even if they had however, the costs for options A and B would have been less than for Options C and D. Note that Ivy Lane interchange has now been removed from the proposed upgrade scheme (refer to section 4.3 of this report). If approved as part of the preferred project report, this would reduce the cost of the proposed upgrade.

Submission numbers

333

Summary of issues

The following submission was concerned with the comparative assessment of Options A2 and B2 undertaken during the route selection phase.

- > It is hard to understand why option B2 was excluded from further pursuit. The result of such exclusion is that no alternative to the T2E passing directly by the town of Bangalow has been pursued in detail by RTA and considered in the EA. (333)
- > The T2E Preferred Route Report (September 2006) states "Section A2 is preferred over B2 as it utilises both the 9(a) reserved road zone and almost half of the existing Bangalow Bypass". This assessment is made by the RTA project team after the corridor assessment and value management workshops even though it was not specifically considered in the value management workshop. (333)
- > The cost assessments inadequately cover the hidden costs of this route selection, costs to Bangalow's residents in terms of health, uncertainty, loss of habitat and amenity due to noise, pollution, highway lighting, increased danger of flooding and environmental despoliation. Damages claims alone could amount to greater than the cost differences between the two route options. (333)

Response

Under the functional criteria category, A2 was superior to B2 in terms of *travel efficiency* and *use of existing highway infrastructure* (which referred to utilisation of the existing road reserve and Bangalow bypass). Within the social category, that B2 and A2 were rated equal on the remaining four factors. The value management workshop results clearly indicate that A2 in an overall sense performed better than B2.

The technical assessment showed B2 performed slightly better than A2 in the safety and functionality category, while A2 performed better in the natural and cultural environment category. This suggests that environmental impacts of B2 would be higher than A2 and any “hidden costs” of environmental impact would also be higher. The RTA maintains that the preferred route would result in an overall improvement in the amenity of Bangalow, and where impacts have been identified management measures have been proposed to mitigate these impacts.

Route option D

Submission numbers

098, 118, 252, 277, 299, 322, 337, 338, 340, 352

Summary of issues

The following submissions were received in relation to route option D.

- > Route D was the cheapest option with the least impact on residents and farmers. (098)
- > The RTA has ignored the obviously better choice for a route option along the base of the coastal escarpment away from the water catchment and farming areas. (277, 322)
- > The only safe way to protect the water catchment is to move the upgrade to Route Option D. (252, 337, 338, 340, 352)
- > Pleased option D abandoned due to flooding, environmental concerns and climate change. (118)
- > Leading up to the announcement of the preferred route a comparison of the environmental costs and benefits of the alternatives shows clearly that Route D posed a lesser community burden. (299)

Response

The process for selecting the preferred route is clearly detailed in the *Tintenbar to Ewingsdale – Upgrading the Pacific Highway: Preferred Route Report* (RTA September 2006). This report is available on the project web site www.rta.nsw.gov.au/pacific (click on Tintenbar to Ewingsdale).

As outlined in Section 2.7.3 of the environmental assessment, option D performed poorly in the technical assessment, and community and agency submissions generally preferred route options A and B over option D. The reasons for the poor performance of option D were mainly its performance in terms of safety and functionality as well as potential impacts on the natural and cultural environment. Costs for option D were significantly higher than costs for options A and B. Higher costs and poorer performance resulted in low value for money.

The water quality management measures detailed in sections 5.10 and 10.10 of the environmental assessment are appropriate for the management of the chronic and acute impacts for both the Emigrant Creek dam and Wilsons River catchments, based on the level of risk to water quality identified for each catchment.

The comparison table included as Attachment 2 of the Water Catchers and Water Drinkers of Ballina Shire submission (submission number 299) is the summary of the sieve 1 analysis from the Route Options Development Report. Sieve 1 was undertaken with the primary purpose of enabling a shortlist of options to be developed. A more detailed technical assessment was undertaken after the completion of the Route Options Development Report. This was known as sieve 2 and involved a preliminary concept design for each option being assessed against refined criteria. The sieve 2 assessment was documented in the Preferred Route Report, which was placed on public display from 26 September to 3 November 2006. It is the sieve 2 analysis that resulted in the identification of the preferred route.

Study area changes

Submission numbers

333

Summary of issues

The following submission was concerned with study area changes since the route selection occurred.

- > One key change since the selection of the preferred route is that the Bangalow residential development, Clover Hill which abuts the existing highway and will be fully exposed to the upgrade, is now completed with approximately 60 dwellings fully occupied. Thus the social and community cost impacts of the preferred route have changed significantly since the route study was undertaken. (333)

Response

The route selection process assumed the full development of Clover Hill. The environmental assessment also assumed this. Specific noise and visual mitigation for Clover Hill has been developed since the environmental assessment display.

As discussed in Section 4.3 of this report, a landscaped mound is proposed between the existing highway and Clover Hill. If approved as part of the preferred project report, this landscape mound would further reduce noise and visual impacts from both the existing and upgraded highway in Clover Hill and Bangalow. The opportunity for proposing this landscaped mound arose from the likelihood of excess spoil resulting from the proposed upgrade and the desire to use this spoil to further enhance noise and visual mitigation measures where feasible.

Selection of preferred route

Submission numbers

012, 033, 034, 047, 050, 051, 052, 053, 054, 060, 061, 062, 063, 064, 065, 066, 067, 083, 084, 085, 086, 087, 088, 090, 091, 092, 093, 095, 097, 099, 100, 107, 108, 109, 110, 111, 113, 130, 131, 133, 134, 141, 142, 143, 145, 146, 147, 150, 155, 156, 157, 160, 165, 166, 168, 170, 171, 191, 195, 198, 203, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 286, 288, 289, 290, 291, 292, 293, 294, 295, 306, 308, 309, 310, 311, 312, 314, 315, 317, 318, 319, 320, 321, 345, 348

Summary of issues

The following submissions question the selection of the preferred route.

- > Aside from cost I have seen no convincing argument as to why this route has been selected. (160)
- > Current proposal provides poor choice of route. (012, 034, 345)
- > Route passes within 200m of a school, 500m of Emigrant Creek and cuts a 250m wide chasm through one of the most important water catchments in the area. The RTA is violating its own criteria for mitigating impacts on the community by placing the health and education of students as the least important factor in determining the route. (099)
- > Alignment should be moved further away from the town of Bangalow. (033, 034, 047, 050, 051, 052, 053, 054, 060, 061, 062, 063, 064, 065, 066, 067, 083, 084, 085, 086, 087, 088, 090, 091, 092, 093, 095, 097, 100, 107, 108, 109, 110, 111, 113, 130, 131, 133, 134, 141, 142, 143, 145, 146, 147, 150, 155, 156, 157, 165, 166, 168, 170, 171, 191, 195, 198, 203, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 286, 288, 289, 290, 291, 292, 293, 294, 295, 306, 308, 309, 310, 311, 312, 314, 315, 317, 318, 319, 320, 321, 348)

Response

The process for selecting the preferred route is clearly detailed in the *Tintenbar to Ewingsdale Preferred Route Report* (RTA September 2006). It details the comparison of the options considered and states the reasoning behind the selection of the preferred route. This report is available on the project web site (www.rta.nsw.gov.au/pacific [click on Tintenbar to Ewingsdale]).

The environmental assessment has identified the potential impacts on Newrybar Public School and Emigrant Creek and appropriate treatments measures have been developed to mitigate these impacts including a landscaped mound between Newrybar Public School and the proposed upgrade, and extensive water quality controls, which are described in sections 5.2.2 and 5.10.2 of the environmental assessment.

The preferred route alignment is located further away from the town of Bangalow than the existing Pacific Highway. It would overlap with the location of the existing Bangalow bypass with the existing northbound carriageway of the Bangalow bypass (the closest carriageway to Bangalow) becoming a local access road, before the alignment diverges

further to the east in the vicinity of the existing Bangalow interchange. The location of the proposed upgrade represents the outcomes of an extremely rigorous route selection process, a process which included consideration of areas further to the east.

2.4 Planning and approvals

2.4.1 Environmental assessment display

Submission numbers

123, 275

Summary of issues

The following submissions were received regarding the opportunity to comment on the environmental assessment.

- > Thank you for opportunity to review and comment. Document of high standard. (123)
- > Thank you for the opportunity to comment on the proposed upgrade for the Tintenbar to Ewingsdale section of the Pacific Highway. (275)

Response

Comments are noted.

2.4.2 Environmental assessment documents

Submission numbers

178

Summary of issues

The following submission was received regarding the availability of the environmental assessment document

- > The document was made available on CD format which was manifestly inadequate to enable detailed review of such a lengthy and complicated document. A printed copy of the assessment reports and working papers was requested, however had been advised that no printed copies were available. Time allowed for submissions is also inadequate in view of the nature and complexity of the document. (178)

Response

The document was made available on CD and on the Tintenbar to Ewingsdale project web site www.rta.nsw.gov.au/pacific (click on Tintenbar to Ewingsdale). This choice of media was considered to be the most efficient for the public to access relevant information given the size of the documents. The complete environmental assessment was four volumes in length. Printed copies were available for viewing at each of the staffed displays and were available for the entire exhibition period (27 August 2008 to 31 October 2008) at the following locations:

- > RTA Pacific Highway Office, 21 Prince Street, Grafton
- > Ballina Motor Registry, Ballina West Shopping Centre, Ballina
- > Lismore Motor Registry, Carrington Street, Lismore
- > Ballina Shire Council, corner of Cherry and Tamar streets, Ballina
- > Byron Shire Council, 70-90 Station Street, Mullumbimby

The closing date for submissions was extended by 32 days until 31 October 2008. The total length of the exhibition was 65 days.

2.4.3 Pre-empting of approvals process

Submission numbers

322, 365

Summary of issues

The following submissions question the validity of the environmental assessment.

- > Amazed at the blatant hypocrisy of your Department conducting an environmental assessment of a major project which has already been under construction for several months. Now impossible to change proposed route. (322)
- > The RTA has pre-empted the approvals process by commencing construction of the Ballina Bypass which is common to the southern most sector of T2E. This sector determines the T2E route and could be seen to be an attempt to determine the approval process for the preferred route by default. (365)

Response

Construction has not commenced on the Tintenbar to Ewingsdale Pacific Highway upgrade. The project currently under construction is the Ballina bypass, which was approved in 2003.

The environmental assessment has been prepared as part of the approval process for the Pacific Highway upgrade between Tintenbar and Ewingsdale. This consists of a highway upgrade from the northern end of the approved Ballina bypass, at the Ross Lane interchange, to the Ewingsdale interchange.

Some of the initial options (C and D) investigated as part of the development of the proposed upgrade consisted of alignments that joined the Ballina bypass alignment about 2.5km south of Ross Lane. These options did not form part of the preferred route. As described above, the preferred route joins the northern end of the Ballina bypass at Ross Lane. Further description of the route selection process undertaken is provided in Part B of the *Tintenbar to Ewingsdale Environmental Assessment* and in the *Tintenbar to Ewingsdale Preferred Route Report*.

It was appropriate to proceed with the construction of the Ballina bypass (including the Ross Lane interchange) because the *Tintenbar to Ewingsdale Preferred Route Report* was definitive in its assessment and because public submissions resulting from the preferred route display reaffirmed the view that the identification of the preferred route was sound. The Ballina bypass was also commenced as a priority so that traffic safety and the amenity of Ballina could be improved.

2.5 Community consultation

2.5.1 General

Submission numbers

035, 160

Summary of issues

The following submission raised general concerns over the consultation process.

- > Consultation with stakeholders needs to happen if there are any negative changes to the T2E plan as displayed in August/September 2008. (035)
- > Trucking companies should not be considered exclusively, the pushing and manipulation by the industry needs to stop. (035)
- > The RTA environmental assessment has failed to pacify community anxiety about severe design and route orientation defects, if these are allowed to migrate to construction; they will undoubtedly inflict unacceptable impacts on both the human and natural environments. (160)

Response

Changes to the proposed upgrade since the environmental assessment are detailed in the preferred project report (Chapter 4 of this submissions report). These changes are proposed to further reduce environmental impacts. The changes are:

- > The removal of Ivy Lane interchange.
- > The addition of a landscaped mound adjacent to Clover Hill estate, Bangalow.

If any design changes occur after project approval, appropriate consultation with the community would occur and additional approvals may be required.

The environmental assessment process involved broad community consultation. No single interest group has been afforded more influence than another.

The RTA has maintained consultation with the community since the display of the environmental assessment and would continue to do so through the detailed design and construction process. Community concerns continue to be addressed through design modifications (see Chapter 4 of this report), improved mitigation and provision of additional information to community members.

2.5.2 Consultation with the Bangalow community

Submission numbers

002, 116, 121, 122, 333, 380

Summary of issues

The following submissions questioned the level of consultation undertaken in Bangalow.

- > The RTA has not consulted with the Bangalow community sufficiently to produce the best outcome for residents of the village and its surrounds. (121,122)
- > The RTA has not properly consulted the members of the Bangalow community and the environmental assessment has fallen far short of addressing this critical issue for our small town. The response and presentations by the RTA indicate that there is no desire to address this issue seriously. (116)
- > Would like equity for all Clover Hill residents when it comes to decisions made in regards to mitigation measures. Believes residents will work in partnership with the RTA if given an equal voice and are part of a transparent consultation process. (002)
- > There has been a failure of both process and procedure as it is believed that the views of neither the Bangalow business community nor the Chamber of Commerce have been sought by the RTA or their consultants. (380)

Response

Extensive consultation has been undertaken over a four year period. At every major stage residents of Bangalow have been informed by a range of means including community meetings, distribution of community updates, progress updates in local media, and the establishment of a project information line and web site.

Specific consultation activities that have occurred with the Bangalow community include:

- > Community information session in October 2004 – project commencement.
- > Community information session in May 2005 – expanded study area
- > Attendance at a Bangalow Community Alliance forum on 18 January 2005 about the Pacific Highway upgrade between Tintenbar and Ewingsdale.
- > Provision of a free call project information line, email and free post.
- > Establishment and regular updates of a project web site.
- > Provision of project updates to the community.
- > Public display of the route options. This included: provision of a community update outlining the route options to the community; provision of the route options development report clearly outlining the process undertaken to determine the short list of route options; staffed public displays, 10 days at Bangalow.
- > Public release of the route options development submissions report which provided a response to the issues raised in the 19,150 submissions on the route options.
- > Public display of the preferred route. This included: provision of a community update outlining the preferred route to the community; provision of the preferred route report clearly describing the process that was followed to select the preferred route; staffed public displays, one day at Bangalow (it was endeavoured to have more displays at Bangalow, however there were not sufficient hall vacancies).

- > Public release of the Part 3A Project Application Report.
- > Public display of the proposed highway access strategy and the strategic access report for community comment.
- > A staffed display during the environmental assessment exhibition period.

The RTA would ensure effective consultation with the community would occur through the detailed design and construction phases.

2.5.3 Adequacy of consultation

Submission numbers

099, 193, 323

Summary of issues

The following submissions questioned the adequacy of the consultation process that has been undertaken.

- > We are dismayed that the RTA believes that they are not accountable to the community for their decisions and the RTA believes that they know what is best for our community. The RTA and its consultants have poorly delivered outcomes. They have not listened to a community standpoint. (193)
- > As a community, experience of consultation with the RTA has been disappointing. Representatives have been unwilling or unable to answer pivotal questions, provide timely feedback or give any indication that community concerns have been considered in the route selection, design of the new highway or the environmental assessment. There has been little time to consider the environmental assessment in light of a new study in the *Journal of Environmental Planning and Management* in September 2008 concerning the impact of highway pollution on schools in the USA, so request a further 6 months to consider the environmental assessment and its ramifications. (099)
- > The RTA have failed to deliver the level of consultation the community expects. (323)

Response

The RTA devoted considerable time and energy to consulting with the community in the options identification and options assessment phases of the project. Consultation occurred over a four year period leading up to the public exhibition of the environmental assessment. Two of the three streams that contributed to the selection of the preferred route involved extensive community input, one being community and agency submissions on the route options display, and the other being the outcomes of the value management workshop for short listed options, which included the participation of representatives from the community liaison group.

It was through community feedback to the preferred route display that the strategic access report was developed and displayed.

The air quality assessment evaluated against relevant DECC criteria and *National Environment Protection Measure* goals. These are based on a review of current research. If new research results in a review or change to relevant air quality criteria then consideration will occur at the time that the change occurs. It is not appropriate to delay an individual project in the absence of changes to criteria, Refer to Section 2.17 for more detail on air quality issues.

2.5.4 Request for extension of time for public display of environmental assessment

Submission numbers

013, 046, 082, 172

Summary of issues

The following submissions requested that the 30 day exhibition period be extended.

- > Request for extension to closing date for submissions - residents and those affected only given one month to respond. (013)
- > Request one month extension to closing date to engage professional assistance. (046)
- > Request for extension to closing date for submissions - residents and those affected only given 1 month to respond. (082)
- > Requesting the closing date for comments be extended by one month until 30 October 2008. (172)

Response

The closing date for submissions was extended by 32 days until 31st October 2008. The total length of the exhibition was 65 days.

2.5.5 Consultation and communication in relation to drinking water catchments

Submission number

316 - Rous Water

Summary of issues

The following submissions relate to communication strategies for the drinking water catchments.

- > Rous Water receives a wide range of community feedback regarding the Pacific Highway upgrade and we are not able to adequately respond to these issues. (316- Rous Water)
- > Implement a public communications strategy to provide timely and accurate information to the public. Develop a community education plan to advise the community of the project and assist them to deal with the impacts imposed through the project. (316- Rous Water)
- > Undertake a catchment signage program that clearly indicates to road users that the highway passes through the Emigrant Creek and Wilsons River drinking water catchment areas. (316 - Rous Water)

Response

The RTA would welcome any community feedback provided to Rous Water regarding the Pacific Highway. Any future Rous Water comments and contributions would be welcomed throughout subsequent design stages.

Ongoing communication with the community would be an important part of the detailed design and construction phases of the proposed upgrade.

The RTA is currently discussing a catchment signage program with Rous Water,

Rous Water in its subsequent comments (dated 3 February 2009) acknowledged that the RTA is committed to working with Rous Water in the management and restoration of riparian zones. Rous Water requested that a structured approach recording RTA commitment be documented.

2.6 Concept design

2.6.1 Overview

Submission numbers

350 - Department of Environment and Climate Change NSW

Summary of issues

The following submission was concerned with the overview of the concept design provided in the environmental assessment.

- > The overview of the concept design does not demonstrate compliance with the principles of ecologically sustainable development. (350 - Department of Environment and Climate Change NSW)

Response

The overview of the concept design does not explicitly discuss compliance with the principles of ecologically sustainable development. This is because the application of these principles in the planning and design of the proposed upgrade are summarised in Table 21.3 of the environmental assessment.

2.6.2 Possible future changes to the current design

Submission numbers

349 - Byron Shire Council

Summary of issues

The following submission was received regarding future changes to the concept design presented in the environmental assessment.

- > Potential for “substantial changes” indicates the current project is not closed to variances. Byron Shire Council requests any such change be done in consultation with relevant (and affected) parties. (349 - Byron Shire Council)

Response

Some modifications to the proposed upgrade have been made since the environmental assessment display in response to community and agency submissions. These have been undertaken to reduce potential impacts. Proposed modifications are presented in the preferred project report (chapter 4 of this document).

If substantial changes to the design are proposed after a determination is made by the Minister of Planning, further assessment and consultation would be necessary.

2.6.3 Southern Bangalow bypass and access to Lismore

Submission numbers

116, 119, 121, 122, 124, 125, 188, 333

Summary of issues

The following submissions were received regarding access from Lismore to the upgraded highway and the potential for a southern Bangalow bypass.

- > This is the fastest growing region in NSW and Lismore is a regional growth centre. Lismore needs to access Brisbane on a daily return basis and will use the shortest possible route. That route is via the Lismore to Bangalow Road not the Bruxner, and the proposed northern access via Ewingsdale is inefficient. (119)
- > The environmental assessment report seems to give little consideration to the town of Lismore (population around 50,000) which is the key regional city of the area. Its importance as the education, health, state government, industrial, transport etc centre of the district seems to have been ignored to the extent that it appears to be the RTA's intent to simply get the coastal / Lismore traffic completely off the Tintenbar to Ewingsdale Pacific Highway section altogether. (116)
- > The best option to get traffic off Bangalow streets is to build a southern Bangalow bypass. (121, 122)
- > The construction of a southern Bangalow bypass would both protect our town and contribute to a much more rational regional plan. (188)
- > Will the RTA's preliminary investigations of the cost of a southern bypass of Bangalow take into account the cost of maintaining the existing highway between Bangalow and Ewingsdale given that the St Helena hill section traverses slip prone escarpment? (124)
- > Lismore has not been provided adequate access to the new highway, little mention in the report and no mention in the 'Traffic' section of school buses. (125)
- > Any southern bypass needs to be well outside the Byron Creek Valley, as earlier researched bypass routes were, such as from Nashua to Fowlers Lane and on to St Helena Hill. But to take advantage of the proposed tunnel under St Helena hill this traffic needs to enter T2E either well south of Bangalow or alternatively, well north of Ewingsdale. (333)

Response

The priority for the RTA is to upgrade the Pacific Highway. Access to the Pacific Highway for east / west traffic travelling between the highway and Lismore via Bangalow Road (main Road 65) would be maintained via the Ewingsdale interchange.

The Bruxner Highway continues to be the primary access route between the Pacific Highway and Lismore. It is a state highway and forms the state's northern most east-west route linking the New England Highway at Tenterfield with the Pacific Highway at Ballina, via Lismore. Main Road 65 (the Bangalow to Lismore road) is a designated main road between Lismore and the Pacific Highway north of Bangalow. It provides an alternate route to the Bruxner Highway for vehicles travelling from Lismore to the Pacific Highway towards Queensland.

With the release of the environmental assessment it was announced that the RTA would commence preliminary investigations on the costs and benefits of a possible southern bypass of Bangalow to determine its feasibility. A southern bypass of Bangalow would allow through traffic travelling between Lismore / Casino and Byron Bay (as well as further north) to access the upgraded highway without the need to travel through Bangalow or on the St Helena Hill section of the existing highway.

A discussion paper has been prepared to present the initial findings of those investigations for community comment. This discussion paper is available on the project web site (www.rta.nsw.gov.au/pacific [click on Tintenbar to Ewingsdale]). Following stakeholder and community input a decision would be made on the need and justification of a southern bypass of Bangalow.

2.6.4 Bangalow interchange

Opposition to Bangalow interchange

Submission numbers

002, 035, 036, 040, 042, 047, 048, 050, 051, 052, 053, 054, 060, 061, 062, 063, 064, 065, 066, 067, 083, 084, 085, 086, 087, 088, 090, 091, 092, 093, 094, 095, 097, 100, 107, 108, 109, 110, 111, 113, 129, 130, 131, 133, 134, 141, 142, 144, 145, 146, 147, 150, 155, 157, 158, 165, 166, 168, 170, 171, 173, 188, 189, 191, 195, 198, 200, 203, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 248, 250, 251, 252, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 274, 279, 281, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 301, 305, 306, 308, 309, 310, 311, 312, 314, 315, 317, 318, 319, 320, 321, 323, 333, 344, 348, 361, 377, 380, 381

Summary of issues

The following submissions were opposed to the proposed interchange at Bangalow Road.

- > No ingress nor egress to Bangalow at all in the upgrade (252, 380)

- > Against the Bangalow Interchange. Access to the tunnel can be provided via the existing road, emergency lanes and access points. (047, 050, 051, 052, 053, 054, 060, 061, 062, 063, 064, 065, 066, 067, 083, 084, 085, 086, 087, 088, 090, 091, 092, 093, 095, 097, 100, 108, 109, 110, 111, 113, 130, 131, 133, 134, 141, 142, 145, 146, 147, 150, 155, 157, 165, 166, 168, 170, 171, 189, 191, 195, 198, 203, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 286, 288, 289, 290, 291, 292, 293, 294, 295, 305, 306, 308, 309, 310, 311, 312, 314, 315, 318, 319, 320, 321, 333, 348)
- > Against the interchange. It would result in unnecessary impacts on the community from increased traffic, lighting, noise and pollution and would create a further scar on the landscape. There would be further impacts on agriculture and tourism in Bangalow. (002, 035, 036, 040, 042, 048, 107, 129, 144, 188, 200, 248, 279, 281, 287, 305, 315, 317, 323, 344, 361, 377)
- > Against - cost, unnecessary due to the existence of interchanges at Ross Lane and Ewingsdale. (002, 035, 036, 094, 144, 157, 158, 173, 222, 248, 250, 251, 301, 305, 315, 317, 381)
- > Against the interchange - losses to the community far outweigh the benefits (047, 050, 051, 052, 053, 054, 060, 061, 062, 063, 064, 065, 066, 067, 083, 084, 085, 086, 087, 088, 090, 091, 092, 093, 095, 097, 100, 108, 109, 110, 111, 113, 130, 131, 133, 134, 141, 142, 145, 146, 147, 150, 155, 157, 165, 166, 168, 170, 171, 189, 191, 195, 198, 203, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 274, 286, 288, 289, 290, 291, 292, 293, 294, 295, 301, 306, 308, 309, 310, 311, 312, 314, 315, 318, 319, 320, 321, 333, 348)

Response

An interchange already exists in the location of the proposed Bangalow interchange. The proposed interchange would replicate the function of the existing interchange. Most of the elements of the new interchange would be further from nearby residents than the existing interchange (particularly the northbound off-ramp).

The new interchange would have additional elements, most notably a roundabout at the same level as the existing highway. The RTA considers that with appropriate noise and landscape treatment the Bangalow interchange can be implemented with minimal impact on nearby residents. The noise modelling undertaken for the environmental assessment included the Bangalow interchange. The results of the modelling indicate that with the identified mitigation measures, there would be an improvement in noise levels in Clover Hill.

Further evaluation of noise and visual mitigation options at Clover Hill has occurred since the display of the environmental assessment. As a result it is proposed that a landscaped mound is constructed between Clover Hill and proposed upgrade. This mound (detailed in Section 4.3) would further reduce noise impacts from both the existing and upgraded highway in Clover Hill and provide visual screening to the proposed upgrade, including the interchange. The opportunity for proposing this landscaped mound arose from the likelihood of excess spoil resulting from the proposal and the desire to use this spoil to further enhance noise and visual mitigation measures where feasible.

As noted in section 13.4 of the environmental assessment, traffic volumes on Bangalow Road are unlikely to change as a result of the interchange.

The location of an interchange in close proximity, but outside the town, provides an appropriate balance between the needs of vehicle users, tourists, businesses and residents. It would also reduce the volume of traffic using the existing highway between Ross Lane and Bangalow.

Justification of Bangalow interchange

Submission numbers

035, 153, 154, 160, 287, 315, 355, 364

Summary of issues

The following submissions questioned the reasons for inclusion of an interchange at Bangalow Road.

- > Concerned about the consultation process in relation to this matter and the views of the community. The Tintenbar to Ewingsdale Preferred Route announcement involved only access points at Ross Lane and Ewingsdale; then without consultation with the local community, the RTA released the Access Strategy Report which included an interchange at Bangalow. Directly affected landowners were not consulted. (035, 153, 154, 160, 287, 355)
- > The environmental assessment fails to justify the need for the half-interchange; it should be removed from the proposed upgrade. Construction costs and environmental impacts are considerable, yet benefits are minimal at best. Reductions in travel time would be minimal. The interchange increases the footprint of road infrastructure on Bangalow, in particular Clover Hill. The increased level of disturbance from traffic and lighting are incomparable with the character of Bangalow. (315, 364)
- > A full interchange would better service the community than two half interchanges. (056, 057, 058, 103, 369)

Response

Ivy Lane and Bangalow interchanges were added to the proposed upgrade scheme after various community representations highlighted a desire for a greater level of access to the new highway. The highway access strategy and the environmental assessment have provided the community with two opportunities to comment on the proposed interchange.

All directly affected landowners were sent a copy of both the strategic access report and the environmental assessment when they were released.

The inclusion of an interchange at Bangalow is seen as maintaining the status quo given the existing interchange. The provision of an interchange with south facing ramps at Bangalow Road would replicate the location and function of the interchange currently in operation on the existing Bangalow bypass with traffic movements being slightly further from existing residents than they are under the existing arrangement.

The RTA considers that with appropriate noise and landscape treatment, Bangalow interchange can be implemented with minimal impact on nearby residents. The noise modelling undertaken for the environmental assessment included the Bangalow

interchange. The results of the modelling indicate that the proposed upgrade would result in a reduction in noise levels at Clover Hill.

As discussed in section 4.3 of this report an additional landscape mound is proposed between the existing highway and Clover Hill. If approved as part of the preferred project report, this mound would further reduce noise impacts from both the existing and upgraded highway at Clover Hill estate and provide visual screening to the proposed upgrade, including the interchange.

Light spill into adjacent areas would be minimal due to the construction of a landscaped mound between the interchange and Clover Hill. Detailed lighting design would be focused on avoiding light spill impacts.

Mitigation of impacts of Bangalow interchange

Submission numbers

024

Summary of issues

The following submission concerned mitigation measures for the Bangalow interchange.

- > Interchange should have sound walls to mitigate noise impacts and lights should be screened. (024)
- > Vegetation required for removal during construction should be replaced with mature and semi-mature trees and shrubs in order to reduce visual impacts. Landscaping to be carried out at earliest possible time. (024)

Response

A detailed landscape plan would be developed at the detailed design phase and implemented as soon as practicable into the construction program to reduce the visual impact of the upgrade.

A landscaped mound is now proposed adjacent to Clover Hill estate to provide noise and visual mitigation. Details of the landscaped mound are described in Section 4.3 of this report. The mound would be revegetated as early as practical in the construction program.

Design of Bangalow interchange

Submission numbers

158, 281, 335

Summary of issues

The following submissions were concerned over the design of the Bangalow interchange.

- > The interchange will be very tight, dangerous and confusing. The exit lane from the Pacific Highway is very short. It will result in increased noise for Clover Hill residents, and is not required by local residents so is a waste of taxpayer money. (335)

- > By deleting these half interchanges it would improve safety, reduce visual impact and reduce construction costs, and dramatically improve the ability to provide noise mitigation necessary for the adjacent Clover Hill Housing Estate. (281)
- > This proposed half interchange also seems to run counter to RTA guidelines which say that the minimum distance between highway interchanges is considered to be 10 km. A half interchange would be just 6 kms from the existing Ewingsdale interchange, and so goes against the RTA's own rules. (158)

Response

The proposed Bangalow interchange has been designed to meet all applicable road safety standards.

An interchange already exists in the location of the proposed Bangalow interchange. The proposed interchange would replicate the function of the existing interchange. Most of the elements of the new interchange would be further from nearby residents than the existing interchange (particularly the northbound off-ramp).

The proposed interchange would have additional elements, most notably a roundabout at the same level as the existing highway. This would be at a higher level than Bangalow Road to enable grade separation.

At no point would traffic exiting the proposed upgrade, be closer than traffic exiting the Bangalow bypass at the existing interchange (although it would be at a higher elevation prior to entering the roundabout).

A landscaped mound is proposed on what is currently the northbound off-ramp at the existing interchange. Details of the proposed mound are provided in Section 4.3 of this report. .

Section 3.2 of the *Tintenbar to Ewingsdale – Upgrading the Pacific Highway: Strategic Access Report* (RTA January 2008) provides details of the factors considered when identifying the location of interchanges. The minimum spacing between interchanges of 10km for rural areas is considered for guidance only and is not a design standard. The location of interchanges is determined by road network requirements for accessibility and route interconnectivity. Accordingly interchanges are located where a major road intersects with other arterial roads or significant local rural roads and therefore actual interchange spacing can be significantly less than 10km. The physical suitability of the site is also an important factor.

Where freeways/motorways bypass rural towns, the location and number of interchanges is normally based on the level of accessibility required between the freeway and the town. This can be an issue for smaller settlements that are economically dependent on tourism.

Support for Bangalow interchange

Submission numbers

043, 056, 057, 058, 103, 369

Summary of issues

The following submissions supported the Bangalow interchange.

- > Support for Bangalow southern exit (043)
- > A full interchange would better service the community than two half interchanges. (056, 057, 058, 103, 369)

Response

The existing topography would not allow north facing ramps to be constructed without considerable earthworks and environmental impacts. A half-interchange at Bangalow is therefore regarded as the optimum solution.

2.6.5 Ivy Lane interchange

Opposition to Ivy Lane interchange

Submission numbers

001, 016, 017, 018, 019, 020, 021, 025, 026, 027, 028, 029, 030, 031, 032, 035, 038, 039, 041, 043, 044, 047, 048, 049, 050, 051, 052, 053, 054, 055, 056, 057, 058, 059, 060, 061, 062, 063, 064, 065, 066, 067, 069, 070, 071, 072, 073, 074, 075, 076, 077, 078, 079, 083, 084, 085, 086, 087, 088, 089, 090, 091, 092, 093, 094, 095, 099, 100, 101, 102, 103, 104, 105, 106, 108, 109, 110, 111, 112, 113, 114, 117, 120, 126, 127, 130, 131, 133, 134, 135, 136, 137, 138, 139, 141, 142, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 157, 165, 166, 168, 170, 171, 175, 176, 177, 178, 180, 186, 187, 189, 191, 192, 194, 195, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 250, 251, 252, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 270, 272, 273, 275, 276, 277, 280, 281, 282, 283, 284, 285, 286, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 318, 319, 321, 328, 329, 330, 331, 333, 335, 336, 337, 338, 340, 343, 347, 348, 349 - Byron Shire Council, 354, 355, 358, 369, 370, 371, 374, 377, 378, 381, 384

Summary of issues

A total of 260 submissions were received stating their opposition to the proposed Ivy Lane interchange.

- > Concern over increased traffic on local roads
- > Concern over potential increased noise impacts.
- > Concern over visual and light spill impacts.
- > Questioning of the justification of the interchange in light of the projected level of use.

Response

After further detailed consideration, the RTA has determined that the Ivy Lane interchange be removed from the proposed upgrade. The removal of the interchange is discussed in detail in Section 4.1 as part of the preferred project report.

Support for Ivy Lane interchange**Submission numbers**

179

Summary of issues

The following submission supported the Ivy Lane interchange and requested it be upgraded to a full interchange.

- > We support the Ivy Lane exit as an essential part of the overall plan but note that it is only a half exit. We would like to repeat our call for this exit to be made both a north and south facing exit.

Response

The RTA has determined that the Ivy Lane interchange be removed from the proposed upgrade. The removal of the interchange is discussed in detail in Section 4.1 as part of the preferred project report.

2.6.6 Ross Lane interchange**Submission numbers**

045, 094

Summary of issues

The following submissions were received regarding the Ross Lane interchange.

- > Support for interchange, but concern about southbound off ramp as it meets the existing highway at a t-intersection, a roundabout would be safer. (094)
- > Directly affected by the new layout. Southbound off-ramp will meet the existing highway at a t-intersection at the front of the property. This will create issues with noise and lights in particular, plus there will be increasing levels of traffic with growth in surrounding areas. Request that the exit be re-aligned 250m further south where there are no residents. (045)
- > If the exit is not re-aligned, what measures can be expected to mitigate the expected impacts (noise and light)? (045)

Response

The details of the intersection would need to be further developed in the detail design phase. The geometric constraints of the site (eg sight lines, sight distances, approach speeds etc) would be reviewed and the appropriate intersection detail developed to meet conformance. Depending on the outcome this may be a T intersection with appropriate provision of turning facilities or a roundabout. Sufficient land and space is available for the development of either treatment.

The detailed design would address the issues of lighting and noise monitoring would occur during operation to determine actual noise levels.

2.6.7 Ewingsdale interchange

Function of Ewingsdale interchange

Submission numbers

047, 050, 051, 052, 053, 054, 060, 061, 062, 063, 064, 065, 066, 067, 083, 084, 085, 086, 087, 088, 090, 091, 092, 093, 095, 097, 100, 108, 109, 110, 111, 113, 130, 131, 133, 134, 141, 142, 145, 146, 147, 150, 155, 157, 165, 166, 168, 170, 171, 191, 195, 198, 200, 203, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 276, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 301, 305, 306, 308, 309, 310, 311, 312, 314, 318, 319, 320, 321, 346, 348, 361

Summary of issues

The following submissions were received in relation to the function of the Ewingsdale interchange

- > Ewingsdale intersection should be re-engineered so heavy commercial through traffic is not permitted on St Helena Hill, Granuaille Road and Bangalow / Lismore Road. (047, 050, 051, 052, 053, 054, 060, 061, 062, 063, 064, 065, 066, 067, 083, 084, 085, 086, 087, 088, 090, 091, 092, 093, 095, 097, 100, 108, 109, 110, 111, 113, 130, 131, 133, 134, 141, 142, 145, 146, 147, 150, 155, 157, 165, 166, 168, 170, 171, 191, 195, 198, 200, 203, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 223, 224, 225, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 276, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 301, 305, 306, 308, 309, 310, 311, 312, 314, 318, 319, 320, 321, 348)
- > Intersection should be redesigned to ensure that heavy commercial through traffic is not permitted on Granuaille Rd and the Bangalow-Lismore Rd. This should be re-enforced with weight limits and speed restrictions. (361)

Response

To achieve all the functional requirements for the road network in this location it is not appropriate to reduce the extent of the proposed changes to the Ewingsdale interchange.

The existing Pacific Highway would be retained to provide motorists with an alternative route to the proposed upgrade and would be a public road. This means that all vehicles, other than restricted access vehicles would be permitted to travel on the existing highway. It would not be accessible by the 25m B-double vehicles, although 19m B-doubles would be permitted. Where the existing highway is handed over to Councils, it would be the decision of the Council in question (in consultation with the RTA) as to its overall role and function.

Between the Bangalow interchange and Ewingsdale interchange the B-double status for the existing highway would need to be retained. This would be needed to cater for any dangerous goods B-doubles that would not be permitted to travel through the tunnel and for all B-doubles when the tunnel is closed.

Impact of Ewingsdale interchange

Submission numbers

023, 115, 281, 362

Summary of issues

The following submissions raised concerns regarding the impact of the proposed modifications to the Ewingsdale interchange

- > Against changes to the interchange at Ewingsdale-object to lack of consideration, loss of privacy, peace, quality of lifestyle, negative impacts on property value. (115)
- > It is stated that the interchange was constructed in 1995. The current Ewingsdale interchange was opened in September 2000 after about 3 years of planning and construction. Doubtless the interchange no longer complies with current design standards but the comparative base of 1995 should not be used. (281)
- > Looks too complicated, will be prone to traffic chaos when large volumes of traffic are trying to access Byron Bay. (023)
- > Not in favour of enlargement as there are already problems with congestion during holiday periods. (362)

Response

During the preparation of the concept design, modifications to the Ewingsdale interchange were proposed to enable connections between the existing highway and the proposed upgrade, and to address issues associated with the readability of the existing layout. The proposed layout is a result of efficient adaptation of the existing interchange and the best balance between providing good traffic capacity while requiring a lesser land take than other typical intersection options.

The statement in working paper 6 that the Ewingsdale interchange opened in 1995 is incorrect. The correct opening date is September 2000 as identified in submission 281.

The modified Ewingsdale interchange has been designed to meet current design standards. As identified in working paper 6, it is anticipated that it would operate at a level of service 'C' 20 years after opening. Existing and projected congestion east of the interchange is primarily due to the limitations of Ewingsdale Road. Enlargement of the interchange is not expected to increase congestion.

Mitigation measures that are proposed to mitigate amenity impacts from the proposed upgrade and the interchange include: general landscape treatments, the provision of a landscaped mound between Ewingsdale and the proposed upgrade.

2.6.8 Bridges and culverts

Submission numbers

350 - Department of Environment and Climate Change NSW

Summary of issues

The following submission concerned the design of bridges and culverts.

- > Design of culverts, bridges and associated scour protection should be in accordance with relevant NSW Government agency guidelines and any advice received from the Department of Environment and Climate Change with respect to fauna. (350 - Department of Environment and Climate Change NSW)
- > A minimal and adaptive approach should be taken to the design of scour protection in a similar manner to that being increasingly used on other Pacific Highway Upgrade projects. (350 - Department of Environment and Climate Change NSW)

Response

The RTA agrees with DECC's comment regarding relevant guidelines and welcomes any DECC input regarding the facilitation of fauna movement.

The RTA would continue its current practice in adopting a minimal and adaptive approach to scour protection, with a view to maintaining ecological and aesthetic values of creek banks.

2.6.9 Existing highway

Submission numbers

373 - Ballina Shire Council

Summary of issues

The following submission concerned the function of the existing highway.

- > It is important for the existing highway to be maintained in a form that allows motorists to use it contiguously as an alternative to the proposed upgrade. (373 - Ballina Shire Council)

Response

The existing Pacific Highway would function as a contiguous road and as an alternative to the proposed upgrade.

2.6.10 Cyclists

Submission numbers

281, 368

Summary of issues

The following submissions raised issues associated with bicycle access to the proposed upgrade.

- > The gradients of the existing highway along with its general design do not support use by cyclists now or in the future after the proposed upgrade becomes operational. It is short-sighted to design the new upgrade so as not to permit safe use by cyclists. (281)
- > The upgrade should provide integrated safe bike routes along the entire length. (368)
- > Bike routes should be provided along the full length of the “local road” (existing Pacific Highway) where car lanes should be cut back to one lane each direction with two properly marked and paved shoulders for bicycle use. Maximum speed limit should be 80km/hr and works should be done as part of RTA hand over to Ballina and Byron councils. (368)
- > New road being built at the end of Plantation Drive should be extended north and south to provide a low traffic, relatively safe and scenic bike route. This could be utilised as a service road during construction of the new highway and as emergency access to the tunnel. The extension would allow connection via a low traffic route for Ewingsdale residents to the Ewingsdale Hall and Church. Currently the only access is via the heavily trafficked and dangerous Ewingsdale Road. (368)

Response

While there is no specific cycle provisions, and noting that there are alternative and safer cycle routes available, the 2.5m shoulders of the proposed upgrade would accommodate cyclists. However, southbound cyclists would not be permitted in the St Helena tunnel due to the narrower shoulder that is proposed.

Cyclists would have two main north-south routes in the area. The existing NSW Coastline Cycleway runs between Ballina and Byron via Lennox Head and Broken Head. The existing Pacific Highway, which would become a local access road would also serve as a cycle route. Any hand over of the existing highway to local government would include an assessment of cycling amenity.

2.6.11 Tunnel design

Submission number

376

Summary of issues

The following submission raised issues associated with the design of the proposed St Helena tunnel.

- > Support a review of the tunnel depth as suggested in Working Paper 11 – Urban design, landscape and visual assessment. Oppose hard engineering stabilisation of the cutting faces, in particular shotcrete, as this would not blend into the surrounding landscape. (376)

Response

It is agreed that the design of tunnel portals is an important aesthetic issue. The detailed design of the portals would need to respond to the urban and landscape design strategic concept discussed in section 18.4 of the environmental assessment. The slope, form and surface treatment of the cut faces around the portals is of particular importance.

The tunnel depth has been carefully evaluated through the concept design and environmental assessment. The proposed depth is seen as the optimum balance between value for money and environmental impacts.

2.6.12 Truck stop

Submission number

006

Summary of issues

The following submission was concerned with a possible truck stop adjacent to their property

- > Assume that the resumed area in front of their property will be utilised as a truck parking area as the road does not actually traverse this area. This would result in unacceptable noise outside their bedroom. (006)

Response

No truck stops, rest areas or service centres are proposed for the upgrade of the Pacific Highway between Tintenbar and Ewingsdale. Truck stops are located further to the north (at Yelgun) and to the south (at Ballina). Service centres are proposed at Ballina and Chinderah in accordance with the Department of Planning's *Far North Coast Regional Strategy*.

2.6.13 Service relocations

Submission numbers

029, 316 - Rous Water

Summary of issues

The following submission was concerned with the relocation of services due to the proposed upgrade.

- > No provision of RTA plans for the relocation of services (029)
- > The environmental assessment does not adequately assess the utility relocation activities that need to be undertaken. Rous Water's experience with the Brunswick to Yelgun section of the Pacific Highway upgrade is that utility relocation was not adequately considered. (316 - Rous Water)
- > Any corridors created for utilities should be of sufficient dimension to cater for augmentation of the utilities if the utility provider identifies that there is a future need to upgrade the service. (316 - Rous Water)
- > RTA should be required to consult with utility providers and identify utility corridors in the detailed design for the highway that allow for current and future utility services. (316 - Rous Water)

Response

Likely service relocation are identified in section 5.14 of the environmental assessment. The precise details for service relocations would be determined at the detailed design phase.

The level of assessment in the environmental assessment is appropriate for this stage of the project. The RTA agrees that service relocations should be appropriately considered in the design of the upgrade and state in the environmental assessment that the location and method of relocation would be identified during detailed design, in consultation with the relevant service provider(s).

The Tintenbar to Ewingsdale project is not the same as the Brunswick Heads to Yelgun project. It consists of a highway upgrade mostly in new corridor with a lower level of conflict with existing services. Also the RTA would endeavour to undertake service relocations pre-construction in order to avoid issues that may arise due to construction time pressures.

The concept design has considered the location of existing service infrastructure and the potential need for any diversion works. Specific details of relocation works would be developed as part of the detail design. The relocation works would form part of either the pre-construction works or construction works. Accordingly the RTA as the project proponent would be responsible for management of any potential impacts associated with the services relocation.

It is anticipated that the relocation works would be within the area considered as part of the environmental assessment and as such would be subject to the construction environmental management plan for the project. If the relocation works include a 'major diversion' then a separate environmental impact assessment for that diversion would be required. The RTA would be responsible for the preparation and determination of the assessment.

Should the owner of services impacted by the proposed upgrade wish to use the relocation works as an opportunity to undertake additional improvement works to their asset or provide sufficient service corridors for future augmentation then the RTA would expect the service authority to discuss any such requirement during the development of the detail design. Agreement to undertake the additional betterment work and appropriate contributions to the additional cost would be subject to negotiation between the RTA and the concerned service authority.

Rous Water in its subsequent comments (dated 3 February 2009) stated that the RTA had now addressed these issues adequately.

2.6.14 Land acquisition

Submission numbers

118, 123

Summary of issues

The following submissions were concerned with land acquisition

- > More attention paid to the remuneration for social upheaval and relocation. Land acquisition costs small part (3%) of total, compensation over and above market should be made taking into account cost of relocation. (118)
- > Want land acquisition and construction phases to proceed quickly so can effectively make decisions regarding property investments (inc. residential, agricultural and farming) which have been on hold. Residents who need to re-locate or develop new residence on their property should be assisted by financial compensation and streamline planning process that will provide special dispensation from local council. (123)

Response

The RTA is committed to proceeding with programmed acquisition as soon as possible after project approval in accordance with the RTA land acquisition policy.

As identified in Appendix B of volume I of the environmental assessment, programmed acquisition may also include costs such as:

- > Reasonable legal costs including conveyancing.
- > Reasonable valuation fees.
- > Reasonable relocation expenses including stamp duty costs in connection with the purchase of another property of equal value.
- > Mortgage costs and other payments.
- > Solatium, which is an amount of money to compensate the owner for the inconvenience of having to move residence.

Any new developments would be subject to meeting the relevant environmental planning instruments that apply to the land at the time of development.

2.6.15 Water use

Submission numbers

350 - Department of Environment and Climate Change NSW

Summary of issues

The following submission was concerned with the management of water use during construction.

- > There does not appear to have been any assessment undertaken on the ability of the town water supply to meet the project needs or what the alternative reclaimed sources are, where they are located in relation to the project and their capability to meet the projects water demands.
- > Water sources need to be matched to real needs to best manage water use during construction. It is recommended that the Statement of Commitments (SoC) include the commitment to provide a “Water Use and Re-Use” sub-plan as part of the Construction Environmental Management Plan. (350 - Department of Environment and Climate Change NSW)

Response

In the interests of water conservation and to allow for drought, it is proposed that reclaimed water be used where reasonable and feasible. The major potential source of reclaimed water would be the water quality basins, however other sources may be considered such as collection from roofs of construction sheds or sewer mining (removal and treatment of sewage from existing mains). Experience gained from the Ballina bypass project suggests that the water consumption associated with construction of the proposed upgrade largely be accommodated from reuse of water from water quality basins (with minor supplementation from the town water supply).

DECC's comment regarding specifying appropriate water quality parameters for batching plants rather than a specific source is noted and is considered reasonable.

While the precise structure of the Construction Environmental Management Plan has not yet been determined, the RTA would include a provision for appropriate consideration of water use and reuse.

2.6.16 Ancillary construction facilities

Submission numbers

350 - Department of Environment and Climate Change NSW

Summary of issues

The following submission was concerned with the location of ancillary construction facilities.

- > More clarification of the conservation significance siting criteria for ancillary construction facilities, is needed. 350 - Department of Environment and Climate Change NSW

Response

Assigning a single tick (desirable characteristic) for the low conservation significance criterion (Table 6.12 of the environmental assessment) is intended to allow for site specific management responses that may result in a neutral or potentially beneficial net conservation outcome.

2.7 Hydrology

Submission number

063, 360

Summary of issues

The following submissions were concerned the upgraded highway may increase the risk of regional flooding.

- > Concern about increased flooding in Bangalow. (063)
- > Proposal risks increasing the magnitude and frequency of flood events. The addition of large scale impervious surfaces will lead to changes in hydrological pathways, resulting in: increased flow volumes, higher peak runoff rates, reduced groundwater re-charge, increased hydraulic load and velocity at discharge points with the potential to alter habitat structure in receiving waterways. What design measures will be adopted to mitigate the increased flood risk? (360)

Response

As identified in section 9.5 of the environmental assessment, hydrologic modelling undertaken for the proposed upgrade suggests there would be no hydrologic changes that impact on existing receivers, infrastructure or development potential of land. Bridge abutments on both sides of Byron Creek would be located in a way that minimises increases in flood levels during flood levels. Bridge design would also aim to minimise change to inundation periods and flow velocities.

A number of performance requirements are identified in the environmental assessment to ensure that flooding is not exacerbated by the proposed upgrade. These performance requirements would be carried through to the detailed design and construction phases.

2.8 Water quality

2.8.1 Assessment approach

Impact on drinking water catchment

Submission number

005, 117, 175, 176, 177, 178, 180, 193, 222, 346

Summary of issues

The following submissions were concerned that the proposed upgrade passes through a protected water catchment

- > In order to provide the appropriate safe level required for drinking water rerouting of the highway to Route Option D is the only safe alternative and this course of action is required. (175, 176, 177, 178, 180, 222)
- > The RTA ignored that the primary land use in the Emigrant Creek dam catchment is to harvest water and store water (193)
- > The value management workshop did not consider the impact on drinking water quality as a major factor in route selection. (346)
- > Drinking water source not given high constraint value during development of this project. Dam was given a no go constraint, so should the catchment. (117)
- > Construction or extension of major highways is prohibited through defined water catchment zones in developed countries. (005)
- > Expected water shortages caused by global warming mean that our catchments and dams should be given absolute protection. To introduce even the slightest possible chance of a mishap is in nobody's interest. (005)

Response

As part of the environmental assessment process, detailed assessment has been undertaken regarding the potential impact of the highway upgrade on the Emigrant Creek dam catchment. The results of the modelling suggest that there would be a general improvement in water quality in Emigrant Creek dam after the opening of the proposed upgrade due to the water quality controls that would be put in place. Comparison of pre-development and post-development annual pollutant loads for the Emigrant Creek dam catchment indicates that proposed water quality control measures would result in reduced loads in respect of total suspended solids, total phosphorus and total nitrogen.

As demonstrated in the environmental assessment and working paper 2, upgrading the highway would significantly reduce the risk of an incident in the Emigrant Creek catchment. The likelihood of an incident involving a pollutant spill for the upgraded highway is 1 in 293 years (down from 1 in 63 years for the existing highway). The upgraded highway would have spill containment devices that would further reduce the risk of a spill entering the creek system to greater than 1 in 440 years (the likelihood varies depending on the type of pollutant and the climatic conditions). The potential for a spill to actually enter the water supply system is further reduced by the ability to shut down the water treatment plant at relatively short notice. This shut down capability is inherent in the plant function to mitigate water quality risks that are present from a variety of activities that occur in the catchment.

The relative impact (positive and negative) of each of the potential route options was assessed using a multi-criteria analysis technique. This incorporated both qualitative and quantitative measures of the impacts of each route and the assessment criteria encompassed functional, social, economic, and environmental and heritage factors.

The evaluation of criteria for issues relating to drinking water quality included:

- > Length of route through Emigrant Creek drinking water catchment.
- > Length of route through "The Lismore Source" drinking water catchment.
- > Length of route within 40m of Emigrant Creek.
- > Proximity to Emigrant Creek Dam.

The route option assessment work clearly details that the reservoir and dam is regarded as 'critical infrastructure' and the assessment process reflects this constraint status. The drinking water catchment area is subject to a variety of different land-uses that potentially affect water quality. Based on the level of risk to water quality in the catchment that has been identified in other studies it was not considered appropriate to preclude options in this area.

The RTA adopted a balanced route selection process, where potential impacts on drinking water quality were seen as important (but one of many) factors that need to be considered in identifying route options and a preferred route. A more detailed response regarding option D is provided in section 2.3.5 of this submission report.

Water quality impacts from changes in local hydrology and groundwater

Submission number

316 - Rous Water

Summary of issues

The following submissions are concerned with the assessment of the impacts of changes to local hydrology and groundwater as a result of the proposed upgrade.

- > The environmental assessment does not provide any assessment of the impacts associated with increased flow rate and velocity of surface water runoff; concentration of flows and changes in flow regimes due to diversions. (316 - Rous Water)
- > No indication has been provided regarding the likely magnitude of the increase in flow velocities and the associated water quality and ecological impacts. (316 - Rous Water)
- > No quantitative information is provided regarding the changes in flows and flow velocities for each catchment. Increased rates of runoff have a range of impacts due to increased number and magnitude of high flow pulses including: stream bed disturbance; in stream bank erosion; and more frequent disturbance to stream invertebrate and fish communities. (316 - Rous Water)
- > No consideration has been given to the potential increase in peak and total surface water flows being discharged to receiving waters caused by the interception of groundwater flows. This could affect aquatic life and downstream landowners. Quantitative estimates should be provided for these impacts. (316 - Rous Water)
- > The environmental assessment failed to provide meaningful analysis of the hydrological impacts on local waterways and aquatic ecology. (316 - Rous Water)

Response

The environmental assessment refers to potential impacts rather than actual predicted impacts. An outcomes based approach is then documented in:

- > Section 7.3 of working paper I which identifies four performance requirements that would be applied to the detailed design of culverts to manage velocities and prevent scour.
- > Performance requirements for bridges are also provided in Section 5.4.1 of the environmental assessment.

- > Section 11.4 of the environmental assessment which identifies that the detailed design of upgrade would aim to minimise any impact on the groundwater flow regime by ensuring that flow paths are maintained without interruption.

The detailed design for the project would be developed to meet these requirements. In meeting these performance requirements, the hydrological impacts of the proposed upgrade would be mitigated to an appropriate level.

All designed operational basins would have a stormwater detention function. Increased flow rates and velocity of surface runoff will be taken into account in the detailed design to manage and mitigate impacts.

Water quality and aquatic ecological impacts of the proposed upgrade are discussed in chapters 10 and 12 of the environmental assessment, and in working papers 2 and 5 respectively. Absence of discussion regarding the impacts of high flow pulses is due to the requirement for the detailed design of the proposed upgrade to avoid such impacts.

The RTA would establish an environmental review group (or similar) for the implementation phase of the project. The formation of the group would allow the RTA to involve key government agencies to periodically review and comment on the development of the detailed design and emerging construction issues. The RTA proposes to invite Rous Water to participate in this group to ensure they have the opportunity to comment on issues, such as those identified above, during the development of the detailed design and during construction.

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that the issues raised can be resolved by the RTA utilising appropriate performance criteria and giving greater consideration to downstream impacts during detailed design. This is consistent with the RTA's response described above.

Water quality treatment measures in Wilsons River catchment

Submission number

316 - Rous Water

Summary of issues

The following submission relates to the proposed level of treatment for the Wilsons River catchment.

- > The approach to managing water quality impacts in Wilsons River catchment does not consider the multiple barrier approach adopted by Rous Water to protect the water supply. No barrier is considered to be more significant than any other. (316 - Rous Water)
- > Rous Water accepts that due to the reduced water quality risk associated with the proposed upgrade within the Wilsons River catchment the mitigation measures adopted may not be as substantive as that required within the Emigrant Creek catchment. (316 - Rous Water)
- > Rous Water considers that there remains a critical need to ensure the protection of catchment ecology within the Wilsons River catchment. (316 - Rous Water)
- > Key waterways and sensitive receiving (aquatic) environments should receive a similar level of protection to the Emigrant Creek catchment. (316 - Rous Water)

Response

The RTA considers that a sound approach has been developed for the management of the chronic and acute impacts for both the Emigrant Creek and Wilsons River catchments, based on the level of risk to water quality identified for the respective catchments in Rous Water documents.

Water quality modelling for the Wilsons River catchment has been undertaken since the display of the environmental assessment to demonstrate that the proposed mitigation measures would ensure an overall improvement in water quality compared to the existing situation. Details of the modelling work are provided in Section 3.2 of this report. The proposed approach includes:

- > Undertaking riparian restoration at all appropriate locations within the road reserve (see figures 3.8a to e in this report).
- > Undertaking riparian restoration in land purchased by the RTA but ultimately located outside the road reserve (a key focus area would be Tinderbox Creek, particularly where a long stretch of the creek runs parallel to the eastern side of the highway).
- > The identification of the measures required to achieve a neutral or beneficial effect. Monitoring would be undertaken to evaluate the effectiveness of treatment devices.

Working paper 2 noted in section 8.2.2 that within the Wilsons River catchment 100% of the road pavement would receive treatment in the proposed water quality ponds during operation of the road and 93 per cent of the associated earthworks would receive treatment during operation. Seven per cent of the total footprint, comprised of some hard to capture batter slopes, would not receive treatment in the proposed ponds.

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that RTA had now addressed these issues adequately.

Water quality peer review

Submission number

316 - Rous Water

Summary of issues

The following submissions relate to the water quality peer review.

- > Peer review results were not included in the environmental assessment and any changes to the assessment as a result of the peer review were not identified. (316 - Rous Water)

Response

The peer review was an independent evaluation of the approach and methodology used for the assessment of water quality impacts and was one of a number of reviews undertaken in preparing the final water quality assessment and working paper.

The reviewer consulted with Rous Water staff and a copy of the peer review was provided by email to Rous Water on 9 May 2008 to assist in their response to NSW Department of Planning during the adequacy review of the environmental assessment. The RTA has received no feedback from Rous Water regarding the peer review prior to the issue of their submission in respect of the environmental assessment.

Rous Water in its subsequent comments (dated 3 February 2009) stated that the RTA response satisfied most of the issues raised in relation to the peer review, except that it was unable to locate the RTA's justification for not undertaking a wet and dry year analysis, as suggested by the peer review. The reason why Rous Water could not locate this component of working paper 2 is because it was initially referred to (incorrectly) as being in section 9.4.2.1. The justification can be found in section 7.4.3.1 of working paper 2.

Event mean concentrations

Submission number

316 - Rous Water

Summary of issues

The following submissions relate to the event mean concentrations used for the water quality modelling.

- > Event Mean Concentration values should be provided. (316 - Rous Water)

Response

The adopted event mean concentration values were not included in working paper 2 or the environmental assessment. They are provided below:

Total Suspended Solids - Event Mean Concentrations			
Land use	Low (mg/L)	Typical (mg/L)	High (mg/L)
Road – pavement and batters	90	270	800
Agriculture - grazing	40	140	500
Rural - crops	20	90	400

Total Phosphorus - Event Mean Concentrations			
Land use	Low (mg/L)	Typical (mg/L)	High (mg/L)
Road – pavement and batters	0.15	0.5	1.5
Agriculture (grazing)	0.2	0.6	2
Rural (cropping)	0.08	0.22	0.6

Total Nitrogen - Event Mean Concentrations			
Land use	Low (mg/L)	Typical (mg/L)	High (mg/L)
Road – pavement and batters	1	2.2	5
Agriculture (grazing)	1	3	9
Rural (cropping)	0.7	2	5

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that RTA had now addressed this issues adequately.

Water quality impacts at interchanges

Submission number

316 - Rous Water

Summary of issues

The following submissions are concerned with higher pollutant loads arising from surface water run-off at the interchange locations.

- > No indication is provided that the highest pollutant loading at exit locations has been considered in the treatment approach for the proposed upgrade. There needs to be a clear indication that the runoff from all exit points is being captured for treatment in the stormwater collection and treatment system, and that additional capacity is provided at these locations to handle the additional pollutant loadings that will be experienced. (316 - Rous Water)

Response

As stated in section 7.1 of the water quality impact assessment working paper, all carriageway runoff is intercepted prior to discharge into receiving waters. This includes all carriageway surface areas associated with the proposed interchanges. In addition the required land take around the proposed interchanges relating to the associated earthworks provides opportunity for additional areas of vegetation to be established which in turn would assist in mitigating the potential water quality impacts of the proposal.

The pollutant loading levels used in the modelling are assigned based on the specific land uses i.e. road, rural and agricultural land.

The modelling considers the parameters given above and its sensitivity does not warrant applying different loading rates within the specific land uses. Conversely there are significant sections of the proposed upgrade where the anticipated traffic flow patterns would result in reduced loadings which are not considered by the modelling thereby ensuring that an appropriate level of conservativeness is achieved.

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that RTA had now addressed this issue adequately.

Water quality impacts from airborne pollution

Submission number

299, 316 - Rous Water

Summary of issues

The following submissions question the validity of the assessment of the potential impact of airborne pollution on water quality.

- > The statement in the environmental assessment that there would be no deterioration in drinking water as a result of airborne pollution arising from the proposed upgrade is unsubstantiated. (316 - Rous Water)

- > Quantitative information should be provided on the amount of deposition of a range of contaminants on catchment surfaces and the loadings from airborne sources compared to loadings from road runoff. Information should be provided regarding what pollutants are transported via airborne pathways, their settlement patterns, loadings and fate, as well as any cumulative impacts on surface water quality that could arise. (316 - Rous Water)
- > The proposed upgrade travels across the drinking water catchment in close proximity to the storage dam and water courses. The prevailing coastal winds are from the east releasing airborne pollution deposits on the western side of the upgrade where the storage dam and confluence of watercourses are present. At some point in time these deposits will find their way into the water. (299)

Response

The RTA does not consider that further assessment of this issue is warranted or justified.

The air quality assessment for the proposed upgrade demonstrates that the air quality impacts resulting from the proposed upgrade would be less than the DECC Impact Assessment Criteria, which have been developed to help protect human health. It is identified in section 4.4 of working paper 2 that the proposed upgrade is predicted to result in no deterioration in air quality and hence, there would be no deterioration in drinking water quality as a result of airborne pollution from the proposed upgrade.

The maximum predicted concentration of pollutants from vehicle emissions occur at the kerbside and decline with distance from the road. The fate of airborne pollutants settling within and adjacent to the roadside form a part of the event mean concentrations that have been used in the modelling that has been undertaken to assess the impact of the upgrade on water quality.

Rous Water conducted its own catchment risk assessment that did not identify airborne pollutants from the Pacific Highway as a significant risk to water quality. The RTA concurs with this finding and considers that further attempts to investigate and quantify the potential impacts of airborne pollutants on water quality are unwarranted.

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that RTA had now adequately addressed issues it raised in relation to water quality impacts from airborne pollution.

Rous Water policy No.11.14

Submission number

316 - Rous Water

Summary of issues

The following submissions relate to Rous Water Policy No. 11.14.

- > Rous Water Policy No. 11.14 has not been considered in the environmental assessment and associated working papers. (316 - Rous Water)
- > Rous Water requests that the RTA be required to undertake analysis as stated in Rous Water policy so that a satisfactory outcome can be demonstrated. (316 - Rous Water)

Response

Rous Water's policy, along with the outcomes of all Rous Water representations, has been considered in the preparation of the working paper 2 and the environmental assessment. The RTA priority has been to prepare structured documents to clearly communicate the outcomes of the assessment, rather than structuring documents around individual external policies.

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that RTA had now addressed this issue adequately.

Water quality impacts

Submission number

047, 050, 051, 052, 053, 054, 060, 061, 062, 063, 064, 065, 066, 067, 083, 084, 085, 086, 087, 088, 090, 091, 092, 093, 095, 097, 100, 108, 109, 110, 111, 113, 123, 130, 131, 133, 134, 141, 142, 145, 146, 147, 150, 155, 157, 165, 166, 168, 170, 171, 175, 176, 177, 178, 180, 189, 191, 195, 198, 200, 203, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 248, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 276, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 301, 305, 306, 308, 309, 310, 311, 312, 314, 318, 319, 320, 321, 348, 376

Summary of issues

The following submissions stated the need to manage the upgrade to reduce the impact on water quality.

- > Would like assurances that sediment from the rock crushing plant is monitored considering the vicinity of local watercourses. (376)
- > Steps should be taken to reduce the impact on town water sources, Byron Creek and Wilson River. (287)
- > Steps should be taken to reduce the risks to Emigrant Creek and Byron Creek water quality. (305, 301, 200, 276, 248)
- > Steps taken to reduce environmental impact esp. Emigrant Creek, Byron Creek, rural property water courses and diesel particle pollution. (123, 175, 176, 177, 178, 180)
- > Steps should be taken to reduce the risks to water quality. (47, 50, 51, 52, 53, 54, 60, 61, 62, 63, 64, 65, 66, 67, 83, 84, 85, 86, 87, 88, 90, 91, 92, 93, 95, 97, 100, 108, 109, 110, 111, 113, 130, 131, 133, 134, 141, 142, 145, 146, 147, 150, 155, 157, 165, 166, 168, 170, 171, 189, 191, 195, 198, 201, 203, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 286, 288, 289, 290, 291, 292, 293, 294, 295, 306, 308, 309, 310, 311, 312, 314, 318, 319, 320, 321, 348)

Response

The RTA assessment approach has been based on ensuring that the pollutant loads that arise after development are lower than the current pre-development loads entering the catchment to ensure that a higher level of catchment and ecosystem protection would ensue. Therefore the risks and impacts to water quality will be lower than the current situation.

The water quality management measures that are proposed during construction are identified in section 10.10.1 of the environmental assessment. These would include: best practice soil and water management would be put in place, including for ancillary construction facilities such as rock crushing plants.

The RTA has demonstrated that acute and chronic pollution loads would be lower when considering a future scenario of both the existing and proposed highway against the existing highway scenario. Further, the RTA has demonstrated that the proposed treatments and measures are consistent with best practice approaches.

Section 3.2 of this report provides details on the additional modelling work that has been undertaken for the Wilsons River catchment. This demonstrates that the pollutant loads that arise after development are lower than the current pre-development loads entering the catchment.

2.8.2 Consultation

Consultation with Rous Water

Submission number

316 - Rous Water

Summary of issues

The following submissions relate to the effectiveness of consultation with Rous Water during the development of the proposed upgrade.

- > There was a large level of involvement of Rous Water in the environmental assessment process including numerous meetings between the RTA and Rous Water. However the effectiveness of this level of consultation is questionable and the responsiveness to the issues raised inadequate. There remain many outstanding concerns, which have been raised in the past. (316 - Rous Water)
- > Many of the meetings were held at relatively short notice and there was limited opportunity to workshop issues. (316 - Rous Water)
- > No formal response provided to concerns identified by Rous Water. (316 - Rous Water)

Response

Table 4.1 of Volume 1 of the environmental assessment provides a summary of the consultation with Rous Water. This information is supplemented by in section 3.3 of working paper 2 which provides details of the key meetings and workshops arising from the consultation process.

Considerable effort has been made to consult with Rous Water over the course of the project. The outcomes of meetings have been recorded and agreed actions have been acted on in good faith.

The level of detail in the consultation summary in working paper 2 is considered appropriate. The outcomes of all those sessions are presented in the environmental assessment, which presents the RTA's assessment of the potential impacts and the proposed mitigation measures.

The RTA has continued to consult with Rous Water following the display of the environmental assessment and has reached an understanding on the majority of the issues raised.

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that RTA had now addressed this issue adequately.

Invitation to planning focus meeting 1

Submission number

316 - Rous Water

Summary of issues

The following submission relates to the involvement of Rous Water in planning focus meeting 1.

- > Rous Water was not invited to attend Planning Focus Meeting No. 1, and did not decline any invitation. This is an incorrect statement and should be modified. (316 - Rous Water)

Response

An invitation to attend the Planning Focus Meeting No. 1 (held in Ballina on 16 November 2004) was sent to Rous Water by mail on 27 October 2004. It was addressed to Phil Silver (the then chairman) at the Lismore offices of Rous Water. The RTA did not receive a response from Rous Water and no representative attended the first planning focus meeting.

Regarding the statement in working paper 2, it would have been more appropriate to use the words that were used in section 10.6.2 of the environmental assessment, which state: "As a key stakeholder to the project Rous Water were invited to attend all of these workshop sessions. Representatives of Rous Water did not attend the first planning focus meeting however representatives attended all of the four subsequent workshop sessions."

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that RTA had now addressed this issue adequately.

Documentation of consultation with Rous Water

Submission number

316 - Rous Water

Summary of issues

The following submissions relate to the level of detail in documenting Rous Water issues raised during development of the proposed upgrade.

- > Rous Water suggest all the issues they have raised and justification of the methodology used to address or ignore them be included in the working paper. (316 - Rous Water)

Response

The level of detail in the consultation summary in Working Paper 2 is considered appropriate for this type of document. It demonstrates the extent to which Rous Water was consulted during the development of the project and the key issues discussed at each session. The outcomes of all those sessions are presented in the environmental assessment, which presents the RTA's assessment of the potential impacts and the proposed mitigation measures. Rous Water is a stakeholder, along with a number of parties with an interest in water quality. Any interested parties have had the opportunity to identify any unaddressed issues in their submission to the environmental assessment.

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that RTA had now addressed this issue adequately.

2.8.3 Water quality guidelines

Consideration of ANZECC Guidelines for Fresh and Marine Water

Submission number

316 - Rous Water, 349 - Byron Shire Council, 350 - Department of Environment and Climate Change NSW, 373 - Ballina Shire Council

Summary of issues

The following submissions relate to the consideration of the ANZECC Guidelines for Fresh and Marine Water in the environmental assessment.

- > The assessment of water quality impacts has not considered the ANZECC Guidelines for Fresh and Marine Water in accordance with the Director-General's requirements of the environmental assessment. (316 - Rous Water)
- > A water quality assessment that considers ANZECC 2000 guidelines is required to ensure that appropriate conditions and discharge limits can be determined for the Environment Protection Licence to ensure that this project does not cause adverse impacts to sensitive receiving environments. To address this issue a comprehensive water quality monitoring program be undertaken in consultation with DECC at least 12 months prior to the commencement of construction. (350 - Department of Environment and Climate Change NSW)
- > The greatest risk to surface waters is during road construction. The measures proposed to monitor and manage pollution from road runoff appear adequate and in accordance with accepted best practise. The RTA must take all reasonable preventative measures to ensure that a failure in the management of environmental protection measures does not permanently damage drinking water supply catchments, riparian zones and natural aquatic ecosystems. (349 - Byron Shire Council)
- > The highway upgrade will provide positive outcomes to water quality as compared to the existing highway and Council encourages the RTA to maximise all efforts to ensure this outcome. (373 - Ballina Shire Council)

Response

The RTA consider that it has demonstrated a sound approach to the management of chronic and acute toxicants and that in doing so they have considered the ANZECC criteria at an appropriate level of detail, consistent with the Director General's environmental assessment Requirements. The approach has been developed for both the Emigrant Creek and Wilsons River catchments, based on the level of risk to water quality identified for the respective catchments in Rous Water documents.

Pollutant loads are assessed in quantitative terms against relevant DECC criteria which the RTA believes are the only practical quantitative criteria to apply to the proposed upgrade.

It is proposed that a comprehensive water quality monitoring program be undertaken in consultation with DECC at least 12 months prior to the commencement of construction.

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that this remains an issue of differing professional judgement between itself and the RTA. The RTA's professional judgement on this issue is represented by the above discussion.

Potential impacts on aquatic ecosystems

Submission number

316 - Rous Water

Summary of issues

The following submission was concerned with the assessment of potential impacts on aquatic ecosystems.

- > Rous Water considers that an ecotoxicological 'approach' could be used as part of the assessment of residual impacts associated with the proposed upgrade. This would provide an understanding of the potential concentrations of a wider range of contaminants in receiving waters for comparison to known ecotoxicological responses for a variety of representative organisms. (316 - Rous Water)
- > The environmental assessment does not address: peak concentrations of a range of contaminants contained in discharge from treatment structures for a range of storm events; physical properties of the contaminants that may impact on removal rates through the proposed treatment structures; variable performance of systems in a range of storm events, including periods of very high intensity rainfall; the acceptability of the likely impacts to aquatic ecosystems; a comprehensive monitoring program aimed at assessing the performance of the treatment structures. (316 - Rous Water)

Response

The RTA assessment approach has been based on ensuring that the pollutant loads that arise after development are lower than the current pre-development loads entering the catchment to ensure that a higher level of catchment and ecosystem protection would ensue.

The assessment documented in working paper 2 and the environmental assessment has gone to considerable effort in identifying contaminants that would be exported from the proposed upgrade. This has been quantified where the RTA is able to undertake effective and comprehensive assessment. The assessment scope and level of detail were increased several times throughout the course of the assessment in response to Rous Water concerns and to the peer review.

The RTA has demonstrated that acute and chronic pollution loads would be lower when considering a future scenario of both the existing and proposed highway against the existing highway scenario. Further, the RTA has demonstrated that the proposed treatments and measures are consistent with best practice approaches and in the sensitive Emigrant Creek dam catchment, modelled water quality is compliant with any of the relevant water quality criteria used in Australia.

The RTA considers that ecotoxicological effects have been considered in an adequate manner. One part of this assessment looked at the risk of acute pollution events and concluded that the future risk of a toxic spill was significantly less than the current situation, and that measures were proposed to intercept spills thereby facilitating their removal and protection of ecosystems from toxicity. Additionally, the fate of pollutants was assessed in relation to a range of climatic scenarios. For chronic toxic pollution, the RTA has proposed interception and treatment measures that would result in far less toxicants reaching ecosystems than is currently the case.

The RTA acknowledges that in the event of an acute pollution incident involving toxicants that escape the treatment measures, that impairment to ecosystem health and the mortality of biota may occur. In a pragmatic sense, knowing exactly what concentrations resulted and the specific effects on individuals or species would and should have no practical influence on the resultant clean-up operations. The risk of such an escape has been assessed and found to be negligible.

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that these remain issues of differing professional judgement between itself and the RTA. The RTA's professional judgement on this issue is represented by the above discussion.

Water quality assessment criteria and application of appropriate water quality guidelines

Submission number

193, 299, 316 - Rous Water, 322, 337, 338, 340, 352

Summary of issues

The following submissions were concerned with the assessment criteria for the protection of ecosystems and the application of appropriate water quality guidelines.

- > The environmental assessment does not establish any criteria or comprehensively assesses whether the protection of ecosystems within receiving waterways is being achieved. (316 - Rous Water)
- > The DECC stormwater quality guidelines do not allow any comment as to whether the protection of ecosystems within receiving waterways has been achieved. (316 - Rous Water)

- > The environmental assessment does not recognize that the protection of ecosystems within receiving waterways is the first barrier, and it provides too much reliance on the Emigrant Creek Water Treatment Plant. (316 - Rous Water)
- > The NSW Department of Environment and Climate Change stormwater quality guidelines provide no guidance to the acceptability or otherwise of the residual impact on the environment. (316 - Rous Water)
- > The RTA has not applied the Australian Drinking Water Guidelines to the Emigrant Creek catchment, rather stormwater guidelines have been applied. (193, 337, 338, 340, 322, 352)
- > The RTA has already demonstrated (during construction of motorway between Brunswick to Yelgun) that they cannot prevent contamination of the waterways. (322)

Response

The RTA consider that they have demonstrated a sound approach to the management of chronic and acute toxicants and that in doing so they have considered the ANZECC criteria at an appropriate level of detail, consistent with the Director General's environmental assessment Requirements. Section 10 of the environmental assessment and working paper 2 demonstrate that there would be a reduction in the pollutant loads entering the Emigrant Creek catchment as a result of the upgrade – refer to Table 10.3 of the environmental assessment for the estimated pollutant load reductions.

The approach has been developed for both the Emigrant Creek and Wilsons River catchments, based on the level of risk to water quality identified for the respective catchments in Rous Water documents.

Water quality modelling for the Wilsons River catchment has been undertaken since the display of the environmental assessment to demonstrate that the proposed mitigation measures would ensure an overall improvement in water quality compared to the existing situation. Details of the modelling work are provided in Section 3.2 of this report.

Pollutant loads for the Emigrant Creek dam catchment are assessed in quantitative terms against relevant DECC criteria which the RTA considers are the only practical quantitative criteria to apply to the proposed upgrade.

The discussion in section 5.3 of working paper 2 relating to the Australian Drinking Water Guidelines was not intended to evaluate the magnitude of residual environmental impacts. The discussion evaluated the proposed upgrade's level of consistency with the guiding principles of the guidelines. The RTA assessment approach has been based on ensuring that the pollutant loads that arise after development are lower than the current pre-development loads entering the catchment to ensure that a higher level of catchment and ecosystem protection would ensue.

The assessment appropriately considers the protection of ecosystems in receiving waterways. The assessment of water quality impacts is focused primarily on the management and mitigation of potential impacts to the receiving waterways. The assessment supports the notion of ecosystems constituting a barrier in a water supply context however in conducting an assessment of potential human health risks (i.e. pollutants that can get into consumer's taps) it is necessary to consider other barriers including those provided by the water treatment plant.

It was not the RTA's intention to downplay the role of ecosystems in relation to a multiple barrier approach. Indeed the RTA plans to develop and implement treatment measures that would act as an additional barrier to the ecosystems in question. This is a barrier that does not exist today and to that end the construction of an additional barrier must be viewed as an enhancement in this catchment.

The RTA has also committed to extensive roadside landscape treatments, and riparian restoration within the road corridor and on riparian land outside the road corridor that is acquired by the RTA. This would add to the existing ecosystem barrier system.

In terms of the acceptability of residual impacts, the proposed upgrade would result in an improvement in water quality and associated ecological values when compared to the existing situation.

RTA takes water quality impact seriously and would implement best management practices to avoid where possible water quality impacts. It is not appropriate to compare one project (such as Yelgun to Chinderah) against another as each site has unique constraints and challenges. The management measures outlined in sections 5.10.2 and 10.10 of the environmental assessment and in the statement of commitments (chapter 5 of this report) would ensure impacts to water quality would be kept to minimum. The RTA would also undertake in-stream water quality monitoring during construction to assess the effectiveness of the controls implemented.

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that these remain issues of differing professional judgement between itself and the RTA. The RTA's professional judgement on this issue is represented by the above discussion.

2.8.4 Catchment zoning

Submission number

299, 363

Summary of issues

The following submissions questioned the validity of the proposed upgrade in terms of the catchment zoning.

- > Emigrant Creek Water Catchment is not simply a 'sensitive' catchment as described by the RTA when discussing its stormwater mitigation processes for the catchment. It is an Environment Protected Water Catchment under the Ballina LEP Zone 7(c) and as such is a gazetted NSW Government regulation. The Zone 7(c) with its prime objective of harvesting and storing water, embodies regulations that provide for it to be protected from pollution-generating developments, a description which aptly describes a 6 lane motorway development proposal. A Senior Counsel opinion (attachment 1) confirms unequivocally that the prime objective of Zone 7(c) is to harvest and store drinking water. It should have been given critical infrastructure and high constraint status (as was the dam and reservoir) when the RTA undertook its constraints assessment for the upgrade alignment. It was not. (299, 363)

Response

Section 75R(3) of the EP&A Act provides that environmental planning instruments (such as the Ballina Local Environmental Plan 1987 (Ballina LEP)) will not apply to the proposed upgrade, once approved. However, section 75J(3) provides that in deciding whether or not to approve the proposed upgrade, the Minister for Planning may (but is not required to) take into account the provisions of an environmental planning instrument that would not (because of section 75R) apply to the proposed upgrade if approved. Furthermore, as the proposed upgrade is a "critical infrastructure project", there is no capacity for a regulation under the Environmental Planning and Assessment Regulation 2000 which would preclude the approval of proposed upgrade if it were prohibited under the Ballina LEP (section 75J(3)).

Notwithstanding, the RTA has considered the Ballina Local Environment Plan 1987 (Ballina LEP) in both the route selection and environmental assessment phases of the proposed upgrade and maintains that the proposed upgrade is entirely consistent with its provisions.

The above submissions only partially discuss the (Ballina LEP) Zone 7(c) objectives (though the legal opinion attached to the submission does discuss the remaining objectives).

The RTA is of the view that the proposed upgrade clearly complies with the objectives of the zone.

The objectives of Zone No. 7(c) – Environmental Protection (Water Catchment) Zone are:

A. The primary objective is to prevent development which would adversely affect the quantity or quality of the urban water supply.

B. *The secondary objective is to regulate the use of land within the zone:*

(a) to encourage the productive use of land for agricultural purposes and to permit development which is ancillary to agricultural land uses, except for development which would conflict with the primary objective of the zone, and

(b) to ensure development of the land maintains the rural character of the locality, and

(c) to ensure development of the land does not create unreasonable and uneconomic demands, or both, for the provision or extension of public amenities or services.

C. *The exception to these objectives is development of public works and services, outside the parameters specified in the primary and secondary objectives, only in cases of demonstrated and overriding public need and subject to the impact on water quality and quantity being minimised as much as is reasonably practical.*

The results of the environmental assessment suggest that there would be a general improvement in water quality in Emigrant Creek dam after the opening of the proposed upgrade due to the water quality controls that would be put in place. Objective A is therefore met.

Objective B relates to the use of the zone. Roads are not prohibited within Zone No. 7 (c).

Upgrading of the Pacific Highway is part of the AusLink National Network. AusLink is the Australian Government's policy for improved planning and accelerated development of Australia's land transport system. It is also part of a ten year commitment by the State

and Australian governments to develop the existing highway between Hexham and the Queensland border. Significantly improving the standard of the highway and providing a safer and more efficient link is a key objective of the project. This effectively complies with objective C.

Clause 24A of the Ballina Local Environmental Plan pertains to development within Zone 7 (c) It states:

(1) This clause applies to land within Zone No 7 (c).

(2) In determining an application for consent to carry out development on land to which this clause applies, the council must take into consideration the following matters:

(a) any potential adverse impact, including any incremental adverse impact, on the water quality within the catchment that may result from the development,

(b) whether adequate safeguards and other measures have been proposed to protect the water quality,

(c) whether the proposed development would be more suitably undertaken on an alternative site,

(d) any comments that have been provided in relation to the proposed development following consultation with the relevant water supply authority.

The proposed upgrade accords with Clause 24A as the environmental assessment has given consideration to adverse impacts on the water quality and has identified that there would be a general improvement in water quality in Emigrant Creek dam after the opening of the proposed upgrade.

Safeguards and other measures have been identified in the environmental assessment through management measures. Management of impacts to water quality would primarily occur through the system of sediment basins that are part of the concept design. Additional water quality management measures during construction would be identified as part of a construction environmental management plan.

The route options development process considered water quality impacts and the suitability of the route alignment.

Ongoing dialogue with Rous Water has ensured their feedback has been considered throughout the assessment phases.

2.8.5 Water quality modelling

Submission number

299

Summary of issues

The following submissions raised issues associated with the accuracy of water quality modeling undertaken for the environmental assessment.

- > Water quality modeling is a developing science and there is limited data to model the performance of the proposed mitigation measures with confidence. (299)

Response

In undertaking the modelling of the proposed treatment measures, the RTA relied on research undertaken under the auspices of an Australian Research Council grant. The research was undertaken by a University of Technology Sydney, PhD student under the supervision of one of Australia's leading stormwater researchers – A/Prof Simon Beecham. The research studied pollutant loads entering several treatment systems similar to those proposed in the Emigrant Creek dam catchment. The results from the research were used in the water quality modelling to calibrate the model and thus to predict water quality performance.

The RTA has no reason to question the veracity of the research, nor the results. However the RTA acknowledges that research has limitations and the comment in the environmental assessment was intended to acknowledge this limitation. The RTA's consultants have remained in close contact with the researchers as they continued to obtain data and these consultants have advised that the same results have been achieved through further research, thereby providing increasing confidence in their adoption.

2.8.6 Water quality impacts

Risk to drinking water quality

Submission number

299, 327

Summary of issues

The following submissions raised risk issues associated with the proposed upgrade location and design.

- > Environmental assessment comprehensively addresses water quality issues. (327)
- > In the Emigrant Creek water catchment we have a drinking water catchment of small size (19km²) with a creek network and a storage dam in very close proximity to the proposed motorway alignment. These three factors substantially reduce the possibilities for dilution of soluble pollutants in the catchment in both acute and chronic water quality management and increase the layer of risk to public health associated with the motorway development. (299)

Response

It is acknowledged that the location of the proposed upgrade presents challenges to the RTA in managing the quality of runoff entering receiving waters. This is why the RTA is proposing highly advanced treatment measures to protect the Emigrant Creek dam water supply, both in terms of chronic and acute risk. These residual risk levels are clearly documented in the environmental assessment.

The RTA reiterates its position that in relation to both chronic and acute pollution risk, that the proposed mitigation measures provide a significant improvement compared to the existing situation.

The RTA also points out that it does not rely on dilution of pollutants as a treatment measure. Rather the RTA has focussed on pollutant loads and the performance of

treatment measures in retaining pollutant loads. This is a far more relevant and meaningful way of assessing impacts in ecological health and human health contexts.

Water quality mitigation measures

Submission number

117

Summary of issues

The following submissions raised health risk issues associated with the proposed water quality mitigation measures.

- > Numerous ponds will store stagnant water bringing mosquitoes - Guppies should be introduced to control problem. (117)

Response

There are various methods of mosquito management that may be employed for water quality basins. The choice of management method would be determined during detailed design.

Submission number

299

Summary of issues

The following submissions raised issues associated with the assessment of performance of proposed mitigation measures.

- > The RTA chose to base its comparative performance of mitigation controls for the proposed motorway on those of the current highway where the RTA, the current owner, was not required to provide mitigation controls in the past (nor proposes remediation controls before handing over ownership to Ballina Council). These comparisons are not relevant. Different compliance conditions apply to development applications in different areas with more robust conditions required for current development applications in water catchments. (299)

Response

The RTA maintains that the comparison with the existing situation is highly relevant in terms of drinking water quality. As demonstrated in the environmental assessment, both chronic and acute risks are lower compared to the existing situation. It can therefore be assumed that the risks to the quality of water entering Emigrant Creek dam are lower than the current situation.

The RTA fully accepts the principle that more robust treatment should apply to development in drinking water catchments. This is reflected in the treatment methods proposed.

Sediment basin sizing and peak rainfall events

Submission number

029, 316 - Rous Water

Summary of issues

The following submissions were concerned with the rainfall event criteria used in identifying the capacity of sediment basins.

- > The rainfall event criteria used in identifying the capacity of sediment basins should be greater than currently proposed as Rous Water considers there has been no structured assessment of the range of possible intense storm events. (316 - Rous Water)
- > Rous Water recommends that the following criteria should be applied to size sediment basins: (316 - Rous Water)
 - / Emigrant Creek catchment, 90th percentile, 5 day rainfall.
 - / Wilsons River catchment, 85th percentile, 5 day rainfall.
- > Larger sediment basins increase the size and performance of the permanent bioretention basins. (316 - Rous Water)
- > RTA is unaware of the amount of runoff during peak rain event in the area, and as a result insufficient drainage may be installed beside and under the road. A large scale event could lead to sediment loads overwhelming the sediment basins, leading to contamination of the catchment. (029)

Response

The sizing of construction phase sediment basins is based on the probability of 5 days of consecutive rainfall rather than a structured assessment of a range of rainfall intensities. This implicitly considers the total depth of rainfall (and all the intensities that happen during the rainfall event) that falls in a catchment and volumes of runoff as opposed to variance in rainfall intensity. The sediment basins are designed with both a settlement zone and a sediment storage zone. The ability for basins to operate as designed will be maintained by regular removal of deposited sediment from the storage zones.

The environmental assessment only identifies the construction sediment basins that would be retained for highway operation. Other measures, as outlined in Section 10.10.1 of the environmental assessment, would also be implemented to manage water quality during construction.

The selection of percentile event for the sizing of the basins is in accordance with the requirements of *Soils and construction - managing urban stormwater* (Landcom 2004). Construction and correctly considers the sensitivity of the receiving environment.

A sensitive receiving environment is considered to be one that has a high conservation value, for example a National Park. The proximity of the proposed upgrade to the reservoir at Emigrant Creek Dam means that the receiving waters are considered to be particularly sensitive to any potential degradation of water quality during construction. Accordingly the sizing of construction sediment basins within the Emigrant Creek catchment reflects that 'sensitive' status.

The proposed upgrade passes through the catchment for the Wilsons River and thereby has the potential to impact on drinking water extracted from the river at Lismore however the proximity of the proposed upgrade to the extraction point, combined with other land

uses in the catchment, means that there is no justification in the assertion that the drinking water source is sensitive to any potential degradation of water quality arising from the proposed works.

The performance of the operational phase basins has been based on a structured appreciation of rainfall intensities. Five years of 6 minute, local rainfall data was used to model the performance of the treatment devices. This is the most comprehensive and direct assessment of rainfall intensities possible.

Since the display of the environmental assessment, the RTA has completed additional water quality modelling for the Wilsons River catchment (described in section 3.2 of this report). The results of the modelling indicate that an overall reduction (compared to the existing situation) in pollutant loadings can be achieved by the proposed upgrade.

A balanced approach would at all times be adopted by the RTA that weighs up the costs (social, ecological, economic, etc) against the benefits. Larger capacity basins require a larger land take and as a result would have a range of additional impacts. The RTA considers it has adopted a balanced approach to the sizing of basins for the proposed upgrade that is consistent with the current guidelines.

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that RTA had now addressed these issues adequately.

Sediment basin sizing and first flush capture

Submission number

316 - Rous Water

Summary of issues

The following submission was concerned with the sizing of sedimentation basins and of the ability of the basins to capture first flush pollutant loadings.

- > The sizing of the bioretention basins for the operational phase should be reviewed to ensure capture of the first flush pollutant loading in all basins as well as to increase confidence in pollution control outcomes for both chronic and acute events. (316 - Rous Water)
- > Basin 20 appears to be undersized. (316 - Rous Water)
- > First flush devices should be able to demonstrate that they can achieve capture of rainfall events within continuous 24 hour time lines. (316 - Rous Water)

Response

The RTA has adopted design techniques used by the stormwater industry to size the basins. The water quality model MUSIC uses a continuous simulation approach to model the effectiveness of the proposed treatment measures and ensure that appropriate water quality control measures are proposed for the upgraded highway.

The RTA considers that the overall approach taken represents best practice. First-flush runoff is typically defined as the flow generated by the first 10 to 15mm of rain therefore, the capture depth identified for Basin 20 is in accordance with accepted guidelines. In addition it should be noted that the proposed mitigation approach includes the provision of a gross pollutant trap upstream of each basin. This would remove a large portion of

suspended solids and litter from the stormwater runoff prior to it entering the basin. It is intended that the maintenance regime for the upgraded highway would include regular cleaning of the traps thereby further reducing the potential water quality impacts of concentrated pollutant levels being released into receiving waters in the event of a rainfall event occurring after a significant dry period.

With respect to drainage of the basins in 24 hours – the use of a continuous simulation modelling approach on this project was undertaken to gain an estimate of the water quality. The model adopted (MUSIC) routes runoff through the treatment devices using a 6 minute time step. Some of the devices were shown to take 2 days to drain dry and this is implicitly considered in the results.

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that RTA had now addressed these issues adequately.

General approach to water quality mitigation measures

Submission number

316 - Rous Water

Summary of issues

The following submissions suggest that a conservative approach is adopted for water quality mitigation measures.

- > Rous Water has identified numerous concerns with the water quality-related impacts and consider it is appropriate to adopt a conservative approach for the implementation of treatment measures. (316 - Rous Water)
- > Rous considers the precautionary principle should apply and that the RTA should not rely on a lack of scientific certainty to delay action. (316 - Rous Water)

Response

The results of the modelling indicate that pollutant load reductions can be achieved post-development compared to pre-development. Accordingly the RTA considers that the threat of serious or irreversible environmental damage as a result of the proposed upgrade is acceptably low. A sound approach has been developed for the management of water quality based on the level of risk to water quality identified for each catchment in Rous Water documents.

Economic costs aside, larger basins are not always more desirable and have considerable impacts of their own which need to be carefully considered in their design and sizing. Adoption of larger basins may afford marginally improved water quality, however, it may well result in further loss of riparian vegetation, incursion onto additional private property, and require greater consumption of resources in its construction and operation.

Stormwater treatment devices are sized using the same methods that wastewater treatment systems are. They are based on a tank reactor model and this allows for decay of pollutants down to background levels. Having larger devices does not guarantee a better outcome and the devices proposed are low down on a very flat part of the diminishing returns curve. In other words, a much larger basin would only achieve a marginal improvement in water quality. When this is weighed up against the costs of the basins (economic, ecological, social and intergenerational) it is considered that the

most balanced approach has been put forward. The RTA considers that it demonstrates a degree of conservatism appropriate to the level of scientific certainty, and therefore satisfies the precautionary principle.

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that RTA had now addressed these issues adequately.

Submission number

299

Summary of issues

The following submission is concerned with the performance of the proposed basins in high intensity rainfall events.

- > Our concern is that the sediment basins (both construction & operational) will not be effective in the intense rain events that are characteristic of the catchment. There is no data on this scenario. The intense rain events data (rainfall in first ~ to 1 hour) is not available to us nor has this data been used in the modeling input exercises for sediment basin control. With such heavy deluges are the sediment basins going to cope or are the contaminants going to overflow into the catchment? (299)

Response

The sizing of construction phase sediment basins is based on the probability of 5 days of consecutive rainfall rather than a structured assessment of a range of rainfall intensities. This implicitly considers the total depth of rainfall (and all the intensities that happen during the rainfall event) that falls in a catchment and volumes of runoff as opposed to variance in rainfall intensity. The sediment basins are designed with both a settlement zone and a sediment storage zone. The ability for basins to operate as designed will be maintained by regular removal of deposited sediment from the storage zones.

It is accepted within the DECC sedimentation basin design criteria that it is not possible to implement construction sediment basins that will capture every rainfall event. The majority of rainfall events will be captured by the sedimentation basins. In cases where the basins are overtopped, there will be sediment capture that will be treated and discharged in accordance with DECC licence requirements.

The environmental assessment only identifies the construction sediment basins that would be retained for highway operation. Other measures, as outlined in section 10.10.1 of the environmental assessment, will also be implemented to manage water quality during construction.

The performance of the operational phase basins has been based on a structured appreciation of rainfall intensities. Five years of 6 minute, local rainfall data was used to model the performance of the treatment devices. This is the most comprehensive and direct assessment of rainfall intensities possible. The model considers the amount of storage available and how much the water level would fluctuate – whether it would overtop and leave the basin or be retained for treatment.

Impact of hydrocarbons on water supply

Submission number

299, 316 - Rous Water

Summary of issues

The following submissions were concerned about the impact of hydrocarbons on the water supply.

- > Environmental assessment has not undertaken a sufficient assessment of the impact of hydrocarbons on the water supply and the risk of damage to the Emigrant Creek Water Treatment Plant has not been adequately defined. (299, 316 - Rous Water)
- > The assessment should identify the likely range of contaminants and the associated loadings contained in runoff from highway surfaces, considering both chronic and acute impacts, assess the ability of the treat these contaminants and identify contingency measures for residual impacts. (316 - Rous Water)

Response

The drainage strategy for the proposed upgrade ensures that within the Emigrant Creek catchment all surface runoff from areas of carriageway and adjacent verges and batters would be collected and drained towards one of the drainage basins. In addition the surface water runoff from the re-aligned section of the existing highway at Emigrant Creek would be subject to the same treatment approach.

The RTA adopted a risk-based approach to this issue with the following as key points reported in the environmental assessment and working papers:

- > The issue only pertains to acute pollution incidents, i.e. spills.
- > A pollutant fate assessment was undertaken and is reported graphically in figure 6 of working paper 2. It shows that for any pollutant type (solid, soluble or floating), that only extremely small quantities could ever reach the water supply off take (the point where water is taken from the dam prior to entering the water treatment plant). This conclusion is highly conservative in that the effects of flows spreading out across the dam are ignored.
- > In the case of hydrocarbons, they would be floating on the water surface. The water supply off take is submerged below the water surface and so has virtually no ability to input any hydrocarbons into the water treatment plant.

Based on this, the RTA considers the risk of occurrence of membrane fouling to be negligible and considers any further assessment to be unwarranted. Similarly, the risk of any pollutant type entering the water treatment plant is very small.

In addition the RTA has committed to the development in consultation with key stakeholders of an emergency response plan for the proposed upgrade. The revised draft statement of commitments would include a specific commitment to this effect.

Rous Water in its subsequent comments (dated 3 February 2009) stated that the implementation of an emergency response plan would satisfactorily address its concerns in relation to these issues.

2.8.7 Existing water treatment plant

Submission number

299

Summary of issues

The following submission was concerned about the role of the Emigrant Creek dam water treatment plant.

- > The RTA relies heavily on the capacity of the new water treatment plant when discussing water quality - a facility that it does not own nor to which it contributes financially to operational and maintenance costs. (299)

Response

The capacity of the water treatment plant does not contribute at all to the contention that the proposed upgrade would result in an overall improvement in water quality. The water treatment plant is important in allowing Rous Water to provide its customers water that meets relevant standards included in the Australian Drinking Water Guidelines from a catchment where the water quality would otherwise not be acceptable (due to the many different contributors to poor water quality in the catchment).

The risk management approach adopted necessitated a discussion of all the barriers to protect human health, as opposed to the RTA's perceived reliance on them. The water treatment plant would form the final barrier in a multi-barrier approach to an accidental spill from the highway. The RTA has committed to provide the initial barriers.

The RTA's proposed treatment measures in Emigrant Creek dam catchment would mitigate the effects of both chronic and acute pollution. Acute impacts refer to an event that would happen infrequently potentially resulting in pollution entering a waterway, such as a spill from a dangerous goods tanker following a road traffic accident.

As demonstrated in the environmental assessment and working paper 2, upgrading the highway will significantly reduce the risk of an incident in the Emigrant Creek catchment. The likelihood of an incident involving a pollutant spill for the upgraded highway is 1 in 293 years (down from 1 in 63 years for the existing highway). If dangerous goods are spilled, the upgraded highway will have spill containment devices that would further reduce the risk of a spill entering the creek system to greater than 1 in 440 years (the likelihood varies depending on the type of pollutant and the climatic conditions). These devices do not exist on the existing highway and the chances of a spill are much higher in the pre-development scenario.

Therefore the RTA considers its proposal to be responsible and representative of a sound risk management approach where the likelihood of pollutants from a spill reaching the water treatment plant intake is extremely remote.

2.8.8 Management of impacts

Water quality monitoring and emergency response plan

Submission number

316 - Rous Water

Summary of issues

The following submission was concerned with water quality monitoring, the development of an emergency response plan and remediation of affected areas in the event of an incident resulting in pollution entering receiving waters.

- > The environmental assessment does not outline the monitoring regime that shall be applied throughout both the construction and operational phases to ensure the effectiveness of the stormwater treatment devices, and the acceptability of the impacts on receiving waters. (316 - Rous Water)
- > The environmental assessment does not commit the RTA to completing the development of an emergency response plan. (316 - Rous Water)
- > The environmental assessment does not identify what actions and responsibilities will be followed to remediate the affected areas of catchment waterways and water supply infrastructure in response to highway incidents. (316 - Rous Water)
- > Rous Water endorses this stated intent to prepare an emergency response plan, however consider that the environmental assessment should contain further detail regarding the range of potential emergency scenario that would be included, and the appropriate response mechanisms that should be followed to protect the water supply system. (316)

Response

The RTA has committed to the development in consultation with key stakeholders of an emergency response plan for the operational phase of the proposed upgrade, in consultation with key stakeholders. The revised draft statement of commitments includes a specific commitment to this effect.

The RTA also recommends signage and emergency telephones to facilitate emergency response to pollution incidents.

The statement of commitments also includes assurances that a water quality monitoring program would be developed for both the construction and operational phases of the proposed upgrade.

The RTA highlights that the contractor for construction of the works would be required to complete and implement a range of management plans as a standard requirement of the works. These would include an incident (emergency) management plan for the construction phase. The RTA would involve key agencies in the preparation and implementation of any such plans.

Responsibility for remediation from highway incidents would be discussed in consultation with Rous Water. Responsibility principles would be included in the emergency response plan.

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that the RTA had now addressed these issues adequately.

Risk of surface water runoff contaminating receiving waterways

Submission number

005, 034, 222, 322, 360, 361

Summary of issues

The following submissions were concerned with the risk of contamination of waterways as a result of the proposed upgrade.

- > Emigrant Creek and Byron Creek are at increased risk of contamination. (361)
- > Risk to Ballina's drinking water. (034)
- > Potential contamination of Emigrant Creek dam should be avoided at all costs given its importance as a secondary water source for predicted growth in Ballina Shire. (005)
- > Increase in commercial traffic carrying dangerous goods increases the chance of a major accident and potential spill into the Emigrant Creek water supply. (005)
- > Increased run-off will deliver high contaminant loads containing hydrocarbons, heavy metals and suspended solids to receiving waterways. These are known to degrade waterway ecology. What measures will be taken to prevent contaminants, including suspended solids, from entering waterways during both construction and operation? What measures will be in place to deal with the risk of toxic spills from accidents? (360)
- > Concerns about toxic contamination of Emigrant Creek water supply from accidental spillage of fuel in water catchments. (222)
- > Diesel particles are too small to be filtered out of the water. This is a real concern for all consumers of this water (the Emigrant Creek catchment). (322)
- > Call for an urgent investigation by a completely independent scientific authority to determine the risk of contamination and the ability of new filtration equipment to effectively filter toxic materials from Emigrant Creek Dam. (005)

Response

The RTA is proposing a range of water treatment measures to protect the Emigrant Creek dam water supply, both in terms of chronic and acute risk.

The results of the water quality modelling for chronic impacts indicate that pollutant load reductions can be achieved post-development versus pre-development. Accordingly the RTA considers that the threat of serious or irreversible environmental damage as a result of the proposed upgrade is acceptably low. A sound approach has been developed for the management of water quality based on the level of risk to water quality identified for each catchment in Rous Water documents.

Acute impacts refer to an event that would happen infrequently potentially resulting in pollution entering a waterway, such as a spill from a dangerous goods tanker following a road traffic accident.

As demonstrated in the environmental assessment and working paper 2, upgrading the highway will significantly reduce the risk of an incident in the Emigrant Creek catchment. The likelihood of an incident involving a pollutant spill for the upgraded highway is 1 in 293 years (down from 1 in 63 years for the existing highway). If dangerous goods are spilled, the upgraded highway will have spill containment devices that would further reduce the

risk of a spill entering the creek system to greater than 1 in 440 years (the likelihood varies depending on the type of pollutant and the climatic conditions) These devices do not exist on the existing highway and the chances of a spill are much higher in the pre-development scenario.

In addition, the RTA has committed to the development of an emergency response plan for the proposed upgrade, in consultation with key stakeholders. The revised statement of commitments includes a specific commitment to this effect.

Therefore the RTA considers its proposal to be responsible and representative of a sound risk management approach where the likelihood of pollutants from a spill reaching the water treatment plant intake is extremely remote.

Maintenance of water quality mitigation measures

Submission number

316 - Rous Water

Summary of issues

The following submissions relate to maintenance of mitigation measures.

- > Rous Water suggest that a maintenance management plan is developed for the proposed upgrade to ensure optimum performance of water quality mitigation measures. (316 - Rous Water)

Response

The importance of a maintenance plan is noted and agreed. It is premature however to develop a plan for a road that has not been designed in detail.

As identified in the statement of commitments, operational environmental management measures would be implemented, as appropriate to manage impacts during operation. The measures would be developed at the appropriate time.

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that the RTA had now addressed these issues adequately.

Water quality monitoring

Submission number

316 - Rous Water

Summary of issues

The following submissions were concerned with water quality monitoring.

- > It is critical that effective monitoring mechanisms are put in place to ensure that the water treatment structures are achieving the intended level of performance, to assess the ambient environmental conditions and any prevailing impacts, and to assess clean-up measures following any incidents. (316 - Rous Water)

Response

The statement of commitments includes assurances that a water quality monitoring program would be developed for both the construction and operation phases of the project and the RTA intends to work closely with DECC and Rous Water in developing water quality monitoring programs.

Also, it is proposed that a comprehensive water quality monitoring program be undertaken in consultation with DECC at least 12 months prior to the commencement of construction.

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that the RTA had now addressed these issues adequately.

Water quality mitigation measures for the existing highway

Submission number

316 - Rous Water

Summary of issues

The following submissions suggests that water quality mitigation measures should be retrofitted to the existing highway immediately in order to address existing risks prior to completion of the upgraded highway.

- > Water sensitive drainage measures should be retrofitted to the existing highway immediately so that the above mentioned issues are addressed, for the period prior to construction, during construction and during the operational phase. (316 - Rous Water)

Response

The RTA does not intend to retrofit the existing highway with water quality mitigation devices. The existing risks to water quality of the existing highway, are identified in section 5.3 of the 2001 Egis Consulting report prepared for and adopted by Rous Water:

"There is a significant risk of spillage of fuels and industrial chemicals into the creek system which, given the small size of the Emigrant Creek dam (870 ML), could be relatively undiluted when it reaches the outlet of the dam".

Upgrading the highway would significantly reduce this risk, as demonstrated in the environmental assessment and working paper 2. The likelihood of an incident involving a pollutant spill for the upgraded highway is 1 in 293 years (down from 1 in 63 years for the existing highway). The upgraded highway would have spill containment devices that would further reduce the risk of a spill entering the creek system to greater than 1 in 440 years (the likelihood varies depending on the type of pollutant the climatic conditions).

The NSW Government is committed to working with the Australian Government to complete the upgrade of the Pacific Highway to dual carriageway as quickly as possible. \$3 billion is being provided by both Governments over the next five years to mid 2014, as part of the Federal Nation Building Program. The Tintenbar to Ewingsdale upgrade has been identified as one of a number of high priority projects for funding under this agreement. Should this project be nominated for funding, then the risk of incidents along the existing highway would diminish considerably. In the interim period, between now

and when construction would commence, the RTA intends to work with Rous Water on developing an emergency response plan for the existing highway in consultation with key stakeholders. The RTA would also facilitate installation of signage on the existing highway advising motorists that they are entering a drinking water catchment.

The effects of runoff from the existing highway and the proposed upgrade have been considered in the environmental assessment and it has been demonstrated that there would be a reduction in the total pollutant load. Where the existing highway is realigned, runoff from that section would be treated before it is released into receiving waterways. Whilst the RTA does not intend to retrofit the existing highway with water quality mitigation devices, the RTA is committed to extensive roadside landscape treatments, and riparian restoration within the road corridor and on riparian land outside the road corridor that is acquired by the RTA would help to mitigate water quality impacts from the existing highway.

Rous Water in its subsequent comments (dated 3 February 2009) while acknowledging that pollution threats from the existing highway are not part of the proposed upgrade, believe that the RTA should nevertheless address mitigation of pollutants from the existing highway. The RTA's view on this issue is represented by the above discussion.

Statement of commitments

Submission number

316 - Rous Water

Summary of issues

The following submission questioned the adequacy of the draft statement of commitments included in the environmental assessment.

- > Rous Water considers that the draft statement of commitments is not adequate to manage the nature and extent of the likely scale of impacts that will arise. (316 - Rous Water)

Response

The RTA has considered all issues raised in submissions on the environmental assessment and has amended the draft statement of commitments as appropriate. The revised statement of commitments is included in section 5 of this submissions report.

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that the RTA had now addressed these issues adequately.

2.9 Groundwater

2.9.1 Impacts on groundwater flows

Submission number

029, 099, 376

Summary of issues

The following submissions raised concerns over changes to groundwater flows and groundwater dependent surface water flows.

- > Concern that cuttings for the tunnel may change the flow of groundwater and affect the creek running from the southern tunnel approach. This is a permanent creek that has never run dry, even in the most serious drought. Concerned that the flow and quality of the creek will be affected during construction and would like assurances that this will be monitored at all times. (376)
- > EA identifies the potential for groundwater flows to be altered which may cause springs to dry up. The proposed mitigation measure to find alternative sources is not viable - the issue is the limited availability of water. (099)
- > Dumping of fill on the valley floor of Palm Springs nursery will impact on a number of springs in the area with unknown consequences. (029)

Response

The environmental assessment identifies a range of management measures that may be implemented in situations where groundwater flows would otherwise be altered. They involve collection of water seeping from cuttings and diverting them either back into the water table or into nearby surface water flows. The maintenance of groundwater flows to nearby creeks would be a high priority.

Fill would not be placed in a way that adversely impacts groundwater flows.

2.9.2 Groundwater impacts of tunnel

Submission number

350 - Department of Environment and Climate Change NSW

Summary of issues

The following submission raised concerns over changes to groundwater flows as a result of the proposed St Helena tunnel.

- > No mention is made of the potential for the impervious tanking in the tunnel to reduce soil moisture in the 43m of soil above the tunnel. (350 - Department of Environment and Climate Change NSW)

Response

Two important points are made in response to this query. Firstly, the unsaturated zone's soil moisture content is not connected hydraulically with the groundwater table, that is, a lowering of a hypothetical water table within the bedrock "aquifer" would not measurably

diminish soil moisture content in the overlying soil layer, since this is sustained by normal rainfall recharge. The St Helena tunnel, would be completely concrete lined with *no* likelihood of seepage of groundwater into the tunnel. This means that groundwater from the overlying water table/s would not be able to drain from the soil and rock layers overlying the tunnel (3 – 5m of soil, and 35 – 40m of highly stratified, poorly fractured basaltic lava sequences) into the tunnel at all. As a consequence, neither groundwater in the basalts nor soil moisture water in the soil would be drawn-down at any measurable rate or depth over time. Soil moisture and local water tables would be preserved in its general pre-construction state, being only affected by natural historic and seasonal recharge processes.

Management of groundwater impacts

Submission number

350 - Department of Environment and Climate Change NSW

Summary of issues

The following submission was concerned with the management of detrimental impacts to groundwater flows.

- > There are no actions proposed in the event that monitoring reveals a problem in ground water tables and a component of the monitoring program should be event based rather than simply chronological over a five year period. Monitoring should commence at least 12 months prior to construction to provide essential baseline data and contingency actions developed and implemented in the event a problem is identified. (350 - Department of Environment and Climate Change NSW)
- > There is no discussion of the potential impact of the proposed engineering mitigation measures on drawdown above the cuttings. Consideration should be given to irrigation from sediment basins should the impacts be significant on remnant native vegetation or agricultural areas. (350 - Department of Environment and Climate Change NSW)

Response

Management actions have been proposed (see section 11.4.3 of the environmental assessment) to mitigate and/or limit groundwater impacts through implementation of specific engineering measures. Monitoring to assess any impacts on the local groundwater and the effectiveness of the mitigation actions are proposed. Type A cuts are likely to require mitigation measures, such as seepage pathway grouting and/or artificial recharge of captured surface water to the shallow groundwater system. Type B cuts are unlikely to require engineering mitigation, but this would need to be verified through monitoring before, during and following construction. Trigger values and specific actions are to be determined during the design phase of the project. A description of Type A and Type B cuts is provided in section 11.3 of the environmental assessment.

The low hydraulic conductivity of the bedrock and soil formations typical of the basaltic lava terrains present along the alignment mean that hydraulic responses are likely to be slow and should be picked up by the proposed monitoring program, the details of which would be developed during the design phase of the project.

Comments regarding the preconstruction monitoring time frame are noted. It should be noted that the most appropriate and adaptable technology of monitoring these water table levels are electronics based ones, namely, automated water level data logger systems (potentially telemetry based). These systems can deliver data at appropriately spaced time frequencies (with hourly, daily or weekly frequencies being readily adoptable and therefore could easily monitor 'events' likely to impact the groundwater systems involved (most particularly, drought and rainfall events).

The water table is relatively deep (6 – 25m below ground level) along the alignment and penetration is limited in extent, which, together with the low hydraulic conductivity and stratified nature of the bedrock and soil formations, typical of the basaltic lava terrains present along the alignment, mean that the drawdown profile is small and is limited in areal extent. Deprivation of soil moisture and water table recharge up-gradient of the road cuts is considered substantially subordinate when considered in relation to deprivation of groundwater (from recharge and diversion of groundwater flow) from the down-gradient groundwater table(s), that is, the impacts are overwhelmingly likely to be felt down-gradient of the cuttings. Long term irrigation of up-gradient groundwater systems, *above the cuttings*, is not considered warranted.

2.10 Ecology

2.10.1 General

Submission number

191, 281, 376

Summary of issues

The following submissions raised general concerns over the impact of the upgrade on ecology.

- > Property owner concerned about preservation of a block of old growth rainforest with endangered plant and fauna species. (191)
- > It is imperative that contractors maintain a strong weed management program for at least 2-3 years. (376)
- > The description in working paper 4 of the location of the proposed corridor fails to identify an important nature reserve located at Hayters Hill. (281)
- > Because of the high rainfall in Tinderbox Valley (1824 mm a year); the potential risk and the ecological impact of the proposal on Tinderbox Creek and downstream Byron Creek will be acute. (281)

Response

Vegetation clearing would be restricted to areas where absolutely necessary in order to reduce the impact of the upgrade on native vegetation. A weed management programme would be implemented by the contractor engaged to undertake the proposed upgrade. This has been identified in the statement of commitments, in Section 5 of this report. Operational management of the proposed upgrade would also include weed management.

The nature reserve located at Hayters Hill is recognised as being of importance to the ecology within the region. It is however located some distance to the east of the study area for the environmental assessment

The RTA is proposing a range of water treatment measures to protect water catchments, both in terms of chronic and acute risk. The environmental assessment and working paper 2 clearly demonstrate through detailed water quality modelling that the advanced water treatment proposed would result in improved water quality and catchment outcomes. Additional water quality modelling has been carried out since the environmental assessment to provide certainty that improvements in water quality can be achieved in the proposed Lismore source (Wilson's River) catchment (which includes Byron and Tinderbox creeks, and their tributaries). The outcomes of this modelling are described in section 3.2.

2.10.2 Ecological survey methodology

Submission number

349 - Byron Shire Council, 350 - Department of Environment and Climate Change NSW, 379

Summary of issues

The following submissions raised concerns over the methodology employed for ecological surveys.

- > No local knowledge was sourced or considered in the assessment. (379)
- > Apparent lack of effort to establish the impact on species not yet listed as threatened. (379)
- > A large amount of Australian wildlife is nocturnal, yet only limited time was given to night surveys. (379)
- > No plot data was collected to quantify data assessments, which is particularly relevant in vegetation patches appearing to have greater than 80% Camphor Laurel as they are not considered as an Endangered Ecological Community (EEC), and therefore are not EEC constrained. (349 - Byron Shire Council)
- > Application of vegetation constraint classes (in Working Paper 4) appears inconsistent in some cases. (349 - Byron Shire Council)
- > Vegetation condition does not necessarily reflect the conservation and habitat values of a patch. (349 - Byron Shire Council)
- > No fauna habitat assessment data was provided for individual patches. (349 - Byron Shire Council)
- > It is surprising that, despite the disturbed nature of most habitat along the upgrade, no introduced species were recorded during the surveys. This casts some doubt over the adequacy of the survey effort. (350 - Department of Environment and Climate Change NSW)
- > There does not appear to have been any survey work directed towards the Mitchells Rainforest Snail. (350 - Department of Environment and Climate Change NSW)

Response

Local knowledge was sourced during the ecological assessment, including discussions with Byron Shire Council and the broader community as part of community consultation.

The survey effort, including survey of nocturnal wildlife is considered appropriate for an assessment of this type. The assessment considered impacts on all biodiversity in the study area, however more emphasis was given to considering impacts to threatened flora and fauna species and ecological communities listed under State and Commonwealth legislation.

The random meander method was used as this is the most effective way of covering a large area to determine the presence of a threatened plant species. The constraints mapping was based on the Byron Shire Council's vegetation mapping and from consultation with Council environmental officers. Byron Shire Council mapping was ground-truthed as part of the field surveys, and if directly impacted, surveyed in detail. Stands of rainforest were identified within the Byron Shire Council mapping. All native vegetation mapped by Byron Shire Council as of high conservation value was included as a high constraint in the vegetation mapping included in Working Paper 4.

The RTA believes that vegetation condition is a major (but not the sole) influence on habitat and conservation value of particular vegetation patches. A range of factors was considered when making these judgements in the environment assessment.

Constraint level of every patch was determined based on a combination of field surveys undertaken over a number of years and seasons, as well as previous records of threatened species and vegetation mapping provided by DECC, Byron Shire and Ballina Councils. The criteria used for determining constraint are detailed in table 4 (page 22) of working paper 4. These methods were used consistently across the study area.

A very conservative approach was used in the habitat assessment, whereby if potential habitat for a species was present then that species was assumed to be present, whether it was detected during the surveys or not. Therefore, any plant species noted in Appendix 4 of working paper 4 as having potential habitat in the study area was assumed to be present in the significance assessments (Seven Part Tests).

One introduced fauna species was recorded during the surveys, the cane toad *Bufo marinus*. The fauna survey effort is clearly stated in section 2.6 of working paper 4. The RTA believe that this level of survey effort is appropriate.

Potential habitat for Mitchell's rainforest snail in the study area occurs within lowland rainforest, although all the records in the region are from low lying areas near the coast and fringing wetlands. None of the vegetation impacted by the proposed route meets these criteria. Additionally, this vegetation type in the study area is considered to be of poor quality due to the small size of the patches, their isolation and degraded nature. Because of this, an expert on the species was not engaged to undertake specific surveys. Searches for shells in leaf litter, under logs and behind bark were however undertaken during the herpetological surveys. These failed to locate evidence of the presence of this species.

2.10.3 Vegetation

General comments on loss of vegetation

Submission number

034, 047, 050, 051, 052, 053, 054, 060, 061, 062, 063, 064, 065, 066, 067, 083, 084, 085, 086, 087, 088, 090, 091, 092, 093, 095, 097, 100, 108, 109, 110, 111, 113, 130, 131, 133, 134, 141, 142, 145, 146, 147, 150, 155, 157, 165, 166, 168, 170, 171, 189, 191, 195, 198, 203, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 248, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 274, 276, 286, 288, 289, 290, 291, 292, 293, 294, 295, 301, 305, 306, 308, 309, 310, 311, 312, 314, 318, 319, 320, 321, 344, 348, 360, 361, 376

Summary of issues

The following submissions raised issues associated with loss of vegetation.

- > The impact of the removal of vegetation can not be underestimated, particularly in a region that prides itself on its natural landscape and vegetation. Although re-planting will occur, the environmental assessment concedes that the cumulative effects of the works would be complete removal of vegetation along a densely vegetated corridor. (344)
- > Scale of the development will result in major vegetation loss within the construction corridor; many species will have reduced access to suitable land. (361)
- > Steps should be taken to reduce the loss of trees and other vegetation. (034, 047, 050, 051, 052, 053, 054, 060, 061, 062, 063, 064, 065, 066, 067, 083, 084, 085, 086, 087, 088, 090, 091, 092, 093, 095, 097, 100, 108, 109, 110, 111, 113, 130, 131, 133, 134, 141, 142, 145, 146, 147, 150, 155, 157, 165, 166, 168, 170, 171, 189, 191, 195, 198, 203, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 248, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 276, 286, 288, 289, 290, 291, 292, 293, 294, 295, 301, 305, 306, 308, 309, 310, 311, 312, 314, 318, 319, 320, 321, 348, 360)
- > Steps should be taken to reduce the environmental impact on Emigrant Creek and Byron Creek, with specific reference to the existing vegetation, especially native trees. (274)
- > The terrestrial flora/fauna assessment does not take into account recommendations made by Cuperus et al in regards to compensation planting, and instead recommend a ratio of less than 0.2:1. Adopting the approach that only 2.0ha of vegetation requires compensation reduces the availability of forage resources for native fauna. This strategy needs to be reviewed and the provision made for at least 10.4ha of native vegetation to be planted or rehabilitated. (376)

Response

Management measures to limit the loss of vegetation and fauna habitat are detailed in section 12.4.1 of the environmental assessment and section 5.2.1 of working paper 4. These measures include restricting clearing to areas where absolutely necessary; fencing to ensure clearing does not extend beyond the area necessary; and restoration, regeneration and rehabilitation of native vegetation.

The RTA has committed to undertake extensive roadside landscape treatments, and riparian restoration within the road corridor and on appropriate sections of land outside the road corridor that is acquired by the RTA, including sections along Byron and Emigrant creeks. This would result in restoration of a considerably larger area of native vegetation than would be initially lost.

In addition to the project specific restoration program, a compensatory habitat package has been agreed previously with the DECC, covering all Pacific Highway proposals in the area between Ballina and the Queensland border (known as “section 5”). This sectional approach provides for a larger and more effectively manageable area of compensatory habitat, suitable for use as an offset for the Tintenbar to Ewingsdale project and other Pacific Highway upgrade projects including the adjoining Ballina bypass.

Edge effects and buffer widths

Submission number

349 - Byron Shire Council

Summary of issues

The following submission raised issues associated with the assessment of edge effects on vegetation patches.

- > There is unclear justification for the conclusion that there would be no new edge effects. (349 - Byron Shire Council)

Response

Based on 50m of edge effects from existing edges, every patch of vegetation impacted by the roads footprint (including the 50m buffer) is already completely (100%) impacted by edge effects. The road creates “new” edge effects in these patches because the position of the edges changes and the edge effects from a road are likely to be different to the edge effects from current adjacent land uses. However, as all the vegetation patches impacted by the road are already completely edge affected, no new areas of vegetation would be edge affected.

Submission number

350 - Department of Environment and Climate Change NSW

Summary of issues

The following submission raised issues associated with the consistency of buffer widths applied to various assessments.

- > There is an inconsistency between the 50m buffer that was applied to the study area and the statement that alteration to groundwater flows could impact on native vegetation up to 200m away. There is also an inconsistency with the aquatic ecology study area which is defined as 500m from the centreline. Impacts on both groundwater and aquatic vegetation are often reflected in the terrestrial components. The DECC confirms its previous comments (dated 28 May 2008) about the inadequacy of the terrestrial 50m buffer. (350 - Department of Environment and Climate Change NSW)

Response

The 50m buffer is used as a practical measure to allow for the typical extent of the majority of indirect impacts on terrestrial ecology from highway development. The research basis for the 50m buffer is referenced in both the environmental assessment and working paper 4. It is acknowledged that in some situations, such as in the case of an altered groundwater regime, impacts can extend beyond 50m. The potential for this to occur is assessed in sections 11.3.4 and 12.3.9 of the environmental assessment.

The zone of potential impacts on aquatic ecology would logically be different to that of terrestrial ecology because of the different physical and ecological processes involved. The RTA does not regard this difference as being an inconsistency.

Significant plant species

Submission number

349 - Byron Shire Council

Summary of issues

The following submission raised issues associated with the assessment of effects on specific specimens of significant plant species.

- > Impacts on two ROTAP species recorded in patch 2 need to be clarified. [note that Patch 2 in the Working Paper 4 is numbered as patch 14 in Chapter 12 of the environmental assessment]. (349 - Byron Shire Council)
- > Threatened plants not subject to direct removal may be damaged through the construction process. (349 - Byron Shire Council)
- > Impacts on threatened species within patch 1 [numbered as patch 15 in Chapter 12 of the environmental assessment] need to be clarified. (349 - Byron Shire Council)
- > Impacts on several other specimens of *Syzygium moorei* need to be clarified. (349 - Byron Shire Council)
- > Further surveys for the threatened plant, Hairy Joint-grass, *Arthraxon hispidus*, should be conducted inside the growing season for this plant. Recent work nearby by the Ballina Bypass Alliance and the Ballina Shire Council suggests there is a good chance that this species will occur along the Tintenbar to Ewingsdale upgrade route. Its translocation should be considered in the proposed translocation plan. (349 - Byron Shire Council)

Response

Both specimens of the *rare or threatened Australian plants* (ROTAP) species in question (shown in vegetation patch 14 in the environmental assessment) are outside the footprint of roadworks, however one is within ten metres. Specific fencing may be appropriate to protect this specimen during construction.

Management measures would be put in place to protect individual specimens of threatened species that can be feasibly retained.

One specimen of *Syzygium moorei* has been identified within the proposed road reserve in Patch 1 (numbered as Patch 15 in Figure 12.1c of the environmental assessment main volume). The specimen is outside the area of direct impact and would be retained. Other threatened plants in this patch are outside the proposed road reserve.

None of the other identified specimens of *Syzygium moorei* would be impacted by the proposed upgrade.

Surveys for *Arthraxon hispidus* are currently being conducted. Translocation or re-establishment of the species would be undertaken where appropriate.

2.10.4 Fauna

Threats to fauna

Submission number

029, 137, 281, 350 - Department of Environment and Climate Change NSW, 379

Summary of issues

The following submissions were concerned with the impact of the proposed upgrade on fauna.

- > It is important to minimise road-kill on native fauna. A new green-field motorway will have considerable impact on ground moving animals. (281)
- > The need for interchange to have illumination at night, for safety reasons, will entail more nocturnal native wildlife being attracted to the area in search of food sources (insects etc) adding to the growing road kill of animals already occurring. (137)
- > Suggest an animal proof fence along the highway to minimise the safety risk of animal strike. (029, 379)
- > Mention should be made of mortality associated with the destruction of nests and consequently a mitigation measure requiring works to be conducted outside the breeding season at any sensitive sites should be included. (350 - Department of Environment and Climate Change NSW)

Response

The RTA is committed to reducing the impact of the proposed upgrade on local fauna. The location of fauna proof fencing integrated with fauna crossings at appropriate locations would be determined at detailed design stage. Appropriate locations may include interchanges where there is an elevated risk of road kill due to lighting attracting food sources.

DECC's comment regarding destruction of nests is noted. Appropriate mitigation such as avoidance of individual trees where possible, and the provision of nest boxes nearby (where appropriate), would be evaluated in the preparation of the construction environmental management plan.

Impacts to platypus

Submission number

117

Summary of issues

The following submissions raised the issue of the impact of the proposed upgrade on local platypus populations.

- > Platypus have been sighted in local creeks. It is classified as vulnerable and protected as is the water catchment. Environmental assessment should address effects of additional water pollution on this mammal. (117)

Response

The platypus is not listed as vulnerable under either the NSW *Threatened Species Conservation Act 1995* or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. Platypus are discussed in section 4.4.1 of working paper 4. It is considered unlikely that the platypus or its habitat would be significantly impacted by the proposed upgrade. The RTA is proposing a range of treatment measures to protect water catchments to reduce the risks to flora/fauna and water quality. Modelling of these treatments indicate improved water quality as a result of the upgrade, which should improve the habitat quality for the platypus as would proposed riparian restoration.

Impacts to koalas

Submission number

350 - Department of Environment and Climate Change NSW

Summary of issues

The following submission raised issues associated with the assessment of effects on the koala.

- > Page 33 of Working Paper 4 refers to the presence of a koala in a plantation as having a high level of ecological constraint yet the environmental assessment (page 178) states that plantations have a low habitat value and the koala record is not mentioned. The EA should refer to the koala assessment (equivalent to SEPP 44) that was conducted to justify its statement. (350 - Department of Environment and Climate Change NSW)

Response

The particular plantation in question was given a high constraint value in the route selection phase. The presence of the threatened flora (*Tinospora tinospoides*) was more important in this designation than the record of the koala, as the koala record appears to be highly isolated with no evidence of a viable koala population occurring in the area. The low habitat value assigned to plantations on Page 178 of the environmental assessment takes into account potential foraging habitat for threatened fauna such as the grey-headed flying fox, but given the unlikelihood of koalas still occurring in the area, any value as koala habitat was deemed to be inconsequential. The SEPP 44 (equivalent) assessment is documented on Page 48 of working paper 4.

Revegetation for fauna habitat

Submission number

094, 281

Summary of issues

The following submissions were concerned with revegetation for fauna habitat.

- > Urge that the recommendation in working paper 4 regarding the need for wildlife corridors in the Tinderbox Creek area be adopted. A number of property owners are re-establishing lowland and riparian rainforest in the Tinderbox Valley and fauna movement is vital to assist with this regeneration. (281, 094).

Response

The RTA has committed to undertake extensive roadside landscape treatments, and riparian restoration within the road corridor and on appropriate sections of land outside the road corridor that is acquired by the RTA. This would include the Tinderbox Creek valley, with the planning and implementation of restoration areas taking into account fauna habitat and movement requirements (including provision for fauna movement under the proposed bridge on the tributary of Tinderbox Creek).

Stands of camphor laurel have been included in the assessment of impacts because of their potential (acknowledged in the environmental assessment and working paper 4) to incorporate ecological values. Although camphor laurel patches were mapped as a “low constraint”, this is relative to other plant communities in the study area, and does not mean they were considered to have no ecological value. Every effort was made at the route selection stage to avoid all levels of ecological constraints, including camphor laurel. The ecological value of camphor laurel patches is recognised and all assessments have taken these values into consideration.

Wildlife movement and habitat values

Submission number

349 - Byron Shire Council, 350 - Department of Environment and Climate Change NSW, 364, 367 - Northern Rivers Catchment Management Authority

Summary of issues

The following submission raised issues associated with the movement of wildlife.

- > Roadkill suggests St Helena ridge is being used as a wildlife corridor. (349 - Byron Shire Council)
- > The value of plantations as corridor links needs to be considered. (349 - Byron Shire Council)
- > The importance of camphor laurel as a fauna habitat is underestimated. (349 - Byron Shire Council, 364)
- > Success of fauna fences depends on the effective implementation of maintenance contracts. (349 - Byron Shire Council)
- > The statement that the upgrade, by following the existing route, minimises further fragmentation and barrier effects is misleading. The additional width will increase both but particularly the latter. (350 - Department of Environment and Climate Change NSW)

- > A commitment to the provision of bat roosting boxes under riparian bridges should be included. (350 - Department of Environment and Climate Change NSW)
- > Consideration should be given to the regeneration of native vegetation along the regional wildlife corridor above the St Helena tunnel. (350 - Department of Environment and Climate Change NSW, 367 - Northern Rivers Catchment Management Authority)

Response

The entire area has potential wildlife habitat value. Some areas have higher wildlife habitat potential than others, and the assessment of wildlife habitat functionality of the St Helena corridor is based on the fact that it does not provide a continuous uninterrupted expanse of vegetation. At a local scale there is likely to be some habitat functionality, which would account for the roadkill. The importance of the vegetation within the corridor is acknowledged through it being mapped as a high constraint in working paper 4. Vegetation within the corridor would not be directly impacted by the road except for a small portion of vegetation patch 15.

Only one area of plantation (numbered as patch 8 in the environmental assessment and patch 9 in working paper 4) would be impacted by the proposed upgrade. No fragmentation of contiguous plantations would occur.

The habitat value of camphor laurel for threatened fauna is acknowledged in both the environmental assessment and working paper 4. Specific mention is made of its importance as a food resource for threatened fauna.

The RTA agrees that maintenance is important in the ultimate performance of fauna fences.

The RTA acknowledges that there would be some increase in fragmentation and barrier effects resulting from the proposed upgrade. Route options that were further from the existing route than the preferred one would however have been expected to result in greater fragmentation and barrier effects overall. Proposed ecological restoration, particularly along creek lines would serve to minimise and in some cases would enhance habitat connectivity.

A commitment regarding bat roosting boxes has been included in the revised statement of commitments (chapter 5 of this report).

Landscape treatments undertaken within the highway reserve on St Helena ridge would recognise its designation as a regional wildlife corridor. Some land immediately above the tunnel would however, remain in private ownership or be returned to private ownership after completion of construction.

Submission number

350 - Department of Environment and Climate Change NSW

Summary of issues

The following submission raised issues associated with consideration of previously designated wildlife corridors.

- > Section 12.2.4 of the environmental assessment should consider any wildlife corridors identified in the Ballina Shire Council's draft Biodiversity Strategy as discussed in working paper 4 on page 50. (350 - Department of Environment and Climate Change NSW)

Response

The wildlife corridors identified by Ballina Shire Council were considered in the route selection stages of the project. None of these corridors are however subject to potential impacts from the proposed upgrade, so no mention of them was deemed necessary in the main environmental assessment document.

2.10.5 Aquatic ecology

Aquatic ecology assessment

Submission number

253 - NSW Department of Primary Industries, 316 - Rous Water, 349 - Byron Shire Council

Summary of issues

The following submission raised issues associated with the assessment of aquatic ecology.

- > The environmental assessment identifies but fails to recognise the significance of aquatic/riparian environments within drinking water catchment areas by restricting the assessment of values to habitat quality and the known presence of threatened/significant species. (316 - Rous Water)
- > Assessment of aquatic/riparian impacts does not recognise catchment values. (316 - Rous Water)
- > No systematic reporting of the results of the habitat assessments undertaken have been included in the environmental assessment. (316 - Rous Water)
- > The environmental assessment fails to provide adequate catchment-specific information to demonstrate that all critical aquatic and riparian habitats throughout the Emigrant Creek and Wilsons River water catchment areas shall be protected. All waterways in the water catchment areas are of aquatic ecological significance as these systems support essential ecosystem processes and functions that maintain water quality at a catchment-scale. (316 - Rous Water)
- > Satisfied with the information contained in the environmental assessment particularly with the detail supplied for Aquatic Habitats Section 12.2.5 and the classification of waterways as per the Fisheries Policy and Guidelines and shown in Table 12.4. Although it could be argued that Byron Creek is in fact a Class 1 not a Class 2 stream as suggested in the table. This is of no consequence as the proposed twin bridges for this location are most suitable for a Class 1 or 2 waterway crossing 253 - NSW Department of Primary Industries.
- > Aquatic ecology assessment has not addressed impacts of culverts in terms of streambank and streambed disturbances. (349 - Byron Shire Council)

Response

The environmental assessment identifies different levels of significance (Table 12.4) using DPI Fisheries habitat classifications as a means of evaluating their significance as part of the assessment process. Applying an equal level of significance to all waterways irrespective of their actual ecological importance would devalue the assessment process.

The extent of riparian and aquatic impact is assessed in the environmental assessment. Riparian habitat occurs as both camphor laurel and lowland rainforest and is inherently part of the direct and indirect effect calculations shown in Table 12.5 of the environmental assessment. It is acknowledged that the component of these that is riparian and non-riparian habitat is not distinguished in the environmental assessment. The extent of aquatic habitat affected is described in Table 12.6 of the environmental assessment.

The RTA agrees that ecological significance and catchment functionality extends beyond threatened species and identified high conservation value areas. The environmental assessment does acknowledge this as evidenced by the assessment of relative habitat values in Table 12.4.

The RTA also agrees that creek lines provide an important function in terms of wildlife movement. This is clearly acknowledged in section 12.2.4 of the environmental assessment.

It should be noted that the proposed upgrade would result in an increase in the extent and quality of riparian habitat in the Rous Water catchments, both through restoration within the road reserve and restoration on riparian land acquired by the RTA that would be outside of the road reserve. A commitment to undertake riparian zone restoration has been demonstrated with the commencement of riparian restoration works on a property acquired by the RTA in the Emigrant Creek catchment. The RTA would continue to work with Rous Water to undertake further restoration works as the land becomes available.

A summary of the habitat assessment is included in the environmental assessment (Table 12.4). The basis for the habitat classifications is systematically reported in section 2.2 of working paper 5.

The RTA would establish an environmental review group (or similar) for the implementation phase of the project. The formation of the group would allow the RTA to involve key agencies and stakeholders to periodically review and comment on the development of the detailed design and emerging construction issues. The RTA proposes to invite Rous Water to participate in this group to ensure they have the opportunity to comment on issues, such as those identified above, during the development of the detailed design and during construction.

The DPI comment regarding Byron Creek is noted.

Requirements for culverts and related impacts are acknowledged in Table 12.6 of the environmental assessment.

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that the RTA had now adequately addressed the above issues they have raised.

Aquatic ecology working paper recommendations

Submission number

316 - Rous Water

Summary of issues

The following submissions commented on the recommendation to modify existing waterway crossings made in working paper 5

- > Working Paper 5 recommends the following improvements to facilitate fish passage: the upgrade of the existing culvert where Emigrant Creek crosses the Pacific Highway; the removal of a causeway upstream of the proposed bridge over Byron Creek. These are not addressed in the main volume of the environmental assessment and the RTA should commit to the implementation of these recommendations. (316)

Response

The modifications to the existing water crossings recommended in Working Paper 5 were not carried through to the environmental assessment. These modifications are outside the scope of the works required for the construction of the proposed upgrade and the RTA does not intend to undertake those works.

Rous Water in its subsequent comments (dated 3 February 2009) while acknowledging that impacts from the existing highway are not part of the proposed upgrade, believe that the RTA should nevertheless address environmental mitigation from the existing highway.

Water catchment ecology

Submission number

316 - Rous Water

Summary of issues

The following submissions were concerned with the consideration of the water catchments in the ecological assessment.

- > The environmental assessment fails to consider the water catchment areas as a whole of an ecosystem basis. Assessment should include consideration of the overall impacts on all vegetated areas (including open meadow and areas in a degraded condition). All local creek systems should be identified as a local wildlife corridor. (316)

Response

The RTA assesses ecological impacts in terms of absolutes i.e. extent of area effected and other measures of magnitude of impact as appropriate.

It is unclear from the above submission how a “whole of ecosystem” basis would differ from the environmental assessment undertaken, other than calculating the extent of pastureland to be affected. Note that the amount of pastureland (as well as other types of agricultural land) that would be affected is documented in Table I 4.3 of the environmental assessment.

Section 12.4 of the environmental assessment also details the mitigation proposed to minimise habitat fragmentation and barrier effects. Creek crossings are proposed to be regarded as wildlife corridors, with landscape treatment, riparian restoration, and engineering design facilitating fauna movement across (under) the proposed upgrade.

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that the RTA had now addressed this issue adequately.

2.10.6 Groundwater dependant ecosystems

Submission numbers

316 - Rous Water

Summary of issues

The following submissions were concerned about how the impacts on groundwater dependent ecosystems were assessed.

- > To use the results of the terrestrial vegetation mapping completed by Biosis (2008) as the basis for determining the impact to groundwater dependent ecosystems is inappropriate. It fails to address river base flow systems that support a diversity of ecosystem types in the subject catchments. (316 - Rous Water)
- > Mapping of high priority groundwater ecosystems contained in the Water Sharing Plan for the Alstonville Plateau Groundwater Sources should be included in the groundwater assessment. (316 - Rous Water)
- > A more reliable assessment of potential impact to groundwater dependent ecosystems would be to assess impacts to all high priority groundwater ecosystems identified from Schedule 5 of the water sharing plan within the nominated buffer zone of 250 m from the proposed upgrade. (316 - Rous Water)
- > The assessment of groundwater dependent ecosystems is flawed and needs to be addressed. For each cut, the identification of groundwater dependent ecosystems and identification of potential impacts and mitigation measures on a sub-catchment basis should be identified. (316 - Rous Water)

Response

The Biosis mapping undertaken for the environmental assessment was given greater emphasis in Working Paper 4 – Terrestrial Flora and Fauna Assessment than the Brodie and Green mapping because it is considerably more accurate, being project specific and based on considerable ground truthing.

The Biosis vegetation mapping provides details of locations of terrestrial vegetation and wetlands; it did not include identification of river base flow systems. River base flow systems however were not ignored in the assessment of groundwater dependent ecosystems. Potentially affected watercourses were identified and an evaluation of the effect of groundwater changes on watercourses and related ecosystems is included in Table 11.2 of the environmental assessment.

Impact assessment of potentially affected groundwater dependent ecosystems has been undertaken irrespective of the priority assigned under the Water Sharing Plan, based on the best available mapping as noted above.

If subsequent investigations identify any existing groundwater dependent ecosystems that have not been assessed, the RTA would undertake additional evaluations during subsequent design phases in order to minimise any deleterious impacts.

The environmental assessment and working papers describe the types of mitigation that would be implemented where impacts on groundwater occur. The RTA would develop these measures during detailed design, construction and operation.

Buffer zones identified in the Water Sharing Plan for the Alstonville Plateau Groundwater Sources (water sharing plan) are highly specific to groundwater extraction activities with different buffer zones applied based on the volume being extracted and the type of bore.

By adopting a range of engineering mitigation measures that minimise impacts on groundwater, the RTA believes that it is acting in accordance with the principles of the water sharing plan.

The Biosis vegetation mapping extends to the entire original study area of the proposed upgrade. The statement in the working paper that the Biosis mapping extends to 50m either side of the proposed upgrade is referring to the Biosis assessment for the environmental assessment as opposed to the more extensive vegetation mapping undertaken earlier in the project. The assessment of groundwater dependent ecosystems is based on the extent of the area of likely impact for each cut, whatever distance from the proposed upgrade this might be.

Rous Water in its subsequent comments (dated 3 February 2009) acknowledges a professional difference of opinion with the RTA regarding impacts on groundwater dependent ecosystems. The RTA's opinion is represented by the above discussion.

2.10.7 Compensatory habitats and restoration programs

Habitat compensation for the proposed upgrade

Submission number

316 - Rous Water, 349 - Byron Shire Council, 351, 367 - Northern Rivers Catchment Management Authority

Summary of issues

The following submissions were concerned with compensatory habitat and restoration programs associated with the proposed upgrade

- > Section 12.4 of the environmental assessment does not commit to any compensatory or offset plantings. The nature and extent of the overall aquatic/riparian impacts need to be assessed, and at least a comparable area identified that will be restored to offset this extent of impact. (316 - Rous Water)
- > Specific compensatory habitat areas should be identified on this project, purchased and managed for the development of suitable habitat to enable long-term recovery and growth of local species within the length of this project. (351)

- > Due to the unique native vegetation and soil type found along this section of the highway, habitat compensation should occur locally. The RTA is to rehabilitate and improve strategic remnants and small patches of Lowland Subtropical Rainforest of the Big Scrub Rainforest as compensation for habitat damage and vegetation removal. (367 - Northern Rivers Catchment Management Authority)
- > Riparian zones affected by the new alignment must be rehabilitated and maintained in a condition which will have enhanced habitat potential and a high riparian zone function. This will be achieved by regeneration and revegetation of local native riparian species planted in their correct location on the bank and removal of threats such as stock and weeds including aquatic and vine weeds. (367 - Northern Rivers Catchment Management Authority)
- > There is significant value to native fauna of a properly funded and monitored habitat nest box project. Would like to be consulted in the development of such a program. (351)
- > Several aquatic habitats should be constructed in the Tintenbar to Ewingsdale upgrade corridor as part of the compensatory habitat package for this project. Native fauna, particularly birds, will benefit substantially from both the construction of nesting boxes and adjacent food sources. (351)
- > Mitigation should consider the Byron Shire No Net Loss Vegetation Policy. (349 - Byron Shire Council)

Response

As discussed in section 12.4.3 of the environmental assessment, a compensatory habitat package that has been previously agreed with DECC (then the National Parks and Wildlife Service), covering all Pacific Highway proposals in the area between Ballina and the Queensland border (known as 'Section 5'). This sectional approach provides for a larger and more effectively manageable area of compensatory habitat, suitable for use as an offset for the Tintenbar to Ewingsdale upgrade and other Pacific Highway upgrade projects including the adjoining Ballina bypass.

The agreement already reached with the DECC provides for an area of 355 ha to be provided by the RTA as an offset for residual impacts of approximately 51 ha across all projects within section 5.

In addition to this, restoration, regeneration and rehabilitation of areas of native vegetation would occur where it remains with the proposed road reserve. Riparian restoration would be undertaken where creek lines occur on land that is acquired as part of the proposed upgrade, but that would be outside the construction footprint. It is envisaged that the area of habitat restored would far exceed the area removed and/or disturbed by the proposed upgrade. Riparian restoration is regarded as being equivalent to the restoration of the lowland rainforest endangered ecological community due to the species composition and structure of typical riparian vegetation in the area.

Where alternative locations exist, nest boxes would be used to replace any removed tree hollows. Such a program would be developed in consultation with DECC.

Mitigation of ecological impacts would exceed *no net vegetation loss* principles.

Rous Water in its subsequent comments (dated 3 February 2009) stated that if key stakeholders (DECC and DPI) are satisfied with proposed treatment, that Rous Water would consider the proposed treatment an acceptable outcome.

Existing riparian restoration programs

Submission number

316 - Rous Water

Summary of issues

The following submissions relate the affect of the proposed upgrade on existing riparian zone restoration works.

- > There is a range of community-based environmental restoration initiatives underway that are potentially undermined either through land acquisition, or through community disruption and reduced motivation. These risks could be mitigated through an active process of support for community environmental restoration activities. (316 - Rous Water)

Response

The RTA would ensure that riparian restoration undertaken as part of the proposed upgrade is complementary to existing community based programs being undertaken in the area.

Rous Water in its subsequent comments (dated 3 February 2009) acknowledged that the RTA is committed to working with Rous Water in the management and restoration of riparian zones. Rous Water requested that a structured approach recording RTA commitment be documented.

2.10.8 Cumulative ecological impacts

Submission number

350 - Department of Environment and Climate Change NSW

Summary of issues

The following submission was concerned with cumulative impacts on Lowland Rainforest.

- > The extent of affected vegetation area given in Table 12.5 of the EA is accepted and, on the face of the data provided, seems a relatively small amount. However, the information in Table 8 of Working Paper 4 (page 58) suggests that the amount of removal of lowland rainforest endangered ecological community represents some 21% of the total proposed across the entire Pacific Highway upgrade, that is, it contributes substantially to the cumulative impact that the latter is having. (350 - Department of Environment and Climate Change NSW)
- > Table 12.7 of the EA that summarises cumulative impacts is missing an analysis of the Brunswick Heads to Yelgun, Ewingsdale to Brunswick Heads upgrades and the proposed Ballina bypass. (350 - Department of Environment and Climate Change NSW)

Response

Assessing cumulative impact as one project's percentage contribution to the total program removal can be misleading. Use of absolute numbers provides a more accurate picture of cumulative and total impact. The fact remains that the area to be removed is small and after restoration programs the proposed upgrade would result in a considerably greater area of lowland rainforest than currently occurs.

Table 12.7 is based on the cumulative impact of the 13 Pacific Highway Upgrade Program projects that were declared as being critical infrastructure under Section 75B(1) of the Environmental Planning and Assessment Act. The Brunswick Heads to Yelgun upgrade and Ballina bypass projects were approved prior to this declaration and as a result were not listed on the table.

2.11 Traffic

2.11.1 Safety

Safety on St Helena hill

Submission number

094, 179, 249

Summary of issues

The following submissions raise issues of safety associated with the proposed upgrade.

- > The RTA has created considerable danger by opening the highway to B-doubles before the highway has been upgraded. There are at least 5 speed changes between Ballina and Ewingsdale. There have been many fatalities and near misses on this stretch of road. Request an immediate reduction in the speed limit to 80km/h as a precondition of approval. (179)
- > 80km/hr speed limit should be imposed on existing highway when it becomes a local road. This would reduce the number of accidents on this stretch. 60km/hr speed limit and camera at St Helena Hill should be kept. (249)
- > The Bangalow to Ewingsdale section of the highway has a very high accident rate because of the hilly sections, therefore by using this section of the road for a main linking road when this highway is upgraded makes no sense at all. (094)

Response

One of the objectives of the proposed upgrade is to reinforce the role of the Pacific Highway as a freight route. The relocation of long distance freight traffic from the existing highway to the proposed upgrade would greatly improve safety on St Helena hill.

The RTA continuously monitors and reviews speed limits as necessary along the highway. In the past five years, speed reductions along the Pacific Highway have occurred within the study area at Ross Lane (80 km/hr), St Helena Hill (60 km/hr) and north of Newrybar (80km/hr).

As detailed in section 2.13 of working paper 6, the accident rate for the existing Pacific Highway between Bangalow and Ewingsdale is 56 accidents per 100 million vehicle kilometers travelled (MVKT) based on accident history for the 5 year period from 1 May 2002 to 30 April 2007.

Since 2004 however, the accident rate on the Bangalow to Ewingsdale section of the highway has decreased significantly as a result of a number of road safety improvement measures. The measures implemented include installation of wire rope safety fence (May 2004), reduction in speed limit to 60km/h (May 2006) and installation of speed camera (September 2006). Analysis of the accident numbers for the 2 year period to 31 December 2007 indicates that the accident rate for the section has reduced to 35 MVKT. It should be noted however that this rate is based upon a shorter period of time so should be considered as an indication of accident trends.

Pavement selection

Submission number

094

Summary of issues

The following submission raised the issue of the performance of pavement in wet conditions.

- > Pavement that performs well in the wet should be given preference for safety reasons to low noise pavement. (094)

Response

The skid resistance of the pavements discussed in the environmental assessment all perform satisfactorily for the design speed. Safety in wet weather is greatly influenced by the amount of water on the road. The RTA provides very strict criteria in respect to this issue for both the detail design and the construction phases to minimise the risks associated with depth of flow on the road surface and the potential for aquaplaning.

Road safety in Bangalow

Submission number

185, 188, 190, 313

Summary of issues

The following submissions were concerned with a decrease in safety in Bangalow due to increased traffic volumes.

- > Decreasing safety, because of increasing traffic in Bangalow. (185, 188)
- > There's a significant increase in the volume of traffic and an increase of heavy vehicles in Bangalow. Is concerned about the safety of this, especially about his children who needs to navigate the Granuaille Road intersection to get to school. (190)
- > The increase of bypassing traffic through Bangalow is totally unacceptable. It is dangerous, especially for children.

Response

Traffic volumes (and therefore road safety) in Bangalow are not expected to be influenced by the proposed upgrade. The RTA as the authority responsible for Main Road 65 (which includes Granuaille Road) would continue to monitor and manage road safety on Granuaille Road, however this would occur separately to the proposed upgrade.

2.11.2 Commercial / heavy vehicles**Submission number**

040, 042, 129, 156, 201, 207, 254, 287, 319, 359

Summary of issues

The following submissions raised issues of heavy transport through the town of Bangalow

- > No heavy transport through Bangalow. (319)
- > All heavy traffic should be directed through the St Helena tunnel and weight restrictions placed on vehicles wishing to use Granuaille Rd and Bangalow-Lismore Rd (040, 042, 129, 201, 254, 359)
- > Environmental assessment ignores these roads create unacceptable conditions at the present and we find RTA responsible for the appalling degradation of our living conditions due to large increase in traffic. A plan is essential to remove through-traffic from Granuaille Rd which has the worst topography for it-steep road on a ridge where vehicles have to brake and accelerate constantly. (156)
- > We don't want increased traffic in Bangalow from trucks carrying dangerous goods past our schools and children in the main street. This increases the danger for school children. (207, 287)

Response

The Pacific Highway is part of the Commonwealth's National Land Transport Network. It not only provides for freight and passenger transport between capital cities, but also for inter- and intra-regional movements of people and goods. The environmental assessment is focused on the Sydney-Brisbane corridor rather than connections to centres to the east or the west in meeting the key objectives of Pacific Highway Upgrade Program. The environmental assessment however, does address the need to separate through and local traffic, the requirement to provide an alternate local road system to the proposed upgrade, and providing safe access to the proposed upgrade. Approximately 44% of the total traffic, and about 25% of the total heavy vehicles, would remain on the existing highway between Ewingsdale and Bangalow. The lower proportion of heavy vehicles that would remain on this section of the existing highway is due to the relatively high proportion of heavy vehicles that are on long-haul routes and therefore would use the proposed upgrade.

The traffic assessment presented in Section 13.4.4 of the environmental assessment assesses the impact of the upgrade on traffic volumes on local roads, including Bangalow Road and Granuaille Road. Traffic volumes in Bangalow are not expected to increase as a result of the proposed upgrade to the Pacific Highway. Accordingly any increase in heavy vehicles in Bangalow would be as a result of overall growth in traffic volumes on the road network as a whole.

Granuaille Road forms part of Main Road 65 and is not part of the Pacific Highway. Access to the Pacific Highway for east / west traffic travelling between the highway and Lismore via Main Road 65 would be maintained via the Ewingsdale interchange. Any upgrade of Main Road 65 is outside the scope of this environmental assessment.

2.11.3 Traffic on St Helena Hill

Submission number

014, 015, 037, 081, 116, 121, 122, 181, 188, 196, 206, 249, 274, 346

Summary of issues

The following submissions raised issues related to the predicted traffic volumes on St Helena Hill following completion of the upgrade and access to the proposed tunnel.

- > All the traffic on the existing highway should be moved to the upgraded highway via the tunnel. To leave 45% of traffic on existing steep and dangerous road is poor planning and not fully utilising new highway. (014, 015, 037, 116, 121, 122, 181, 188, 274, 349 - Byron Shire Council)
- > Traffic using the steep St Helena Hill should be put on the new motorway south of the tunnel so that this traffic does not have to travel over the Ewingsdale Interchange and close to the Myocum Road residents. Forcing traffic to use St Helena Hill will simply continue the risk of bad accidents. (196, 206)
- > Ewingsdale to Bangalow section of the existing Pacific Highway should only be used as a service road to link Coolamon Scenic Drive and St Helena Road to Bangalow or Ewingsdale. (249)
- > Lismore traffic currently passes through the town of Bangalow before travelling over St Helena Hill to Ewingsdale. RTA does not appear to have fully considered the consequences for this traffic which may use more local roads after the upgrade than at present. The Lismore traffic should be fully integrated into the upgrade so as to remove traffic from the streets of Bangalow while avoiding the use of roads such as the Old Pacific Highway past Ewingsdale Hall and Church. (346)
- > As part of this project an interchange at the southern end of Bangalow would prevent over 50% of the traffic from having to leave the highway at Ewingsdale interchange and travel along the notorious accident black spot of St Helena Hill to the village of Bangalow and onward to Lismore. This was the reason for the tunnel in the first place, to prevent accidents on St Helena Hill. (081)

Response

The environmental assessment is focused on the Sydney-Brisbane corridor rather than connections to centres in the west because that is the focus of the Pacific Highway Upgrade Program. While it is important that Pacific Highway upgrades do nothing to preclude effective regional linkages beyond the Pacific Highway corridor, these linkages are dealt with as separate projects by the RTA and receive priority in accordance with need and benefits. The environmental assessment was focussed on upgrading of the highway between Tintenbar and Ewingsdale, potential impacts on the local road network were discussed in section 13.4 and in working paper 6.

The proposed upgrade addresses road safety with significant savings in lives and injuries anticipated.

This combined with a significant reduction in traffic volumes on the existing highway would contribute to further improvements in road safety. For the St Helena hill section of the existing highway, approximately 56% of the existing traffic would transfer to the proposed upgrade. This would include about 75% of the total heavy vehicle currently using this section of the highway. A large proportion of the traffic remaining on this section is travelling to and from Lismore via Main Road 65 and Bangalow.

The location of the proposed upgrade is consistent with the *Northern Pacific Highway Noise Taskforce Report* (2003) which recommended the review of the previous Bangalow to Ewingsdale environmental impact statement (based on an alignment close to the existing highway on St Helena Hill) in light of concerns over noise impacts.

Regardless of the decision that will be made from the investigations into a southern bypass of Bangalow, the existing highway would be retained as an alternative to the proposed upgrade.

2.11.4 Traffic impacts

Impacts during construction

Submission number

256 - Ministry of Transport

Summary of issues

The following submission raised concerns over impact of construction on local bus services.

- > It is requested that potential disruptions to existing bus services are identified and mitigated through the construction management plan. (256 - Ministry of Transport)

Response

Measures to minimise disruption to bus services would be identified in the construction environmental management plan.

Local road network

Submission number

033, 278

Summary of issues

The following submissions raised concerns over the traffic impact the proposed upgrade would have on local roads.

- > Environmental assessment ignores the impact of the upgrade on the surrounding roads which interact with the highway. (033)

- > It is inconceivable that the RTA would expend such a large sum of taxpayer dollars to upgrade a highway to a super freeway status without properly acknowledging the impacts on the roads and townships. (278)

Response

The traffic impacts on local roads and townships were assessed by the RTA. The assessment is described in section 13.4 of the environmental assessment with more detailed technical information provided in working paper 6.

Traffic impact on Bangalow

Submission number

033, 116

Summary of issues

The following submissions were concerned with increased traffic in Bangalow as a result of the proposed upgrade.

- > A plan is essential to remove traffic from Granuaille Rd - increasing levels of traffic are causing noise impacts to local residents as well as increased pollution. (033)
- > Bangalow should be a destination, not a through road. Access to the Pacific Highway should be diverted away from Bangalow. (116)

Response

Through traffic in Bangalow is not expected to increase as a result of the proposed upgrade. The Pacific Highway was diverted away from Bangalow in 1994 and the upgrade would see the highway moved slightly further away from the town.

By providing access to the highway at Bangalow via the south facing ramps at Bangalow Road, the RTA is maintaining the existing situation. Access is considered to be required in order to support the growing tourist market in Bangalow and support local businesses.

Ewingsdale interchange and Ewingsdale Road

Submission number

349 - Byron Shire Council

Summary of issues

The following submission was concerned with congestion on Ewingsdale interchange and Ewingsdale Road

- > An instantaneous increase in traffic resulting from the proposed upgrade would worsen congestion on Ewingsdale interchange and on Ewingsdale Road. (349 - Byron Shire Council)

Response

An “instantaneous increase” would not be expected on Ewingsdale Road, as its accessibility from Brisbane and the Gold Coast is not being affected by the proposed upgrade. A gradual traffic increase would however be expected along the lines of the highway traffic growth rates identified in working paper 6.

Ewingsdale interchange has been designed to accommodate the expected increase. Ewingsdale Road is a Council owned road and management of its functionality is therefore the responsibility of Byron Shire Council.

Public transport

Submission number

256 - Ministry of Transport, 372

Summary of issues

The following submission was concerned with how the proposed upgrade would cater for public transport.

- > It is requested that the role of public transport is further assessed to achieve greater reliability, service performance and travel time for public transport users as a result of the project. (256 - Ministry of Transport)
- > Complementary transport options should be considered concurrently so that best value for money and environmental solutions can be obtained and allocated across alternative transport modes. (372)

Response

Optimisation of public transport (bus) links would occur during the detailed design phase of the proposed upgrade. The separation of through and local traffic by the proposed upgrade provides an opportunity for safer and more efficient bus links.

Potential transport modes in the area include private vehicle, pedestrian and bicycle, with bus being the only available public transport mode in the area. All of these transport modes have been considered in a complementary manner during the route selection and environmental assessment phases of the proposed upgrade.

2.12 Land use and property

2.12.1 Property access

Martins Lane

Submission number

029, 324

Summary of issues

The following submissions were received regarding access to the existing highway at Martins Lane during construction and operation.

- > How will safe and adequate access to the property be provided during construction? (029)
- > Access road to the south of Martins Lane should be wide enough to allow two vehicles to pass safely and be able to support heavy vehicles. The underpass at Martins Lane must also be sufficient height and width to allow heavy vehicles through. (029)
- > Against underpass/ overpass south of Martins Lane and north of Ross Lane. It is virtually across the road from our property and should be located at existing Martins Lane West. (324)

Response

The RTA is committed to safe and adequate access during construction. Individual access requirements would be discussed and agreed with property owners for both the construction and operation phase.

The RTA confirms that the access road at Martins Lane would be sufficient height and width to allow two vehicles to pass safely and to allow heavy vehicles through. The underpass would have a minimum overhead clearance of 5.3m.

An underpass or overbridge across the proposed upgrade alignment in the vicinity of Martin Lane West has a number of major constraints which combine against its viability. The vertical alignment of the proposed upgrade is too low to allow construction of an underpass which would avoid drainage issues. Construction of an overbridge would result in significant additional cost and the proximity of the existing Pacific Highway to the structure would result in a sub-standard junction approach. In addition the junction visibility for vehicles emerging from Martins Lane West is less than desirable and its location directly opposite Martins Lane results in a crossroads layout which is undesirable. Providing the underpass approximately 150m south of Martins Lane enables its location to be positioned in a section of the upgrade alignment which is already on an earthwork embankment and also provides an efficient link to the existing highway.

Tinderbox Creek valley

Submission number

173

Summary of issues

The following submission was received regarding access routes in the Tinderbox Valley during construction.

- > There is no mention of access routes for construction in the Tinderbox Valley. This is a significant issue given the immense movement of earth and machinery. (173)

Response

Access routes would be determined during the detailed design stage. The preferred arrangement is to construct access routes and haul roads within the proposed upgrade corridor to be utilised by construction traffic. However, initially there may need to be some establishment via the local road network. These details would be developed as part of the construction environmental management plan for the proposed upgrade, to manage any potential impacts from the movement of machinery, equipment, materials and spoil.

Residents on Tinderbox Road would be kept informed of any changes to access arrangements during the construction of the upgrade.

Local road signs

Submission number

332

Summary of issues

The following submission had a request for local road signage.

- > Request that the access bridge connecting Piccadilly Park Rd with the old Pacific Highway have street name signage (Piccadilly Park Rd) placed on either side. (332)

Response

Signage in the vicinity of construction works would be retained where possible, or replaced if affected. Any request for additional street signage would need to be taken up with the relevant council.

2.12.2 Agriculture

Impact on agriculture (general)

Submission number

005, 034, 301, 305

Summary of issues

The following submissions were concerned with impacts of the upgrade on agriculture

- > Proposal will significantly reduce the arable land on the escarpment. The area's value will be incalculable into the future given increasing food and water shortages. (005)
- > Excellent loamy farming soil and high rainfall will go to waste under tarmac and cement. (034)
- > That a minimal amount of agricultural land be resumed and used for the construction of the Tintenbar to Ewingsdale section of the Pacific Highway. (301)
- > Steps should be taken to reduce the amount of prime agricultural land resumed and used for construction of the proposed upgrade and any relevant interchanges that are deemed necessary. (305)

Response

About 192.5ha of agricultural land would be directly affected by the proposed upgrade. This figure is 4.5ha less than the area documented in section 14.3.1 of the environmental assessment, because of the removal of Ivy Lane interchange from the proposed upgrade (refer to section 4.2.5 for more information). The RTA is committed to land use outcomes that promote effective and productive use of remnant land. Mitigation measures would include amalgamation of land with adjacent properties to protect existing land use and to provide increased opportunity for enhanced land use. Vegetative buffers would be established where required to ensure protection of existing agricultural production.

Impact on macadamia plantations

Submission number

029, 253 - NSW Department of Primary Industries, 299

Summary of issues

The following submission raised concerns over impacts on macadamia plantations.

- > Severe impact on areas of established macadamias - will lead to lower production and income (029)
- > There will be severe restrictions on the ability to spray trees for pests in the vicinity of the road (029)
- > The proposed inclusion of buffer plantings within the road corridor as far as practical is supported in principle. These plantings and any buffer plantings that are planned adjacent to the corridor on private lands should be subject to negotiation with the adjoining landowner. (253)

- > Construction and operation will increase airborne pollution which may restrict photosynthesis and pollination, and may result in contamination of the end product. The buffer zone should have an extra density of plantings, including taller species. (029)
- > Plantings should be species that are not hosts to pests and diseases of macadamias. All areas of plantings and remnant lands should be kept free of vermin and weeds (029)
- > Ownership of remnant lands should be established well before the road is completed to ensure proper management of macadamia farms due to the long time frames involved in maintaining the crops. (029)
- > Just to the north of the motorway crossing Emigrant Creek, a long term research and development project (conducted by the CSIRO for the Macadamia Industry on a privately owned macadamia plantation) is subject to acquisition. It is not an isolated research project - it is a program of comparative values among various locations along the east coast and thus puts analysis of the results of the whole project at a severe disadvantage. (299)

Response

The impacts on macadamia plantations are acknowledged by the RTA and described in Section 14.3.1 of the environmental assessment.

The landscaped edge of the road reserve would in many cases, serve as a buffer to allow macadamia plantations to grow as close to the boundary without restrictions on spraying activities. The RTA would continue to consult with the Department of Primary Industries and property owners over the selection of suitable species for planting in areas adjacent to macadamia plantations.

There is no evidence of airborne pollution from the existing highway causing detectable reductions in photosynthesis or pollination of macadamias growing in adjacent properties. Airborne pollution levels would generally be less than current levels as a result of the proposed upgrade due to more consistent travel speeds and improved grades.

The RTA is committed to promoting the mitigation measures outlined in the remnant land strategy.

The RTA acknowledges the impact of the proposed upgrade on the Macadamia research project north of Emigrant Creek.

Remnant land and altered farm configuration

Submission number

253 - NSW Department of Primary Industries, 299

Summary of issues

The following submission raised concerns over the size and functionality of remnant and altered parcels of land.

- > The large number of severed parcels is of concern. The productive and sustainable use of severed land parcels that consist of good quality agricultural land resources is a key issue. Mechanisms should be put in place to make it attractive for adjoining property owners to amalgamate severed parcels with their current properties. (253 - NSW Department of Primary Industries)

- > The proposed upgrade will appear to be creating a number of land islands (45 ha of trapped land) as a result of property severance. The future productive use of trapped land is difficult to estimate as it will be dependant on many factors including access) size of parcel, suitability for agriculture and the like. The highway upgrade could interfere with the future development of affected lands where the development is no longer considered viable such as the development of grazing lands to more intensive land uses due to issues of layout and economies of scale. NSW DPI supports the principle of agricultural land amalgamation to preserve and enhance opportunities for sustainable) profitable and productive agricultural pursuits where this is practical to do so. Any resulting and necessary applications for boundary adjustments should be streamlined and of minimal cost to landholders. (253 - NSW Department of Primary Industries)
- > The finalisation and implementation of an effective remnant land strategy will be important to limit the impact of the proposed upgrade on the productive use of high value resource lands. Acquisition of remnant lands by adjoining owners will be contingent upon, among other things) the cost of acquiring the land, the benefits of acquisition to the adjoining owner(s) and the suitability of the land for agricultural production and other rural pursuits. (253 - NSW Department of Primary Industries)
- > Any planned relocation of sheds or farm infrastructure and any redesign of farm layout should be undertaken in consultation with or regard to neighbours so as to reduce the risk of neighbour issues and land use conflict disputes. (253 - NSW Department of Primary Industries)
- > There is the potential for some unforeseen agricultural property and agribusiness impacts to arise following the formal negotiated partial acquisition and compensation process. It is desirable that landholders be given an opportunity to approach the RTA or their agents for mitigation of or assistance with unforeseen impacts within a reasonable time period . (253 - NSW Department of Primary Industries) following the formal compensation process.
- > residual land in the Zone 7(c) water catchment (Emigrant Creek Water Catchment) should be reforested and maintained over a three to five year period to protect the catchment. There is no evidence that any of the involved parties (RTA, Rous Water, Ballina Council) are willing to assume the responsibility and the costs involved in ownership of this alienated land and maintenance in perpetuity. (299)

Response

The RTA have identified amalgamation of severed parcels as an appropriate land use outcome. If acquired property is ultimately determined to be excess to the RTA's ultimate land requirements, opportunities for reselling land as amalgamated parcels would be identified.

The potential impact of "trapped land" on agricultural production was taken into account in the environmental assessment. As discussed in the paragraph above, the RTA would promote the principle of amalgamation.

It is agreed that the finalisation and implementation of the remnant land strategy would be critical in the detailed design, construction and operational phases of the proposed upgrade.

If relocation of farm infrastructure occurs while property is in RTA ownership, the RTA would undertake appropriate consultation with neighbours.

The RTA agrees that restoration/revegetation would be a good land use outcome on some affected parcels of land. It is important that a long term management framework for such lands is identified.

Impact of road drainage

Submission number

253 - NSW Department of Primary Industries

Summary of issues

The following submission raised concerns over the impact of road drainage on agricultural activities.

- > Road drainage systems should be designed so as not to create an adverse impact on adjoining and downstream agricultural lands, erosion risk or agricultural enterprises. (253 - NSW Department of Primary Industries)

Response

A range of measures are proposed to minimise the impacts of road runoff on surrounding land and receiving waters. Some clarifications to the information on water quality management presented in the environmental assessment are provided in section 3.2 of this report.

Agricultural diseases

Submission number

253 - NSW Department of Primary Industries

Summary of issues

The following submission raised concerns over the potential spread of Panama disease between banana plantations.

- > The draft statement of commitments and Construction Environmental Management Plan should include the objective of minimising the spread of agricultural related disease and panama in particular. The NSW DPI Panama Disease Management protocol should be mentioned as a reference document in relation to this objective. (253 - NSW Department of Primary Industries)

Response

Appropriate measures to prevent the spread of Panama disease would be included in the construction environmental management plan for the proposed upgrade.

2.12.3 Property impacts

Property prices

Submission number

011

Summary of issues

The following submission was concerned with impacts of the upgrade on property prices

- > Concern that property prices will decrease at Clover Hill with the new highway coming so close. (011)

Response

The proposed upgrade would be located further away from Clover Hill and would result in a reduction in noise levels in comparison to the current situation. It would overlap with the location of the existing Bangalow bypass with the existing northbound carriageway of the Bangalow bypass (the closest carriageway to Bangalow) becoming a local access road, before the alignment diverges further to the east in the vicinity of the existing Bangalow interchange. Overall the amenity at Clover Hill would improve. On this basis it is considered unlikely that property prices would decrease as a result of the proposed upgrade.

The proposed upgrade would include a number of mitigation measures to be implemented, including low noise pavement and at resident treatments. A landscaped mound has been added to the proposed upgrade to further reduce noise impacts. The landscaped mound would also minimise the visual impact of the upgraded highway on Clover Hill residents. It is unlikely that any nearby elements of the proposed upgrade would be visible from Clover Hill estate.

More detail on the landscaped mound in the vicinity of Clover Hill is included in Section 4.3.

Activities adjacent to property

Submission number

115

Summary of issues

The following submissions had concerns over activities adjacent to property.

- > The intention to bulldoze native trees on their eastern and southern boundaries will take away the visual and aural protection from pollution from the highway. Appears on southern boundary a private access road to adjacent property is intended to be built which will lead to more noise and loss of privacy. Is this private road being provided in addition to the private access tunnel built under the Pacific Highway? (115)

- > Intention to use the land adjacent to our property as a stores depot will result in multiple truck movements every day as you build the interchange and upgrade the Highway. The incessant beeping from the trucks and dust and on-site tar factories pollute our homes. (115)

Response

To compensate for the removal of some existing vegetation along the road corridor landscape treatments would be carefully developed and detailed in the detailed design phase to mitigate the visual impacts.

The local access road in this location (off Myocum Road) would provide access to two properties, and would replace the existing access points to these properties.

These ancillary facilities would be identified using the locational criteria in section 6.6.9 of the environmental assessment. All sites would be subject to the working hours that would be detailed by the Department of Planning in the conditions of approval if the proposed upgrade is approved. Control measures would be implemented to ensure (noise) and dust is limited.

The preliminary locations of the ancillary work sites identified in the environmental assessment, including crushing plants, are considered appropriate. The final location of sites for construction facilities would be made with the input of the contractor(s) during detailed design. It is not possible to be definitive regarding the location of these sites at this stage in the process as much would depend on the particular construction approach adopted by the contractor.

Management of RTA owned land

Submission number

316 - Rous Water

Summary of issues

The following submissions relate to the management of RTA owned land.

- > The RTA land acquisition process has the potential to disrupt both human and ecological communities within the catchment. The RTA should commit to the development of comprehensive land management plans for all lands acquired by the RTA. (316 – Rous Water)

Response

The RTA utilises a local agent to manage acquired land through commercial leasing agreements. Any agreement between the RTA and the lessee is subject to the terms and conditions of the agreement in relation to the use and maintenance of the property. If any adjoining land owners have concerns regarding the maintenance of leased properties they should contact the RTA's Property Services Section or the leasing agent for further action.

2.12.4 Future urban development

Submission number

325, 333, 349 - Byron Shire Council

Summary of issues

The following submission had concerns over impact on planning for future urban development.

- > Apparent disregard for Byron Shire Council's strategic direction, as outlined in the Bangalow Settlement Strategy, specifically in relation to loss of vegetative buffer between future residential development and the proposed upgrade in the vicinity of Clover Hill estate. (325, 333, 349 - Byron Shire Council)

Response

Byron Shire Council has been consulted throughout the route selection and environmental assessment process. The RTA is aware of the Bangalow Settlement Strategy, which is acknowledged in section 2.2.2 of the environmental assessment. The concept design for the proposed upgrade has been developed with future urban areas taken into account. The proposed upgrade is located further away from any proposed development than the existing highway. Existing vegetative buffers to the future residential areas in question are not under threat.

The RTA is also aware of the draft Local Environmental Plan. The specifics of the draft Plan were not however available at the time of the publication of the environmental assessment.

2.13 Noise and vibration

2.13.1 General

Submission number

014, 015, 030, 031, 116, 121, 122, 146, 173, 188, 226, 280, 341

Summary of issues

The following submissions raised general issues of noise impact due to the proposed upgrade.

- > Concerned about increase of noise from increasing traffic.
- > Concerned about stress and illness that will be caused by noise.
- > Expect all noise measures to be considered including low noise pavement, noise walls etc.

Submission numbers 014, 015, 116, 121, 122, 280, 341

- > Bridge over the old highway will cause noise. (030, 031)
- > Concerned about noise from heavy traffic. (146, 188, 226)

- > The noise issues are also a concern particularly where the proposed highway crosses Byron Creek in the southern end of Tinderbox Valley. From the viewpoint of the folk of Tinderbox Rd, we will see and hear the traffic from this bridge. (173)
- > Would like the freeway as far away as possible as noise from the current highway causes sleep disturbance. (030)

Response

Assessment of noise impacts originating from the construction and operation of the proposed upgrade is detailed in sections 15.2 and 15.3 of the environmental assessment. Mitigation measures aimed at reducing these impacts can be found in section 15.4. Feasible and reasonable mitigation measures have been developed using a detailed noise model for the project that takes into account local topography, road grades, traffic volumes from the existing highway and the proposed upgrade, and existing buildings.

Noise levels would generally be reduced as a result of the proposed upgrade. More consistent traffic speeds and improved grades would particularly reduce the noise levels emanating from heavy vehicles. Some receivers would however be subject to an increase in noise levels, generally in situations where the proposed upgrade would be closer than the existing highway.

A number of measures are proposed to further reduce noise levels at sensitive locations. Proposed noise mitigation measures include:

- > Use of low noise pavement at sensitive locations to reduce noise generated by the proposed upgrade.
- > Landscaped mounds at sensitive locations to reduce noise emanating beyond the road reserve. An additional mound at Clover Hill has been added to the proposed upgrade since the environmental assessment exhibition (see section 4.3 of this report)
- > Architectural noise reduction treatment of individual houses where appropriate.

Blasting would be restricted to certain times and coordinated with any potentially affected sensitive receivers.

Bridge joints would be designed so that there is a minimal tyre impact noise on the bridge joints. Low noise pavement would also be used on bridges.

Consultation with potentially affected residents would be undertaken during construction with regard to the timing of noise generating activities.

Low noise pavement

Submission number

022, 037, 081, 107, 128, 160, 173, 222, 315, 358, 376, 377

Summary of issues

The following submissions raised the issue of the use of low noise pavement.

- > Low noise asphalt road surfaces should be utilised from the St Helena tunnel to beyond Newrybar in order to minimise the creation of road surface noise.
- > Residents of Tinderbox Valley were originally told there would be low noise pavement through this section, but the environmental assessment states this will not happen as it is not economically feasible. The RTA should be made accountable for

these previous assurances. Everything possible should be done to reduce the noise impact on the quiet valley.

- > The whole of the T2E from Ross Lane to Ewingsdale should be surfaced with low-noise pavement.

Submission No. 022, 037, 081, 107, 173, 160, 222, 315, 358, 376, 377

- > Low noise pavement should be used adjacent to Clover Hill. (002, 344)
- > Low noise pavement should be used on both the highway and St Helena Rd. (009, 022, 023, 037, 068, 081, 128, 174, 342, 345, 362)

Response

The use of low noise road surface has been investigated for a number of sections along the proposed upgrade. Low noise pavement generally has higher capital and life cycle costs and therefore it is used where the most value can be achieved.

The proposed locations for low noise pavement are described in Section 15.2 of the environmental assessment and include:

- > All bridges.
- > From about 300 m south of Newrybar to Skinners Creek.
- > From south of Bangalow to 750 m north of the proposed railway crossing at Bangalow.
- > From the northern portal of the tunnel through to the Ewingsdale interchange.

For isolated residences that still exceed the applicable criteria, individual architectural treatments become the only viable option. These may include one or a combination of upgraded glazing, fresh air ventilation, and courtyard treatments including noise mounds. These would be undertaken in consultation with potentially affected residents.

The RTA is not aware of any commitment made regarding low noise pavement in the Tinderbox Creek valley.

Profile line marking (ripple strips)

Submission number

002, 023, 107, 160, 358, 377

Summary of issues

The following submissions had concerns with the possible use of profile line marking (ripple strips) on the upgraded highway.

- > No ripple strips should be used. (002, 023, 107, 160, 358, 377)

Response

Currently no profile line marking is proposed for the upgraded highway.

Profile line marking is a road treatment that provides the RTA with improved road safety outcomes. The use of profile line marking would be reviewed should a safety issue emerge during the operation of the proposed upgrade, such as visibility in rain, fog and at night. Subject to review of safety on the upgraded highway during operation, profile line marking would not be installed within 500m of sensitive receivers unless it is deemed essential from a safety point of view.

2.13.2 Assessment methodology

Submission number

068, 333, 345, 350 - Department of Environment and Climate Change NSW

Summary of issues

The following submissions are regarding assessment methodology for predicted traffic noise levels.

- > Noise projections do not take into account westerly winds which blow for a large portion of the year. Also truck noise at night is intermittent, so creates noise louder than the background levels. Noise from trucks changing gears and braking near the entrance of the tunnel will cause a further problem. (068)
- > Re-assessment of the projected data in regards linear traffic increase (suggested 3%) from both localised approved developments in Ewingsdale and SE Qld bound traffic. (345)
- > The maximum noise level assessment in the NIA does not appear to have been conducted in accordance with the ENMM. It is not clear in the NIA whether the proponent has considered mitigating night time maximum noise level impacts through the use of options such as increasing barrier heights, and location and height of earth mounds. (350 - Department of Environment and Climate Change NSW)
- > RTA's measurement of traffic noise in Bangalow was limited to only two sites, one in Clover Hill and the other at the primary school in the centre of the village almost a kilometer from the existing highway. These are clearly inadequate to measure the full area of Bangalow affected by highway noise. (333)
- > In cases where major roads such as this pass so close to residential and recreational areas as well as special use areas such as the Feros Aged Care Facility (located within 500 metres) of the proposed T2E intersection), there is a case for reviewing the standard upon which the RTA operates. Indeed, because Bangalow is not part of the T2E study area, there is doubt as to whether any noise measurements have been made at this facility or at other relevant sites abutting the highway. (333)

Response

The accepted road traffic noise prediction methodology in Australia is CoRTN. It has been widely shown to provide credible results on hundreds of similar road traffic noise projects in Australia over the last 15-20 years. While CoRTN does not have algorithms for metrological effects, the model has been calibrated against on-site noise monitoring which covered a period of variable weather conditions.

Intermittent truck noise, such as engine braking, is louder than the background levels and it is recognised that the subjective response of these types of intermittent noises is not well understood. While a qualitative assessment of this noise is provided in the assessment, the quantitative assessment is based on the average (ie Leq) traffic noise level, since this is (better) able to be related to the subjective response. The entrance of the tunnel is not expected to cause any 'amplification' of the noise of trucks changing gears and braking.

The noise level assessment has been based on likely future traffic volumes which have been determined as part of the traffic assessment, taking account of likely future developments in Ewingsdale and South East Queensland. That being said, the predicted traffic noise levels are not strongly sensitive to changes in traffic volumes, a 100% increase in traffic

volumes would be necessary to increase noise levels by just 3dB(A). The suggested 3% increase in traffic volumes would increase traffic noise levels of just 0.13dB(A), which is well below the prediction accuracy of the model itself, and certainly not perceptible by humans.

Maximum noise levels were assessed, with the assessment documented in section 5.6 of working paper 8. Noise mitigation is intended to reduce both maximum and average noise levels. The decision on the extent of noise mitigation is largely based around a determination of what is reasonable and feasible.

Measurements have been taken at representative locations along the whole study area, and have generally been used to calibrate the computer noise model of the highway. It is not necessary to undertake traffic noise measurements at every receiver location to calibrate a noise model. The level of road traffic noise exposure experienced by locations within Bangalow itself, both with the existing and proposed road, are adequately described by the results of the computer noise model, which takes into account the location of the road and screening by intermediate earthworks.

The study area boundary did not represent the boundary of impact assessment. It represented the outer limit of potentially feasible routes during the route selection process. Road traffic noise levels have been predicted at locations throughout Bangalow, as shown on the noise level contour plots. Noise levels at places of active and passive recreation have been considered, however these are generally less sensitive and therefore have a traffic noise criteria higher than or equal to residential premises (see criteria in Table 1 and 2 of working paper 8).

2.13.3 Construction noise

Construction hours

Submission number

376

Summary of issues

The following submission raised the issue of construction hours.

- > Request assurances that construction hours will be restricted to that stated in the environmental assessment, and as a rock crushing plant is likely to be located in the vicinity, that there be no construction for at least one day a week. (376)

Response

Should the proposed upgrade be approved, standard construction hours would be limited to those specified by the Department of Planning in the conditions of approval for the project. However, the RTA would not rule out the possibility of extending the standard construction hours. Note, this would only occur following community consultation and seeking formal approval from the Department of Planning to a modification to the Conditions of Approval. Additionally construction may occur outside the standard construction hours. However, this would also only occur with the approval of the Department of Planning following further consultation with affected residents and, if required, additional construction noise assessments.

The locations of all ancillary work sites identified in the environmental assessment, including crushing plants, are considered appropriate. The final location of sites for construction facilities would be made with the input of the contractor(s) during detailed design. It is not possible to be definitive regarding the location of these sites at this stage in the process as much would depend on the particular construction approach adopted by the contractor.

To limit impacts, locational criteria were identified in the environmental assessment that would need to be followed before a site is selected (Table 6.12 of the environmental assessment).

Blasting

Submission number

350 - Department of Environment and Climate Change NSW

Summary of issues

The following submission raised the issue of vibration criteria to be used in relation to blasting.

- > Various vibration criteria have been cited in the environmental assessment. The DECC's Assessing Vibration: a Technical Guideline should be used for assessing all potential annoyance from vibration. (350 - Department of Environment and Climate Change NSW)

Response

The environmental assessment references criteria from both AS2670.2-1990, BS6472-1992 and the vibration dose value (VDV) (root mean quadrature, RMQ) approach adopted in the 2006 DECC guidance. However, the latter is difficult to use in practice, since there are few construction equipment source levels documented in VDV terms, and very few (if any) consultants have any equipment capable of directly measuring VDV levels. Furthermore, the 'dose' based approach would require a detailed understanding of the *duration* that particular equipment would be expected to run for – this level of detail is not available at this early stage of project planning, and any such VDV predictions would be expected to be little more than speculation. An outcomes based approach to the assessment and management of impacts was therefore adopted.

Submission number

350 - Department of Environment and Climate Change NSW

Summary of issues

The following submission raised concerns regarding the prediction of blasting impacts.

- > For potential blasting impacts, DECC would expect the proponent to use appropriate site laws to ensure blasting criteria in the ANZECC guidelines are not exceeded at all sensitive receiver locations. The environmental assessment does not provide sufficient information on potential construction noise and vibration levels, stating that the levels will be site specific. (350 - Department of Environment and Climate Change NSW)

Response

In practice, blasting shots are carefully designed by the shot-firer to ensure that appropriate vibration limits are achieved at the nearest sensitive receiver. The primary parameter controlling blasting vibration is the maximum instantaneous charge. Appropriate site laws have been used to recommend a typical MIC of around 4 kg to ensure that the ANZECC overpressure and vibration guidelines are met.

With regards to construction plant source noise levels, the values used in the predictions, and shown in Table 15 of working paper 8 are based on guidance from AS2436-1981 (which is itself substantially copied from BS5228-1997). However, it is important to understand that this source data is over 30 years old, so it has been supplemented with more recent guidance provided by the UK Department of Environment, Food and Rural Affairs (DEFRA) *Update of Noise Database for Prediction of Noise on Construction and Open Sites* (2005). This guidance supports the use of a typical average-maximum+ construction site sound power levels of between 113-115 dBL_w. The more recent DEFRA guidance also supports the use of a maximum sound power level for percussive piling of 120 dB(A) L_w rather than 130 dB(A) L_w.

An outcomes based approach to the assessment and management of construction noise impacts has been adopted to allow for variations in construction methods.

2.13.4 Noise mitigation

General

Submission number

029, 123, 125, 333, 377

Summary of issues

The following submissions raise the issue of noise mitigation measures.

- > RTA should use excess spoil for noise mounds along the length of the upgrade. Heavily populated areas should be a priority for noise reduction by the RTA. (029)
- > The Emigrant Creek crossing at Newrybar will be at such an elevation that noise transmission will affect hundreds in the local community. Requires noise wall protection along the length to minimise the impact. (377)
- > Trees should be replanted in great numbers and now where feasible to provide green screen. (123)
- > Owner requested that house has noise mitigation treatment. (125)
- > RTA does recognise that the T2E poses significant noise problems greater than those of the current highway. They therefore propose low-noise pavement surfacing for limited parts of the T2E. In this area sound travels a long way and it is requested that Planning require the whole of the T2E from Ross Lane to Ewingsdale to be surfaced with low-noise pavement. (333)

Response

Opportunities for spoil sites have been identified in the concept design at Newrybar, Bangalow, and Ewingsdale that would assist in the mitigation of noise. As discussed in section 4.3 of this report, an additional landscaped mound is proposed between the existing highway and Clover Hill. If approved as part of the preferred project report, this mound would further reduce noise impacts from both the existing and upgraded highway in Clover Hill and Bangalow.

During construction there may be opportunities for excess spoil to be placed on private property to provide visual and noise mitigation for adjoining properties. These opportunities would depend on the availability of excess spoil, discussions between the contractor and property owners, and the need to provide a well integrated design with the surrounding landscape.

The Emigrant Creek bridge would have a low noise pavement surface. Bridge joints would be designed to minimise tyre impact noise. A noise wall on Emigrant Creek bridge is not considered feasible and reasonable, given the mitigation given the relatively small number of residences in close proximity to the bridge and the noise reduction that can be expected from the mitigation measures discussed above.

There would be extensive tree planting in the road reserve as part of the landscape treatment of the proposed upgrade. The presence of vegetative buffers on roads generally has little impact on noise levels however.

The final decision on treatment measures to individual houses would be made in consultation with property owners, after additional noise assessment is carried out which is based on the detailed design of the proposed upgrade.

The RTA does not suggest that the proposed upgrade “poses noise problems greater than those of the current highway”. In fact noise levels would reduce for the majority of residents. The RTA does however acknowledge that noise levels are likely to exceed the traffic noise guidelines in some locations and has therefore evaluated different mitigation options. In some locations (primarily where there are clusters of residents) it is cost effective to install low-noise pavement. Where residents are more scattered, different solutions have been and would continue to be investigated.

Noise mitigation at Clover Hill

Submission number

333, 350 - Department of Environment and Climate Change NSW

Summary of issues

The following submission is concerned with potential noise mitigation adjacent to Clover Hill estate.

- > Architectural treatment is totally unsuitable and unsatisfactory in a climate such as Bangalow's. (333)
- > In the assessment for the Clover Hill residences, the NIA asserts that barriers are deemed not feasible and reasonable when the “target barrier” exceeds 8m high. DECC considers that this is not in accordance with the RTA's Environmental Noise Management Manual. (350 - Department of Environment and Climate Change NSW)

- > It is not clear whether architectural treatment is considered for receiver locations at the Clover Hill catchment. The NIA states that a 5.5 metre barrier is feasible and reasonable. The ENMM talks about the optimisation of barrier and architectural treatment options (Practice Note IV), suggesting that residual noise impacts (impacts above the criteria after the barrier height optimisation process) should, in certain circumstances, be assessed in terms of architectural treatment. (350 - Department of Environment and Climate Change NSW)

Response

Architectural treatment is considered when other noise mitigation measures for properties subject to exceedences of noise levels such as noise barriers are not considered reasonable or feasible, or when barriers would create unacceptable impacts (such as visual impact) due to their height or positioning.

Example 3, of Practice Note IV(c) of the RTA Environmental Noise Management Manual provides an example where the target noise level cannot be achieved without a barrier in excess of 8m height limit, and states that this indicates that *barriers are not a viable option for this assessment location*. The exclusion of barriers higher than 8m from further analysis is therefore in accordance with the RTA Environmental Noise Management Manual. Furthermore, Practice Note IV(a), pg 108 states 'Noise barriers more than 8 m high are generally considered visually unacceptable'. The nature/ context of the rural environment suggests that 8 m high barriers would not be visually desirable.

Noise mitigation at Clover Hill estate has been refined since the exhibition of the environmental assessment and it has been determined that a landscaped mound would be constructed between the estate and the proposed upgrade. This is described in section 4.3 of this report. Architectural treatments may still be required at Clover Hill estate despite the proposed upgrade resulting in a reduction in noise when compared to a *no build* scenario.

Architectural treatments

Submission number

029, 082, 156, 315, 344

Summary of issues

The following submissions were concerned with the use of architectural treatments as a mitigation measure.

- > No mention of the on-going cost of air-conditioning which may be offset by the provision of solar voltaic panels to reduce the cost both monetarily and to the environment. (029)
- > Architectural treatments will change living styles; the quiet of the surrounding areas will be lost, as will the ability to enjoy the local bushland or even a barbeque on the veranda. (029, 156, 315)
- > Fearful of getting noise abatement measures based on cost savings rather than effectiveness. (082)
- > The environmental assessment provides little information on what architectural treatments would entail and the RTA has been reluctant to detail which residences would be selected for treatment. There is also no information as to whether the noise barrier at Clover Hill will be a mound or a wall. (082, 344)

Response

The RTA would endeavour to meet the objectives of the *Environmental Criteria for Road Traffic Noise*, where feasible and reasonable.

For houses where at-resident treatments are required to be investigated the RTA would negotiate directly with the owner of the property on the type of treatment options available. Treatment options provided by the RTA may include upgraded window glazing, provision of fresh air ventilation systems that meet Building Code of Australia requirements, upgrading window and door seals, sealing of wall vents and installation of external screen walls/court yard treatments. The type of treatment used would depend on the owner's preferences, predicted noise exposure and direction of noise exposure, existing condition of the building in question and cost effectiveness of the treatments.

In accordance with the RTA *Environmental Noise Management Manual* the RTA does not provide for owners maintenance and on-going operating costs associated with at-resident treatments. All at- resident treatment works would require a 7 year labour warranty and would be covered by a 5 year part warranty (or if they are procured on a supply and install basis, a 5 year part and labour warranty).

2.13.5 Pacific Highway Noise Taskforce Report

Submission number

080, 350 - Department of Environment and Climate Change NSW, 373 - Ballina Shire Council

Summary of issues

The following submissions relate to the Pacific Highway Noise Taskforce Report

- > The RTA should take into consideration the recommendations of the Pacific Highway Noise Taskforce Report (September 2003). In particular, the recommendations for the detailed design stage. These include more detailed noise designs (no studies on noise levels on Friday Hut or Fernleigh Rds). (373 - Ballina Shire Council).
- > Community representations to the Taskforce expressed the view that the noise criteria in the document *Environmental Criteria for Road Traffic Noise* were not acceptable. (373 - Ballina Shire Council)
- > It is recommended that the architectural treatment allocated as part of the taskforce process be examined in each case to ensure that the level of mitigation provided is commensurate with (or better) than the architectural treatment that would have arisen as part of this project. (350 - Department of Environment and Climate Change NSW)

Response

The DECC's *Environmental Criteria for Road Traffic Noise* (ECRTN) is the NSW Government policy on assessing road traffic noise. In terms of the recommendations from the Northern Pacific Highway Noise Taskforce that were agreed by the then Minister for Roads that are relevant to the proposed upgrade have been implemented. For example the proposed use of low noise pavement in key sections of the proposed upgrade and the completion of the Bangalow to St Helena EIS review during the route selection phase of the proposed upgrade, in light of concern over road traffic noise.

As part of the detailed design process for developing noise mitigation measures the RTA will examine architectural treatments allocated as part of the Northern Pacific Highway Noise Taskforce process to ensure that the level of mitigation provided is commensurate with (or better) than the architectural treatment that would have arisen as part of this project.

2.13.6 Noise at Bangalow

Construction noise at Bangalow

Submission number

269, 315, 333, 344

Summary of issues

The following submissions relate to possible ancillary facility site near Bangalow.

- > Concern over construction plants located in close vicinity to Bangalow. (269, 315, 333, 344)

Response

The locations of ancillary work sites identified in the environmental assessment, including the site near Bangalow, are considered appropriate. The final decision on sites for construction facilities would be made with the input of the contractor(s) during detailed design. It is not possible to be definitive regarding the location of these sites at this stage in the process as much would depend on the particular construction approach adopted by the contractor.

To limit impacts, locational criteria were identified in the environmental assessment that would need to be followed before a site is selected (Table 6.12 of the environmental assessment). These include criteria relating to proximity to residences..

Road traffic noise at Bangalow

Submission number

002, 012, 047, 050, 051, 052, 053, 054, 060, 061, 062, 063, 064, 065, 066, 067, 083, 084, 085, 086, 087, 088, 090, 091, 092, 093, 095, 097, 100, 108, 109, 110, 111, 113, 121, 122, 130, 131, 133, 134, 141, 142, 143, 145, 146, 147, 150, 155, 156, 157, 160, 165, 166, 168, 170, 171, 189, 191, 195, 198, 200, 203, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 252, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 274, 276, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 301, 305, 306, 308, 309, 310, 311, 312, 314, 315, 318, 319, 320, 321, 323, 326, 333, 348, 359, 361

Summary of issues

The following submissions were concerned with road traffic noise levels in Bangalow.

- > Concern over noise in Bangalow due to upgrade, in particular noise at Clover Hill.
- > Wants the RTA to understand that noise needs to be managed within and outside homes in Bangalow to maintain the current environment.

Submission No. 012, 361, 160, 315, 143, 002, 326, 359, 333

- > The sound levels of the existing highway exceed the RTA's own acceptable levels of highway noise so near to a community and should be looked at again since the RTA has come up with an inadequate mitigation measure.
- > The report fails to define in detail the level of noise that is to be expected

Submission No. 156, 269, 323

- > Steps should be taken to reduce the noise impacts on Bangalow. (047, 050, 051, 052, 053, 054, 060, 061, 062, 063, 064, 065, 066, 067, 083, 084, 085, 086, 087, 088, 090, 091, 092, 093, 095, 097, 100, 108, 109, 110, 111, 113, 130, 131, 133, 134, 141, 142, 145, 146, 147, 150, 155, 157, 165, 166, 168, 170, 171, 189, 191, 195, 198, 200, 201, 203, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 252, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 274, 276, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 301, 305, 306, 308, 309, 310, 311, 312, 314, 318, 319, 320, 321, 348)
- > To relieve impact of noise on Bangalow, consider moving the proposed highway upgrade away from Bangalow (further East). (279, 339, 344)
- > Should use tunnel to lower stress and illness caused by associated noise for Bangalow residents. (121, 122)

Response

Noises levels in Bangalow and Clover Hill from the existing highway and the proposed upgrade would be less after the construction of the proposed upgrade compared with predicted noise levels if it is not constructed.

Assessment of noise impacts originating from the construction and operation of the proposed upgrade are detailed in sections 15.2 and 15.3 of the environmental assessment. Mitigation measures aimed at reducing these impacts can be found in section 15.4. Feasible and reasonable mitigation measures have been developed using a detailed noise model for the project that takes into account local topography, road grades, traffic volumes from the existing highway and the proposed upgrade, and existing buildings.

In the vicinity of Bangalow the proposed mitigation measures include: a highway that is further from Bangalow than the existing highway, reduced grades on the proposed upgrade compared with the existing highway, use of low-noise pavement, and at resident treatments.

In addition to these measures, as discussed in section 4.3 of this report, a landscaped mound is proposed between the existing highway and Clover Hill. If approved as part of the preferred project report, this mound would further reduce noise impacts from both the existing and upgraded highway in Bangalow and Clover Hill.

Noise barrier at Clover Hill estate

Submission number

002, 011, 107, 279, 344

Summary of issues

The following submissions raised the issue of a noise barrier near Bangalow.

- > Need for sound barriers around Clover Hill. (107, 011, 002, 279, 344)
- > Even though the new highway will be further away from Clover Hill, the noise will not be reduced much due to different path angles. Suggest a second noise barrier in the median strip between north and south lanes to mitigate noise from new south-bound lanes. (011)
- > The community needs input into the design of the wall. (107, 279)

Response

A landscaped mound is proposed between the existing highway and Clover Hill. If approved as part of the preferred project report, this mound would further reduce noise impacts from both the existing and upgraded highway in Clover Hill and provide visual screening to the proposed upgrade, including the interchange. The mound, including calculations of noise reduction, is described in section 4.3 of this report.

The Clover Hill community would be consulted regarding the design of the landscaped mound prior to and/or during the detailed design phase of the proposed upgrade.

Additional noise impact assessment

Submission number

047, 050, 051, 052, 053, 054, 060, 061, 062, 063, 064, 065, 066, 067, 083, 084, 085, 086, 087, 088, 090, 091, 092, 093, 095, 097, 100, 108, 109, 110, 111, 113, 130, 131, 133, 134, 141, 142, 145, 146, 147, 150, 155, 157, 165, 166, 168, 170, 171, 189, 191, 195, 198, 203, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 274, 276, 286, 288, 289, 290, 291, 292, 293, 294, 295, 301, 305, 306, 308, 309, 310, 311, 312, 314, 315, 317, 318, 319, 320, 321, 339, 348

Summary of issues

The following submissions requested further noise monitoring at Bangalow

- > Further noise testing should be conducted at Clover Hill. (047, 050, 051, 052, 053, 054, 060, 061, 062, 063, 064, 065, 066, 067, 083, 084, 085, 086, 087, 088, 090, 091, 092, 093, 095, 097, 100, 108, 109, 110, 111, 113, 130, 131, 133, 134, 141, 142, 145, 146, 147, 150, 155, 157, 165, 166, 168, 170, 171, 189, 191, 195, 198, 203, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 286, 288, 289, 290, 291, 292, 293, 294, 295, 306, 308, 309, 310, 311, 312, 314, 318, 319, 320, 321, 348)
- > RTA's assessment of noise levels throughout Bangalow is totally inadequate; noise testing should be redone. (301, 305, 276, 227, 274, 317, 339, 315)

Response

A detailed noise assessment has been undertaken for the environmental assessment and has involved a process of direct measurement at representative locations, modelling and calculation in accordance with methodology prescribed by regulatory authorities, relevant Australian Standards, and undertaken by suitably qualified and experienced practitioners

Additional noise modelling has been undertaken since the environmental assessment to identify the mitigating effects of the proposed landscaped mound adjacent to Clover Hill on nearby residents. The results of this additional assessment are provided in section 4.3 of this submissions report. These results show that the proposed upgrade would result in a further reduction in noise levels for residents of Clover Hill.

2.13.7 Noise at Newrybar Public School

Submission number

099, 379

Summary of issues

The following submissions were received regarding the Newrybar Public School

- > Has there been any thoughts on relocating the Newrybar School to the east on the coffee farm so it is not surrounded by roads? (379)
- > Noise levels exceeding acceptable criteria are endured by students and staff everyday. Consultation with the school to put in noise and dust mitigation has so far resulted in no action. Despite already exceeding criteria, the proposed mitigation measure is to not increase existing noise levels by more than 0.5dB. The only other proposed mitigation is the RTA's "reasonable and feasible" test which has already resulted in the RTA unwilling to commit to fair and reasonable solutions. (099)

Response

Relocation of Newrybar Public School was an option that was discussed with the school and the Department of Education and Training. All parties involved in the discussions agreed that relocation was not a desirable outcome.

Ongoing consultation with the Newrybar Public School has occurred since the selection of the preferred route to develop options for the provision of early and effective noise mitigation measures. Treatments to the school buildings are in the process of being implemented, while additional measures are identified in the environmental assessment. These measures include low noise pavement in the section of the proposed upgrade adjacent to Newrybar (including the school), and a landscaped mound between the school and the upgrade.

2.13.8 Noise at Ewingsdale

General

Submission number

009, 010, 037, 196, 356

Summary of issues

The following submissions raised issues of increasing noise levels in Ewingsdale

- > With increased traffic - car and truck (especially B-Double trucks) - on the Pacific Highway at Ewingsdale we have been severely affected by constant and considerable road noise. (037)
- > Noise mitigation measures should be implemented to reduce the impacts on Ewingsdale. (009, 010, 196)
- > A noise wall should be built on the western side of the proposed upgrade at Ewingsdale. (356)

Response

Assessment of noise impacts originating from the construction and operation of the proposed upgrade is detailed in sections 15.2 and 15.3 of the environmental assessment. Mitigation measures aimed at reducing these impacts can be found in section 15.4 of the environmental assessment. Feasible and reasonable mitigation measures have been developed using a detailed noise model for the project that takes into account local topography, road grades, traffic volumes from the existing highway and the proposed upgrade, and existing buildings.

In the vicinity of Ewingsdale the proposed mitigation measures include: low noise pavement, a landscaped mound approximately 8m high between Ewingsdale and the proposed upgrade, and a noise wall approximately 4 m high and 150m long south of the landscape mound.

In addition to the above, there may be opportunities to dispose of excess material on land adjacent to the proposed upgrade by forming landscaped mounds that would improve visual and noise amenity for adjacent residents.

The noise assessment does not indicate that a noise wall on the western side of the proposed upgrade at Ewingsdale would meet feasible and reasonable criteria.

2.13.9 Assessment criteria

Submission number

022, 023, 037, 174, 333, 342, 345, 349 - Byron Shire Council, 350 - Department of Environment and Climate Change NSW

Summary of issues

The following submissions raised the issue of the assessment criteria applied in the environmental assessment.

- > New noise criteria of 55dB(A) day and 50dB(A) night be applied to Ewingsdale not 0.5dB(A) over present levels. (342, 022, 023, 037, 345)
- > What noise standards are going to be used? Those that apply new roads, or redeveloped roads? Given that this is such a new piece of road, and along a new alignment, surely the new standards should apply here. (174)
- > Recent experience following the Brunswick Heads to Yelgun Pacific Highway upgrade indicates that levels identified in the Environmental Criteria for Road Traffic Noise may not be suitable for a majority of residential properties. (349 - Byron Shire Council)
- > The predicted noise levels in Appendix C of the NIA are compared against day and night criteria that include the allowances in the Environmental Criteria for Road Traffic Noise (ECRTN). It appears that the allowance criteria are being incorrectly applied. The allowance criteria apply only after it has been demonstrated that the base criteria cannot be achieved using feasible and reasonable noise mitigation. (350 - Department of Environment and Climate Change NSW)
- > Standards need to be regularly reviewed in the light of changing standards elsewhere. One aspect that needs to be considered in Bangalow's case is that building materials will tend to be wood, whereas in countries such as Germany, the UK and USA with more severe winters, buildings are of thicker more soundproof material such as brick. Such buildings can absorb much higher road noise levels than wooden buildings. (333)

Response

The *new road* noise criteria have been applied for the entire length of the proposed upgrade between Tintenbar and Ewingsdale except for one short section where the proposed upgrade would use one of the carriageways of the existing Bangalow bypass.

With regard to the noise contours at Ewingsdale, the noise model includes all roads with significant traffic flows that would influence the predicted traffic noise levels in study area.

The DECC's *Environmental Criteria for Road Traffic Noise* (ECRTN) is the NSW Government policy on assessing road traffic noise.

Allowance criteria have been applied in accordance with RTA ENMM Practice Note IV for determining reasonable and feasible noise treatment measures. The road design measures have been considered in the development of the preferred route concept design including adjustments to horizontal and vertical alignments, optimised use of surrounding topography and identification of key locations for low noise pavement surfaces (detailed in section 5.6 and section 15.2 of the environmental assessment). These measures are consistent with Phase 1 and Phase 2 investigations in Section 7 RTA ENMM.

Once these feasible and reasonable road design measures were incorporated into the concept design, an analysis of future existing noise levels and predicted noise levels 10 years after opening was undertaken. The analysis was undertaken in accordance with the ECRTN and Practice Note I of the ENMM to determine what additional noise mitigation treatments would be required. From there, potential requirements for noise barriers and “at resident” treatments were determined (Appendix C of the working paper 8 details the assessment process).

The process described above is illustrated on pg 104 of the RTA ENMM in Practice Note IV ‘Selecting and designing ‘feasible and reasonable’ treatment options for road traffic noise from new and redeveloped roads affecting residential land uses’.

The NSW road traffic noise criteria are reviewed periodically, and are considered to be reasonable compared to other state or international standards. While there are significant differences in the sound insulation provided by between various building materials, it is not reasonable to generalise regarding the sound insulation properties of buildings in particular countries.

Proposed mitigation measures

Submission number

007, 008, 009, 022, 023, 037, 068, 081, 128, 174, 196, 334, 342, 345, 356, 362

Summary of issues

The following submissions were received regarding noise mitigation measures at Ewingsdale.

- > Earth mound and noise wall should be extended right up to the entrance to the tunnel and no gaps in the noise wall up to the Ewingsdale interchange.
- > Concerned there is no provision for a noise wall on the western side of the highway, that there will be considerable noise pollution especially from truck brakes.
- > Noise walls at least 4.5m high should be built along the highway wherever there are no earth mounds eg. South of Plantation Drive.
- > Request that the noise wall be constructed prior to blasting and pile-driving at St Helena Hill.
- > The existing wall needs to remain.

Submission No. 007, 008, 009, 022, 023, 037, 068, 128, 174, 196, 334, 342, 345, 356, 362

- > A noise camera should be erected at the tunnel approach and exit to force the noise offenders to properly maintain their vehicles. (081)
- > It appears that the proposed upgrade will move closer to Ewingsdale, making the existing barrier to the west of the upgrade rather than to the east of the upgrade. Figure 5.2j in the EA suggests that there will be a noise mound located adjacent to the upgrade, between Ewingsdale and the upgraded section of road, however this is not discussed in the NIA. (350 - Department of Environment and Climate Change NSW)

Response

Assessment of noise impacts originating from the construction and operation of the proposed upgrade is detailed in sections 15.2 and 15.3 of the environmental assessment. The noise impact assessment was undertaken in accordance with Environmental Criteria for Road Traffic Noise (ECRTN) and Environmental Noise Management Manual (ENMM) requirements. Mitigation measures aimed at reducing these impacts can be found in section 15.4 of the environmental assessment.

Feasible and reasonable mitigation measures have been developed using a detailed noise model for the project that takes into account local topography, road grades, traffic volumes on the existing highway and the proposed upgrade, and existing buildings.

In the vicinity of Ewingsdale the proposed mitigation measures include: low noise pavement, a landscape mound approximately 8m high between Ewingsdale and the proposed upgrade, and a noise wall approximately 4 m high and 150m long south of the landscape mound.

Where possible and practical, mitigation measures would be implemented early in the construction phase.

Part of the existing wall at Ewingsdale would be retained and would be located west of the upgraded highway.

The comment regarding noise cameras is noted. Noise camera technology is currently being refined with in service placement criteria yet to be developed.

Appendix F, Figure F2 of working paper 8 provides a detail of the noise barrier scenario used in the 'mitigated case' modelling for Ewingsdale. This indicates clearly where the existing barrier is proposed to be retained, where the proposed earthworks allow this to happen, and where the existing barrier would need to be removed, where earthworks are necessary. The future-existing noise levels have been modelled with the existing 4.5 m high noise barrier in its current location. A large mound is proposed to be included to the east of the new carriageway alignment, and this has been included in the noise model.

Noise from St Helena tunnel

Submission number

009, 037, 068, 174, 345, 362,

Summary of issues

The following submissions raised concerns over road traffic noise from the tunnel under St Helena Hill.

- > Concern over lack of mitigation measures for St Helena Tunnel. (174)
- > No reverb noise flare shown for the tunnel, it appears that trucks entering will make a 'popping' or horn like noise. (068, 009)
- > Entry to tunnel needs to be lower to reduce noise. (345, 362)

Response

The noise modelling presented in the environmental assessment accurately reflects the noise emanating from the tunnel. Feasible and reasonable mitigation measures have been developed using a detailed noise model for the project that takes into account local topography, road grades, traffic volumes from the existing highway and the proposed upgrade, existing buildings and includes an allowance for the noise impacts from the tunnel.

The traffic noise coming from the tunnel portal was modelled and taken into account in the noise assessment using a generally accepted approach. This approach was validated in an Australian study of tunnel noise prediction undertaken for VicRoads which included measurements near the Heysen tunnels outside Adelaide. The model was shown to over-predict noise from tunnels and therefore the model is considered to be slightly conservative.

Impact on Ewingsdale residences

Submission number

037

Summary of issues

The following submissions concerned increased noise affecting residences at Ewingsdale

- > Proposed upgrade would be located a further 50m towards residences at Ewingsdale without adequate noise protection. (037)

Response

Noise modelling undertaken for the proposed upgrade indicates, that with the proposed mitigation measures, the noise levels in Ewingsdale would be improved when compared to the existing highway.

Feasible and reasonable mitigation measures have been developed using a detailed noise model for the project that takes into account local topography, road grades, traffic volumes on the existing highway and the proposed upgrade, and existing buildings.

In the vicinity of Ewingsdale the proposed mitigation measures include: low noise pavement, a landscape mound approximately 8m high between Ewingsdale and the proposed upgrade, and a noise wall approximately 4 m high and 150m long south of the landscape mound.

2.13.10 Noise monitoring

Submission number

350 - Department of Environment and Climate Change NSW

Summary of issues

The following submission is concerned with noise monitoring during operation of the proposed upgrade.

- > DECC expects that a monitoring and validation requirement for operational noise (including validation of design year traffic volumes and composition) will be included in any project approval. (350 - Department of Environment and Climate Change NSW)

Response

A monitoring program is proposed and included in the statement of commitments. The noise monitoring will include validation of design year traffic volumes and composition.

2.13.11 Other noise issues

Research article on effects of noise

Submission number

080

Summary of issues

The following submission referenced recent research into the effects of noise.

- > A recent study in the European Heart Journal found that noise levels greater than 35dB increases blood pressure, even while sleeping. The louder the noise, the larger the increase. In the absence of a detailed noise study, what are the likely effects on local residents? (080)

Response

The extent to which noise levels impact on health, in terms of sleep state, blood pressure and other sleep disturbance indicators is not well understood and it is not possible to quantify at what noise level road traffic noise has a significant effect on health particularly at relatively lower road traffic noise levels. The effect of road traffic noise on activities such as listening and reading and reaction to road traffic noise in terms of annoyance has been established and is applied in the NSW Government Environmental Criteria for Road Traffic Noise (ECRTN). These criteria are based on well-documented social surveys. The RTA applies these criteria in accordance with the ECRTN as triggers for assessment and goals for noise mitigation. The ECRTN is considered to be among the most stringent road traffic noise criteria in Australia.

Effects of road traffic noise on animal welfare

Submission number

179

Summary of issues

The following submission relates to impact of noise from construction of the upgrade on the animals at Macadamia Castle

- > Concerned over what mitigation measures will be put in place to reduce noise during and after construction as animals have recently displayed erratic behaviour when exposed to machinery noise. Macadamia Castle should be designated as a sensitive noise receiver although it is not rated as one in the environmental assessment. (179)

Response

The RTA does not specifically provide noise mitigation for domestic or native animals. During construction there may be opportunities to dispose of excess material on land adjacent to the proposed upgrade by forming landscaped mounds that would improve visual and noise amenity for adjacent properties, including the Macadamia Castle.

2.14 Aboriginal heritage

Submission number

350 - Department of Environment and Climate Change NSW

Summary of issues

The following submission concerned communication and consultation with the Aboriginal community.

- > It is strongly recommended that the proponent demonstrate how input by affected Aboriginal communities has been considered when determining and assessing impacts, mitigation strategies and making final recommendations to ensure ACH outcomes can be met by the proposal. (350 - Department of Environment and Climate Change NSW)
- > While the EA contains many statements indicating that community consultation has been undertaken for the project, it needs to provide clear evidence to demonstrate how the Aboriginal community have been consulted throughout the assessment process and confirm their comments. (350 - Department of Environment and Climate Change NSW)

Response

Consultation with the Aboriginal community and the ways in which input has contributed to the assessment are documented in section 16.1.3 of the environmental assessment and section 2.3.1 of working paper 9.

The RTA would be happy to provide DECC with additional evidence of consultation if and as required.

2.15 Social and economic

2.15.1 Community impact

Community impacts - general

Submission number

281, 345

Summary of issues

The following submissions raised general concerns of community impacts from the proposed upgrade.

- > Poor attention given to local community issues. (281)
- > Social cost has been ignored. (345)

Response

A large amount of consultation has taken place over the last four years from identification of the study area and development of route options through to preferred route and the environmental assessment. This has included public meetings, formal submissions, staffed displays, community updates and community liaison groups (refer to section 2.5 of this report for more detail). Feedback from the community has been taken into account when making decisions at each stage of the project.

Measures have been taken to reduce the social impacts. These include the provision of safe and adequate access to the proposed upgrade both during and after construction; ongoing communication with the community during construction; the provision of a safer Pacific Highway leading to a drop in the accident rate; and safer and more efficient travel in area on the existing Pacific Highway as through traffic would utilise the upgraded highway.

Community impacts – Bangalow

Submission number

034, 129, 167, 190, 219, 228, 288, 323

Summary of issues

The following submissions raised concerns over the impact of the upgrade on the town of Bangalow

- > Bangalow has a unique “step back in time” ambience. Don’t let them ruin this town with an upgrade. We like Bangalow the way it is. (219)
- > Don’t destroy this beautiful village. Bangalow will be left with no relevance to a vibrant and interesting heritage town. (288)
- > Concerned about the enormity of the footprint on Bangalow - that the RTA has planned such mammoth infrastructure on the doorstep of Bangalow is no less than obscene. Community and environmental impact will be substantial.(34)

- > Many heritage items remain on the main street - to turn into a transport hub for inland traffic is not good enough. RTA has opportunity to rectify the situation now and is imperative that it does so. (34,129)
- > I have travelled all over the world and I chose to live in Bangalow because it is the most beautiful area in the world together with its delightful community. It would be horrendous to destroy it because of bad planning. (228)
- > The shire of Bangalow is a picturesque family town with much civic pride. This has suddenly been shattered by the Sydney centred decision making RTA via the State Government kowtowing to the trucking lobby. (167)
- > In the EA there is no account on the impact that this will have on the quality of life. In the EA, the social impacts have been defined, but there is no commentary in the report on these points or predicted outcomes. (323)

Response

The proposed upgrade would lead to a number of beneficial outcomes for the town of Bangalow. Benefits include improved air quality, lower noise levels and safer and more efficient travel for Bangalow residents.

As discussed in Section 4.3 of this report, an additional landscaped mound is proposed between the existing highway and Clover Hill. If approved as part of the preferred project report, this mound would further reduce noise impacts from both the existing and upgraded highway at Clover Hill and provide visual screening to the proposed upgrade, including the Bangalow interchange.

A landscape and urban design strategy has been prepared to maximise the integration of the proposed upgrade into the surrounding landscape.

2.15.2 Economic impacts on Bangalow businesses

Submission number

323

Summary of issues

The following submission questioned the economic impacts of the proposed upgrade

- > No data or consultative information has been presented to justify the selection of the preferred route in terms of economic impact on Bangalow businesses. (323)
- > If the businesses, community and tourist destination 'convenience' is downgraded and the town ceases to attract tourists and potential new residents as an outcome of this upgrade, the future remains unanswered. (323)

Response

A large body of information is available regarding the selection of the preferred route

The environmental assessment predicts impacts on Bangalow businesses (and businesses in other locations) on the basis of accessibility, visibility and operating amenity. Because the proposed upgrade would not change traffic patterns through Bangalow or result in any impacts on operating amenity, long term impacts are deemed to be neutral.

The RTA would investigate a tourist signage strategy as part of the proposed upgrade, in consultation with relevant stakeholders, to help reduce the impact of the proposed upgrade on local businesses.

2.15.3 Impacts on tourism businesses

Macadamia Castle

Submission number

179, 381

Summary of issues

The following submissions raised issues over the impact of the proposed upgrade on the Macadamia Castle.

- > Macadamia Castle is the Far North Coast's most visited attraction. The new highway will remove roadside access and reduce the number of light vehicles passing from 13,920 to 1,750 per day by 2012. This will have a massive impact on our business and the local economy. (179)
- > Totally dispute the claim in the environmental assessment that the upgrade would have some short-term negative impacts on the business, but should be neutral or positive over the long term. Would like to see the justification for this claim. (179)
- > Seeking assurance that the RTA will provide sufficient signage on its own property and agree to other signage on our property. (179)
- > Macadamia Castle would be adequately serviced by the existing Pacific Highway without Ivy Lane Interchange. There is evidence that quieter routes flourish once large volumes of through traffic are removed. Examples are various towns in the Tweed Area, such as Mooball, Burringbar, Tumbulgum and Murwillumbah, which have flourished after the Yelgun to Chinderah upgrade bypassed these towns. (381)

Response

The proposed upgrade would provide safer access to Macadamia Castle as the entrance would be located off the highway.

The analysis of business impacts in the environmental assessment was qualitative. The statement regarding effects being neutral to positive in the long term is in reference to the trading environment of Newrybar and Knockrow as a whole not to Macadamia Castle specifically. The assessment of long term impacts at Macadamia Castle acknowledges potential loss of business due to reduced exposure, but also the positive impacts of improved amenity, hence the overall qualitative assessment of impact being neutral.

The assessment of the economic impacts was based on the assumption that some level of adaptation of the Macadamia Castle business would occur over time to respond to the changed environment and to take advantage of the improved amenity. It was assumed that given the Macadamia Castle's potential as a tourist attraction and the high volume of tourists that visit the Byron Bay region a shift in focus from passing trade to local/tourist trade could result in neutral or positive outcomes over time. This would be enhanced with the existing highway promoted as a tourist route.

The RTA would investigate a tourist signage strategy for the project, in consultation with relevant stakeholders, to help reduce the impact of the proposed upgrade on local businesses. A review of all tourist signage along the highway is being undertaken and new principles are to be developed in consultation with Tourism NSW.

The RTA would continue to consult with the property owner in regards to signage. Any signage proposed for placement on private property is subject to the requirements of State Environmental Planning Policy 64 (SEPP 64). Under this SEPP all signage within 250m of classified roads and of a certain size need to be referred to the RTA for review and concurrence. The RTA review on safety grounds, this would include , but not limited to consideration of:

- > Distance from decision points.
- > Does it give direction.
- > Does it form a distractive background to motorist viewing other signage or roadway ahead.
- > Does it cause a sight restriction.

There are also criteria for urban design included in the assessment. In addition, there are the requirements in the development control plan that Ballina Shire Council uses to assist in the approval process.

Tourist cottage business

Submission number

003

Summary of issues

The following submission raised concerns over the impact the proposed upgrade would have on their tourist cottage business.

- > New highway will impact on the operation of our business which offers peaceful, private accommodation for guests who seek rest and relaxation. 5 of 6 cottages will be impacted by noise and 3 will have direct views over the highway. The upgrade will impact on the amenity of the cottages and on the viability of the business. The sale value of the property has been greatly affected. Seeking compensation or assistance from the RTA to ensure the business is viable into the future. (Assistance may be architectural noise treatments, noise wall, plantings etc). (003)

Response

The RTA is committed to avoiding where possible the potential effects of Pacific Highway upgrade projects on the environment and local communities. The route selection process for the proposed upgrade reflects this commitment.

Where impacts cannot be avoided, the RTA endeavours to reduce these impacts to the best of its ability. Impacts and mitigation measures have been further considered as part of the environmental assessment process for the proposed upgrade.

The environmental assessment includes consideration of noise, visual, and social and economic effects of the proposed upgrade and provides details of the proposed mitigation measures.

The RTA provides compensation for the acquisition of land for a public purpose under the Land Acquisition (Just Terms Compensation) Act 1991 however land from this particular property is not required to be acquired for the proposed upgrade.

The RTA would maintain communication with nearby property owners through the detailed design phase to ensure that opportunities to further minimise impacts are identified and implemented. This may include for example, the tailoring of landscape treatments to provide screening of the proposed upgrade from specific properties.

Bed and breakfast business

Submission number

081

Summary of issues

The following submission raised concerns over the impact the proposed upgrade would have on their business

- > Concerned that the increased noise levels generated by traffic on the new highway will be detrimental to bed and breakfast business in Ewingsdale. (081)

Response

There is a landscaped mound proposed for the section of the proposed upgrade adjacent to Ewingsdale. This would reduce both the noise and visual impact on the property. Low noise pavement is also planned for this section of the proposed upgrade. With these mitigation measures, it is expected that noise levels in 2012 would be up to 2.5dB less than if the proposed upgrade did not proceed. The landscaped mound has the potential to be extended in length and height depending on the project opportunities and the availability of excess spoil material, which may provide further improvements in amenity for this property.

Other tourism businesses

Submission number

332, 341

Summary of issues

The following submissions raised concerns over the impact the proposed upgrade would have on their business.

- > Property is the only one containing State Significant Land affected by Tintenbar to Ewingsdale. Frontage onto Pacific Highway will be lost. Have spent considerable sums of money on creating an eco-tourism facility and are concerned that visitors will have difficulty finding the property. Only area for signage would be east of the access bridge. Have requested to retain ownership of a small parcel of land on the western side to create a property identity in order to ensure the viability of the tourism operation. (332)
- > Construction stage will hinder the ability to derive an income from the property that is being converted to a tourist facility. (341)

Response

The RTA is committed to establishing long term ownership and use of remnant land as early as feasible. This would be taken up with the property owner. Any existing signage would be retained or reinstated if affected by the construction of the upgrade. Any request for additional signage would need to be taken up with Council.

The RTA is committed to avoiding or minimising the potential effects of Pacific Highway upgrade projects on the environment and local communities.

The RTA is committed to providing safe and adequate access to properties affected by the upgrade during both the construction and operation phases as agreed to with individual property owners.

The RTA would investigate a tourist signage strategy associated with the proposed upgrade, in consultation with relevant stakeholders, to help reduce the impact of the proposed upgrade on local businesses. A review of all tourist signage along the highway is being undertaken and new principles are to be developed in consultation with Tourism NSW.

Tourism in Bangalow

Submission number

121, 122, 287

Summary of issues

The following submission raised concerns over the impact the proposed upgrade would have on tourism in Bangalow.

- > Encroachment of a freeway interchange, within walking distance of the town centre of Bangalow, and, in mass, three times the size of the current northern end bypass will destroy the hamlet appeal of a town dependant on tourism.
- > Increased heavy traffic on two main streets will reduce its attraction to tourists.

Submission No.s 121, 122, 287

Response

It is considered unlikely that the proposed Bangalow interchange would have a detrimental affect on tourism in Bangalow.

An interchange already exists in the location of the proposed Bangalow interchange. The proposed interchange would replicate the function of the existing interchange. Most of the elements of the new interchange would be further from nearby residents than the existing interchange (particularly the northbound off-ramp).

The new interchange would have additional elements, most notably a roundabout at the same level as the existing highway. The RTA considers that with appropriate noise and landscape treatment, Bangalow interchange can be implemented with minimal impact on Bangalow town centre.

It is unlikely that any element of the interchange, which is further east than the existing interchange, would be visible from the Bangalow town centre. The proposed interchange is not greatly different in scale to the existing interchange at Bangalow. As discussed in

section 4.3 of this report, a landscape mound is now proposed between the existing highway and Clover Hill. If approved as part of the preferred project report, this mound would provide visual screening to the proposed upgrade, including the interchange.

Traffic forecasts presented in table 13.6 of the environmental assessment predict no increase in daily traffic volumes on Granuaille Rd or Bangalow Rd both east and west of the proposed interchange as a result of the proposed upgrade.

2.16 Visual amenity and urban design

2.16.1 Landscape treatments

Submission number

160, 364

Summary of issues

The following submissions were concerned with the proposed landscape treatments

- > There is no proposal within the RTA's environmental assessment that confirms the replant and regeneration of native rainforest trees along the eastern side of the highway's boundary. (160)
- > It is proposed that the length of Tintenbar to Ewingsdale through the Tinderbox Valley be without trees so motorists can enjoy the views. Request that this area be treed to provide a buffer that will hinder the dispersion of pollutants; filter the noise through the valley; screen the road from view of residents who previously had a beautiful, rural outlook; and help maintain privacy and security. (364)

Response

Site landscape treatments along the entire length of the proposed upgrade would comprise a high proportion of locally native rainforest tree species. In areas identified for riparian restoration, it is intended that the structure and species composition of the locally occurring lowland rainforest community is re-established.

The initial landscape concept included in working paper 11 does indicate a generally low open planting scheme in the Tinderbox Creek valley. This does however allow for taller planting to be a priority in situations where it is necessary to screen the proposed upgrade from particular viewpoints (such as nearby residences) and where riparian restoration is appropriate within the road reserve. This planting scheme would be defined during detailed design.

2.16.2 Visual impact

Submission number

029, 197, 281, 305, 349 - Byron Shire Council

Summary of issues

The following submissions were concerned with the visual impact of the proposed upgrade:

- > Steps should be taken to reduce the visual impacts of the proposed upgrade. (305, 197)
- > A suitable buffer is required to reduce the visual impact of the new highway on surrounding properties. (029)
- > Steps should be taken to reduce the visual impact of the concept design on Tinderbox Valley and in relation to the St Helena Tunnel, such as increasing the tunnel length and modifying portal design and cuttings to be more sympathetic to the prominent St Helena ridgeline; utilising vertically independent carriageways through the Tinderbox Valley in order to reduce the motorway character of the proposed upgrade; and site specific screen planting to provide visual screening to residents throughout the valley. (281, 349 - Byron Shire Council)
- > The view north from St Helena hill is important and potential impacts on this view from the additional road infrastructure at Ewingsdale should be minimised. (349 - Byron Shire Council)

Response

The proposed mitigation measures to reduce the visual impact of the upgrade have been identified in section 18.4 of the environmental assessment.

The tunnel portal design is an important aspect of the proposed upgrade from an urban design perspective. Detailed design would be consistent with the landscape and urban design principles identified in the environmental assessment.

The importance of views from St Helena is acknowledged. Landscape treatment and vertical separation of the existing highway and the proposed upgrade would assist in minimising impacts on this view.

Visual impact at Bangalow

Submission number

002, 012, 034, 047, 050, 051, 052, 053, 054, 060, 061, 062, 063, 064, 065, 066, 067, 083, 084, 085, 086, 087, 088, 090, 091, 092, 093, 095, 097, 100, 107, 108, 109, 110, 111, 113, 130, 131, 133, 134, 141, 142, 145, 146, 147, 150, 155, 157, 160, 165, 166, 168, 170, 171, 173, 189, 191, 195, 198, 200, 201, 203, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 248, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 274, 276, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 301, 306, 308, 309, 310, 311, 312, 314, 315, 318, 319, 320, 321, 323, 333, 341, 348, 361

Summary of issues

The following submissions relate to the visual impact of the proposed upgrade on Bangalow:

- > Steps should be taken to reduce the visual impacts on Bangalow. (011, 047, 050, 051, 052, 053, 054, 060, 061, 062, 063, 064, 065, 066, 067, 083, 084, 085, 086, 087, 088, 090, 091, 092, 093, 095, 097, 100, 107, 108, 109, 110, 111, 113, 130, 131, 133, 134, 141, 142, 145, 146, 147, 150, 155, 157, 160, 165, 166, 168, 170, 171, 189, 191, 195, 198, 200, 201, 203, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 248, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 274, 276, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 301, 306, 308, 309, 310, 311, 312, 314, 315, 318, 319, 320, 321, 341, 348)
- > The upgrade will have a huge visual impact on Bangalow. (012, 034, 173, 315, 323, 333, 361)
- > A four lane highway network, encompassing a Bangalow interchange and ancillary access roads, will serve to create a 400 (plus) metre wide footprint running east from Clover Hill estate and terminating at Byron Creek. The sheer magnitude of this design and the type of construction will dissect the countryside and destroy Bangalow's country village ambiance and rural atmosphere. (160)
- > The cutting through 'Arundel' will remain an ugly, visual scar on what is now a focal point for the residents of Bangalow and surrounding areas as well as travellers which use the existing highway. (107, 160, 222)
- > A solution would be to replace the cutting with a "cut and cover" tunnel. (011, 222, 315)
- > Landscaping should be used to blend the cutting as much as possible. (002, 107)
- > Visual impact could be minimised by utilising local basalt rocks from road works and building a retaining wall, or by using gabion structures. (011)
- > Figure 18.5 shows the scarring of the Arundel cutting from one of the lowest parts of the town. Clearly RTA selected this location for the visualisation because it carefully understates the scale of the cutting. (333)

Response

The proposed Bangalow interchange and adjacent sections of the proposed upgrade would have very low visibility from Bangalow. The cutting at Arundel Hill would have a visual impact, which is acknowledged in the environmental assessment. Some additional photographic simulations have been prepared to gain a better understanding of the impacts of this cutting. These are presented in figures 3.2 to 3.7 of this report. Landscape treatments would be used to minimise the obtrusiveness of this and other significant cuttings.

As discussed in section 4.3 of this report, a landscaped mound is proposed between the existing highway and Clover Hill. If approved as part of the preferred project report, this mound would provide visual screening to the upgrade, including the interchange for Clover Hill and Bangalow.

The location shown on Figure 18.5 of the environmental assessment was not chosen to underestimate the scale of the cutting at Arundel Hill. It was chosen because it offers

one of the closest and most direct views from the town. It is acknowledged however that this is not the only location from where the cutting would be visible. Additional photographic simulations are provided in section 3.1 of this submissions report to match the Rankin Drive location illustrated in the Bangalow 2020 submission, and the view from Blackwood Crescent at Clover Hill (a viewpoint discussed with some community members at the staffed environmental assessment displays). This is accurately represented through matching the digital model of the proposed upgrade to the photograph.

Headlight glare

Submission number

333

Summary of issues

The following submission was concerned about the impact of headlight glare on local residents.

- > An important point not given any consideration in the EA is the impact on Bangalow of headlights of trucks and cars using the highway during darkness. This is a particular problem with respect to trucks which dominate night-time use of the highway. Because of the height of the proposed Arundel cutting it is likely that the headlights of northbound traffic passing through the cutting will shine across the Bangalow valley intermittently throughout the night. (333)

Response

The alignment of the proposed upgrade is such that there is little potential for headlight glare to be directed towards residences. If potential for this is found to occur it can be easily managed by planting on the road verge which would very quickly reach a height that would screen truck headlights.

Significance of visual impacts

Submission number

173, 315

Summary of issues

The following submissions felt the visual impact of the proposed upgrade were understated in the environmental assessment

- > Illustrations in the environmental assessment understate the visual problems. (173)
- > The images on the environmental assessment report show no apparent mitigation by way of trees in these two cuttings (315)

Response

The photographic simulations in the environmental assessment accurately represent potential visual impacts. Additional photographic simulations have been prepared to gain a better understanding of the impacts of the Arundel Hill cutting. These are presented in Figures 3.2 to 3.7 of this submissions report.

Landscape treatments are not shown on the photographic simulations as it was intended to illustrate worst case scenarios. A particular focus would occur during detailed design however, on the use of landscape treatments to minimise the obtrusiveness of major cuttings, particular the cutting at Arundel Hill.

A tunnel at Arundel Hill is not considered to be appropriate due to the significant additional costs for the limited benefits that would be gained.

Mitigation at Bangalow

Submission number

011, 143, 160, 167, 333

Summary of issues

The following submissions raised concerns regarding potential mitigation measures in Bangalow.

- > Knocking down the trees and replace them with a 4.5 meter sound barrier wall has a devastating effect on Bangalow. (167)
- > Loss of vegetation, large areas dominated by hard pavement and bridges with little option for replanting and screening due to communities close proximity to freeway. Bangalow will experience high visual sensitivity however the EA gives no indication of mitigation measures. (143, 160)
- > Residents should be consulted regarding any proposed visual/noise mitigation measures. (011)
- > A solution would be to replace the cutting with a “cut and cover” tunnel at Arundel Hill. (333)

Response

As discussed in section 4.3 of this report, a landscaped mound is proposed between the existing highway and Clover Hill estate. There would be some initial loss of roadside vegetation adjacent to Clover Hill to allow for the construction of the landscaped mound. This would however be immediately planted, and based on previous experience with growth rates in this location, a significant vegetative barrier would quickly establish. The end result of landscape treatment associated with the proposed upgrade would be significantly greater extent of native vegetation than currently occurs in the area.

If a tunnel was deemed appropriate at Arundel Hill, it would be cheaper to construct as a bored tunnel, rather than cut and cover, due to its depth. An additional tunnel would add greatly to the project cost. The RTA believes this would not be a prudent use of public money.

2.17 Air quality

2.17.1 General

Submission number

033, 047, 050, 051, 052, 053, 054, 060, 061, 062, 063, 064, 065, 066, 067, 083, 084, 085, 086, 087, 088, 090, 091, 092, 093, 095, 097, 100, 108, 109, 110, 111, 113, 130, 131, 133, 134, 141, 142, 145, 146, 147, 150, 155, 157, 165, 166, 168, 170, 171, 189, 191, 195, 198, 203, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 248, 252, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 274, 276, 279, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 301, 305, 306, 308, 309, 310, 311, 312, 314, 318, 319, 320, 321, 348

Summary of issues

The following submissions raised general concerns over air quality due to the upgrade.

- > Steps should be taken to reduce the risks to air quality, particularly in regards to diesel particle pollution (047, 050, 051, 052, 053, 054, 060, 061, 062, 063, 064, 065, 066, 067, 083, 084, 085, 086, 087, 088, 090, 091, 092, 093, 095, 097, 100, 108, 109, 110, 111, 113, 130, 131, 133, 134, 141, 142, 145, 146, 147, 150, 155, 157, 165, 166, 168, 170, 171, 189, 191, 195, 198, 203, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 248, 252, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 274, 276, 279, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 301, 305, 306, 308, 309, 310, 311, 312, 314, 318, 319, 320, 321, 348)
- > Not enough effort is being put into protecting people's health - carcinogens from pollution cause cancer, traffic pollution is responsible for 1,200 deaths/yr. (033)

Response

Generally speaking, air quality would be improved as a result of the proposed upgrade. This would occur as a result of the more consistent traffic flow that would occur and the improved grades, compared to the existing highway.

Air quality modelling was undertaken as part of the environmental assessment to determine compliance with air quality goals at key locations. The air quality modelling revealed that air quality is well below relevant criteria, even at locations such as Newrybar Public School. Concentrations of pollutants drop by half within 10m of the kerbside.

Vehicle emission impacts are effectively managed at source, but while no specific mitigation measures are proposed, air quality management would be incorporated into the overall construction environmental management plan.

The criteria against which air quality impacts were assessed (see tables 19.2-19.4 in the environmental assessment) have been developed by the relevant authorities to take into account the health risks of the particular pollutants in question.

2.17.2 Analysis in environmental assessment

Submission number

033, 096, 099, 156, 160, 193, 315, 323, 333, 339, 358

Summary of issues

The following submissions raised concerns over the analysis of air quality impacts

- > Assessment in the environmental assessment is flawed. It does not contain any local data.
- > It is unacceptable that the RTA has not monitored or collected real data measuring air quality in Bangalow. The comparison that is made by the RTA with Coffs Harbour is unacceptable.
- > Bangalow has its own micro-climate with a number of factors influencing the air quality, so studies should be carried out to show the reality of the situation.

Submission No. 033, 096, 156, 160, 193, 315, 323, 333, 339, 358

- > The RTA states that the rate of air pollution will be less given that the highway will be divided into independent Southern and Northern bound road networks, how can such a claim be made without scientific analysis? (160)
- > Newrybar School has been identified as a sensitive receiver, yet the only data is from monitoring stations more than 300km away. Why haven't monitoring stations been set up next to the most sensitive air and water receivers for the past 2 yrs to gather relevant, site specific data? (099)

Response

The air quality assessment and modelling for the project was based on local climatic conditions. The model was also set to define a worst-case wind direction when predicting pollutant concentrations at each receptor. The reference to Coffs Harbour was in relation to air monitoring data. As discussed in the Working Paper 12, (Section 4.3) air quality data by the RTA at the Pacific Highway near Coffs Harbour was used as a baseline for the model only.

The Coffs Harbour monitoring site was located at the Pacific Highway between Korora Public School and the Korora Rural Fire Brigade, north of Coffs Harbour. Due to the proximity of the monitoring location to the highway, the concentrations are influenced by traffic volumes that are considerably greater than those predicted for the proposed upgrade. The baseline data therefore result in the model giving a conservative indication of the air quality that would be experienced in the study area. These data were used in Section 7.1 of the air quality report to provide a conservative estimate of background levels of pollutants.

The model used to predict air quality impacts takes into account local topography and climatic factors. Air quality goals for the proposed upgrade are met at kerbside and pollutant concentrations drop to half within 10m of the road.

2.17.3 Air quality at Bangalow

Submission number

012, 014, 015, 033, 096, 116, 121, 122, 188, 222, 252, 315, 359

Summary of issues

The following submissions were specifically concerned with the impact of the upgrade on air quality at Bangalow

- > This historic, beautiful and once serene area is slowly but surely being overwhelmed by fumes from ever increasing traffic, in particular diesel particulate fumes from over 2,500 trucks passing through daily. (012, 014, 015, 033, 116)
- > Residents will be affected by an increase in pollution, resulting in potential health problems. (096, 121, 122, 188, 222, 315, 359)
- > Bangalow is in a valley with walls on three sides and does not receive much relief from coastal breezes, trapping pollution. (033, 096, 252)

Response

The air quality in the vicinity of the existing highway near Bangalow would be improved because:

- > The proposed upgrade would see the Pacific Highway moved further away from the town of Bangalow.
- > Traffic forecasts indicate that vehicles numbers, and in particular truck numbers, on the existing highway adjacent to Bangalow would decrease significantly when the upgrade is complete.

The air quality adjacent to the upgraded highway would be better than the air quality adjacent to the existing highway if there was no upgrade for the following reasons:

- > The grades on proposed upgrade would be less than the grades on the existing highway. Lower grades mean lower emissions.
- > Vehicle numbers on the existing highway (without an upgrade) would be more than vehicle numbers on the upgraded highway as not all traffic would transfer to the upgrade. Some local traffic would remain on the existing highway.

The model used to predict air quality impacts takes into account local topography and climatic factors. Air quality goals for the proposed upgrade are met at kerbside and pollutant concentrations drop to half within 10m of the road.

2.17.4 Fog

Submission number

094, 281

Summary of issues

The following submissions raised the issue of fog in the Tinderbox Valley

- > The assessment fails to recognise the safety issue that fog in the Tinderbox valley will present to the operation of the proposed St Helena Tunnel. (094)
- > Suggest a method of monitoring and warning of fog be established at St Helena tunnel. (281)

Response

Variable message signs would be installed at both north and south approaches to the tunnel to warn of incidents. These signs would also have the potential to provide notification to drivers of any adverse weather conditions ahead such as fog. The RTA would review this issue further in the detail design in conjunction with development of the incident management plan for the tunnel.

2.17.5 Construction

Submission number

173, 269, 349 - Byron Shire Council

Summary of issues

The following submissions were concerned with air quality during construction.

- > A batching plant nearby to the proposed work site at the highway will cause pollution in Clover Hill. The plant should be located far away from houses. (173)
- > The air quality will be affected not only during completion but also during construction by possible nitrous oxides resulting from blasting. (269)
- > Dust sensitive individuals should be forewarned of any adverse construction conditions. (349)

Response

The sites for construction facilities identified in the environmental assessment are considered appropriate. The final location of sites for construction facilities would be made with the input of the contractor(s) during detailed design. It is not possible to be definitive regarding the location of these sites at this stage in the process as much would depend on the particular construction approach adopted by the contractor.

To limit impacts, locational criteria were identified in the environmental assessment that would need to be followed before a site is selected (Table 6.12). These include criteria relating to proximity to residences. There would also be a range of operating conditions placed on the contractor to ensure that construction air quality impacts are minimised.

Oxides of nitrogen including nitrogen dioxide are emitted during blasting. The level of emissions would depend upon a number of factors including the size of the blast and

the length of time the explosives have been in the ground. However these emissions are transient and by the time they are transported to nearest sensitive receptors, which would be at safe distances from the blast, it is very unlikely that any exceedences of nitrogen dioxide air quality goals would occur. This assessment is based on measurement by the RTA's air quality consultants of emissions from actual (and more powerful) blasting.

The entire community would be regularly updated on construction activities that may affect them. It is not feasible to maintain a database of individuals with particular sensitivities. It is therefore recommended that anybody with specific needs maintain regular contact with the project team through one or more of the various communication channels that would be made available (such as the project hotline).

2.17.6 Effect on water

Submission number

316 - Rous Water, 352

Summary of issues

The following submission was concerned with airborne pollution entering waterways

- > Airborne pollution will enter the Environmental Protected Water Catchment on an ever increasing volume by way of vehicle exhaust and road spray during the frequent rain events in the area. The RTA dismisses this risk of toxic pollution as low. The RTA can not prevent this pollution entering the waterway which Government legislation says must be protected as a matter of priority. (352)
- > The evidence should be presented that there would be no deterioration in drinking water as a result of airborne pollution arising from the proposed upgrade (316 - Rous Water)

Response

The RTA does not believe that further assessment of this issue is warranted or justified.

The air quality assessment for the proposed upgrade demonstrates that the air quality impacts resulting from the proposed upgrade would be less than the DECC Impact Assessment Criteria, which have been developed to help protect human health. It is identified in Section 4.4 of Working Paper 2 that the proposed upgrade is predicted to result in no deterioration in air quality and hence, there would be no deterioration in drinking water quality as a result of airborne pollution from the upgrade.

The maximum predicted concentration of pollutants from vehicle emissions occur at the kerbside and decline with distance from the road. The fate of airborne pollutants settling within and adjacent to the roadside form a part of the event mean concentrations that have been used in the modelling that has been undertaken to assess the impact of the upgrade on water quality.

Rous Water in its subsequent comments (dated 3 February 2009) stated that it considered that the RTA had now addressed this issue adequately.

2.18 Other issues

2.18.1 Bangalow southern bypass

The following submissions were received regarding a possible southern Bangalow bypass (listed by submission number below).

Submission No. 004 - Lismore City Council, 011, 012, 014, 015, 023, 027, 028, 035, 036, 040, 042, 081, 086, 116, 119, 121, 122, 123, 124, 125, 128, 132, 156, 158, 181, 188, 203, 222, 248, 249, 252, 254, 274, 278, 285, 296, 326, 372, 376, 381

Response

The feasibility of a bypass is being investigated by the RTA separately to the Tintenbar to Ewingsdale Pacific Highway upgrade.

2.18.2 Non-Aboriginal heritage

Submission number

222

Summary of issues

The following submission concerned heritage items on private property

- > The buildings on our land have been identified as having moderate heritage value to the local area. This site should be reclassified and recorded for the archives before it is demolished for the highway upgrade. (222)

Response

The environmental assessment identifies that the buildings in question would be recorded in a manner consistent with NSW Heritage Office standards and guidelines.

Submission number

255 - Heritage Council of New South Wales

Summary of issues

The following submission requested a series of approval conditions relating to indigenous and non-indigenous heritage.

The following conditions are requested:

- > The Proponent shall prepare a Non-Indigenous Heritage Management Plan in consultation with the Heritage Council of NSW as part of the Construction Environmental Management Plan. That document shall include details of all procedures to be implemented during the works in relation to non-Indigenous heritage items.
- > A specialist heritage manager or heritage consultant shall be nominated for the works. The consultant shall have appropriate qualifications and experience commensurate with the scope of the Major Project works. The name and experience of this consultant shall be submitted to the Director General for approval prior to commencement of works. The heritage consultant shall advise on the detail design resolution of new

works, undertake on site heritage inductions, and shall inspect new works, design and installation of services (to minimise impacts on significant fabric and views) and manage the implementation of the conditions of approval for the Project. A report by the heritage consultant (illustrated by works' photographs) shall be submitted to the Director-General for approval within 6 months of the completion of the works which describes the work, any impacts/damage and corrective works carried out.

- > All construction contractors, subcontractors and personnel are to be inducted and informed by the nominated heritage consultant prior to commencing work on site as to their obligations and requirements in relation to historical archaeological sites and 'relics' in accordance with guidelines issued by the Heritage Council of NSW.
- > Photographic and archival recording of all affected Heritage items, as identified in the specialist reports prepared as part of the environmental assessments for the project, is to be undertaken prior to the commencement of any construction activity. Recording is to be completed in accordance with the Guidelines issued by the Heritage Council of NSW. Copies of these photographic recordings should be made available to the Heritage Branch, Department of Planning, and also to the Local Studies Library and the Local Historical Society in the relevant Local Government areas. (255)

Response

A detailed environmental assessment of non-Aboriginal heritage generally found a low level of significance. Given this low level of significance and risk, the RTA does not consider it is justified to appoint a specialist heritage manager/consultant as requested by Heritage Council of NSW.

The RTA considers heritage impacts as a result of the proposed upgrade can be satisfactorily managed through implementation of the management measures identified in the environmental assessment and in the revised statement of commitments.

3 Additional investigations and clarifications to the environmental assessment

3.1 Arundel Hill cutting

The environmental assessment acknowledged the visual impact on Bangalow that would result from the Arundel Hill cutting that is proposed south of the town. One of the four visual simulations in Chapter 18 of the environmental assessment included a representation of the Arundel Hill cutting. This simulation was taken from the southern end of Robinson Road which is approximately 1.3km north-west of the cutting. The viewpoint was chosen to represent one of the worst-case views from Bangalow.

Several submissions highlighted the potential visual impacts of the cutting at Arundel Hill, south of Bangalow, and suggested that the Robinson Road viewpoint in the environmental assessment was chosen to deliberately underestimate the visual impact of the proposal. The Bangalow 2020 submission was one of these submissions and included graphic representations of the cutting from Rankin Drive and the existing Bangalow bypass. These representations do not accurately visualise the form and scale of the cutting at Arundel Hill.

To provide some further clarity in terms of the visual impacts of the cutting, three additional visual simulations were prepared as part of this submissions report. These simulations (like those presented in the environmental assessment) are based on a three dimensional model of the concept design and as such can be regarded as having a high level of accuracy.

Two of the additional simulations correspond to the locations represented in the Bangalow 2020 submission. A third (Blackwood Crescent at Clover Hill estate) is also represented after it was discussed with some residents during the environmental assessment exhibition identified it likely to have a prominent view of the cutting.

The location of the additional viewpoints is shown in Figure 3.1, while the visual simulations (as well as existing views for comparison, are shown in Figures 3.2 to 3.7. The focal length used for each image is the same and matches that used for the visual simulations in the environmental assessment.

Viewpoint A is from the merge point of the southbound on-ramp on the existing Bangalow interchange. The viewpoint is approximately 1.5 km north of the top of Arundel Hill. The simulation from this viewpoint is generated entirely from the digital model of the proposed upgrade and has not been merged with the original photograph. This is due to the scale of visual change that would occur, particularly in the foreground of this view. This general viewing location is arguably not as sensitive as those discussed above, as it would be experienced by vehicle users for a relatively short durations rather than residents. The cutting is prominent in the view, with much of the western cut face being visible.

Viewpoint B is from Blackwood Crescent at Clover Hill estate. This viewpoint is approximately 1.4km north of the cutting. The proposed upgrade would result in a change to the horizon from this viewpoint, as well as removing prominent trees from the ridgetop. Only a small area of the eastern face of the cutting is likely to be visible due to the angle of the view in relation to the highway alignment.

Viewpoint C is from Rankin Drive at Bangalow. It is approximately 1.9 km north of the top of Arundel Hill. In addition to the removal of the farm house and trees on top of Arundel Hill, the main visual change would be the change to the horizon line reflecting the opening created by the cutting. Part of the eastern cut face would be visible from this location, however the eastern face would be obscured due to the angle of the view. Mature fig trees on an intervening ridgeline partially screen the cut.

The ultimate visual contrast created by views of the cut faces would be related to the success of landscape planting. The visual simulations present a worst case scenario, illustrating no landscape treatment.

Figure 3.1 Additional viewpoint locations

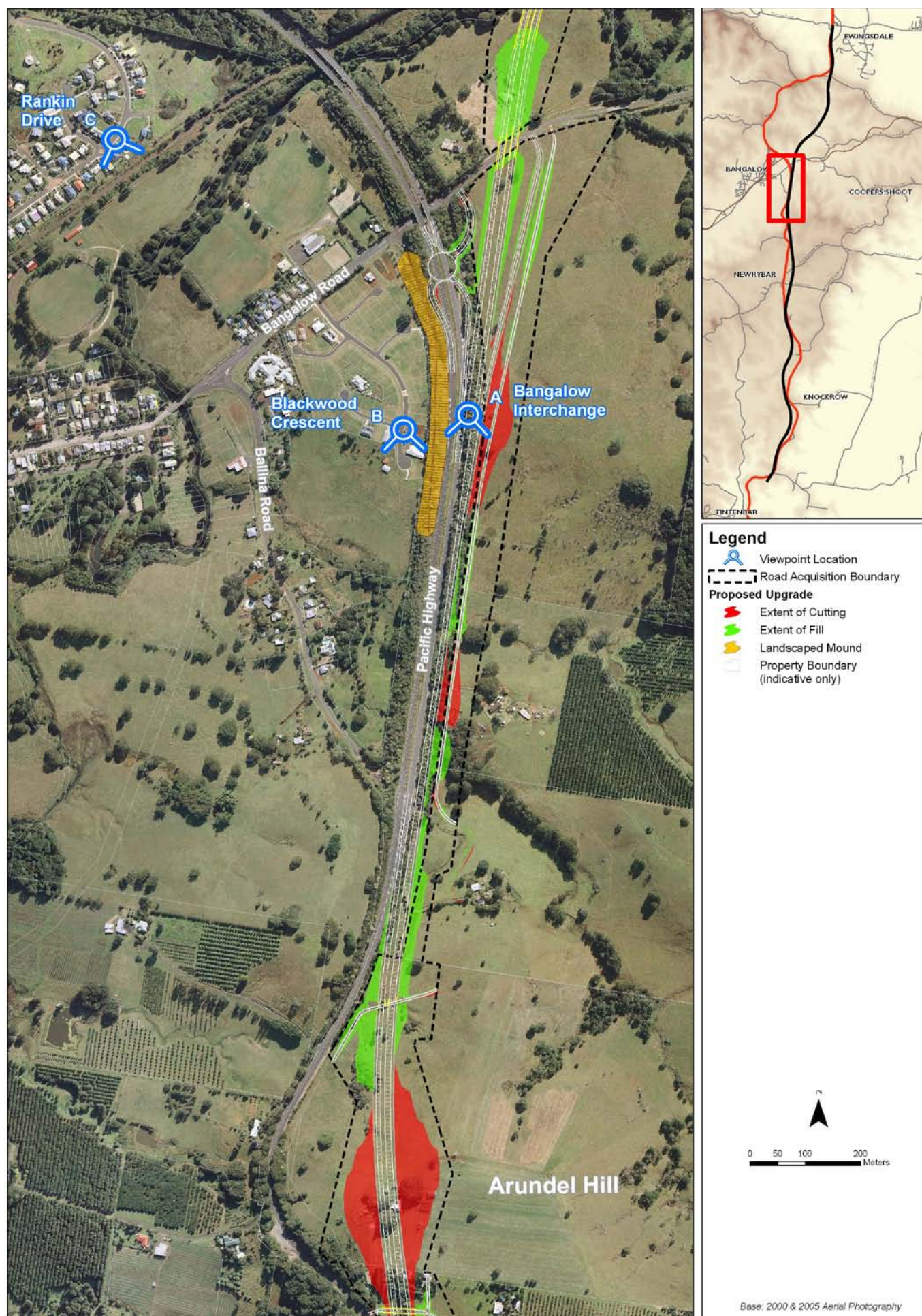




Figure 3.2 Viewpoint A - Bangalow interchange, Bangalow, existing view

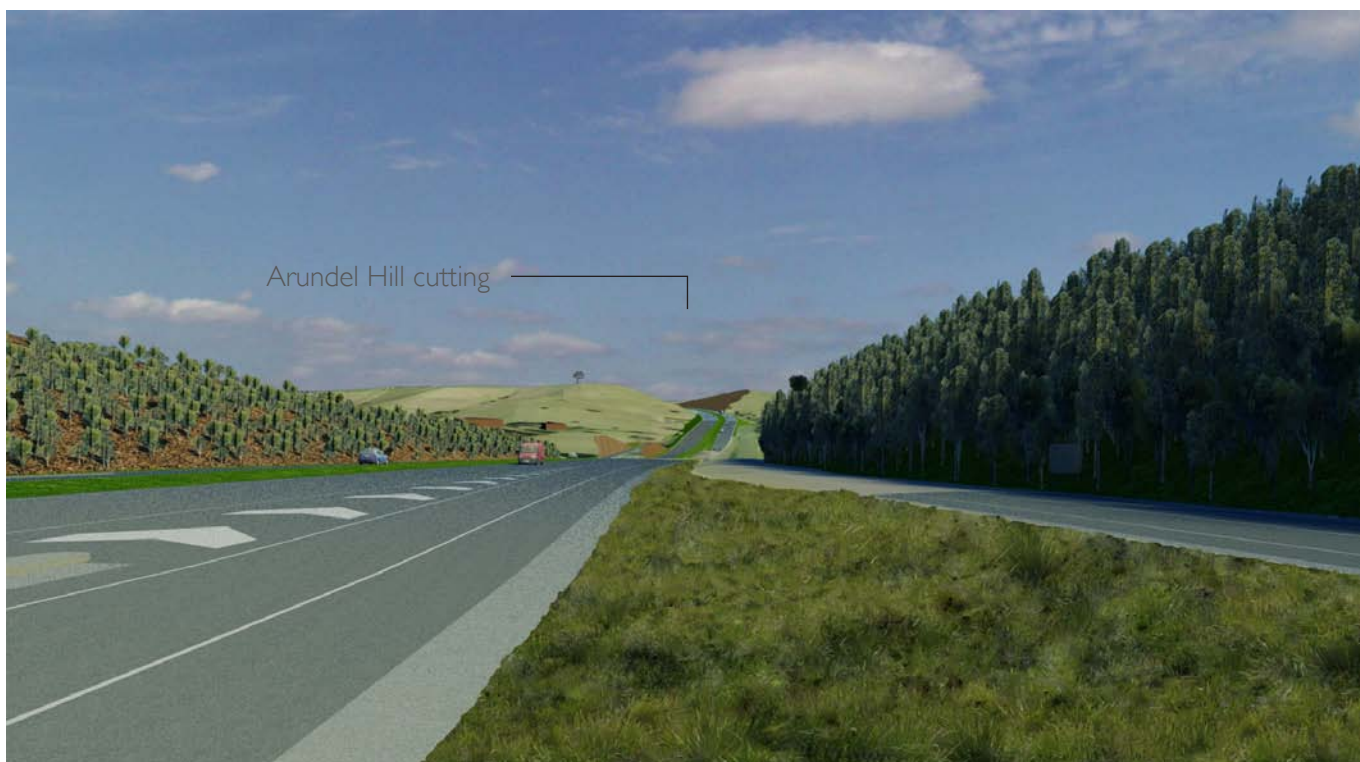


Figure 3.3 Viewpoint A - Bangalow interchange, modelled view of proposed upgrade



Figure 3.4 Viewpoint B - Blackwood Crescent, Clover Hill estate, Bangalow, existing view



Figure 3.5 Viewpoint B - Blackwood Crescent, Clover Hill estate, Bangalow, photographic simulation of proposed upgrade



Figure 3.6 Viewpoint C - Rankin Drive Bangalow, existing view



Figure 3.7 Viewpoint C - Rankin Drive Bangalow, photographic simulation of proposed upgrade

3.2 Water quality modelling – proposed Lismore source catchment

The environmental assessment included detailed water quality modelling of the water quality of runoff from the proposed upgrade in the Emigrant Creek dam catchment. A more qualitative assessment was undertaken for areas outside the Emigrant Creek dam catchment. This water quality modelling indicated that the proposed upgrade would result in an improvement in water quality entering Emigrant Creek dam when compared to the existing situation. The difference in level of detail in the assessment of the different catchments was due to the particular proximity of Emigrant Creek dam to the proposed upgrade.

In undertaking ongoing discussions with Rous Water it was deemed appropriate to gain a level of confidence that water quality within the proposed Lismore source (Wilson's River) catchment would also be improved as a result of the proposed upgrade when compared with the existing situation. Additional water quality modelling has therefore been carried out for this catchment since the environmental assessment was placed on public exhibition. This modelling also helped to refine the water quality treatment concept so that an appropriate mix of treatment device types could be identified in the proposed Lismore source catchment.

The water quality modelling identified that under a scenario where eight of the proposed eighteen basins in the proposed Lismore source catchment are converted to bio-retention (sand filter) basins, the goal of achieving an improvement in water quality compared to the existing situation can be achieved. The basins that would be converted to bio-retention basins are numbers 34, 35, 36, 37, 46, 49, 50, and 55. The location of numbered basins is shown in Figures 4.1a to 4.1j of this report. The results of the water quality modelling are shown in Table 3.1 below.

Table 3.1 – Proposed Lismore source catchment – water quality modelling results

Pollutant	Pre-development load	Post-development load	Percent change
Total Suspended Solids (tonnes/yr)	114	71	38% reduction
Total Phosphorus (kg/yr)	252	163	35% reduction
Total Nitrogen (kg/yr)	1400	1232	12% reduction

The pre-development load shown in Table 3.1 represents the pollutant load entering receiving waters within the proposed Lismore source catchment from the existing highway. The post-development loads are those predicted to enter the same receiving waters from both the existing highway and the proposed upgrade. The table includes indicate water quality with and without the proposed treatment.

The above water quality modelling is relatively conservative and for the most part assumes that the existing (predominantly agricultural) land uses in those parts of the road reserve not subject to pavement or earthworks, would remain. In reality, these areas would be extensively landscape with native species with the result that pollutant exports from the road reserve would be substantially lower than if the existing agricultural uses were to

remain. The modelling does however take into account the water quality improvements that would result from an estimated 19.26 ha of riparian restoration that would be implemented as part of the proposed upgrade within the road reserve in this catchment. Proposed riparian restoration within RTA acquired land beyond the road reserve has not been factored into the model as the precise extent of this restoration has not been quantified.

The modelling shows that the proposed upgrade would result in an overall improvement in water quality within the proposed Lismore source catchment when compared with the existing situation.

3.3 Ecological restoration

The environmental assessment identified that restoration of the locally occurring low land rainforest/riparian ecological community would occur in two situations:

- > Where there are drainage lines in the road reserve
- > Where there are drainage lines in land initially acquired by the RTA but would be outside the road reserve.

Because the extent of land acquisition outside the road reserve cannot be accurately evaluated at this point, estimation of the area of riparian restoration resulting from the latter situation has not been undertaken.

Since the exhibition of the environmental assessment however, the RTA has undertaken additional work identifying the locations for riparian restoration within the road reserve. Potential areas for riparian restoration are shown on figures 3.8a-e. The total of these areas comprise approximately 31 ha. Riparian restoration in this area would aim to recreate the species composition and structure of the lowland rainforest endangered ecological community. The estimated direct removal of existing lowland rainforest in the study area as identified in the environmental assessment as 2 ha with further direct impact on 3.7 ha of the community. The proposed upgrade can therefore be regarded as resulting in a significant increase in the total area of lowland rainforest before the additional restoration area (yet to be precisely defined) outside the road reserve is taken into account.

The RTA has already undertaken one area of riparian/lowland rainforest restoration on property that it has acquired that would be outside the road reserve. This initial restoration program has been highly successful and provides a level of confidence in the success of the broader restoration program.

Figure 3.8a Potential riparian restoration area within the road reserve

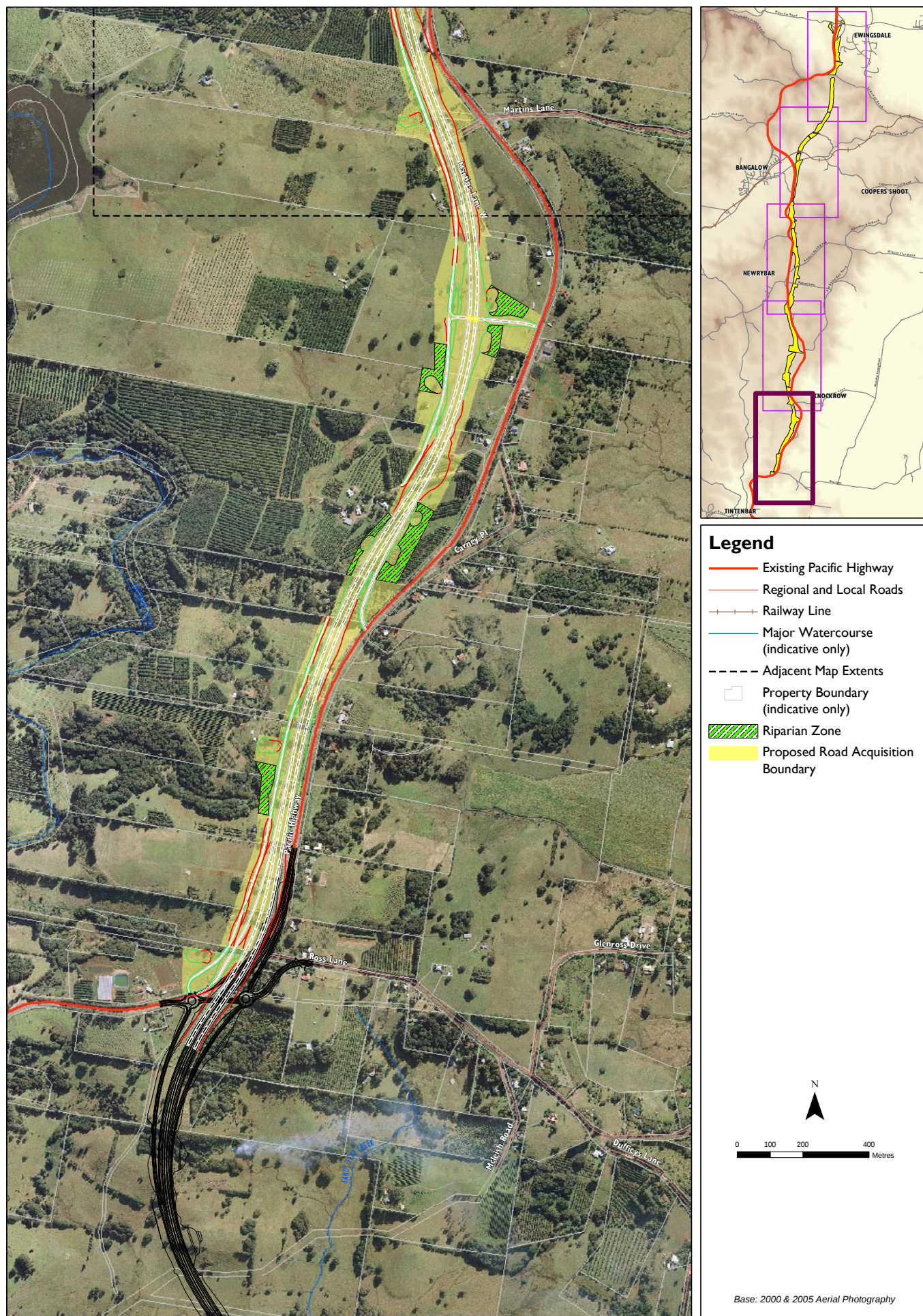


Figure 3.8b Potential riparian restoration area within the road reserve

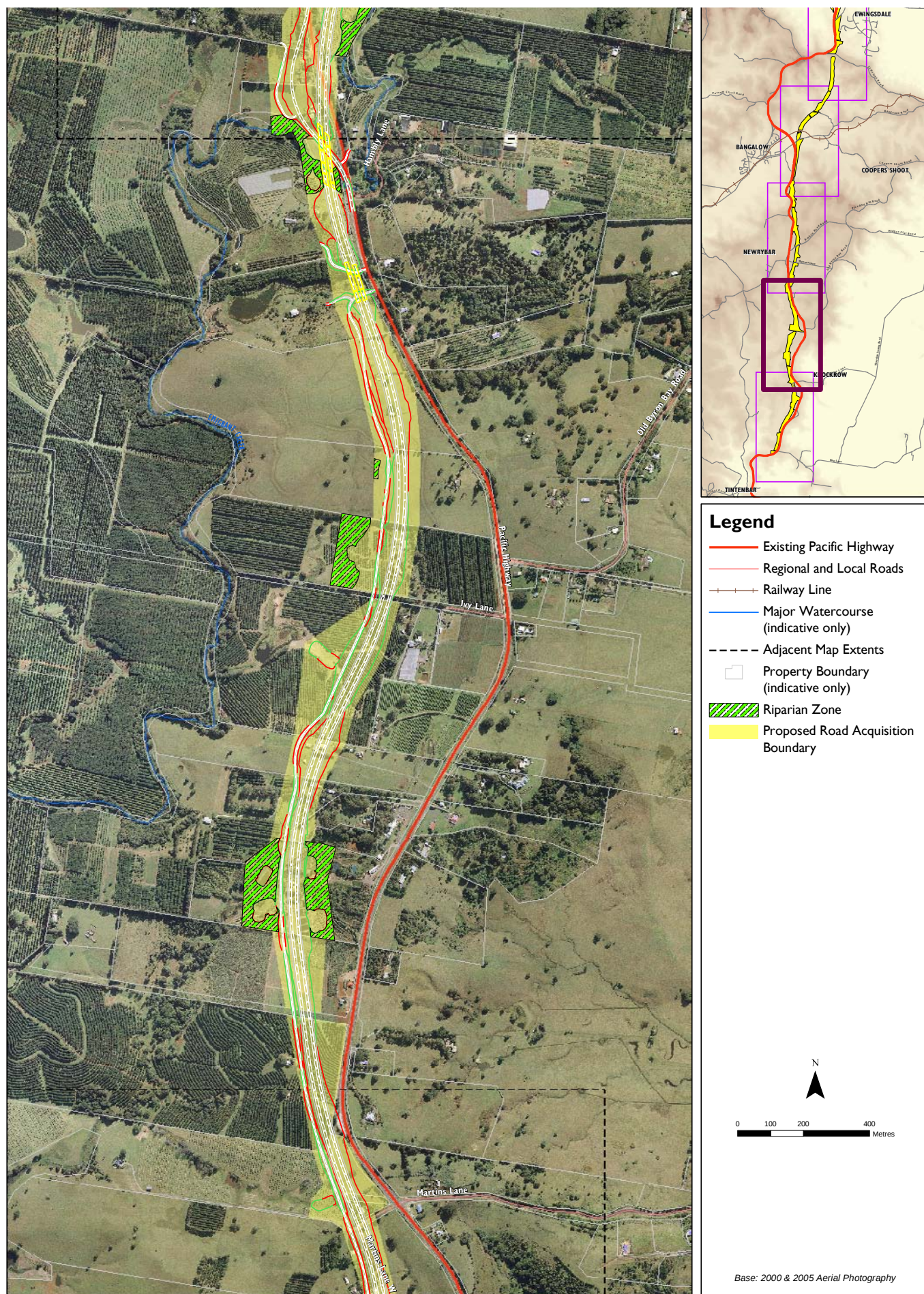


Figure 3.8c Potential riparian restoration area within the road reserve

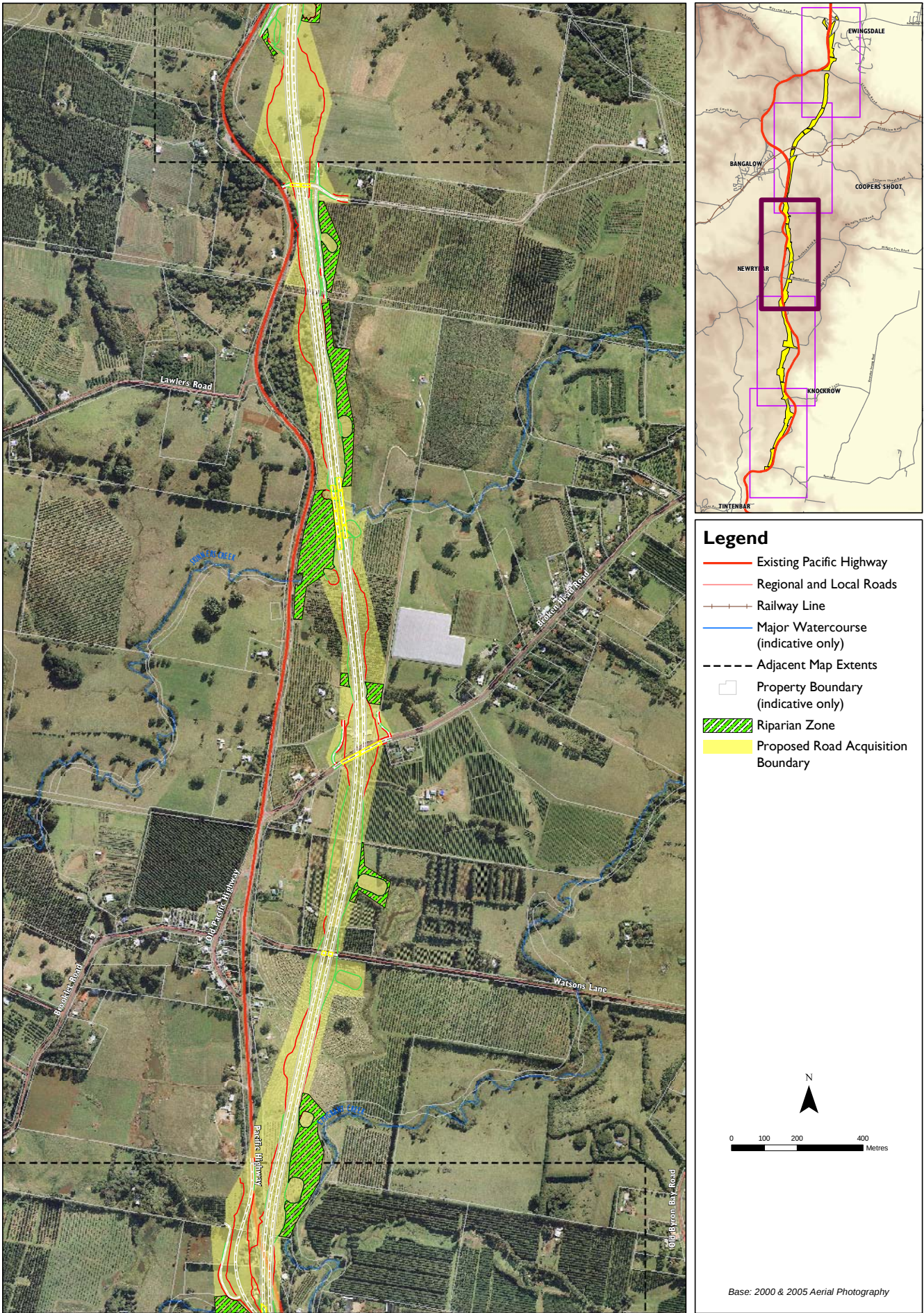


Figure 3.8d Potential riparian restoration area within the road reserve

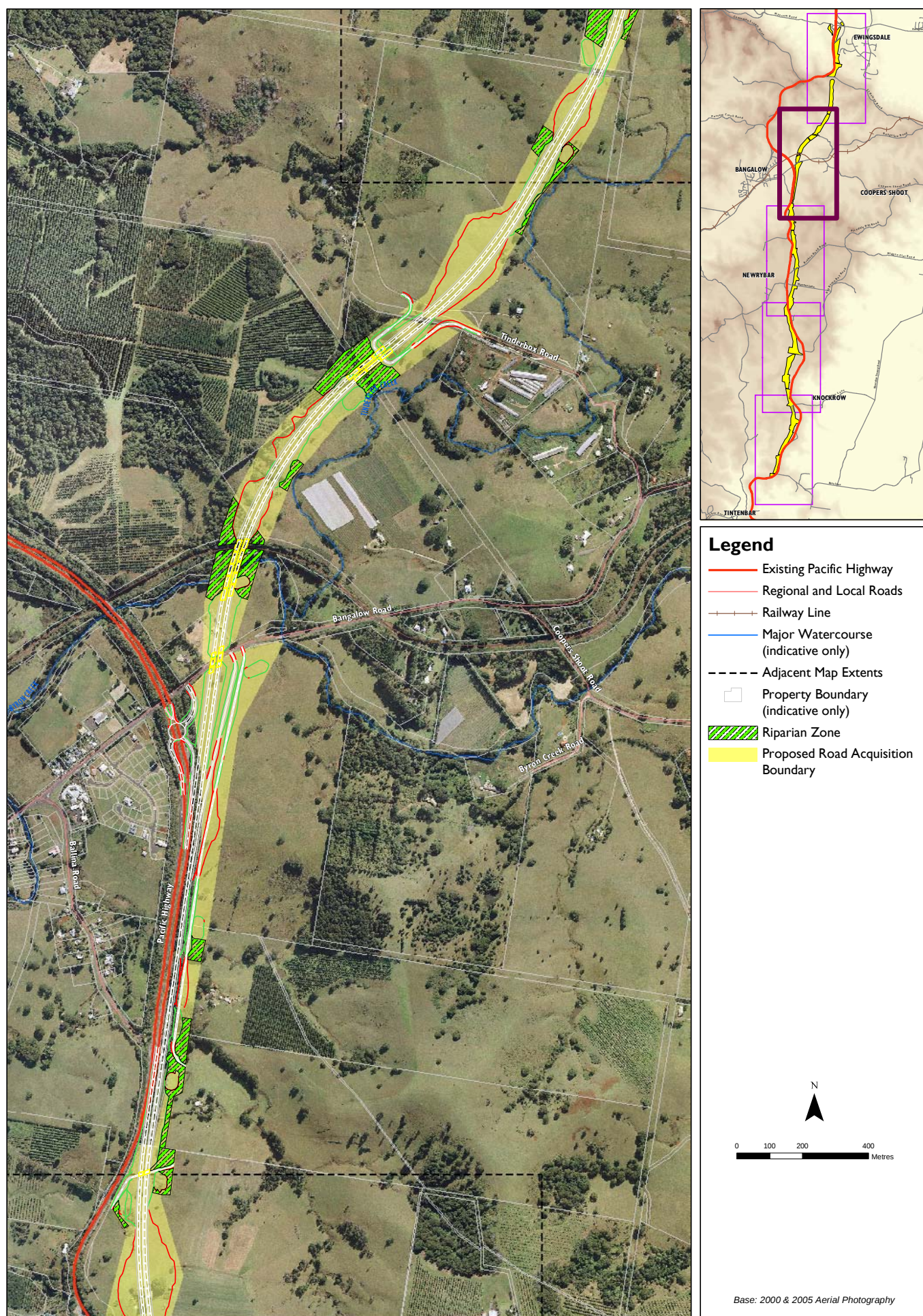
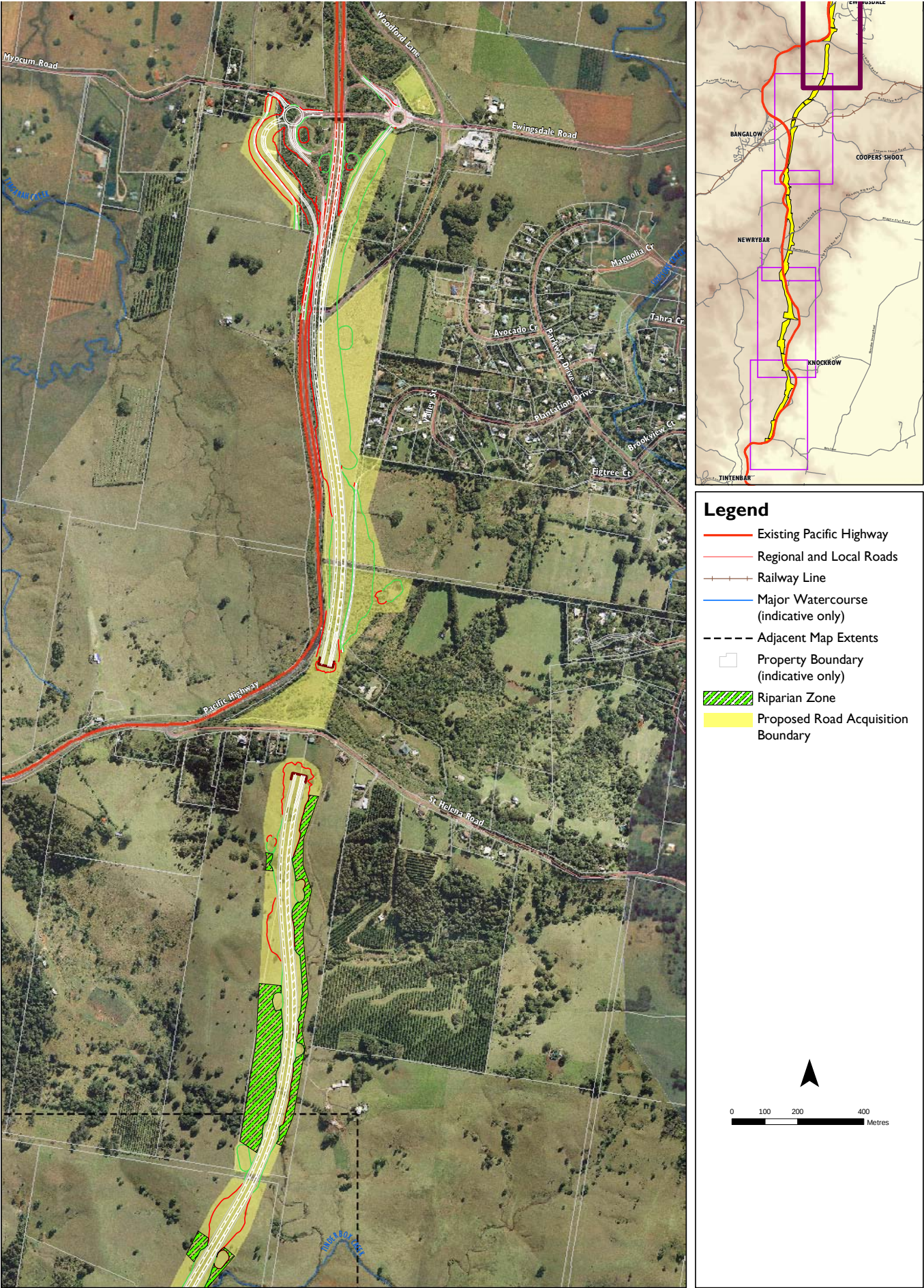


Figure 3.8e Potential riparian restoration area within the road reserve



3.4 Corrections and updates to the environmental assessment

Several minor errors have been identified since the environmental assessment was placed on public exhibition. These are corrected below.

Environmental assessment, figure 5.2j

The label stating “existing southbound off-ramp realigned to accommodate future traffic growth” is incorrectly positioned. It should be located at the existing southbound off-ramp at Ewingsdale Interchange.

Environmental assessment, figure 5.5

The label stating “existing northbound off-ramp would be closed” is incorrectly positioned. It should be located on the western side of the existing highway.

Environmental assessment Chapter 12 and Working paper 4, Terrestrial ecology assessment

The black flying fox *Pteropus alecto* is discussed several times in the environmental assessment and working paper 4 as a threatened species (listed as vulnerable under the Threatened Species Conservation Act 1995). The species was removed from this list in August 2008 (while the environmental assessment was in press).

Environmental assessment, section 9.5.4 Skinners Creek

Skinners Creek was incorrectly referred to as Emigrant Creek. The first sentence should read: “Bridge abutments on both sides of Skinners Creek would be located in a way that minimises increases in flood levels during flood events.”

Environmental assessment, section 9.5.5 Byron Creek

Byron Creek was incorrectly referred to as Emigrant Creek. The first sentence should read: “Bridge abutments on both sides of Byron Creek would be located in a way that minimises increases in flood levels during flood events.”

Working Paper 2, Water quality assessment

In Section 3.2 of Working Paper 2, it is stated that Rous Water declined an invitation to attend Focus Meeting No. 1.

An invitation to attend the Planning Focus Meeting No. 1 (held in Ballina on 16 November 2004) was sent to Rous Water by mail on 27 October 2004. It was addressed to Phil Silver (the then chairman) at the Lismore offices of Rous Water. The RTA did not receive a response from Rous Water and no representative attended the first planning focus meeting.

Rous Water did not formally decline the invitation, therefore this would be better expressed in the manner of Section 10.6.2 of the environmental assessment, which stated: “As a key stakeholder to the project Rous Water were invited to attend all of these workshop sessions. Representatives of Rous Water did not attend the first planning focus meeting however representatives attended all of the four subsequent workshop sessions.”

Working Paper 8, Noise and vibration assessment

One house (immediately adjacent to receiver number 258-H01) was not included in the noise assessment. This house would likely to be considered to exceed criteria. Future noise assessments in the detailed design phase would include this house.

Working Paper 10, Social and economic assessment

In Table 5 on page 35 the foregone value of annual agricultural gross margin are out by a factor of ten and should read:

- > Directly affected \$454,000
- > Indirectly affected \$241,000
- > Total \$695,000

The version of the same table in the environmental assessment (Table 17.2) is correct.

4 Preferred project report

4.1 Introduction

On 28 November 2008, the RTA was advised by the Department of Planning that the Director-General requires the RTA to submit a preferred project report for the proposed upgrade (and the Statement of Commitments to be revised) if the RTA's response to submissions requires changes to the proposed upgrade.

Section 75H(6)(b) provides that the purpose of a preferred project report is to outline proposed changes to a project to minimise its environmental impact.

The following is a preferred project report in accordance with Section 75H (6) (b) of the Environmental Planning and Assessment Act 1979. In this regard, the RTA has determined that there are two project changes that will minimise the proposed upgrade's environmental impact, being:

- > The removal of Ivy Lane interchange
- > The addition of a landscaped mound adjacent to Clover Hill estate, Bangalow.

The preferred project is represented in Figures 4.1a to 4.1j. Changes are highlighted with a blue outline around the annotation boxes.

Some of these marked changes include minor adjustments to the proposed acquisition boundary after consultation with landowners. These minor adjustments are part of a continual process that would occur through the detailed design phase and are therefore not discussed further in the preferred project report.

Figure 4.1a Preferred project

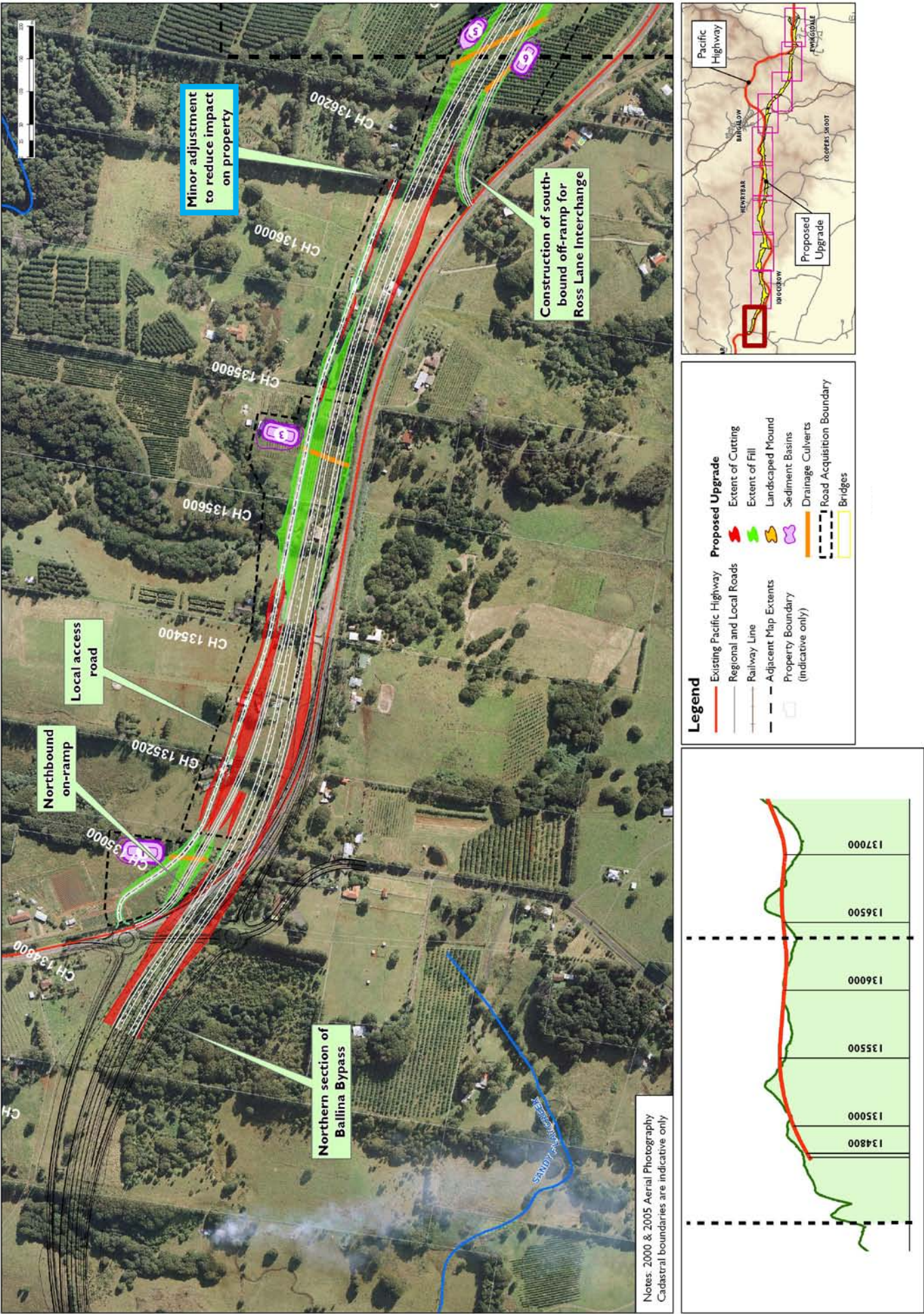


Figure 4.1b Preferred project

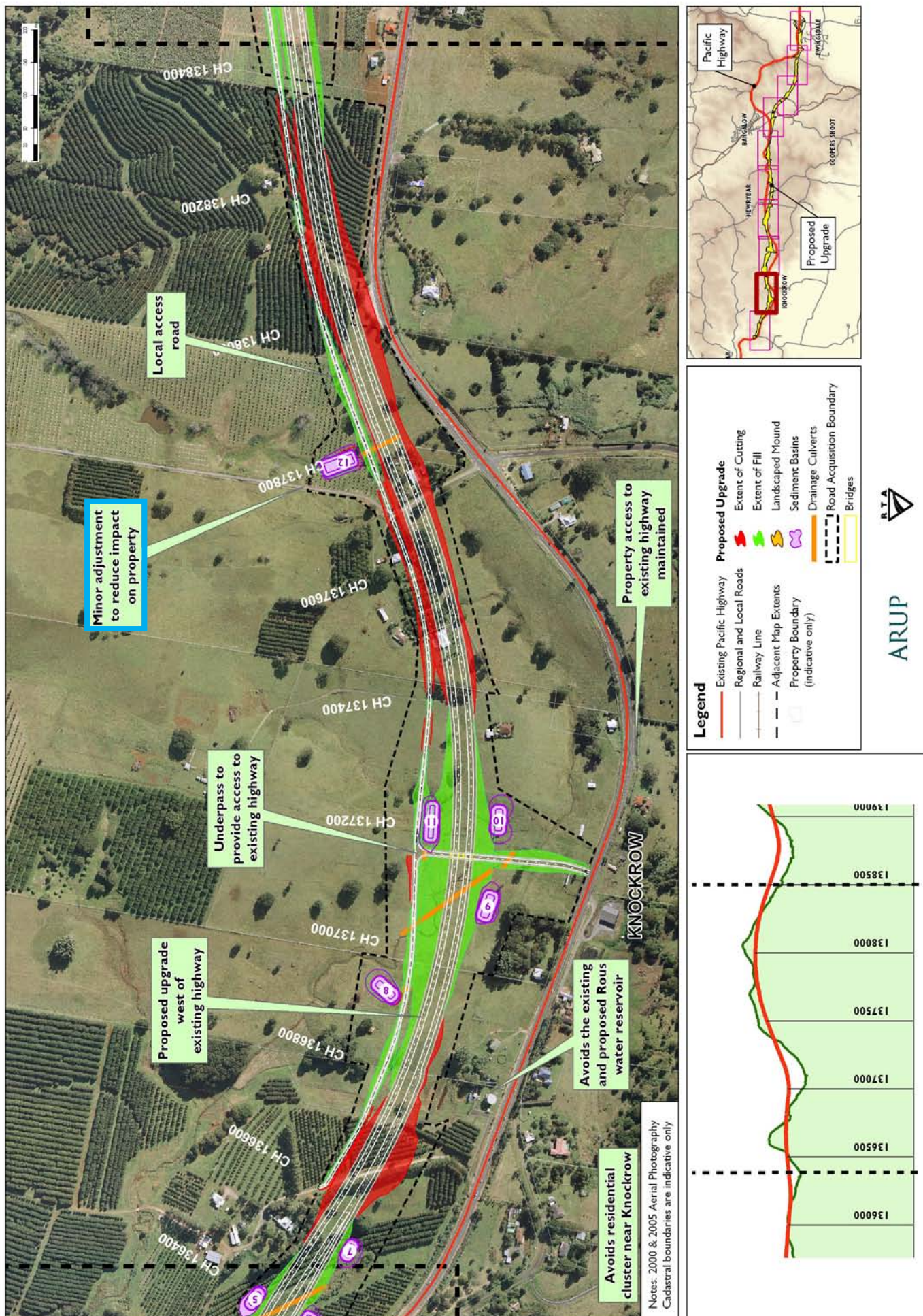


Figure 4.1c Preferred project

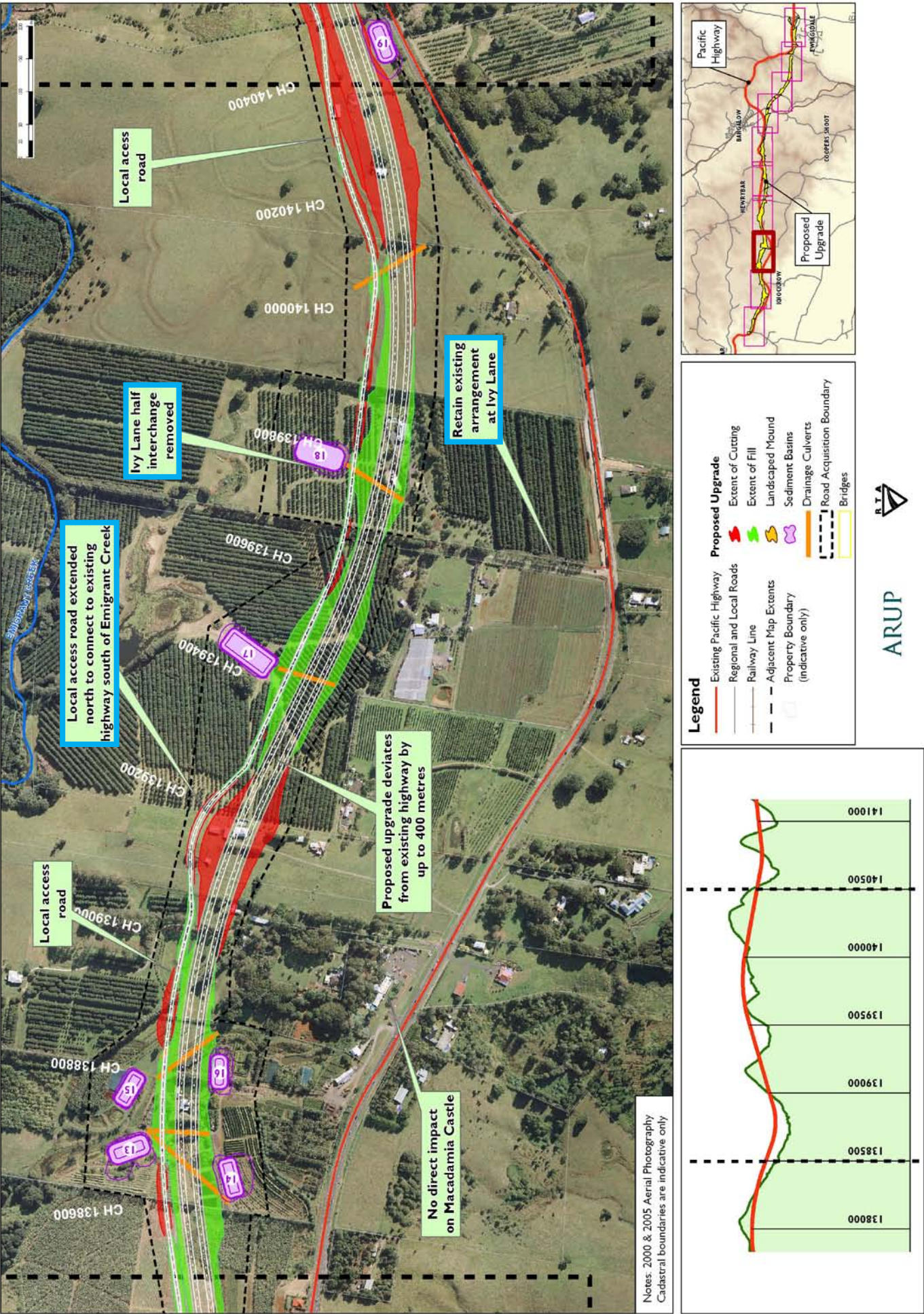


Figure 4.1d Preferred project

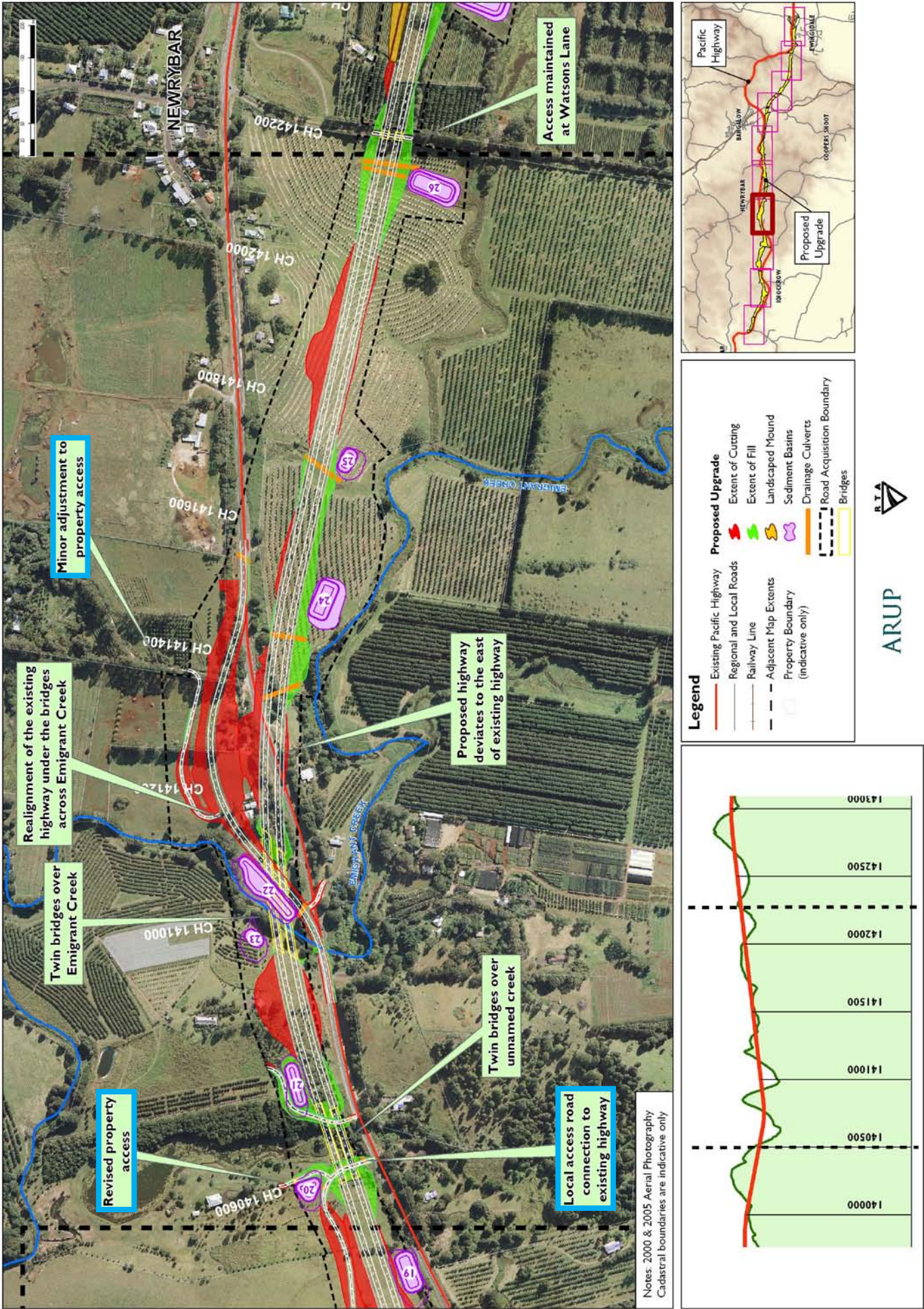


Figure 4.1e Preferred project

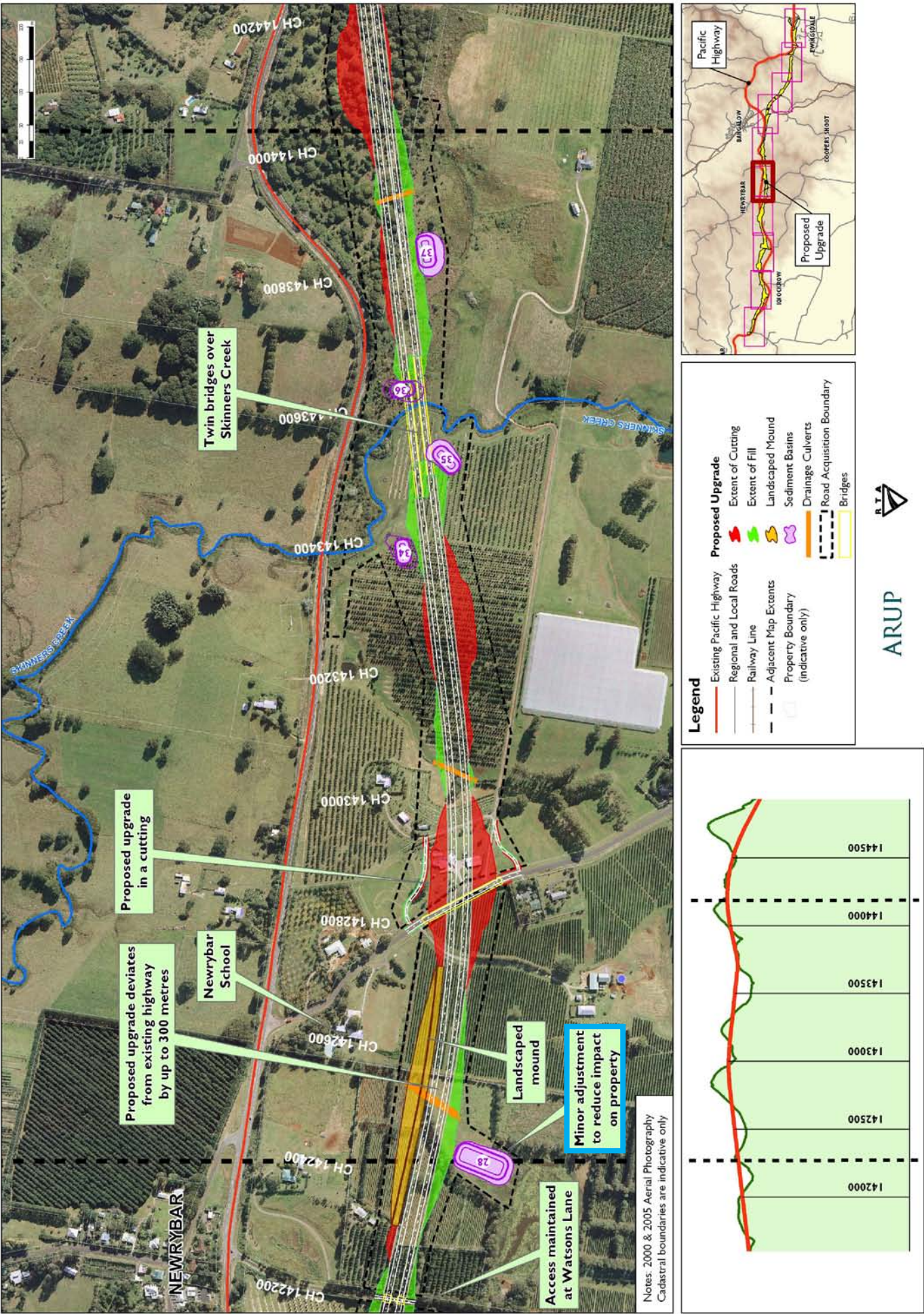


Figure 4.1f Preferred project

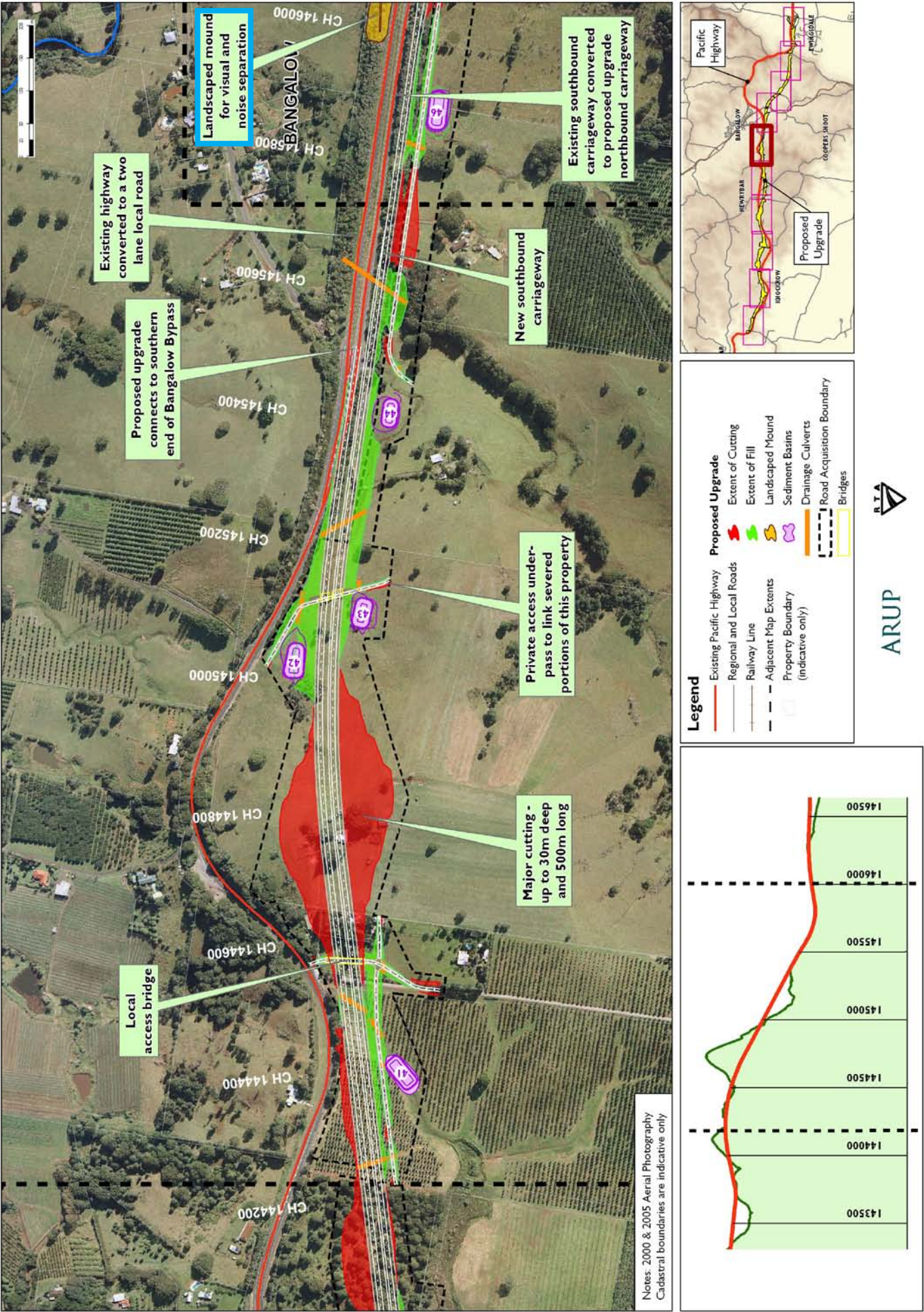


Figure 4.1g Preferred project

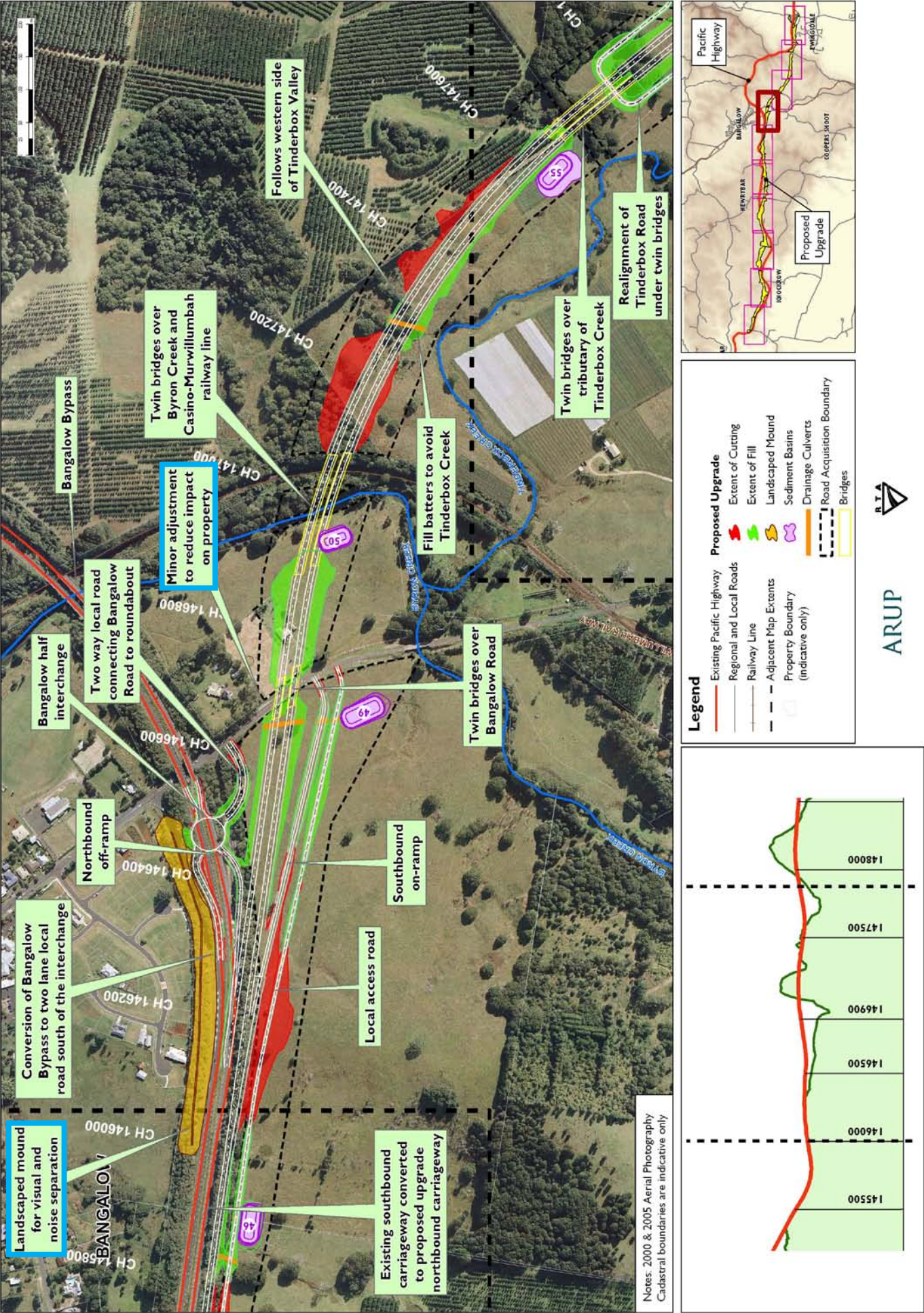


Figure 4.1h Preferred project

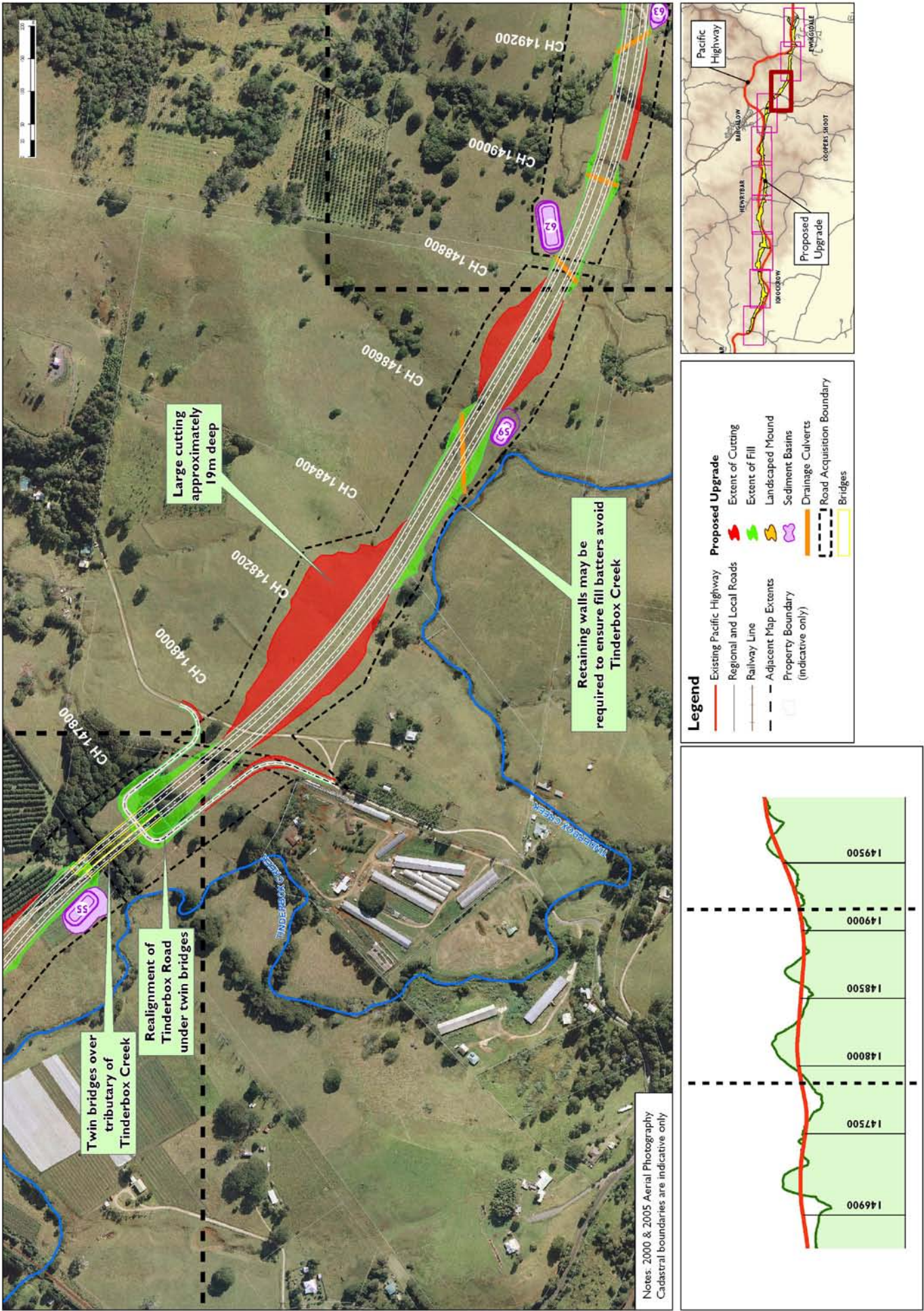


Figure 4.1i Preferred project

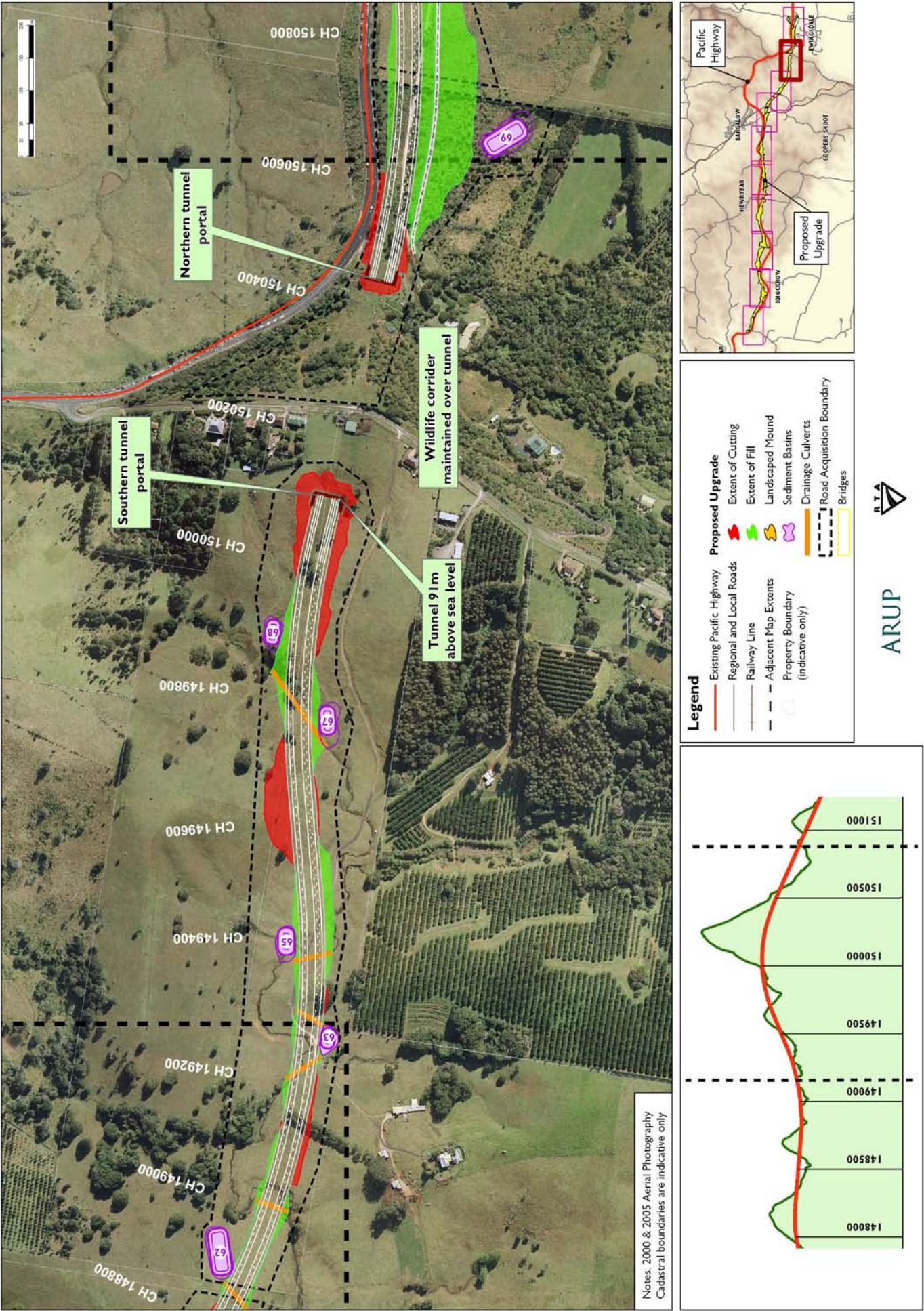
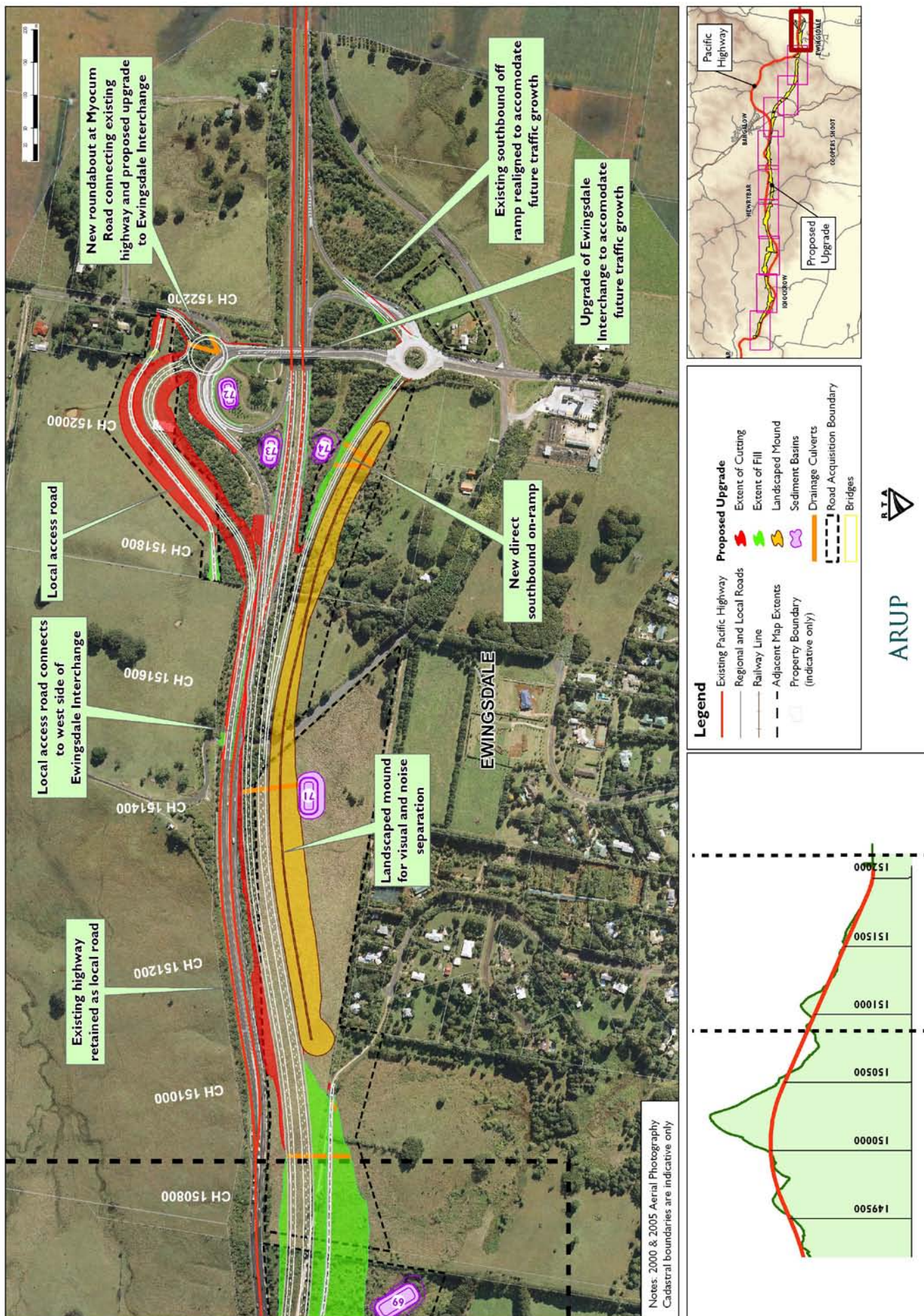


Figure 4.1j Preferred project



4.2 Removal of Ivy Lane interchange

4.2.1 Background

The environmental assessment concept design for the proposed upgrade included a half-interchange (with north-facing ramps) at Ivy Lane near Knockrow. This interchange, along with another half-interchange at Bangalow (with south-facing ramps) were added to the concept design after community representations resulting from the release of the preferred route identified the need for increased access to the proposed upgrade.

The Ivy Lane interchange comprised a northbound on-ramp and a southbound off-ramp, connected to roundabouts on both sides of the proposed upgrade. The interchange would have been connected to the existing road network by a link road from the eastern roundabout back to Ivy Lane. The two roundabouts would be connected by an underpass that would also maintain access to properties on the western side of the proposed upgrade. The roundabout on the eastern side also had a local access road connecting to it which services properties on Ivy Lane.

In response to community submissions on the environmental assessment and after undertaking further evaluations of the interchange, the RTA has determined to remove it from the proposed upgrade.

4.2.2 Issues raised in submissions

260 submissions stated objection to the proposal to provide access to the proposed upgrade at Ivy Lane. 67 were single issue submissions opposing the interchange and 122 submissions used a 'form letter which includes a statement against Ivy Lane interchange. One submission expressed support for the inclusion of the Ivy Lane interchange.

The main concerns raised in submissions against the Ivy Lane interchange are as follows:

- > The interchange would be of little use, except for easier access to the Macadamia Castle.
- > Residents signed a petition against the interchange yet it is still in the proposal.
- > A 110km/hr highway with no access between interchanges at Ross Lane and Ewingsdale was sold to the community.
- > Interchange would increase traffic on Old Byron Bay Road and other local roads (rat running). Traffic bound for Byron Bay would avoid the congested Ewingsdale Road and access Byron Bay from the south via the Ivy Lane interchange and Old Byron Bay Road.
- > Noise impacts from vehicles breaking to exit the highway at Ivy Lane.
- > Additional cost of the interchange for no perceived benefit to the community.
- > Greater land take required to construct the interchange, more impact on agricultural land.
- > Visual impacts due to greater footprint of the interchange.
- > Interchange would require street lights at night, visual impacts of lights.

One submission was received in support of the interchange. The comments in relation to the interchange are provided below:

- > Ivy Lane Interchange - Support the interchange as essential to the survival of Macadamia Castle. Request that this be made a full interchange.

4.2.3 Assessment of alternatives

Issues raised in the submissions were considered by the RTA. Two alternatives to address community concerns were identified.

- > Develop an alternative interchange layout to reduce its real and perceived environmental impacts.
- > Remove the interchange

An engineering review identified little opportunity to reduce the footprint or undertake other design changes that would make any real difference to the impacts of Ivy Lane interchange. This limited scope to alter the design as well as the general opposition to the interchange from the immediate community members who would most use it led to the RTA determining that the interchange would be removed from the proposed upgrade.

4.2.4 Proposed changes

As well as the interchange itself, the underpass at Ivy Lane would also be removed from the proposal and the local access road arrangements on the western side of the upgrade would be amended to provide access to the properties on that side. The altered configuration is shown in figure 4.1c.

The access road shown in the environmental assessment which runs north from the proposed underpass south of Martins Lane West is extended to link back into the existing Pacific Highway just south of the unnamed creek located approximately 250m south of the Emigrant Creek crossing. The proposed arrangement results in a continuous local access road which would provide access between Knockrow and Emigrant Creek to all the remnant areas of land west of the Pacific Highway upgrade alignment.

The provision of a continuous access road on the western side also avoids any requirement for local traffic to double back in the opposite direction in order to either access property or the existing Pacific Highway.

The proposed extension results in an additional 1.5km length of local access road being required along the western side though approximately 400m of that length would have been required as part of the originally proposed interchange.

The removal of the interchange at Ivy Lane also offers a number of cost savings to the proposal as a result of:

- > Removal of ramps.
- > Removal of roundabouts.
- > Reduction in volume of cut and fill.
- > Reduced land acquisition costs.
- > Removal of twin highway bridges over Ivy Lane.

- > Removal of access road from the junction of the Pacific Highway and Ivy Lane through to the west of the upgrade.
- > Opportunities to optimise the highway vertical alignment during detailed design by the removal of a level control at Ivy Lane.

4.2.5 Environmental assessment of the removal of Ivy Lane interchange

The impacts of the proposed removal of Ivy Lane interchange relative to the impacts of the proposed upgrade as presented in the environmental assessment are identified below.

Hydrology

The Ivy Lane interchange location is not adjacent to a watercourse. The closest watercourse is Emigrant Creek, which is crossed by the proposed upgrade approximately 400m north of the interchange location. Construction and operational water quality basins may be able to be reduced in size as a result of the reduced area of earthworks and paved surface, however the removal of the interchange is unlikely to noticeably alter water flows entering Emigrant Creek.

Water quality

The pollutant load from the proposed upgrade during both construction and operation would be expected to reduce slightly as a result of the removal of the interchange due to the reduced extent of road infrastructure. Because all road runoff has been proposed to be subject to a high level of treatment with or without the interchange, the quality of runoff entering receiving waters is likely to be unchanged from that predicted in the environmental assessment.

Groundwater

None of the earthworks associated with the Ivy Lane interchange were anticipated to have an effect on groundwater flows. The removal of Ivy Lane interchange from the proposed upgrade would not be expected to result in any change in groundwater impacts.

Ecology

None of the terrestrial vegetation patches discussed in Chapter 12 of the environmental assessment occur in close proximity to the Ivy Lane interchange location. There would be no change in terrestrial ecological impacts as a result of the removal of the interchange.

There is no aquatic habitat in the vicinity of the interchange location. No change in impacts on aquatic ecology would be expected.

Traffic

Traffic with an origin north of Ewingsdale and a destination in the Knockrow/Newrybar area (and vice versa), would need to travel further on the existing highway with the removal of the Ivy Lane interchange. This would place more traffic on the existing highway and would increase travel time for those vehicles by about 1 to 1.5 minutes.

Removal of the interchange could also affect the Ross Lane and Ewingsdale interchanges. The estimate 860 vehicles/day that would have used the Ivy Lane interchange would be divided between the other two interchanges. Due to the proximity of the Ross Lane interchange to Ivy Lane, approximately 3.5 km for the south bound off ramp and 4.5 km for the north bound on ramp, compared with the Ewingsdale interchange approximately 13 km away, it is expected that the majority of these vehicles would transfer to the Ross Lane interchange. This impact is not expected to affect the level of service of the Ross Lane interchange.

One of the community concerns was that the presence of Ivy Lane interchange would create a *rat run* opportunity with southbound traffic heading for Byron Bay potentially bypassing Ewingsdale interchange and using Ivy Lane interchange and Old Byron Bay Road or Broken Head Road to access Byron Bay or Suffolk Park. While the travel distances involved suggest that the rat running if it occurred would tend to be minimal and focused in peak times only, the removal of the interchange further reduces the potential for this to occur.

Land use and property

The proposed acquisition boundary would be reduced by approximately 4.5 ha with the removal of the Ivy Lane interchange. Much of the land that would now be outside the road reserve is currently used for macadamia farming. The remainder is predominantly grazing. The loss of agricultural land resulting from the proposed upgrade would therefore be slightly less with the removal of the interchange.

Properties bisected if the Ivy Lane interchange was included would remain so with the removal of the interchange.

The properties that are east of the upgrade at Ivy Lane who require access on occasion to the west of the upgrade would need to travel to the an underpass several hundred metres north of the previously proposed location of the Ivy Lane underpass.

Noise and vibration

Some marginal increase in noise levels would occur in areas close to the existing highway and Ross Lane interchange due to the slight traffic increase that would be experienced at these locations. While slight decreases in noise levels may occur in close proximity to the Ivy Lane interchange location due to more consistent traffic speeds in the area. It is unlikely however that these differences in noise levels would be of a magnitude that would be perceptible by residents.

Aboriginal heritage

No change in Aboriginal heritage impacts would be expected a result of the removal of the Ivy Lane interchange from the proposed upgrade.

Social and economic

The local community raise a number of concerns regarding the Ivy Lane interchange. While some of these were real and some perceived, the removal of the interchange from the proposed upgrade avoids these particular impacts being of concern to community members.

No changes to business impacts in Newrybar and Bangalow would be expected as a result of the removal of the interchange. Southbound traffic accessing Newrybar businesses would need to travel further on the existing highway, however the nature of the businesses in Newrybar and the current patterns of use suggest that this would not result in a noticeable impact.

Access to the Macadamia Castle at Knockrow would be affected by the removal of the interchange and would affect this business as it has some reliance on passing trade. Southbound traffic would now need to access the existing highway at Ewingsdale interchange, some 13km further north, to be able to access Macadamia Castle. Northbound passing trade would be less affected, with the requirement to exit at Ross Lane interchange remaining unchanged, however these vehicles would be required to use the existing highway through to the Ewingsdale interchange to continue their journey rather than re-entering the proposed upgrade at Ivy Lane.

Visual amenity and urban design

There was significant opportunity to minimise the visual prominence of Ivy Lane interchange through landscape treatments. Its removal however, would reduce the scale of road infrastructure in the area and consequently lessen the visual impact of the proposed upgrade in this area slightly and remove the potential for impacts associated with lighting of the interchange.

Air quality

The potential for localised air quality impacts during construction of the proposed upgrade would be slightly reduced due to a smaller volume of earthworks occurring at this location.

Changes in operational air quality would be expected to be less than detectable levels at any nearby sensitive receiver, given the minimal level of air quality impacts that would occur with the interchange in place.

Other environmental impacts

The environmental assessment evaluated a series of other environmental impacts of the proposed upgrade that were not identified as key issues in the Director General's requirements. These were geology and soils, climate change, non-indigenous heritage, hazards, and resources and waste. The removal of Ivy Lane interchange would not

result in a major change to any of these factors, however carbon dioxide emitted during construction and overall resource use would be reduced slightly because of the reduction in road infrastructure.

Overall environmental impacts

The removal of Ivy Lane interchange will reduce the overall environmental impacts of the proposed upgrade. The reduction in environmental impacts arises primarily from the reduction in the scale of infrastructure required and therefore reduced land requirements and impacts associated with the visibility of the interchange.

4.3 Landscaped mound at Clover Hill estate

The environmental assessment discussed various noise mitigation options for the Clover Hill estate and adjacent areas at Bangalow. Discussions with Clover Hill residents during and after the environmental assessment exhibition suggested the need for more clarity regarding mitigation at this location. In response a specific proposal has since been developed for a landscaped mound immediately adjacent to the eastern boundary of Clover Hill estate that would attenuate noise and act as a visual buffer.

The proposed landscaped mound would be approximately 500 m long and would utilise some of the excess material expected to arise from the construction of the proposed upgrade. The earth mound would be constructed between the existing Bangalow bypass and the residential area of Clover Hill. It would run from a point approximately 100 metres south of the southern end of Blackwood Crescent to just south of the Bangalow Road.

South of the existing northbound off-slip on the Bangalow bypass the mound would be located on the existing slope positioned between the bypass and the rear of residential lots at Clover Hill. Thereafter the mound would be constructed over the existing northbound off-slip, which would be removed as a result of the proposed amendments to the Bangalow interchange.

Similar to the proposed landscaped mound at Ewingsdale it is proposed that the mound would be designed using 2:1 (horizontal to vertical) slopes and would have a 2m wide flat surface at its top.

A concept design for the mound has been developed which indicates that the top of the mound would be approximately 4m above the level at the rear of the Clover Hill lots located closest to the Bangalow bypass. At its northern end the top of the mound would be approximately 10m above existing ground level at the toe of the slope however at this point the mound would be some distance from the nearest adjacent property boundaries. The concept design of the mound has also considered the need to provide adequate drainage at the toe of the slope nearest the residential properties in order to prevent any issues arising from stormwater runoff. The mound would be vegetated with appropriate native species which would be expected to add to the visual screen created by the mound itself.

Plan and a cross section sections of the landscaped mound is shown in Figure 4.2 and Figure 4.3, while aerial perspectives with and without the mound are shown in Figures 4.4 and 4.5 respectively.



Figure 4.2 Clover Hill landscaped mound - plan

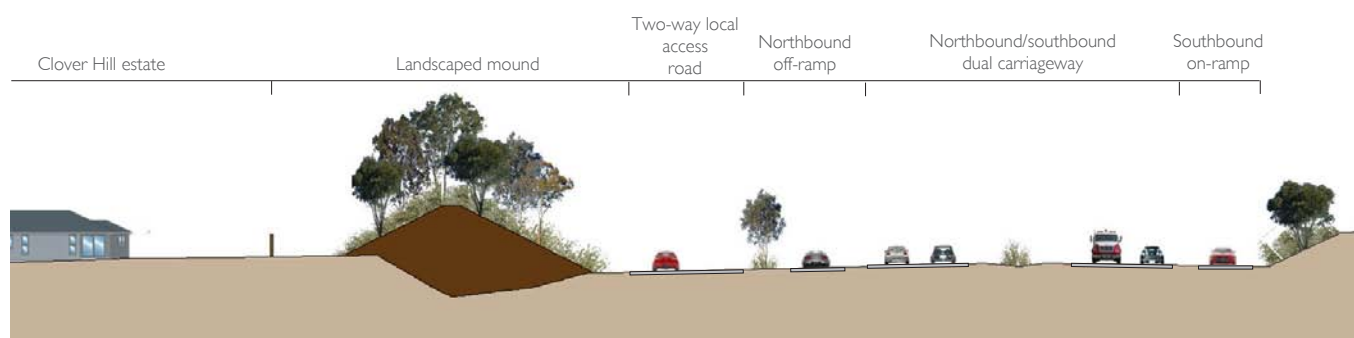


Figure 4.3 Clover Hill landscaped mound - cross section at chainage 146300
(landscape planting details to be developed during detailed design)



Figure 4.4 Aerial perspective of proposed upgrade near Clover Hill (looking north east) without landscaped mound

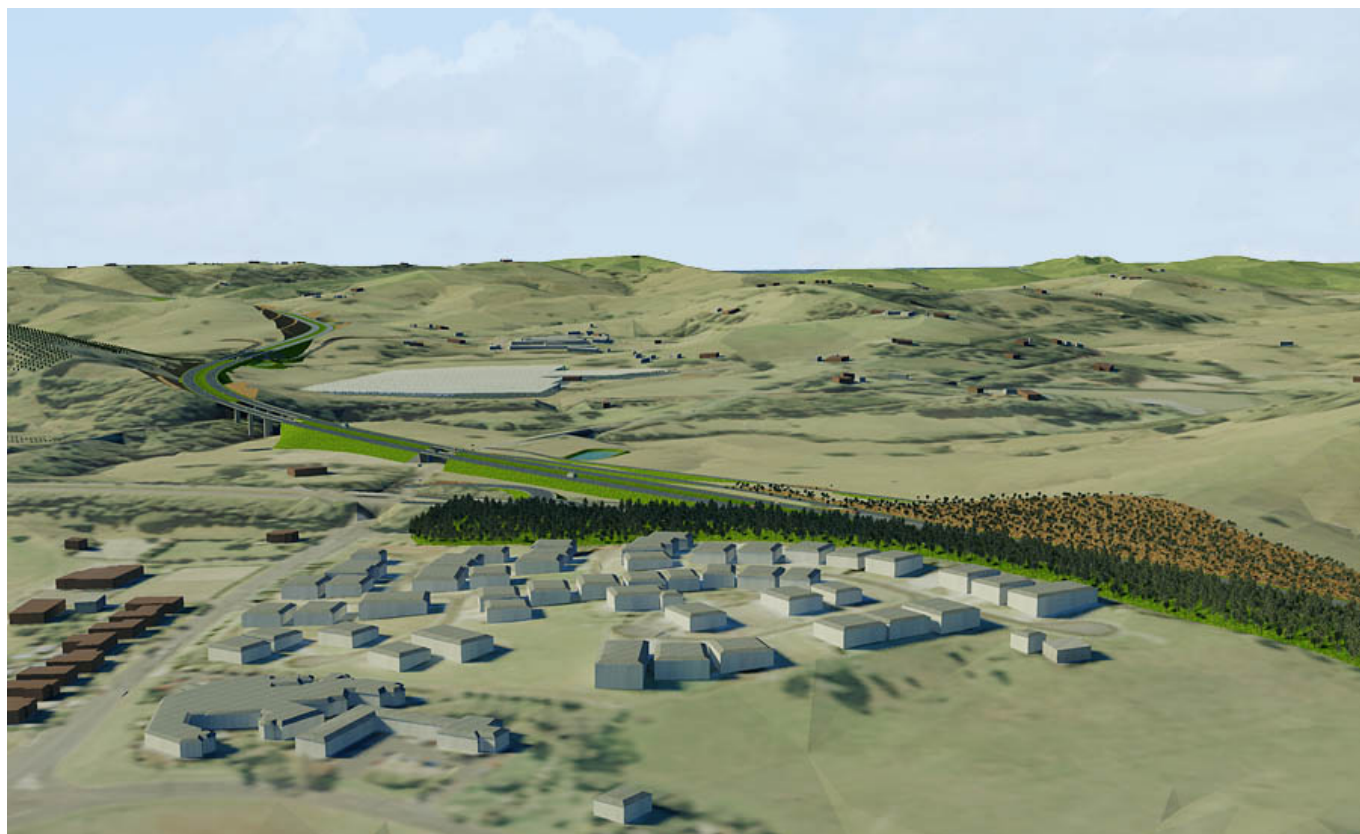


Figure 4.5 Aerial perspective of proposed upgrade near Clover Hill (looking north east) with landscaped mound

4.3.1 Environmental assessment of the Clover Hill landscaped mound

The impacts of the proposed landscaped mound adjacent to Clover Hill estate relative to the impacts of the proposed upgrade as presented in the environmental assessment are identified below.

Hydrology

The proposed landscaped mound would not result in any hydrological changes other than requiring drainage at the toes of its embankments needing to be directed into the appropriate water quality basin.

Water quality

The quality of runoff entering receiving waters would not be expected to change as a result of the construction of the Clover Hill landscaped mound.

Groundwater

Groundwater flows would not be expected to change as a result of the construction of the Clover Hill landscaped mound.

Ecology

None of the terrestrial vegetation patches discussed in Chapter 12 of the environmental assessment occur in close proximity to the landscape mound location. The construction of the mound would require the removal of existing native landscape treatments that were planted as part of the existing Bangalow bypass works. This vegetation has some limited habitat value. The plantings would be immediately replaced with new native landscape treatments on the proposed mound.

There is no aquatic habitat in the vicinity of the landscaped mound location. No change in impacts on aquatic ecology would be expected.

Traffic

There would be no change to traffic patterns as a result of the addition of the proposed landscaped mound.

Land use and property

The proposed landscaped mound would not result in any additional property acquisition. The mound would in part be located on what is now, the northbound off ramp at the existing Bangalow interchange. No changes in land use would occur.

Noise and vibration

The landscaped mound is in part, aimed at reducing noise levels to residents of Clover Hill estate and nearby areas. Additional noise modelling was carried out as part of the refinement of the design of the landscaped mound. The results of the noise modelling are shown in Table 4.1. Locations of receivers are shown in Figure 4.6.

Table 4.1 Effect of landscaped mound on noise levels in the vicinity of Clover Hill estate, Bangalow

Receiver no.	2012 Noise Level with no upgrade dB(A)		2012 Noise Level with upgrade (no landscaped mound) dB(A)		2022 Noise Level with upgrade (no landscaped mound) dB(A)		2012 Noise Level with upgrade and landscaped mound dB(A)		2022 Noise Level with upgrade and landscaped mound dB(A)		Effect of landscaped mound dB(A)
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
769-HOI	60.5	59.0	59.5	57.0	60.0	58.0	57.5	55.5	58.5	56.5	-2.0
800-HOI	55.0	53.0	52.0	50.0	53.0	51.0	51.0	49.0	52.0	50.0	-1.0
823-HOI	55.5	53.5	53.0	50.5	54.0	51.5	52.0	50.0	53.0	51.0	-1.0
894-HOI	67.5	65.5	65.0	62.5	66.0	63.5	57.0	55.0	58.0	56.0	-8.0
894-HO2	59.5	58.0	58.5	56.5	59.5	57.5	57.0	55.0	58.0	55.5	-2.0
894-HO3	58.0	56.0	57.5	55.0	58.5	56.0	56.5	54.5	57.5	55.5	-1.0
894-HO4	59.0	57.5	54.5	52.0	55.5	53.0	51.5	49.5	52.5	50.0	-3.0
894-HO5	59.0	57.0	53.5	51.0	54.5	52.0	51.0	48.5	52.0	49.5	-2.5
894-HO6	56.0	54.0	51.5	49.0	52.5	50.0	51.0	48.5	52.0	49.5	-0.5
894-HO7	63.5	61.5	55.5	52.5	56.5	53.0	52.5	49.0	53.5	50.0	-3.5
894-8	65.5	64.0	64.0	61.5	65.0	62.5	56.5	54.5	57.5	55.0	-7.5
894-9	56.5	54.5	56.0	53.5	56.5	54.5	55.0	53.0	56.0	54.0	-1.0
894-10	66.0	64.5	65.0	62.5	66.0	63.5	57.0	55.0	58.0	55.5	-8.0
894-11	57.0	55.5	56.0	54.0	57.0	55.0	55.5	53.5	56.5	54.5	-0.5
894-12	56.5	55.0	56.0	53.5	56.5	54.5	55.0	53.0	56.0	54.0	-1.0
894-13	65.5	64.5	65.0	62.5	65.5	63.5	56.5	54.5	57.5	55.5	-8.5
894-14	56.0	54.5	55.0	53.0	56.0	54.0	54.0	52.0	55.0	53.0	-1.0
894-15	60.5	58.5	58.5	56.5	59.5	57.5	56.5	54.5	57.5	55.5	-2.0
894-16	65.5	64.0	64.5	62.0	65.0	63.0	56.5	54.0	57.5	55.0	-8.0
894-17	58.5	57.0	57.0	54.5	57.5	55.5	55.0	52.5	56.0	53.5	-2.0
894-18	56.5	54.5	54.5	52.5	55.5	53.5	54.0	51.5	55.0	52.5	-1.0
894-19	58.0	56.0	55.5	53.0	56.5	54.0	53.5	51.0	54.0	52.0	-2.5
894-20	60.5	59.0	59.0	56.5	60.0	57.5	56.5	54.5	57.5	55.0	-2.5
894-21	56.0	54.5	55.0	52.5	56.0	53.5	52.0	50.0	53.0	51.0	-3.0
894-22	66.5	65.0	65.0	62.5	65.5	63.5	56.5	54.0	57.5	55.0	-8.5
894-23	61.0	59.5	59.0	56.5	60.0	57.5	56.0	54.0	57.0	55.0	-3.0
894-24	59.0	57.0	56.5	54.0	57.5	55.0	55.0	53.0	56.0	54.0	-1.5
894-25	67.5	66.0	65.0	62.5	66.0	63.5	56.5	54.0	57.5	55.0	-8.5
894-26	60.5	59.0	58.5	56.0	59.5	57.0	55.0	53.0	56.0	54.0	-3.5
894-27	60.5	59.0	58.0	56.0	59.0	56.5	55.0	53.0	56.0	53.5	-3.0
894-28	65.5	63.5	63.0	60.5	64.0	61.0	56.0	53.5	57.0	54.5	-7.0
894-29	60.5	59.0	58.0	55.5	59.0	56.5	55.0	53.0	56.0	54.0	-3.0
894-30	57.0	55.5	54.5	52.0	55.5	53.0	53.0	51.0	54.0	52.0	-1.5
894-31	58.0	56.5	55.5	53.5	56.5	54.0	54.0	51.5	54.5	52.5	-2.0
894-32	56.5	55.0	53.5	51.0	54.5	52.0	52.5	50.0	53.5	51.0	-1.0
894-33	60.5	59.0	57.5	55.5	58.5	56.0	55.0	52.5	56.0	53.5	-3.0
894-34	64.5	62.5	61.5	59.0	62.5	60.0	55.0	52.5	56.0	53.5	-6.5
894-35	59.5	57.5	56.5	54.5	57.5	55.5	55.0	52.5	55.5	53.5	-2.0
894-36	60.0	58.5	56.5	54.0	57.5	55.0	52.5	50.5	53.5	51.5	-4.0
894-37	63.0	61.5	60.0	57.5	61.0	58.5	55.5	53.5	56.5	54.5	-4.5
894-38	67.5	66.0	64.0	61.5	65.0	62.0	53.5	50.5	54.5	51.5	-11.0

Receiver no.	2012 Noise Level with no upgrade dB(A)		2012 Noise Level with upgrade (no landscaped mound) dB(A)		2022 Noise Level with upgrade (no landscaped mound) dB(A)		2012 Noise Level with upgrade and landscaped mound dB(A)		2022 Noise Level with upgrade and landscaped mound dB(A)		Effect of landscaped mound dB(A)
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
894-39	60.0	58.0	56.0	53.5	57.0	54.5	52.5	50.0	53.5	51.0	-3.5
894-40	64.0	62.0	60.5	58.0	61.5	59.0	54.5	52.0	55.5	53.0	-6.0
894-41	65.0	63.5	61.5	58.5	62.5	59.5	53.5	50.5	54.0	51.5	-8.5
894-42	52.0	50.5	51.5	49.0	52.0	50.0	50.5	48.5	51.5	49.5	-1.0
894-43	55.5	54.0	52.5	50.0	53.5	51.0	51.0	49.0	52.0	49.5	-1.5
894-44	67.5	65.5	63.0	60.5	64.0	61.0	52.5	50.0	53.5	50.5	-10.5
894-45	61.5	60.0	57.5	55.0	58.5	56.0	53.0	50.5	54.0	51.5	-4.5
894-46	56.0	54.5	51.5	49.0	52.5	50.0	51.0	48.5	52.0	49.5	-0.5
894-47	61.5	59.5	56.5	54.0	57.5	55.0	52.5	50.0	53.5	51.0	-4.0
894-48	62.5	61.0	58.0	55.5	59.0	56.5	52.5	50.0	53.5	50.5	-6.0
894-49	63.5	62.0	58.5	56.0	59.5	57.0	52.5	49.5	53.0	50.5	-6.5
894-50	61.5	59.5	56.0	53.5	57.0	54.5	52.5	50.0	53.5	50.5	-4.0
894-52	59.0	57.0	53.5	51.0	54.5	52.0	51.0	48.5	52.0	49.5	-2.5
894-53	65.0	63.5	59.5	56.5	60.5	57.5	52.0	49.0	53.0	50.0	-7.5
894-54	62.0	60.5	56.5	54.0	57.5	55.0	52.5	50.0	53.5	50.5	-4.5
894-55	60.5	59.0	55.5	52.5	56.0	53.5	52.0	49.5	53.0	50.5	-3.5
894-56	63.0	61.5	57.0	54.0	58.0	55.0	52.0	49.0	53.0	49.5	-5.5
894-57	64.5	62.5	57.5	54.5	58.5	55.0	51.5	48.5	52.5	49.5	-6.0
894-58	60.5	59.0	55.0	52.5	56.0	53.0	52.0	49.5	53.0	50.5	-3.0
894-59	61.5	59.5	55.5	53.0	56.5	53.5	52.0	49.5	53.0	50.0	-3.5
894-60	62.0	60.0	55.5	52.5	56.5	53.5	52.0	49.0	53.0	50.0	-3.5
894-61	61.5	59.5	55.0	52.0	56.0	53.0	51.0	48.5	52.0	49.0	-4.0
904-HOI	53.0	51.5	50.5	48.5	51.5	49.0	50.0	47.5	50.5	48.5	-1.0
905-HOI	53.0	51.0	50.5	48.5	51.5	49.0	49.5	47.5	50.5	48.5	-1.0
906-HOI	53.0	51.5	51.0	48.5	52.0	49.5	50.0	47.5	50.5	48.5	-1.5
907-HOI	54.0	52.5	51.5	49.0	52.5	50.0	50.0	48.0	51.0	49.0	-1.5
909-HOI	53.5	52.0	51.0	48.5	51.5	49.5	48.5	46.5	49.5	47.5	-2.5
910-HOI	55.0	53.5	52.0	49.5	53.0	50.5	50.0	48.0	51.0	48.5	-2.0
911-HOI	55.0	53.5	52.0	50.0	53.0	50.5	50.0	47.5	50.5	48.5	-2.5
912-HOI	59.5	57.5	53.0	50.5	54.0	51.5	51.0	48.5	52.0	49.0	-2.5

Table 4.1 indicates that on top of the noise reduction that would be achieved by the proposed upgrade compared to a no-build scenario for residents in and around Clover Hill, the landscaped mound would further reduce noise levels for all residents in this area. An overall noise benefit would therefore result. Some residences are however still likely to exceed applicable noise criteria and would potentially qualify for individual property treatments.



Figure 4.6 Location of noise receivers at Clover Hill estate

Aboriginal heritage

No change in Aboriginal heritage impacts would be expected as a result of the landscape mound.

Social and economic

The landscaped mound would improve the general amenity of the Clover Hill area because of the decrease in noise levels that would result. There is not likely to be any effect on local businesses as a result of the mound.

Visual amenity and urban design

The landscape mound would be a prominent visual feature that would be highly visible from some residences on the eastern side of Clover Hill estate, as well as from vehicles travelling on Bangalow Road. The mound would however be in keeping with the existing character of the area, and once landscape treatments have established, closely resembling the character of the vegetative buffer that currently exists between Clover Hill estate and the existing Bangalow interchange.

The mound would however raise the height of the adjacent ground level and result in landscape plantings being several metres higher in some locations than those currently located along the existing northbound off-ramp. The visual impacts of this higher vegetation would generally be positive, strengthening the visual buffer between Bangalow and the proposed upgrade, and minimising the chance of lighting structures being visible at night. Some increased morning shadowing of residential properties would however occur, with the effect being greatest adjacent to the southern portion of the mound where residential properties abut the road reserve.

There would be some visual impact during construction, with the existing vegetation being removed and opening up views to the east until the mound is completed. The establishment of landscape planting would further add to the visual buffer created by the landscaped mound.

Air quality

The landscaped mound is not likely to result in a measurable improvement in air quality during operation of the proposed upgrade given the minimal air quality impacts that would occur without the landscape mound in place.

There is some potential for increase dust generation in the vicinity of Clover Hill estate during construction. The air quality management measures included in the Construction Environmental Management Plan would minimise these impacts.

Other environmental impacts

The environmental assessment evaluated a series of other environmental impacts of the proposed upgrade that were not identified as key issues in the Director General's requirements. These were geology and soils, climate change, non-Aboriginal heritage, hazards, and resources and waste. The addition of the landscape mound at Clover Hill estate would not result in a major change to any of these factors, however there would be some resource use efficiencies gained through the ability to use excess spoil for the construction of the mound.

Overall environmental impact

The addition of the landscaped mound adjacent to Clover Hill would result in an overall reduction in the environmental impact of the proposed upgrade. This reduction in impacts is primarily due to lower noise levels and improved visual amenity for residents at and near Clover Hill.

5 Revised statement of commitments

A number of revisions have been made to the statement of commitments as a result of environmental assessment submissions. Additions are indicated as blue underlined text, while deletions are indicated as strike-through text.

Objective	Ref No.	Commitment	Timing	Reference Document
General environmental management				
Ensure the potential impacts of the project are managed	EM1	A construction environmental management plan (CEMP) will be prepared and implemented to guide project delivery.	Pre-construction and construction	> Department of Planning Guideline for the Preparation of Environmental Management Plans. > RTA QA Specification G36, Section 4.1.1
	EM2	Operational environmental management measures will be implemented, as appropriate, to manage impacts during operation of the project (see commitments below).	Operation	
	<u>EM3</u>	<u>An environmental review group comprising key government agencies will be established prior to the commencement of detailed design to provide advice to the RTA on environmental design and implementation issues. The environmental review group will be maintained until the end of construction.</u>	<u>Pre-construction and construction</u>	
Communication and consultation				
Ensure effective consultation with the community	CI	The community will be informed through various media as to the proposed works schedules, areas in which these works are proposed and construction hours. Contact names and phone numbers of relevant staff will be provided.	Pre-construction and construction	> RTA Community Involvement Practice Notes and Resource Manual (RTA 1998)

Objective	Ref No.	Commitment	Timing	Reference Document
Communication and consultation				
	C2	The existing project website will be maintained, including periodic updates of work progress, consultation activities and proposed work schedules. The website will provide a description of relevant approval authorities and their area of responsibilities, and contact names and phone numbers of relevant staff.	Pre-construction and construction	> RTA Community Involvement Practice Notes and Resource Manual (RTA 1998)
Ensure effective management of complaints	C3	The existing 24-hour toll free project phone line will be maintained and advertised.	Pre-construction and construction	> RTA Community Involvement Practice Notes and Resource Manual (RTA 1998) > AS 4269 Complaints Handling
	C4	A system to receive, record, track and respond to complaints within a specified timeframe will be established, including procedures for non-compliance.	Pre-construction and construction	> RTA Community Involvement Practice Notes and Resource Manual (RTA 1998) > AS 4269 Complaints Handling
Maintain pro-active consultation with directly affected property owners.	C5	Property owners will be consulted about the implementation of mitigation measures that affect their property and any issues raised will be considered where reasonable and feasible.	Pre-construction and construction	> RTA Community Involvement Practice Notes and Resource Manual (RTA 1998)
Land use and property				
Provide appropriate level of compensation in relation to property acquisitions	LI	All property acquisitions will be negotiated with affected landholders in accordance with relevant legislation and RTA policy.	Pre-construction	> Land Acquisition (Just Terms Compensation) Act 1991 > RTA Land Acquisition Policy (RTA 1999)

Objective	Ref No.	Commitment	Timing	Reference Document
Land use and property				
Manage potential impacts on structures or properties due to construction or operation of the project	L2	Subject to land owner agreement and following appropriate notification, building and property condition surveys will be conducted on those structures or properties that may be affected. Owners of structures or properties will be given a copy of the inspection report prior to the commencement of construction. Where liable, any property damage caused directly or indirectly by the project's construction or operation will be rectified at no cost to the property owner(s). Alternatively, the RTA may negotiate compensation for the property damage with the property owner.	Pre-construction and construction	> RTA QA Specification G36AS 4349.1 Inspection of Buildings > ISO 4866 Mechanical Vibration and Shock – Vibration of Buildings – Guidelines for the Management of Vibrations and Evaluation of their Effects on Buildings
Promote appropriate final land uses on land subject to partial or full acquisition	L3	A remnant land strategy to minimise land use severance and sterilisation, and a mitigation strategy for final land uses will be implemented in consultation with Ballina and Byron Councils and in general accordance with the principles described in Section 14.4 of the Environmental Assessment.	Pre-construction and construction	> Land Acquisition (Just Terms Compensation) Act 1991 > RTA Land Acquisition Policy (RTA 1999)
Construction noise and vibration				
Limit construction noise impacts on sensitive receivers, and where reasonable and feasible, comply with relevant standards to reduce noise to an acceptable level.	CN1	Reasonable and feasible mitigation that seeks to achieve the construction noise objectives detailed in the Environmental Noise Control Manual (EPA 1994) will be developed and implemented during construction and will include measures in Commitments CN2 to CN8.	Pre-construction and construction	> Environmental Noise Control Manual (EPA 1994) > AS 2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites

Objective	Ref No.	Commitment	Timing	Reference Document
Construction noise and vibration				
	CN2	Construction hours will normally be limited to between 7am and 6pm Monday to Friday and between 7am and 1pm Saturday. These works will only be undertaken after informing affected residents and consulting with the DECC and relevant local council(s).	Construction	> Protection of the Environment Operations Act 1997 > RTA Environmental Noise Management Manual (RTA 2001)
	CN3	Consultation with potentially affected residents will be undertaken with regard to the timing of noise generating activities.	Pre-construction and construction	> RTA Community Involvement Practice Notes and Resource Handling (RTA 1998)
	CN4	Operational noise controls will be installed early in the construction phase, where reasonable and feasible, to assist in the management of construction noise.	Construction	
	CN5	All mechanical equipment and silencing equipment (where installed) will be well maintained.	Construction	> AS 2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites
	CN6	Equipment not in use will be switched off to avoid unnecessary noise emissions.	Construction	
	CN7	Concurrent operation of noisy equipment will be avoided, as far as reasonable and feasible.	Construction	
	CN8	Construction noise will be monitored at sensitive receivers including during potentially high risk noise activities. The monitoring data will be analysed to determine compliance with the construction noise objectives and approval and/or licence requirements. Any necessary adaptive management requirements will be identified and implemented where reasonable and feasible.	Construction	> RTA Environmental Noise Management Manual (2001) > NSW Industrial Noise Policy (EPA 1999)

Objective	Ref No.	Commitment	Timing	Reference Document
Construction noise and vibration				
Limit construction vibration impacts on sensitive receivers and, where reasonable and feasible, comply with relevant standards to reduce vibration levels to an acceptable level.	CN9	Reasonable and feasible mitigation that seeks to achieve construction vibration criteria will be developed and implemented and will include measures in Commitments CN10 and CN11.	Pre-construction and construction	> Assessing vibration: A Technical Guideline (DEC 2006) > Environmental Assessment - Section 15.1.4
	CN10	Vibration monitoring and construction equipment testing will be undertaken at representative locations to ensure that vibration levels do not exceed applicable criteria. Any necessary adaptive management requirements will be identified and implemented where reasonable and feasible.	Construction	> Assessing vibration: A Technical Guideline (DEC 2006) > Working Paper 8 – Noise and Vibration Assessment
	CN11	Consultation with potentially affected residents will be undertaken with regard to activities that are likely to produce high levels of vibration.	Pre-construction and construction	> RTA Community Involvement Practice Notes and Resource Handling (RTA 1998)
Limit impacts on sensitive receivers associated with blasting activities during construction and, where reasonable and feasible, comply with relevant standard to reduce airblast overpressure and vibration levels to an acceptable level.	CN12	Air blast overpressure and vibration will be measured from test blasts to establish appropriate propagation characteristics for the site and increase the accuracy of blasting predictions.	Construction	> Assessing vibration: A Technical Guideline (DEC 2006) > Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration (ANZECC 1990)
	CN13	Reasonable and feasible mitigation that seeks to achieve airblast overpressure and vibration criteria will be developed and implemented.	Pre-construction and construction	> Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration (ANZECC 1990) > Working Paper 8 – Noise and Vibration Assessment

Objective	Ref No.	Commitment	Timing	Reference Document
Construction noise and vibration				
	CN14	Blasting vibrations and air blast overpressure will be monitored during construction. Any necessary adaptive management requirements will be identified and implemented where reasonable and feasible.	Construction	
Operation noise and vibration				
Limit operational noise impacts experienced at sensitive receivers and, where reasonable and feasible, comply with relevant standards to reduce noise levels to an acceptable level.	ON1	Operational noise mitigation measures will be designed and implemented to achieve applicable road traffic noise criteria where reasonable and feasible.	Pre-construction, construction and operation	> RTA Environmental Noise Management Manual (RTA 2001) > Environmental Criteria for Road Traffic Noise (EPA 1999)
Determine effectiveness of operational noise control measures	ON2	The design and implementation of operational noise mitigation measures will be undertaken in consultation with potentially affected residents	Pre-construction, construction and operation	> RTA Environmental Noise Management Manual (RTA 2001) > Environmental Criteria for Road Traffic Noise (EPA 1999)
	ON3	Monitoring of operational noise will be undertaken within one year of the opening of the proposed upgrade. Should the monitoring indicate that traffic noise levels exceed those predicted for the proposed upgrade, additional measures will be investigated and implemented where reasonable and feasible.	Operation	> RTA Environmental Noise Management Manual (RTA 2001) > Environmental Criteria for Road Traffic Noise (EPA 1999)
Traffic, transport and access				
Manage construction traffic impacts on local roads	TI	Pre- and post-operation road condition reports will be undertaken for local roads likely to be used during construction. Any damage, beyond normal wear and tear, will be repaired at no cost to relevant road authorities unless an alternative arrangement is agreed between the RTA and the relevant road authority.	Pre-construction operation	

Objective	Ref No.	Commitment	Timing	Reference Document
Traffic, transport and access				
	T2	> Construction vehicle movements, work programs and traffic control measures will be planned to maintain a balanced traffic flow. This will be achieved by: > avoiding or minimising traffic impacts during peak periods, long weekends and holiday periods. > considering other road works in the area and local traffic movements. > consulting with relevant road authorities. > providing prior communication of changes to traffic conditions to the affected community.	Pre-construction and construction	
Manage and limit disruption of property access during construction and operation	T3	Access to properties will be maintained during construction, and where necessary temporary alternative arrangements will be provided in consultation with the property owner.	Construction	> RTA Traffic Control at Work Sites > RTA QA Specification G10 Control of Traffic
	T4	Where any legal access would be permanently affected by the project, alternative access to an appropriate standard will be provided where feasible and reasonable in consultation with the property owner. Where alternative access arrangements are not feasible or reasonable and a property is left with no access, negotiations will be undertaken with the property owner for the acquisition of the property.	Pre-construction	> RTA Traffic Control at Work Sites > RTA QA Specification G10 Control of Traffic > Land Acquisition (Just Terms Compensation) Act 1991 > RTA Land Acquisition Policy (RTA 1999)

Objective	Ref No.	Commitment	Timing	Reference Document
Visual amenity				
Integrate the proposed upgrade into the surrounding landscape, minimise impacts from sensitive viewpoints, and maximise the quality of vehicle user experience.	VI	Undertake detailed design and construction to be consistent with the landscape and urban design strategy described in Section 5.15 and 18.4 of the Environmental Assessment.	Pre-construction and construction	> Urban and Regional Design Practice Notes, Beyond the Pavement (RTA 1999) > Pacific Highway Urban Design Framework (RTA 2005) > Working paper 11 – Urban Design, Landscape and Visual Assessment.
Heritage				
Minimise impacts to Aboriginal heritage	H1	Detailed design will minimise impact to the identified Aboriginal heritage items wherever reasonable and feasible.	Pre-construction	
	H2	Construction plans will show all identified Aboriginal heritage items within the construction corridor that will not be directly impacted by construction	Pre-construction and construction	
	H3	Any identified Aboriginal heritage items in the construction corridor not directly impacted by construction will be fenced prior to any adjacent works and where appropriate, will be signposted.	Pre-construction and construction	

Objective	Ref No.	Commitment	Timing	Reference Document
Heritage				
	H1	<u>Salvage collection of surface artefacts at sites A9 and A10 will be undertaken</u>	<u>Pre-construction</u>	
	H2	<u>Limited salvage collection of sub-surface artefacts at sites A9 and A10 will be undertaken</u>	<u>Pre-construction</u>	
	H3	Construction personnel will be educated on their obligations for Aboriginal cultural materials under the National Parks and Wildlife Act 1979.	Construction	> Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC 2005) > RTA Aboriginal Liaison Protocol Aboriginal cultural heritage: standards and guidelines kit (DECC) > Protecting Aboriginal objects and places - interim guidelines for community consultation (DECC) National Parks & Wildlife Act 1979
	H4	In the event that human remains are encountered during construction, management measures referred to in Section 16.4 of the Environmental Assessment will be followed. The need for and function of this protocol will be included in site induction programs.	Construction	> Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC 2005) > RTA Aboriginal Liaison Protocol Aboriginal cultural heritage: standards and guidelines kit (DECC) > Protecting Aboriginal objects and places - interim guidelines for community consultation (DECC) National Parks & Wildlife Act 1979 > Working Paper 9 - Cultural heritage assessment

Objective	Ref No.	Commitment	Timing	Reference Document
Heritage				
	H5	In the event that Aboriginal objects (other than human remains) are encountered during construction in areas outside of previously recorded Aboriginal sites or potential archaeological deposits, the protocol referred to in Section 16.4 will be followed. The need for and function of this protocol will be included within site induction programs.	Construction	> Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC 2005) > RTA Aboriginal Liaison Protocol Aboriginal cultural heritage: standards and guidelines kit (DECC) > Protecting Aboriginal objects and places - interim guidelines for community consultation (DECC) National Parks & Wildlife Act 1979
Ensure ongoing Aboriginal stakeholder input to address potential impacts on Indigenous heritage items, areas, object and landscapes	H6	The registered Aboriginal stakeholders and the DECC will be consulted in the management and mitigation of impact to Aboriginal heritage including: > mitigation of impact to identified Aboriginal heritage items > the procedures to be followed if unknown Aboriginal heritage items are encountered during construction; and > the inclusion of identified Aboriginal heritage items in maintenance documents for use during operation.	Pre-construction and construction	> Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC 2005) > RTA Aboriginal Liaison Protocol Aboriginal cultural heritage: standards and guidelines kit (DECC) > Protecting Aboriginal objects and places - interim guidelines for community consultation (DECC) National Parks & Wildlife Act 1979
Minimise impacts to non-Indigenous heritage	H7	Detailed design will minimise impact to the identified non-Aboriginal heritage items wherever reasonable and feasible.	Pre-construction	

Objective	Ref No.	Commitment	Timing	Reference Document
Heritage				
	H8	If any previously unidentified non-Aboriginal heritage are encountered, all works that would potentially impact the item and/or its curtilage will cease immediately. The DECC and the RTA Senior Environmental Officer will be notified immediately and specialist advice will be sought if required. Works will not recommence until appropriate clearance has been received.	Pre-construction and construction	
Social and economic				
Minimise social impacts during construction and operation of the proposed upgrade.	S1	In addition to the commitments identified in this table under noise, air quality and visual which relate to social impacts, the following specific commitment will also be met: The location of ancillary construction facilities will take into account the proximity of residences.	Pre-construction	
Minimise economic impacts during construction and operation	S2	Ongoing consultation with potentially affected businesses will occur prior to and during construction to address individual concerns and issues and to identify any adaptive management requirements.	Pre-construction and construction	
	S3	Adequate signage will be implemented during construction and operation to ensure businesses and their patrons are aware of new access routes and/or potential disruptions.	Construction and operation	> Guidelines for Tourist Signage (RTA 2005)

Objective	Ref No.	Commitment	Timing	Reference Document
Surface water quality				
Minimise impacts to downstream surface water quality.	W1	Development and implement water quality control measures during construction including (but not limited to): Minimising disturbed areas. Construction of sediment basins as early as practical and feasible. Using sediment fences, check dams, level spreaders and other devices to supplement sediment basins. Implementing landscape treatments (or temporary cover crops) as early as practical and feasible.	Pre-construction and construction	> RTA QA Specification G38 Soil and Water Management. > RTA Code of Practice for Water Management (1999) > RTA Stockpile Management Procedures 2001 > Soils and Construction: Managing Urban Stormwater (Landcom 2004) > Managing Urban Stormwater – Soils and Construction Volume 2D – Main Road Construction (DECC – draft)
	W2	A specialist soil conservation consultant will be engaged during detailed design to assist in the development of erosion and sediment control measures and during construction to implement and improve measures.	Pre-construction	> Managing Urban Stormwater – Soils and Construction Volume 2D – Main Road Construction (DECC – draft)
	W3	A water quality monitoring program will be developed and implemented during construction.	Pre-construction and construction	> Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000
	<u>W3</u>	<u>Background water quality monitoring of receiving waters will be undertaken for at least 12 months prior to construction in consultation with DECC</u> <u>A water quality monitoring program to measure the effectiveness of treatment measures will be developed and implemented during construction.</u>	<u>Pre-construction and construction</u>	<u>> Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000</u>

Objective	Ref No.	Commitment	Timing	Reference Document
Surface water quality				
	W4	<u>An emergency response plan for protection of water supplies will be prepared in consultation with Rous Water and DECC prior to commencement of operation of the proposed upgrade.</u>	Operation	> <u>Australian Drinking Water Guidelines 2004</u>
	W5	Ongoing communication will be maintained with Rous Water, with water quality monitoring results being made available.	Pre-construction, construction and operation	
	W6	The water quality of discharges from the road reserve into the Emigrant Creek dam catchment will be monitored during operation to ensure that water quality meets the criteria discussed in Chapter 10 of the Environmental Assessment. Reasonable and feasible adjustments to water quality management during operation will be made if water quality management measures do not perform to these criteria	Operation	> Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 > Soils and Construction: Managing Urban Stormwater (Landcom 2004) > Managing Urban Stormwater – Soils and Construction Volume 2D – Main Road Construction (DECC – draft)
Groundwater				
Minimise impacts to groundwater flows during construction and operation	G1	Groundwater monitoring bores will be installed at an appropriate location downstream of cuttings predicted to impact on groundwater flows. Monitoring will be undertaken during construction and for one year of operation.	Pre-construction, Construction and operation	
	G2	If any essential water supply to any properties is affected, reasonable and feasible mitigation will be implemented in consultation with the relevant property owner(s).	Construction and operation	
Flora and fauna				
Minimise the impacts of vegetation clearance and habitat loss	F1	Detailed design will minimise the area of native vegetation to be cleared wherever reasonable and feasible.	Pre-construction	

Objective	Ref No.	Commitment	Timing	Reference Document
Flora and fauna				
	F2	Construction plans will show ecologically sensitive areas within the construction corridor that will not be impacted by construction. Where clearing is required, the area will be fenced with highly visible temporary fencing or flagging tape to ensure that clearing does not extend beyond the area necessary.	Pre-construction and construction	
	F3	Known locations of threatened plants will be avoided where possible and fenced to protect them from direct and indirect impact.	Construction	
	F4	Clearing of vegetation will comply with appropriate RTA guidelines in relation to fauna rescues.	Construction	> RTA Pacific Highway Office guidelines for fauna rescue associated with roadworks.
	F5	Where alternative locations exist, nest boxes will be used to replace any tree hollows. Such a program will be developed in consultation with DECC.	Construction	
	F5	<u>Bat roosting boxes (or alternative habitat structures) will be installed on bridges that cross creeks.</u>	<u>Construction</u>	
	F6	<u>Riparian restoration will be undertaken in sections of the road reserve that include drainage lines.</u>	<u>Construction</u>	
	F7	Riparian restoration will be undertaken where creeklines occur on land that is acquired as part of the proposed upgrade, but that would be outside the construction footprint.	Pre-construction and construction	
Minimise edge effects on adjacent vegetation	F8	Ancillary construction facilities will be sited away from areas of adjacent native vegetation.	Construction	
	F9	Waste material during construction will be stored away from adjacent native vegetation	Construction	

Objective	Ref No.	Commitment	Timing	Reference Document
Flora and fauna				
	F9	Weeds will be managed in the road reserve both during construction and operation.	Construction and operation	
	F10	<u>Noxious and environmental weeds will be managed in the road reserve both during construction and operation.</u>	<u>Construction and operation</u>	<u>Noxious Weeds Act</u>
	F11	Locally indigenous species will be used in landscape treatments.	Construction	
Minimise habitat fragmentation, barrier effects, and road mortality	F11	Detailed bridge design and associated landscape treatment and revegetation will take into account terrestrial fauna movement opportunities along riparian corridors.	Pre-construction and construction	
	F12	The road reserve will be fenced at strategic points (primarily near creek crossings), to encourage wildlife movement beneath the highway.	Construction and operation	
Minimise impacts on aquatic habitat	F13	Waterway crossings will be designed and constructed to maintain fish passage in accordance with the fish habitat classification of each waterway and in consultation with the Department of Primary Industries (Fisheries).	Pre-construction and construction	> Fishnote: Policy and Guidelines for Fish Friendly Waterway Crossings (NSW Fisheries). > Policy and Guidelines for Design and Construction of Bridges, Roads, Causeways, Culverts and Similar Structures (NSW Fisheries 1999). > Fish Passage Requirements for Waterway Crossings (Fairfull and Witheridge 2003).

Objective	Ref No.	Commitment	Timing	Reference Document
Air quality				
Minimise air quality impacts during construction	A1	Dust suppression and avoidance during construction will include the following measures: Minimise exposure of soils Where needed, stockpiles, work areas and exposed soils will be dampened to prevent the emission of dust from the site or areas kept in a condition which minimises wind blown or traffic generated dust using other means. All equipment for dust control will be kept in good operating condition. Silt will be removed from behind filter fences and other erosion control structures on a regular basis, so that collected silt did not become a source of dust; and Remove construction dirt from adjacent roads.	Pre-construction and construction	> Department of Environment and Climate Change Guideline Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales.
	A2	Dust generating activities will cease during high wind and when existing dust suppression methods are ineffective.	Construction	
	A3	Dust deposition and particulate monitoring will be undertaken during construction at sensitive receivers. Adaptive management measures will be undertaken where necessary and where reasonable and feasible.	Construction	> AS 3580.10.1-1991 Methods of Sampling Analysis of Ambient Air. > DECC Guideline Approved Methods for Modelling and Assessment of Air Pollutants in New South Wales. > AS 2922 Ambient Air Guide for Siting of Sampling Equipment.

Objective	Ref No.	Commitment	Timing	Reference Document
Greenhouse gases and energy use				
Minimise greenhouse gas emissions during construction and operation	G1	During detailed design, opportunities will be identified to reduce operational greenhouse gas emissions and energy consumption wherever reasonable and feasible. Opportunities may include improvements to grade and road alignment, use of renewable energy technologies, use of energy efficient pavements and use of energy efficient street lights.	Pre-construction	
	G2	Energy efficient vehicles, plant and equipment (including office equipment) will be selected wherever reasonable and feasible.	Pre-construction and construction	
	G3	All vehicles and equipment will be maintained and serviced to meet the manufacturers' specifications.	Construction	
	G4	Low emission fuels will be used wherever reasonable and feasible.	Construction	
	G5	Where available, a renewable energy source accredited by the Green Power Accreditation Program and/or photovoltaic panels will be used for on-site electrical energy.	Construction	

Objective	Ref No.	Commitment	Timing	Reference Document
Waste				
Minimise and manage the production and impacts of waste during construction	WS1	The waste hierarchy (avoid/resource recovery/disposal) will be maximised during construction and will be incorporated into work programs and site inductions.	Pre-construction and construction	> Waste Avoidance and Resource Recovery Act 2001 - Waste Avoidance and Resource Recovery Strategy (Department of Environment and Conservation 2006) > NSW Government's Waste Reduction and Purchasing Policy Environmental Guidelines > Assessment, Classification and Management of Liquid and Non Liquid Waste (EPA 1999)
	WS2	A waste register will be maintained, detailing types of waste collected, amounts, date/time and details of disposal.		
	WS3	Regular visual inspections to ensure work sites are kept tidy and to identify opportunities for reuse/recycling.		
	WS4	Disposal of chemical, fuel and lubricant containers and solid and liquid wastes will occur in accordance with the requirements of the DECC.		> Assessment, Classification and Management of Liquid and Non Liquid Waste (EPA 1999)
	WS5	The reuse of materials will be maximised.		

Appendix A

List of submissions and where issues have been addressed

Submission No.	Name	Report Reference
001	Ilona Whiley	2.6.5
002	Trent Taylor	2.5.2, 2.6.4, 2.13.1, 2.13.6, 2.16.2
003	Ian and Julie Ritchie	2.15.3
004	Lismore City Council (see also 357)	2.18.1
005	Richard and Laurel Dumbrell	2.8.1, 2.8.8, 2.12.2
006	J and B Curnow	2.6.12
007	John Greenham	2.13.9
008	B. Lancaster	2.13.9
009	Teresa Davis	2.13.8
010	Heather Devlin	2.13.8
011	Mr and Mrs E Fizzell	2.12.3, 2.13.6, 2.16.2, 2.18.1
012	Sally Marshall	2.3.4, 2.3.5, 2.13.6, 2.16.2, 2.17.3, 2.18.1, 2.18.3
013	Bangalow 2020 (see also 333)	2.5.3
014	Bernt Berentsen	2.11.3, 2.13.1, 2.17.3, 2.18.1
015	Katy Berentsen	2.11.3, 2.13.1, 2.17.3, 2.18.1
016	Tanya Goffett	2.6.5
017	Paul Goffett	2.6.5
018	J. Cooke	2.6.5
019	Peter McQuhae	2.6.5
020	Patricia McQuhae	2.6.5
021	Individual submission (signature unclear)	2.6.5
022	Ranald Macdonald	2.13.9
023	Ewingsdale Progress Association	2.6.7, 2.13.1, 2.13.9, 2.18.1
024	Paul De Fina	2.6.4
025	Alan Craig	2.6.5
026	Sharyn Poole	2.6.5
027	Kane Braggins	2.6.5, 2.18.1
028	Leonie Braggins	2.6.5, 2.18.1
029	Steve Blackmore	2.6.5, 2.6.13, 2.8.6, 2.9, 2.10.4, 2.12.1, 2.12.2, 2.13.4, 2.16.2
030	Joseph Hulbert	2.6.5, 2.13.1
031	Cherie and Terrence Hulbert and four children	2.6.5, 2.13.1
032	Richard and Colleen James	2.6.5
033	Nadine Hood	2.3.5, 2.11.4, 2.17.1, 2.17.2, 2.17.3
034	Aileen Cole	2.3.5, 2.8.8, 2.10.3, 2.12.2, 2.15.1, 2.16.2
035	Carol Darroch	2.5.1, 2.6.4, 2.6.5, 2.18.1
036	Geoff and Lauren Prior	2.6.4, 2.18.1
037	Michael J Moyle and Karen Klaich	2.11.3, 2.13.1, 2.13.8, 2.13.9
038	Ean Jones	2.3.1, 2.6.5
039	Helen Craig	2.6.5
040	Nick Houghton	2.3.1, 2.6.4, 2.11.2, 2.18.1
041	Stephen Brooks	2.6.5
042	Kelly Houghton	2.3.1, 2.6.4, 2.11.2, 2.18.1

Submission No.	Name	Report Reference
043	M. Flick	2.6.4, 2.6.5
044	Catherine Craig	2.6.5
045	Kerry Tenison	2.6.6
046	Watercatchers and Waterdrinkers of Ballina Shire Inc (see also 299 and 363)	2.5.4
047	Dianne Martin	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
048	M.G. Alcorn	2.6.4, 2.6.5
049	Maxine Clark	2.3.4, 2.6.5, 2.18.3
050	Mary Carol Cook	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
051	Mark Baker	2.3.5, 2.6.4, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
052	Alan Mazlin and Clive Tasker	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
053	Colin Cook	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
054	Jeanne, Bryan and Anthea Sjoborg	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
055	Lynne Davies	2.6.5
056	Colin White	2.6.4, 2.6.5
057	Anita White	2.6.4, 2.6.5
058	Renee White	2.6.4, 2.6.5
059	Kim McQuhae	2.6.5
060	Patricia M. Walker	2.3.5, 2.6.4, 2.6.5, 2.8.1, 2.6.7, 2.10.3, 2.13.6, 2.16.2, 2.17.1
061	Tim Armstrong	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
062	Suzanne Brodie	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
063	Jan Carmody	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.7, 2.10.3, 2.13.6, 2.16.2, 2.17.1
064	Sandra Loyall	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
065	Ronald Baker	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
066	Marie McDonald	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
067	Bruce McDonough and Kevin Palmer	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
068	Simon R. Davis	2.13.2, 2.13.9
069	H.R. Alcorn	2.6.5
070	Ian Cooke	2.6.5
071	Mr and Mrs Dennis and Elizabeth Morrissey	2.6.5
072	Madeleine Feehan	2.6.5
073	Brigette Bain Jones	2.6.5
074	Mrs Marie Swain	2.6.5
075	Melissa Macdonald	2.6.5
076	John M. Hewitt	2.6.5
077	Ellie Bain Jones	2.6.5
078	Will Bain Jones	2.6.5
079	Max Bain Jones	2.6.5
080	Chris and Shirley Warn	2.13.5, 2.13.11
081	Amber Gardens Guesthouse	2.11.3, 2.13.1, 2.13.9, 2.15.3, 2.18.1
082	Jan Chamberlain	2.5.4, 2.13.4
083	J. Devereux	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1

Submission No.	Name	Report Reference
084	R.E. Dennett	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
085	Geoffrey Bishop	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
086	Jim Whittle	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1, 2.18.1
087	Anthony Maxwell	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
088	Mellissa Madden	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
089	J.W. and R Homery	2.6.5
090	Norman C. Moore	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
091	Karen Stafford and Duncan Sproul	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
092	Ann and Bill Fogarty	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
093	Jane Helen Gabrielsen	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
094	Robyn Bauer	2.6.4, 2.6.5, 2.6.6, 2.10.4, 2.11.1, 2.17.4
095	Cecilia and Olivier Chaussemiche	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
096	Nadine Hood (duplicate of 33)	
097	J.C. Lea	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
098	Aileen Cole (duplicate of 34)	
099	Jacqueline Annandale	2.3.5, 2.5.3, 2.6.5, 2.9, 2.13.7, 2.17.2
100	Roger and Jean Forman	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
101	C. Baker	2.6.5
102	Cameron McQuhae	2.6.5
103	John Martin	2.6.4, 2.6.5
104	Dennis McKinnon	2.6.5
105	Gerard Swain	2.6.5
106	Ken McCaffery	2.6.5
107	E. Taylor	2.3.5, 2.6.4, 2.13.1, 2.13.6, 2.16.2
108	Trent and Emma Taylor	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
109	Gregory Chisholm	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
110	Lynne French	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
111	Katharine Myres	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
112	Mr and Mrs G.E. Martin	2.6.5
113	David and Helen Bowler	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
114	Terry and Kay Sandon	2.6.5
115	Mr A Villanueva and Mrs T Clearwater	2.6.7, 2.12.3
116	Phil Kirby	2.5.2, 2.6.3, 2.11.3, 2.11.4, 2.13.1, 2.17.3, 2.18.1
117	Vince Gianatti	2.6.5, 2.8.1, 2.8.6, 2.10.4
118	Jack and Yvonne Harper	2.3.1, 2.3.5, 2.6.14
119	Chris Shevellar	2.6.3, 2.18.1
120	Ian and Kathy Dall	2.6.5
121	Ruth K Kirby	2.5.2, 2.6.3, 2.11.3, 2.13.1, 2.15.3, 2.16.2, 2.17.3, 2.18.1
122	Ruth K Kirby	2.5.2, 2.6.3, 2.11.3, 2.13.1, 2.15.3, 2.16.2, 2.17.3, 2.18.1
123	Louise Savrda, Rowan Porritt and Claire Porritt	2.4.1, 2.6.14, 2.8.1, 2.13.4, 2.18.1
124	Ian Ritchie	2.6.3, 2.18.1
125	Robert Johnston	2.6.3, 2.13.4, 2.18.1

Submission No.	Name	Report Reference
126	Graeme Hickson	2.6.5
127	Ron Johnson	2.6.5
128	Allen and Maureen Lind	2.13.1, 2.13.9, 2.18.1
129	Matthew Morris	2.6.4, 2.11.2, 2.15.1
130	Marshal and Sonya Page-Smith	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
131	Gayle Cue	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
132	Nadine Hood	2.18.1
133	Noel and Dorothy Thomas	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
134	Julian Packshaw	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
135	Katherine Leary	2.6.5
136	Richard Hagley	2.6.5
137	Paul Tischler	2.6.5, 2.10.4
138	Claire Bedford	2.6.5
139	Jasper Gotterson	2.6.5
140	Robert Johnston (duplicate of 125)	
141	Hugh Ross Burton	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
142	Pauline Burton	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
143	Mark McGrory	2.3.5, 2.13.6, 2.16.2
144	Tim Gotterson	2.6.4, 2.6.5
145	Melissa and Richard Poynting	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
146	Donna Young	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.1, 2.13.6, 2.16.2, 2.17.1
147	Shelly O'Brien	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
148	Estrella Reakes	2.6.5
149	Barbara Gould	2.6.5
150	David and Jeanette Lucas	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
151	Dr Joanne Doran	2.6.5
152	Lynda Baird	2.6.5
153	Martin Kenny	2.6.4, 2.6.5
154	Mark P Ryan	2.6.4, 2.6.5
155	Nina Packer	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
156	BLISS' (Bangalow Locals In Support of Traffic and Bypass Study)	2.3.5, 2.11.2, 2.13.4, 2.13.6, 2.17.2, 2.18.1
157	Mrs. M.J. Haye	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
158	Ian Hay	2.6.4, 2.18.1
160	Fraserfam Pty Ltd	2.3.5, 2.5.1, 2.6.4, 2.13.1, 2.13.6, 2.16.1, 2.16.2, 2.17.2
161	Fraserfam Pty Ltd (supporting information for submission 160)	
162	Fraserfam Pty Ltd (supporting information for submission 160)	
163	Fraserfam Pty Ltd (supporting information for submission 160)	
164	Fraserfam Pty Ltd (supporting information for submission 160)	

Submission No.	Name	Report Reference
165	Brett McPhail	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
166	Sally Marshall	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
167	Chris Lawson	2.3.2, 2.15.1, 2.16.2
168	Gary and Emma Sharman	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
169	Michael J Moyle and Karen Klaich (duplicate of 037)	
170	William James Hatton and Johanna Hatton	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
171	Elisabeth Newhouse	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
172	Don Page M.P.	2.5.4
173	Jonathan Wallen	2.6.4, 2.12.1, 2.13.1, 2.16.2, 2.17.5
174	Perry Hobson	2.3.1, 2.13.9
175	Eleanor Alcorn	2.6.5, 2.8.1
176	Eleanor Alcorn (duplicate of 175)	
177	Brian Alcorn	2.6.5, 2.8.1
178	Brian Alcorn	2.4.2, 2.6.5, 2.8.1
179	Tony Gilding	2.6.5, 2.11.1, 2.13.11, 2.15.3
180	Dianne Alcorn	2.6.5, 2.8.1
181	Ian Ritchie	2.11.3, 2.18.1
182	NSW Department of Primary Industries (duplicate of 253)	
183	Ruth K. Kirby (duplicate of 121)	
184	Phil Kirby (duplicate of 116)	
185	Ruth K. Kirby (duplicate of 122)	
186	J.R. Zentveld	2.6.5
187	Rebecca Zentveld	2.6.5
188	Jenny Coman	2.6.3, 2.6.4, 2.11.1, 2.11.3, 2.11.4, 2.13.1, 2.17.3, 2.18.1
189	Lisa Mattas Estreich and Peter Estreich	2.6.4, 2.6.5, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
190	David Roland	2.11.1, 2.15.1
191	Michael Hermann	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
192	John Zentfeld	2.6.5
193	Robert and Rowena Deards	2.3.5, 2.5.3, 2.8.1, 2.8.3, 2.17.2
194	Stephen John Bedford	2.6.5
195	John Kelly	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
196	Jason Brooker	2.11.3, 2.13.8, 2.13.9
197	Mr A Villanueva and Mrs T Clearwater (duplicate of 115)	
198	Damian Koch	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
199	Carol Brown	2.6.5
200	Suzanne Donovan	2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.13.6, 2.16.2
201	Mark Gasson	2.6.5, 2.11.2, 2.16.2
202	Mark and Therese Shepherd	2.6.5
203	John Roberts McIntosh	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1, 2.18.1

Submission No.	Name	Report Reference
204	Boyd Kellner	2.6.5
205	Yingwei Deng	2.6.5
206	Warwick Jones	2.6.5, 2.11.3
207	Alexia Rolfe	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.11.2, 2.13.6, 2.16.2, 2.17.1
208	Julian White	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
209	Kate Crawford	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
210	Anna Sansom	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
211	Liza Nikolaidis	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
212	John White	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
213	Melissa Tipoe	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
214	Hannah Ross	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
215	Kate Trimboli	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
216	Kim Hutchinson	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
217	Kim Goodricic	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
218	Annette White	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
219	Jenny and David Kennedy	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.15.1, 2.16.2, 2.17.1
220	Lindel Gass	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
221	Carolyn Kapytko	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
222	Geoff and Janelle Jarrett	2.3.1, 2.6.4, 2.6.5, 2.8.1, 2.8.8, 2.13.1, 2.17.1, 2.17.3, 2.18.1, 2.18.2
223	Joyce Ryan	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
224	Robin and Ian Black	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
225	D.E. Langford and H.A. McKay	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
226	Mr K. and Mrs P. Rettenmaier	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.1, 2.13.6, 2.16.2, 2.17.1
227	Aileen Cole	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
228	Madeleine de Lorme	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.15.1, 2.16.2, 2.17.1
229	Brian. Lesley, Isaac, Ellyce, Nathan Dolling	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
230	Ron and Colleen Schmidt	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
231	Mavis and Kevin Harley	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
232	John Kennedy	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
233	Isobel Sinclair	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
234	Graham and Deirdre Kerr	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
235	Syd and Caroline Evans	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
236	Janet Fraser	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
237	Ailsa Embleton and Tobias Mason	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
238	Bronwyn Watt and Andrew Woods	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
239	R.E. Brown	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
240	Nicolee Woods	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
241	P.M. Brown	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
242	Peta Zanotti	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1

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243	Lawrence Kevin Boyle	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
244	Melanie Hughes	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
245	Karen Jordan	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
246	Sen Harriman and Justine Crawford	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
247	Alf and Renee Coren	2.6.5
248	Tony Angles	2.6.4, 2.6.5, 2.8.1, 2.10.3, 2.16.2, 2.17.1, 2.18.1
249	Ray and Mary Crandell	2.6.7, 2.11.1, 2.11.3, 2.18.1
250	Individual Submission (marked not for publication)	2.6.4, 2.6.5
251	Individual Submission (marked not for publication)	2.6.4, 2.6.5
252	Michelle Argent	2.3.5, 2.6.4, 2.6.5, 2.13.6, 2.17.1, 2.17.3, 2.18.1
253	NSW Department of Primary Industries	2.10.5, 2.12.2
254	Scott Baldwin	2.11.2, 2.18.1
255	Heritage Council of NSW	2.18.2
256	Ministry of Transport	2.11.4
257	Bronwyn Fife	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
258	Dianne Mounley	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
259	Gawain Brown	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
260	Mrs. M. Simpson	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
261	David and Margaret Williams	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
262	Bernard Harriott	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
263	Lauren Maizey	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
264	Stephen Penfold	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
265	Mr. Aloys B. Tromp and Mrs. Elsbeth Gartly	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
266	Hannah Jones	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
267	John and Margaret Curtis	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
268	Jo-Anne Stewart	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
269	Susie Forster	2.13.6, 2.17.5
270	Lynelle Foster	2.6.5
271	Amber Gardens Guesthouse (duplicate of 081)	
272	Mr Gregory Foster	2.6.5
273	Michelle Foster	2.6.5
274	Henry Seccombe	2.6.4, 2.10.3, 2.11.3, 2.13.6, 2.16.2, 2.17.1, 2.18.1
275	R.W. Howard and J.A. Howard	2.4.1, 2.6.5
276	Ms Shae Biddell	2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
277	Mrs E.F. Alcorn	2.3.5, 2.6.5
278	Andrew Robinson	2.11.4, 2.18.1
279	Gerard and Jenny Brophy	2.6.4, 2.13.6, 2.17.1
280	Nicole Swain	2.6.5, 2.13.1
281	Keith Bauer	2.6.4, 2.6.5, 2.6.7, 2.6.10, 2.10.1, 2.10.4, 2.15.1, 2.16.2, 2.17.4
282	Myles Parfitt	2.6.5

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283	Irish Parfitt	2.6.5
284	B. Parfitt	2.6.5
285	Julian Goodwin	2.6.5, 2.18.1
286	Jannine Campton	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
287	Sue Abbey	2.6.4, 2.6.7, 2.8.1, 2.11.2, 2.13.6, 2.15.3, 2.16.2, 2.17.1
288	Genevieve White	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.15.1, 2.16.2, 2.17.1
289	Calvin Robert Willis	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
290	Mrs Margaret Flack	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
291	Rex Flack	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
292	Mavis Middleton	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
293	Victoria Jeffery	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
294	Gerard Stanhope	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
295	Michiko Stanhope	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
296	Mark Alcorn	2.6.5, 2.18.1
297	Mr W.K. Beadman	2.6.5
298	Ian and Donna Jenner	2.6.5
299	Watercatchers and Waterdrinkers of Ballina Shire Inc (see also 046 and 363)	2.3.5, 2.6.5, 2.8.1, 2.8.3, 2.8.4, 2.8.5, 2.8.6, 2.8.7, 2.12.2
300	Ruth Gotterson	2.6.5
301	Raymond Leslie Hick	2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.12.2, 2.13.6, 2.16.2, 2.17.1
302	Denise Woolsey	2.6.5
303	David A. Woolsey	2.6.5
304	Allen Horstmanshof	2.6.5
305	Fay Lynette Bryant	2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.12.2, 2.13.6, 2.16.2, 2.17.1
306	R.J. and G.M. Maher	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
307	Mr. G.A. Alcorn	2.6.5
308	G.J. and A.N. Potter	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
309	Tracey Brown de Longen	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
310	Carl Welsby and Kate Neale	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
311	Juliet Pratley, Ben Ireland, Jack Ireland	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
312	Wayne Lewis	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
313	Individual submission (signature unclear)	2.6.5, 2.11.1
314	Brigitte Zeisig	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
315	Northern Rivers Project Management	2.3.5, 2.6.4, 2.13.1, 2.13.4, 2.13.6, 2.16.2, 2.17.2, 2.17.3
316	Rous Water	2.5.5, 2.8.1, 2.8.2, 2.8.3, 2.8.6, 2.8.8, 2.10.5, 2.10.6, 2.10.7, 2.12.3, 2.17.6
317	Trent Taylor	2.3.5, 2.6.4, 2.13.6
318	Megan Wadsworth	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
319	Lois Wadsworth	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.11.2, 2.13.6, 2.16.2, 2.17.1
320	Rose Wadsworth	2.3.5, 2.6.4, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
321	Rod Wadsworth	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
322	David W. Johnston	2.3.5, 2.4.3, 2.8.3, 2.8.8

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323	Bangalow Chamber of Commerce	2.5.3, 2.6.4, 2.13.6, 2.15.1, 2.15.2, 2.16.2, 2.17.2
324	Southern Cross Botanicals	2.3.1, 2.12.1
325	Gai Hart-Hughes	2.12.4
326	Olivier Chaussemiche	2.13.6, 2.18.1
327	Coastal Environment Preservation Society	2.8.6
328	Colin W. Lewis	2.6.5
329	Allan Pepper	2.6.5
330	Kerrie Pepper	2.6.5
331	Judy Gibbon	2.6.5
332	Rex Harris	2.12.1, 2.15.3
333	Bangalow 2020 (see also 013)	2.3.5, 2.5.2, 2.6.3, 2.6.4, 2.6.5, 2.12.4, 2.13.2, 2.13.4, 2.13.6, 2.13.9, 2.16.2, 2.17.2
334	Ray and Mary Crandell	2.13.9
335	D.R. Harris	2.6.4, 2.6.5
336	R.N. Engert	2.6.5
337	Diane Alcorn	2.3.5, 2.6.5, 2.8.3
338	Eleanor Alcorn	2.3.5, 2.6.5, 2.8.3
339	Judith Baker	2.13.6, 2.17.2
340	Brian Alcorn	2.3.5, 2.6.5, 2.8.3
341	Shannon and Michael Brookes	2.13.1, 2.15.3, 2.16.2
342	Rosemary Macdonald	2.13.9
343	Jo England	2.6.5
344	Siboney and Vince Duff, Janice Ryan	2.6.4, 2.10.3, 2.13.4, 2.13.6
345	Kim Collins	2.3.5, 2.13.2, 2.13.9, 2.15.1
346	Bernard Grinberg	2.3.5, 2.6.7, 2.8.1, 2.11.3
347	Alan Logan	2.6.5
348	Judith Beadle	2.3.5, 2.6.4, 2.6.5, 2.6.7, 2.8.1, 2.10.3, 2.13.6, 2.16.2, 2.17.1
349	Byron Shire Council	2.3.3, 2.3.5, 2.6.2, 2.6.5, 2.8.3, 2.9, 2.10.2, 2.10.3, 2.10.5, 2.10.7, 2.11.4, 2.12.4, 2.13.9, 2.16.2, 2.17.5
350	NSW Department of Environment and Climate Change	2.6.1, 2.6.8, 2.6.15, 2.6.16, 2.8.3, 2.8.8, 2.10.2, 2.10.3, 2.10.4, 2.10.8, 2.13.2, 2.13.3, 2.13.4, 2.13.5, 2.13.9, 2.13.10, 2.14
351	Byron Bird Buddies	2.10.7
352	Ian Cooke	2.3.5, 2.8.3, 2.17.6
353	Ray and Mary Crandell (duplicate of 334)	
354	Lyn Plummer	2.6.5
355	Greg Plummer	2.6.4, 2.6.5
356	Ian Ritchie	2.13.8, 2.13.9
357	Lismore City Council (see also 004)	2.2.2
358	Ian Duncan	2.6.5, 2.13.1, 2.17.2
359	Bangalow Community Alliance	2.11.2, 2.13.6, 2.17.3
360	David Pont	2.7, 2.8.8, 2.10.3
361	Peta Beeman	2.6.4, 2.6.7, 2.8.8, 2.10.3, 2.13.6, 2.16.2
362	Cary Mora	2.3.2, 2.6.7, 2.13.9

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363	Watercatchers and Waterdrinkers of Ballina Shire Inc (see also 046 and 299)	2.8.4
364	Blackwood Ecological Services	2.6.4, 2.10.4, 2.16.1
365	Individual Submission (name withheld on request)	2.3.5, 2.4.3
366	Ian Ritchie (duplicate of 356)	
367	Northern Rivers Catchment Management Authority	2.10.4, 2.10.7
368	Byron Shire Bicycle Users Group	2.6.10
369	Dr Greg Davies	2.6.4, 2.6.5
370	Bill and Glenda Chapel	2.6.5
371	Barry and Joy Coleman	2.6.5
372	Nadine Hood	2.11.4, 2.18.1
373	Ballina Shire Council	2.3.1, 2.6.9, 2.8.3, 2.13.5
374	Dr Marianne Logan	2.6.5
375	Shannon and Micahel Brookes (duplicate of 341)	
376	Gary and Donna Jarrett	2.6.11, 2.8.1, 2.9, 2.10.1, 2.10.3, 2.13.1, 2.13.3, 2.18.1
377	Casey Lewis	2.6.4, 2.6.5, 2.13.1, 2.13.4
378	Paul, Lynette and Dane Johnstone	2.6.5
379	Nature Conservation Council of NSW	2.3.2, 2.10.2, 2.10.4, 2.13.7
380	Bangalow Chamber of Commerce	2.5.2, 2.6.4
381	Ian Clapham	2.3.5, 2.6.4, 2.6.5, 2.15.3, 2.18.1
382	Bill and Glenda Chapel (duplicate of 370)	
383	Paul Lynette and Dane Johnstone (duplicate of 378)	
384	Dr Paul Gannon	2.6.5