

Appendix E

**Agency/Stakeholder
Submissions**

Contents

- E1 Ballina Shire Council
 - E1.1 Landcare Group
 - E1.2 Submissions Relating to Water Catchment and Drinking Water Supplies
 - E1.3 Council Submission on the Ballina Bypass
- E2 Byron Shire Council
 - E2.1 General Comments
 - E2.2 Comments on Terrestrial Ecology Component of Report
- E3 Department of Environment and Conservation
 - E3.1 Biodiversity
 - E3.2 Aboriginal Cultural Heritage
 - E3.3 Air quality
 - E3.4 Noise
 - E3.5 Water
 - E3.6 Space required for mitigation
- E4 NSW Department of Planning
- E5 NSW Department of Primary Industries
 - E5.1 Agricultural Issues
 - E5.2 Fisheries Issues
 - E5.3 Minerals Issues
 - E5.4 State Forest Issues
- E6 Jali LALC
 - E6.1 Letter from Appointed Administrator
- E7 Northern Rivers Regional Development Board
 - E7.1 Strategic Approach to Transport Planning
 - E7.2 Pacific Highway Upgrade
 - E7.3 Data Analysis
 - E7.4 Agricultural Land Protection
- E8 Rous Water
 - E8.1 General Comments on All Route Options
 - E8.2 Comments on Specific Route Options

E1 Ballina Shire Council

Three separate council submissions on the Tintenbar to Ewingsdale Route Option Development Report/Display were received by the project team. These included:

- 28 November 2005 Newrybar Landcare Group submission addressed to Council
- 6 December 2005 submission including one letter and five form letters addressed to Council (protection of drinking water)
- 28 November 2005 Council submission regarding the Ballina Bypass.

Responses to the above submissions (relating directly to the Tintenbar to Ewingsdale project) are provided below.

E1.1 Landcare Group

The issues and constraints associated with the Landcare Group properties on Broken Head Road have been taken into account in the development of the constraint mapping included in the Route Options Display Report. The project team is aware of the concerns of this group and these concerns have been represented by Rebecca Zentveld, a member of the project's Community Liaison Group.

E1.2 Submissions Relating to Water Catchment and Drinking Water Supplies

The concerns and interests of the 'Water Catchers and Water Drinkers' have been made known to the project team through a separate submission. Responses to their concerns are included in the Route Options Submissions Report. This report will be available on the project website in the near future.

E1.3 Council Submission on the Ballina Bypass

The project team notes the Council's preference for the finalisation of the planning, design and construction of the Ballina Bypass on its approved alignment at the earliest opportunity, including planned construction to Ross Lane, thereby negating impacts to structure planning under investigation at Cumbalum Ridge.

As noted in the Route Options Display Report, Options A and B follow the approved Ballina Bypass alignment between Sandy Flat Road and Ross Lane; Options C and D would tie into the Ballina Bypass at Sandy Flat Road.

If Option C or D becomes the preferred route, then the section of the Ballina Bypass alignment north of Sandy Flat Road would not be required. Timing on the decision of the preferred route for the Tintenbar to Ewingsdale project is such that if Option A or B becomes the preferred route, it will not impact the proposed implementation schedule for the construction of the Ballina Bypass north of Sandy Flat Road.

Potential impacts to the Cumbalum Ridge area will be taken into account in the assessment of the short list of route options.

E2 Byron Shire Council

E2.1 General Comments

Maintaining connectivity of communities must be assured.

- Grade separation (overpass or underpass) will be provided where the short listed route options intersect with significant local roads such as Midgen Flat Road and Broken Head Road. This will ensure that the current connectivity of communities is maintained as much as possible.

Ease of access to town centres must be maintained, in particular to Bangalow, to ensure the viability of the community and local businesses.

- Access to Bangalow will be maintained through the existing highway and connections. Vehicles travelling from outside the study area to Bangalow along the proposed upgraded Pacific Highway would use the interchanges proposed at Ross Lane/Sandy Flat Road or Ewingsdale and travel along the existing highway to Bangalow. Appropriate signage will be provided prior to the interchanges to ensure drivers' understanding of access to Bangalow.

Road safety is of the highest importance when considering access to/from the highway and connectivity of communities.

- Road safety has been identified as a key consideration for the selection of a preferred route. For this reason, all access to and from the upgraded highway would be through grade-separated interchanges. Safety would also be a key consideration with respect to any alterations of the local road network.

Interchanges must be considered in terms of the potential impact they may have in adding traffic to a local road network that has already reached its full capacity. In particular, council has concerns about additional traffic loads being put onto the coast road from Lennox Head to Byron Bay. However there has been no indication as to whether there would be any other interchanges, or how access to existing communities will be achieved. Council wants to know how the RTA will address issues of impact on the local road network knowing that any interchange south of Ewingsdale with access to the coast road will add more traffic to this road.

- No additional interchanges have been proposed between Ross Lane and the existing Ewingsdale Interchange. The RTA is aware of Council's concerns regarding additional traffic on the coast road.

E2.2 Comments on Terrestrial Ecology Component of Report

Summary: Report is deficient and should be discarded.

- It is acknowledged that the information on the threatened species section of the RODR needs clarification. Some input on threatened species methodology that was included in the *Terrestrial Ecology Working Paper* was not included in the RODR and this has resulted in a misinterpretation of the data. However, the RTA stands behind the data presented and feels that it provides an appropriate preliminary level of information to differentiate between the options. Additional field investigations and analysis have been conducted since the RODR. This information will be used in the detailed analysis of the short list of route options.

E2.2.1 Presentation of Information

Impacts assessed within the various route option corridors are described as “ecological characteristics” (s.8.8.1) when characteristics normally refer to ecological attributes such as the type, condition, size, shape, connectivity etc of vegetation patches, presence of conservation priority communities and species, presence of threatened species’ habitat, known populations or occurrence of threatened species etc, but not perturbations.

- The ecological attributes used to characterise the vegetation patches for the constraints mapping are the same as those discussed and included in the RODR identification of terrestrial constraints, Section 5.8.2. Chapter 8 addresses impacts associated with the route options and Section 8.8.1 identifies this section as Overview of Impacts.

One impact is described as the “number of patches and area of vegetation or habitat that potentially would be affected” but the terms are not explained. What does “potentially” mean? Does this include vegetation patches adjacent to the route options that would not require destruction? Is the “area” only that area of the patch falling within the 250 m route option corridor or the whole area of a patch that falls inside and outside the corridor?

- “Number of patches and area of vegetation that potentially would be affected” refers to patches or parts of patches that fall within the proposed 250 m wide corridor shown for the route options and does not include any part of a patch that falls outside the 250 m corridor.

The footprint design of the options will most likely require less land than that shown for the corridors in the RODR. Therefore it is likely that some ‘affected’ patches that fall within the corridor (particularly those on the corridors edge) will be able to be avoided by the footprint.

Regional and sub-regional wildlife corridors are described as “wildlife route options” (s.8.8.1).

- Regional and sub-regional wildlife corridors described as 'wildlife route options' is a misprint in the RODR summary. They should be referred to as 'wildlife corridors'.

Threatened Species Occurrence. It is suggested that threatened species are likely to exist within many vegetation patches because of the “disturbed and highly fragmented nature of much of the vegetation in the local area”. However, poor vegetation condition usually mitigates against the occurrence of most threatened species.

- Many threatened species have been found within patches of vegetation dominated by Camphor Laurel.

The statement that threatened species are likely to exist within many vegetation patches because of the “disturbed and highly fragmented nature of much of the vegetation in the local area” refers to the fact that the general fragmentation of vegetation in the local area has led to many local species being listed as threatened because their habitat has previously been cleared.

Table 8.11 states two threatened species records are “very close to B1” but Table 8.12 indicates only one record for this route option. Table 8.11 also lists the presence of a colony of the threatened (TSC Act 1995) Grey-headed Flying-fox *Pteropus poliocephalus* in close proximity to route option D1 but Table 8.12 ignores this occurrence.

- Please note Table 8.11 refers to recordings by section and in Section B1 and D1 the explanations say ‘very close’ and ‘approximately 200 m of a no go area’; Table 8.12 refers to those that are ‘directly impacted’ or lie within the 250 m corridor of the route option. Furthermore, additional records of threatened species have been compiled since the printing of this report and are included in the updated constraints mapping. Previous records of threatened species have not been used directly to distinguish between route options, but instead each vegetation patch within the study area has been assessed as potential habitat for threatened species. This approach is more conservative than it would be if constraints were simply determined using the location of threatened species, as it is likely that many threatened species would be missed as they are, by definition, rare.

Evaluation criterion 27 (Appendix A) refers to the “Number and area (ha) of vegetation or habitat likely to be affected”, but what does “likely to be affected” mean? Are these patches that will be destroyed by the Upgrade construction and also patches close by, downstream or connected by corridors that will be cut, or none of the latter?

- The evaluation criteria “Number and area of vegetation likely to be affected” refers to the patches of vegetation that fall within the proposed corridors. The area refers to the total area of vegetation that falls within the corridor, not including sections of patches outside the corridors. The number refers to the number of patches of vegetation that fall within the vegetation corridor, including those falling partially outside the corridor. It is likely that once the road footprint is finalised, a smaller area and number of vegetation patches will be impacted.

The explanation of evaluation criterion 27 states, “Where riparian flora and fauna has been mapped, this will also be included”. Does this mean that if “flora and fauna” have not been mapped then they will not be included?

- A more detailed explanation of this criterion is as follows:

This criterion accounts for threatened species and migratory animals; the patches of vegetation where these species are known to occur are given a higher constraint rating than equivalent vegetation without such records. In addition, riparian vegetation is given a higher constraint rating than equivalent non-riparian vegetation.

E2.2.2 The mapped information is confused and inaccurate

Mapping of vegetation within route options. Although roads, nodes and threatened species records are superimposed over route options (Fig. 8.6), vegetation patches falling within options are obscured, with the result that it is not possible to check tabulated data.

- The detail of the mapping can get lost when presented in the report as A4 figures – we apologise for this. Please refer to *Preliminary Terrestrial Ecology Assessment Report* for larger, more detailed maps.

High constraint vegetation (“key habitat”) is indicated as falling within a wildlife corridor (Fig. 8.6) but the mapping shows many patches outside corridors and s.8.8.1 states other factors were considered in assessing values.

Medium constraint vegetation is indicated to include “all other native vegetation” (Fig. 8.6) and although s.8.8.1 claims Camphor Laurel Cinnamomum camphora-dominated patches within corridors were rated as medium constraint, the mapping shows many Camphor Laurel patches outside corridors mapped as medium constraint.

- Definitions of low, medium and high terrestrial ecological constraints classifications are provided in Table 5.9, page 58 of the RODR.

Threatened species occurrence. Only three threatened species records (one flora, two fauna) are shown within route option corridors (Fig. 8.6) whereas Table 8.12 indicates the existence of five records. Confusingly, one of the mapped records (Fig. 8.6) is shown as falling within the C/D corridor while Table 8.12 shows no threatened species recorded within these route corridors.

- This is an error in summarising the *Preliminary Terrestrial Ecology Assessment Report* for the RODR. Refer to *Preliminary Terrestrial Ecology Assessment Report* for larger, more detailed maps and more explanation with regards threatened species.

Additional records of threatened species have been compiled since the printing of this report and are included in the updated constraints mapping, but not used directly to differentiate between route options. Records of threatened species have been compiled from a variety of sources, including Biosis Research’s surveys, DEC, Ballina Shire and Byron Bay Council, Big Scrub Rainforest Landcare Group, Birds Australia Atlas Database, Community Information Sessions and information passed on from landowners. Once finalised, Biosis Research are happy to provide BSC with data sets for its own records.

We note that threatened species were not used as evaluation criteria, instead a more conservative approach was adopted where by the quality of the habitat was assessed.

Additional records of threatened species have been compiled since the printing of this report and are included in the updated constraints mapping, but not used directly to differentiate between route options. Records of threatened species have been compiled from a variety of sources, including Biosis Research’s surveys, DEC, Ballina Shire and Byron Bay Council, Big Scrub Rainforest Landcare Group, Birds Australia Atlas Database, Community Information Sessions and information passed on from landowners.

E2.2.2.1 Methodology - the ecological evaluation criteria adopted are flawed and result in ecological values being downgraded

Number of Ecological Criteria Adopted. Only four ecological criteria (three terrestrial and one aquatic), of a total of 39 criteria (Appendix A), are selected for the evaluation of route options. This results in ecological values being significantly downgraded when compared with social, engineering and economic factors and is inconsistent with the equal ranking assigned to these four major values.

- The evaluation criteria for the Sieve 1 process (selection of the short list of route options) was developed and agreed in conjunction with the Community Liaison Group for the project. A refined set of criteria will be used in the selection of the

preferred route; this refined group of criteria will be grouped into three 'silos' which are Functional, Social/Economic, and Natural and Cultural Environment. Performance of each of the shortlisted options in the separate silos will be evaluated. Thus environmental issues will be assessed exclusive of functional and social and economic concerns.

Evaluation Criterion 27 apparently combines the number and areas of both high and medium value remnant and regenerated vegetation or habitat into one value. No explanation is provided as to how this was achieved, but it appears that such combination would have cancelled out the initial ranking (and presumably weighting) of the sub-criteria of high and medium value remnant and regenerated vegetation or habitat.

- High and Medium constraint vegetation are considered separately, with a higher weighting being applied to High constraint vegetation.

Further, the values assigned to individual sub-criteria are likely to have been highly subjective. For example, how were patches assessed as habitat for threatened species? The data provided suggest that this was only on the basis of records from the extremely selective Atlas of NSW Wildlife.

- Patches of vegetation that contained potential habitat for threatened species were treated as though they contained threatened species and were given a high constraint rating accordingly, regardless of whether or not threatened species had been previously recorded in them. Biosis Research's on-site surveys and information provided to us by Ballina and Byron Shire Councils, DEC, Big Scrub Rainforest Landcare Group and landowners were used to assist in evaluation of patches as potential habitat for threatened species. The DEC records were one source among a variety of other sources of information that were used to assess habitat values of patches of vegetation.

High value/constraint vegetation/habitat is defined as "generally consists of rainforest with minimal Camphor Laurel infestation" (s.8.8.1) but this ignores communities in the study area such as swamp sclerophyll forest and river-flat eucalypt forest on coastal floodplains, both listed as endangered ecological communities (EECs, Threatened Species Conservation (TSC) Act 1995) and consequently of high significance.

- All vegetation patches meeting the criteria of an endangered ecological community were given a high constraint rating regardless of condition.

Medium value vegetation/habitat is indicated to include all other native vegetation and Camphor Laurel-dominated patches within wildlife corridors (s.8.8.1). However, this appears to overlook Camphor Laurel-dominated forest outside corridors, which ignores its function in providing habitat for threatened plant species and important foraging habitat for threatened bird species such as the Rose-crowned Fruit-dove Ptilinopus regina.

- Camphor Laurel patches outside wildlife corridors were given a lower constraint rating relative to other native vegetation patches within the study area, which are in better condition or contain better flora and fauna habitat than Camphor Laurel. This is not to infer that Camphor Laurel patches have no significance as flora and fauna habitat, only that the significance of these patches is lower relative to other patches of native vegetation. It is recognised that Camphor Laurel patches contain habitat for some threatened plants and animals. Camphor Laurel patches inside wildlife corridors were given a higher constraint rating than those outside wildlife corridors because they helped maintain connectivity by providing sub-optimal habitat

between patches of optimal habitat (native vegetation), not because they provided better habitat. Refer to *Preliminary Terrestrial Ecology Assessment Report* for more details..

Evaluation Criterion 28 assesses impact due to the “number of ‘edges’ created through remnant and regenerated habitat areas” but the number of edges would equate to the number of patches cut, so has little validity as a separate criterion. A more meaningful measure would have been to calculate the length or edge/unit area of affected patches.

- Evaluation Criterion 28 assesses the impact due to the number of edges created through patches of vegetation. For this criterion, only new edges were considered, that is, edges created were only considered if they dissected larger patches of vegetation greater than 50 m wide, as research suggests that this distance is the extent of most edge effects. Therefore edges created through smaller patches, which are likely to already be entirely impacted by edge effects, were not counted as new edges.

Evaluation Criterion 29 provides the number of times a wildlife corridor would be crossed, but the cutting of regional and subregional corridors appears to be subsumed into one value, negating the initial separation.

- The one Regional corridor within the study area is traversed by all four route options for similar lengths, so there is no need to differentiate between the different types of wildlife corridors.

Local corridors have been ignored, particularly riparian corridors, and no attempt has been made to differentiate between corridors already cut by the existing highway and those still relatively uninterrupted.

- Local corridors are considered to be important and have been considered. Riparian vegetation, which acts as a wildlife corridor, was given a higher constraint than equivalent non-riparian vegetation. Local corridors already cut by the existing road are differentiated from those that are less disturbed, which is one reason why options close to the existing highway have less impacts than those more distant.

The assessment also fails to realise that the proposed tunnel section does not cross or cut a sub-regional corridor, invalidating totals in Tables 8.10 and 8.12. No attempt is made to take into account the potential for connecting interrupted corridors through the provision of vegetation under bridges or over a route by employing cut and cover tunnels.

- With respect to the St Helena wildlife corridor, all four options pass under this corridor through a tunnel, therefore not differentiating the results shown. Where possible, impacts to wildlife corridors will be minimised in the design of the footprints of the options. Impacts on corridors may be mitigated through the provision of fauna over and under passes in appropriate locations. The concept design phase of the preferred route will include a more detailed analysis of proposed mitigation measures.

E2.2.3 The Pairwise comparison used to rate ecological evaluation criteria against other criteria is not valid

Number of ecological evaluation criteria. As noted above, with only four ecological criteria selected, comparison with more numerous social, engineering and economic criteria is biased against ecological values. A total of 10 ecological criteria are required to achieve a balanced comparison.

Comparison of ecological criteria with social, engineering and economic criteria. Even with criteria being evenly selected, the comparison of ecological criteria with social, engineering and economic criteria is invalid because these values cannot be rated against each other. Such comparison could also be expected to be highly subjective, with results reflecting the expertise and interests of participants.

- Highway planning projects seek to achieve a balance in environmental, social, economic, cultural and engineering impacts. This is a difficult and complex process. However in the end compromises and trade-offs are generally required. The Sieve 1 process reflects this difficult decision making process.

The pairwise assessment of the evaluation criteria provided a sensitivity test to the Sieve 1 process, and was undertaken by a variety of project team and stakeholders. The evaluation criteria were developed and agreed in conjunction with the Community Liaison Group for the project. A refined set of criteria will be used in the selection of the preferred route. These criteria will be grouped into 'silos' for 'Safety and Functionality', 'Natural and Cultural Environment' and 'Social and Economic'. Within these silos the criteria will undergo another pairwise assessment. The silos themselves are not weighted.

E2.2.4 Bioregional Significance of the Area - No attempt appears to have been made to assess or place into context the significance of the study area, and the NSW north coast region generally, for biodiversity conservation.

National significance. The NSW North Coast region is nationally important in providing autumn and winter food resources for nomadic and migratory insectivorous, nectarivorous and frugivorous birds and nomadic nectarivorous and frugivorous fruit bats. The region and the study area are at the centre of one of two refugia for the ancient Tumbunan subtropical rainforest biota, representative of pre-Gondwanan flora and fauna and of particular scientific and conservation significance. The coastal plain area of the region and study area supports Wallum plant and animal communities of high scientific and conservation significance. With regard to the latter attribute, expansion of the route options study area onto the coastal plain appears to have taken no account of the much higher likelihood for significant ecological impact. This area contains a substantially higher diversity of habitats than the immediate hinterland, reflected by the recent listing of six EECs under the TSC Act (1995), with consequent greater potential for significant impact. This would include permanent dislocation of coast to hinterland connectivity and major disruption to ecological functioning through changes to landforms and drainage patterns caused by the requirements for road construction cut and fill.

State significance. The NSW north coast region supports the highest number of threatened plant and animal species and endangered ecological communities in the State.

- The significance of the NSW north coast region as a resource for nationally significant bird and mammal species is recognised. However, it is important to note the vast majority of the study area has been previously cleared and or highly modified. As stated above the importance of native vegetation remnants and wildlife corridor have been highlighted and included as criteria for route option selection. All route options occur within the region that Council notes concern for and therefore the value of the region as a resource for nationally significant fauna is common to all routes. The RODR specifically focuses attention on ranking the route options according to environmental sensitivity and therefore this proposed criterion, being common to all routes, does not provide a mechanism to differentiate between route options.

The RODR does however identify specific values of National environmental significance that may be impacted either directly or indirectly by each of the possible route options. These criteria are used to differentiate between route options and will help in selecting a route that reduces the impacts to the ecological values that contribute to the ecological significance of the NSW north coast region.

It is important to note that the recent listing of six vegetation communities as Endangered Ecological Communities on the TSC Act renders these communities as significant at the state level and discussion of the significance of these communities should be confined to State Significance. Biosis Research agrees that the coastal plain has greater ecological value than the adjacent hinterland due to a greater diversity of habitats and its proximity to a number of nature reserves, although the recent preliminary determination of Lowland Rainforest as an Endangered Ecological Community on the TSC Act may reduce the difference between these two areas.

The impact of all route options on the connectivity between the hinterland to coast has been considered. We note, in discussion with Byron Shire Council, that Options C and D have potential to add an additional 'barrier effect' to east west wildlife movements.

E2.2.5 Threatened Communities and Species Values

Dependence on Atlas of NSW Wildlife records. The threatened species records as provided, representing a few opportunistic observations contained in the Atlas of NSW Wildlife, are meaningless for comparing route options. This is inferred by the claim made in relation to “potentially affected vegetation patches”, where it is stated that “it is likely that threatened species exist within these areas” (s.8.8.2). However, the numbers of Wildlife Atlas records are then misleadingly (and inaccurately, see s.1 above) inserted in a table designed to show “terrestrial ecology characteristics” of each route option (Table 8.12) and included in the comparison of route options “key characteristics” (s.8.8.3).

A valid threatened species assessment would have examined vegetation and other habitats along each of the route options as potential threatened species habitat and then made a comparison on that basis. A conservative assessment of threatened species’ records in the vicinity of the route options, together with habitats along the routes indicates that 16 threatened plant species and 20 threatened vertebrate species are likely to be present.

- Threatened species records from the DEC Atlas of NSW Wildlife have not been used directly for identification of ecological impacts of route options. It is acknowledged that the information on the threatened species section of the RODR needs clarification. Some input on threatened species methodology that was included in the *Terrestrial Ecology Working Paper* was not included in the RODR and this has resulted in a misinterpretation of the data. Rather than using the records of threatened species, Biosis Research used the presence of potential habitat for threatened species to determine the constraint level of each vegetation patch, and these were used to compare route options. However, threatened species records were used to upgrade Camphor Laurel to the next highest constraint rating if threatened species were known from these patches. Records of threatened species have been compiled from a variety of sources, including Biosis Research’s surveys, DEC Atlas, Birds Australia’s Atlas, Ballina and Byron Council, Big Scrub Rainforest Landcare Group and information passed on from landowners. This information has been used to assist in constraints mapping. Biosis Research’s approach is more conservative than it would be if simply the location of threatened species were used as an indicator of constraint level. For the current assessment Biosis used similar methods for the threatened species assessment as those recommended, i.e. “examined vegetation and other habitats along each of the route options as potential habitat for threatened species habitat and made a comparison on that basis”.

Lack of consideration of endangered ecological communities (EECs) in the study area. EECs, which have equal status with threatened species under the TSC Act (1995), are largely ignored in the study area assessment and route options summary. The study area contains examples of freshwater wetlands on coastal floodplains, swamp sclerophyll forest on coastal floodplains, swamp oak floodplain forest, river-flat eucalypt forest on coastal floodplains, subtropical coastal floodplain forest and lowland rainforest on floodplain and several of these are present in route option corridors. Apart from a reference to swamp sclerophyll forest (on coastal floodplains) within route option C (s.8.8.), no other consideration is given to EECs in route options evaluation.

A recent preliminary listing of lowland rainforest as an EEC will also now need consideration in route options assessment, as this community is widespread in the study area.

- Endangered Ecological Communities have been defined as such in the constraints mapping and have been given a high constraint regardless of condition. The EECs that are known to be present within the study area include Swamp Sclerophyll Forest, Lowland Rainforest on Floodplains and Freshwater Wetlands on Coastal Floodplains. Although there is potential habitat for Sub-tropical Coastal Floodplain Forest within the study area, it has not been previously recorded. If Byron Council have further information, from that provided by council previously, which suggests other patches of EECs occur within the study area and have not as yet been mapped, then Biosis Research would be grateful for that information. Since the completion of the *Preliminary Terrestrial Ecology Assessment Report*, Lowland Rainforest has been preliminary listed on the TSC Act as an EEC and will be treated as an EEC in future reporting and analysis until a final determination is made.

E3 Department of Environment and Conservation

E3.1 Biodiversity

Of the four options presented, Options A (Blue) and B (Green) appear likely to have the least potential to adversely impact on the biodiversity of the study area and its local and regional landscape. Through mostly following the existing highway corridor, these options will minimise disturbance of key habitat and wildlife corridors, remnant high conservation value (HCV) native communities (EECs), freshwater wetlands, and landscape structure and function. DEC supports the route option/s that will have the least potential to adversely impact on the ecological integrity, persistence and long-term survival of threatened and protected flora and fauna and their habitat within the local and regional landscape.

- It is agreed that potential impacts to native flora and fauna are minimised with options that follow or are in close proximity to the existing Pacific Highway Corridor.

Options A and B have fewer crossings of waterways than Options C and D, but Options A and B cross two aquatic habitats with medium constraints. Options C and D cross aquatic habitats with low to negligible constraints.

Options A and B will, however, bisect 16 and 20 patches, respectively, of high conservation value native vegetation, create edge effects through these remnants, traverse one sub-regional and one regional wildlife corridor, and potentially degrade the habitat of a number of threatened plant and animal species. A range of mitigation measures will need to be developed and implemented to safeguard the quality of these attributes of the study area's biological diversity.

In contrast, Options C and D appear to have greater potential to adversely impact on the ecological integrity, condition and landscape connectivity of native vegetation and faunal assemblages and their remaining habitat in the study area and its region. Both options bisect in two places a subregional wildlife corridor that runs from Broken Head to Newrybar and southeast to connect with several significant coastal regional wildlife corridors. Option D especially impinges on key lowland habitat within the wildlife corridor. Both options also bisect a regional wildlife corridor linking upland remnant native vegetation at Tintenbar with lowland swamp and forest communities in nearby Ballina Nature Reserve (NR).

- The route options assessed in the Route Options Development Report (RODR) were based on corridor widths of 250m. Therefore patches of vegetation falling within the corridor, particularly those on the edge of the corridor, may be avoided in the concept design of the footprints of the options. Where possible, impacts to high value vegetation and wildlife corridors will be minimised in the design of the footprints. Impacts on wildlife corridors may be mitigated through the provision of fauna over and under passes in appropriate locations.

It is agreed that, as stated in the terrestrial ecology report, it is difficult to prescribe detailed mitigation measures to protect flora and fauna at this stage in the project, other than to identify requirements for fauna passage where wildlife corridors are impacted. However, an important consideration will be the feasibility of mitigative measures to reduce potentially adverse impacts of this project on ecological processes and biodiversity. These will need to be assessed against each option to ensure that standards of environmental performance can be achieved in the survey, construction and operation phases of the project. Temporary measures to ameliorate potential impacts on native flora and fauna and their habitats will need to be agreed upon before construction commences. Proposed works will need to provide adequate underpasses and overpasses to facilitate the movement of terrestrial and arboreal fauna to and from foraging and breeding areas either side of the dual carriageway route.

- The assessment of the short list of route options includes a preliminary analysis of mitigation measures that is reflected in the costing of the options. The concept design phase of the preferred route will include a more detailed analysis of mitigation proposed for the preferred route, and finally the environmental assessment phase of the project would include specifics associated with mitigation measures.

The maintenance of the quality and connectedness of regional and subregional wildlife corridors is recommended wherever possible. This requires consideration of native vegetation, regardless of tenure, as providing potential links for the movement and dispersal of fauna. Overlaying the various route options in Figure 5.10 of the RODR would assist the reader in considering the location of route options in relation to wildlife corridors.

- Figure 5.10 shows the existing terrestrial ecology conditions and constraints. The route options are overlaid on the wildlife corridors in Figure 8.6, Terrestrial Ecology Characteristics and the Short List of Route Options. Mitigation of impacts to wildlife corridors will be assessed as described previously.

Development and implementation of a revegetation plan to ameliorate disturbance to wildlife corridors caused by future construction activities is recommended. This would utilise indigenous species and detail measures to ensure the sustainability of plantings and weed control. Design of the selected route will need to incorporate fauna underpasses and overpasses and perimeter fencing adjacent to the highway at points bisecting key wildlife corridors, e.g. between Nodes 1 and 2 (Sandy Flat Road vicinity) and Nodes 4 and 5 (Tinderbox Creek area).

- Details of the requirements of any revegetation plan will be provided during the environmental assessment phase of the preferred route, and is likely to include rehabilitation and revegetation of native vegetation communities, management plans for threatened species, a weed management plan, use of locally indigenous species and design of fauna over and under passes.

The only DEC estate near the study area is Ballina NR and Hayters Hill NR to the northeast. Potential impacts of the proposal on these reserves are likely to be confined to water quality and impairment of wildlife corridors that partially link these reserves to native vegetation remnants on privately owned lands.

- Mitigation against disturbance to wildlife corridors that provide links between nature reserves will be detailed during the environmental assessment phase of the preferred route, and is likely to include fauna under and over passes and revegetation/rehabilitation of disturbed areas of native vegetation.

DEC must ensure that threatened flora and fauna species, populations and ecological communities and their habitat are adequately protected from the proposed roading activities and appropriate habitat restoration measures are devised and implemented. The importance of this is highlighted by the occurrence of a number of threatened species, EECs, and HCV vegetation communities on land subject to Options A, B and C. These include, for example, Swamp Sclerophyll Forest, Spotted-tailed Quoll, Square-tailed Kite, Osprey, Little Bent-wing Bat and Grey-headed Flying-fox.

- The study area supports a variety of valuable areas of native vegetation. These constraints have been assessed in the development of the short list of route options. Further minimisation of impacts is being investigated in the development of the footprints of the route options. Where impacts cannot be avoided, suitable mitigation measures will be proposed to reduce the impact and/or compensate for impacted areas.

DEC is concerned that the RODR and the terrestrial ecology report have not included reference to the full range of threatened plants and animals that have been recorded in or near the study area, or that are considered likely to be present. There is a need for the consultants to review all available databases and studies including those held or undertaken by DEC, Australian Museum, Forests NSW, CSIRO Sustainable Ecosystems, national herbarium, and universities. This will allow a more accurate and comprehensive identification and assessment of the potential impact of the proposal on threatened and locally and regionally significant biodiversity in and near the study area. It will also facilitate the development of measures to mitigate potential impacts of the proposal on threatened biota.

- Rather than the records of threatened species, Biosis Research have used the presence of suitable habitat for threatened species as an indicator that threatened species are or may be present, and patches of vegetation have been mapped accordingly. Furthermore, patches that are dominated by Camphor Laurel have been upgraded to a higher constraint rating if threatened species are known to occur in these patches. Records of threatened species have been compiled from a variety of sources, including Biosis Research's surveys, DEC, Ballina Shire and Byron Bay Council, Big Scrub Rainforest Landcare Group, Birds Australia Atlas Database, Community Information Sessions and information passed on from landowners. This information has been used to assist in constraints mapping. This approach is more conservative than it would be if constraints were simply determined using the location of threatened species as an indicator, as it is likely that many threatened species would be missed as they are, by definition, rare.

DEC representative, Andrew Huggett, has been contacted regarding DEC's query. Arup will re-review the DEC information and contact Andrew if necessary for clarification.

The scope of the terrestrial ecology report could be increased by the inclusion of a desktop assessment of whether the study area contains any "centres of endemism", or modelled "key habitat" for threatened species. This information is available under licence from DEC.

- DEC mapping of "centres of endemism" and "Key Habitat" were used in the constraints assessment mapping to aid in identification of areas of high constraint. Refer to *Terrestrial Ecology Working Paper*.

One SEPP 14 wetland occurs within the path of Option D north of Midgen Flat Road. DEC recommends that the proposed routes avoid SEPP 14 wetlands wherever possible. Specific impact mitigation measures will be needed to safeguard the ecological integrity of this wetland and its catchment. Measures to minimise the impact of route options that bisect existing floodplain and non-SEPP 14 wetlands will also need consideration. Species of intercontinental migratory wading birds subject to JAMBA and CAMBA provisions will require consideration in the design of mitigation measures, especially if Option D is selected as the preferred route.

- The boundaries of the expanded study area and the development of route options were designed to avoid SEPP 14 Wetlands. SEPP 14 Wetlands have been mapped as "no-go" areas within the constraints mapping. According to the SEPP 14 Wetlands mapping we have been provided, there are no SEPP 14 Wetlands in the study area. Mitigation measures for non-SEPP 14 Wetlands and floodplains will be addressed during the concept design of the preferred route.

DEC representative, Andrew Huggett, has been contacted regarding this query. Andrew will provide data to Arup via email.

The defined assumptions and vegetation classifications used in discussion of environmental constraints in the terrestrial ecology report are generally satisfactory. The criteria subsequently used to evaluate the route options should also consider impacts to wetlands and any mapped SEPP 44 Koala habitat.

- In the RODR, wetlands and SEPP 44 habitat are included in the assessment criteria with all other habitat types, as areas of SEPP 44 have not been mapped at this time. SEPP 44 habitat would be surveyed and mapped during the environmental assessment stage of the project. However, preliminary investigations suggest that SEPP 44 habitat does not exist within the 250m corridors of the short list of route options.

Whilst SEPP 44 Koala Habitat Protection is referenced as relevant legislation in the terrestrial ecology report, and Koalas are known to occur in the study area, there is no discussion on the presence or absence of mapped SEPP 44 Koala habitat in the study area. Therefore this element does not appear to have influenced consideration of each route options.

- Koalas, along with other threatened species, have been considered in the constraints mapping. There is one known location of a Koala in the northern section of the study area, although this location will not be directly impacted by any of the short list of route options. This site was not shown in the RODR, but has been included in the updated constraints mapping.

The conservation status, habitat requirements and response to disturbance of aquatic plants and vertebrate fauna will require consideration in the impact assessment process. Threatened fish species such as the Oxleyan Pygmy-Perch will require special consideration.

- The importance of aquatic plants and vertebrate fauna is recognised and the impact on these species will be considered in more detail during the environmental assessment stage of the project. In the RODR, the presence of habitat for these species is used to indicate that they are present, and the potential impact on these species is considered accordingly.

Habitat requirements, conservation status and response to disturbance of aquatic plants will be considered in the assessment of impacts for the preferred route. Note that no Oxleyan Pygmy perch or any other threatened fish species have been found when sampling in appropriate habitats.

There is also a need to evaluate the overall ecological impact of the proposed route options at a total landscape scale. That is, potential impacts of the development need to be considered within the context of other development occurring within the local and regional landscape, including the other sections of the Pacific Highway Upgrade Project. Of key importance to the protection of ecological integrity (ecosystem structure and functioning) at a regional scale is the degree to which the T2E project is likely to contribute to the cumulative effects of development within the region. While this is characteristically difficult to quantify, consideration needs to be given to appropriate planning and mitigation measures to reduce the cumulative ecological impact of the T2E project in the region. The DEC is encouraged that the terrestrial ecology report considers Ballina Shire Council's draft Biodiversity Strategy and relates the draft Strategy to other information sources used.

- Cumulative impacts would be assessed once the preferred route is selected and during the more detailed environmental assessment stage of the project.

E3.2 Aboriginal Cultural Heritage

The Aboriginal cultural significance of the study area needs to be carefully assessed in consultation with the local Aboriginal community. There is a need to understand the importance of the indigenous cultural landscape as one large site rather than as individual significant sites. DEC recommends that archaeological investigations be undertaken in areas of cultural significance prior to any works commencing. Scrutiny of these investigations by suitably qualified persons is also recommended. Further consultation with DEC's Aboriginal Heritage Information management System and Northern Aboriginal Heritage Section, the Local Aboriginal Land Council, and the local Elders should be undertaken prior to selection of the preferred route option.

- The AHIMS register, consulted prior to fieldwork, provided a list of known sites and list of reports of previous work in the study area. Additionally, an Aboriginal Focus Group was formed for this project to help facilitate consultation. The importance of the landscape has been mentioned by Aboriginal representatives. Assessment of the cultural landscape is difficult as any construction (highway or other) will impact on the landscape of the study area. The low number of recorded sites to link portions of the study area also makes broad assessments difficult. It must also be acknowledged that the landscape has been highly altered by Europeans. Consultation with the Aboriginal Focus Group will continue in the refinement of the short list of route options and selection of the preferred route.

Consultation with the Northern Aboriginal heritage unit of DEC has not yet been undertaken but will be during the detailed assessment of the short list of route options.

E3.3 Air quality

Whilst Section 5.9.3 provides limited information on air quality, the only other information provided in the RODR is a summary of the length of grades over 4.5% as presented in Tables 8.1 and 8.34. This information is not sufficient to accurately gauge the air quality impacts of the various route options.

- The DEC submission states that the summary of the length of grades over 4.5% for each option, as presented in the RODR, is not sufficient to accurately gauge the air quality impacts of the various route options. The grade summary provides a way of ranking the various options that is useful at this stage in the assessment process. Further, greenhouse gas emissions will be calculated from estimates of fuel consumption on each of the routes, which will be a factor in the preferred route

selection process. In general, the options that are most favourable in terms of greenhouse gas will also be favourable for other vehicle emissions.

Regarding air quality, it is often the case that there is little distinction between rural highway upgrade route options.

The air quality impacts of the preferred route will be assessed using computer dispersion modelling, which will take account of road grade, vehicle speed, traffic mix, local dispersion conditions, degree of congestion, proximity of sensitive receptors, and background levels of pollution.

E3.4 Noise

The community Noise Burden (CNB) approach used in the RODR fails to indicate how each of the proposed options perform in relation to the DEC guideline Environmental Criteria for Road Traffic Noise (ECRTN). The RODR therefore is not unable to provide information as to the number of receivers who will experience noise levels that exceed the ECTRN for the various route options, nor is any assessment of the feasibility of mitigation measures provided.

In general, the DEC favours the route options that comply with the (ECRTN) and have the least impact on new noise receivers, based on the information available, option A appears to perform best in this regard.

Whilst options B, C and D impact on fewer receivers than option A, they impact on receivers who currently experience low background and low local traffic noise levels. The potential noise impacts and the reasonable and feasible options for effective mitigation should be carefully considered when determining the suitability of these options.

- The assessment of the long list of route options (Sieve 1) does not explicitly consider how the options perform in relation to the DEC ECRTN. It was considered appropriate to evaluate only the more general 'noise burden' of the route options, rather than the number of properties which would exceed the specific traffic noise criteria, since the routes were still subject to revision at that stage of the project.

Care must be exercised with assessment of the feasibility of mitigation at the route option development stage. A preliminary assessment of feasibility of mitigation is provided in the *Noise Working Paper*.

The number of properties likely to exceed the DEC traffic noise criteria was determined as a part of the ongoing noise studies being undertaken for the detailed assessment of the short list of route options; the results indicate:

- Option A: 112
- Option B: 51
- Option C: 44
- Option D: 35

Option D is therefore likely to have the lowest impact in this regard.

We are not aware of any published DEC policy that states DEC's preference for route options that have the least impact on new noise receivers.

The issue of change in noise impacts on receivers, and particularly those that are currently unaffected is clearly complex. Arup has developed the Relative Community Noise Burden measure as an indicator of the burden imposed on the community by the change in noise levels. It is a scientifically based methodology, based on the Noise Burden methodologies developed by the UK DETR and studies

of subjective impact of change in traffic noise levels published in the UK Design Manual for Roads and Bridges. It is the most advanced and technically rigorous study ever undertaken for the route options assessment in NSW.

Questions of impacts on lifestyle or social equity relating to 'new' noise impacts on previously unaffected receivers are not addressed in the *Preliminary Noise Impact Assessment Report*.

E3.5 Water

As stated above, DEC supports the option that has the least impact on sensitive receiving waters such as SEPP 14 wetlands and floodplains. The extent of floodplain crossed by options C and D will require significant engineering works during construction to ensure the stability of the carriageway and associated bridges and culverts.

- DEC's support of options that have the least impact on sensitive receiving waters such as SEPP 14 wetlands and floodplains is noted. According to available data, there are no SEPP14 wetlands impacted by the short list of route options (see response page 3, para 3).

We note the extent to which the options traverse the catchments for Emigrant Creek Dam and the Proposed Lismore Water Source. We agree with the RODR that best practice management measures would be required to minimise impacts on drinking water catchments and would expect that best management practices would be applied to all aspects of the proposed highway upgrade. The engineering and designs for all bridges and culverts must fully consider all environmental impacts associated with their construction and operation, including the provision for water quality pollution controls. The feasibility and practicality of these controls should be provided to better differentiate between the proposed options.

- Requirements for mitigation measures (including design and costs) will be included in the detailed assessment of the short list of route options. Effective mitigation for water quality and sedimentation is possible for all route options and is therefore not a differentiator between options.

E3.6 Space required for mitigation

An important factor in differentiating between the route options is ensuring that sufficient corridor can be acquired to permit the installation and maintenance of appropriate mitigation measures for noise, water quality and fauna during both the construction and operation phases of the upgrade. This information is not provided in the RODR.

- The comparison of the route options in the RODR was based on a route option corridor width of 250m which would include adequate space required for mitigation measures. The refinement of the route options includes the development of footprints for each option which will generally be less than the 250m. Footprint designs will include allowances for mitigation measures.

E4 NSW Department of Planning

Regarding your submission dated 12 December 2005, we note the Department's role in the management, development and conservation of resources and the value the Department places on both state and regionally significant farmland identified in the Farmland Protection Project.

The Tintenbar to Ewingsdale Route Options Development Report identified state significant farmland as a high constraint and impacts to this resource have been minimised, where possible. It should be noted that route options for this project were developed by attempting to minimise the impacts on a whole range of high constraints, not just those relating to farmland. Most of the study area is designated regionally significant farmland and therefore impacts are unavoidable.

The project team has recently conducted detailed surveys of agricultural properties in the study area. This data will assist the project team in refining the options and, where possible, minimizing severance impacts to agricultural properties.

We note that the Department of Planning will not be making any formal comment on the proposed options (email of 18 January 2006, Brendon Baker).

E5 NSW Department of Primary Industries

Regarding your submission dated 18 November 2005, we note that your response is a coordinated DPI submission and reflects the views of the former NSW Fisheries, Mineral Resources NSW, State Forest NSW and NSW Agriculture. Following are responses to the issues included in your submission.

E5.1 Agricultural Issues

This section of highway and the study areas contains some of the best quality agricultural land in the north coast region and indeed NSW. The majority of the locality has been mapped as regionally significant farmland by the Northern Rivers Farmland Protect Project. In addition, the soils and climate of the locality support a diversity of high value and regionally important agricultural industries. The locality also supports a rural community and rural based businesses which are either reliant or closely linked to the rural and agricultural landscape that has been created and continues to be created in this locality.

The importance and value of the agricultural lands within this locality and the production these lands can sustain is substantial. All proposed route options have an impact on good quality agriculture land and individual agricultural enterprises. Options A and B are expected to have substantial impacts on high quality agricultural land and agricultural production. These two options are also expected to have impacts on farm economics due to property severance as well as considerable impacts on property access arrangements. Options C and D have less overall impact on the high quality horticultural lands and horticultural production though will have localised impacts on horticulture and specific property impacts. Option D will have an impact on lands utilised for sugar cane production, macadamias and some soy beans.

All options converge at a tunnel in the northern section. The potential impacts of this tunnel on agriculture in this locality and the local micro climate in the vicinity of the tunnel have not been assessed at this time by NSW DPI though this issue requires consideration in route option development in order to ascertain the full potential impacts of the options on local agriculture.

The RTA acknowledges the value that DPI places on the regionally significant farmland in the study area and the impacts of route options A, B, C and D on agricultural lands. We note that to date the DPI has not commented on impacts in the vicinity of the proposed tunnel.

Mr Rik Whitehead's participation in the Value Management Workshop, December 2005, is appreciated. Information presented at the workshop included detailing the scope of the agricultural study being conducted by Hassall's. This agricultural study will provide significant input in the detailed assessment of the short list of route options and can be further discussed with DPI through future Agricultural Focus Group meetings. If required alternative arrangements can be made to discuss the results of this study with DPI.

E5.2 Fisheries Issues

The RTA acknowledges that the DPI Aquatic habitat protection Unit (AHUP) is satisfied with the information provided in the RODR. Additionally, that DPI (AHUP) prefers a route that minimises impact upon fish and aquatic habitat such as wetlands, especially SEPP 14 wetlands. Please note that SEPP 14 wetlands have been avoided in the development of the route options.

E5.3 Minerals Issues

A separate response from Mineral Resources should be forthcoming. To date, we have not received their response.

E5.4 State Forest Issues

Comments that all options are remote from areas of Forests NSW and they have no issues to raise have been noted.

E6 Jali LALC

E6.1 Letter from Appointed Administrator

Discussions between the Appointed Administrator of Jali Local Aboriginal Land Council (LALC) and the Co-ordinator of Jali LALC have concluded that the most appropriate route for the Ballina to Tintenbar Pacific Highway upgrade is to follow the existing highway pattern, wherever possible.

We say this because the infrastructure that has evolved in this area is a result of placing the Highway in its present location.

We understand that this route has the potential to impact on approximately 70 houses and ask that the sensitivity of this issue be taken into account.

Where ever possible we would like negotiations with land owners to ascertain the best outcome for their situation.

We are also of the view that there is justifiable means to have a highway inland (west) to cater for the trucks travelling interstate on a regular basis.

This area is well known for its tourism ability and this road should enhance the growth of tourism in this area and not hinder it. Further, the proposed routes traverse land of known past indigenous occupation and we are fearful of possible damage to items of indigenous artefacts and heritage.

We note that discussions between the Administrator and the Co-ordinator of Jali LALC have concluded that the most appropriate route for the upgrade is to 'where ever possible follow the existing highway pattern'. We also note that the members of the Jali LALC have not endorsed this position.

The following responses are provided to the issues and/or concerns included in your letter.

- The project team has endeavoured to minimise impacts on dwellings in the study area and 100 meetings have been held with property owners to better understand their concerns and explore mitigation measures where possible.
- The scope of the project is to develop a 'M Class' motorway between Tintenbar and Ewingsdale to cater for all vehicle types. The large number of intersections, population densities, and the current high use of the existing Pacific Highway for local trips dictates that the Tintenbar to Ewingsdale section of the Pacific Highway upgrade should be 'M Class' for safety reasons.
- Traffic studies undertaken in the early 1990's and detailed in the '*North Coast Road Strategy Report (1992)*' have shown that the amount of traffic which would divert to the New England Highway if it was upgraded would not substantially reduce the traffic volumes on the Pacific Highway. The government has asked the RTA to examine the feasibility of other routes west of the Pacific Highway in complementing the Pacific Highway in meeting the transport needs of the State and the region. The RTA is currently undertaking a preliminary assessment of the proposals put forward by the Local Member for Ballina, Mr Don Page, and others. A report is expected to be finalised in the next month or so.
- The importance of tourism in the area is being taken into account in the assessment of the short list of route options and the recommendation of a preferred route.

- Known and potential Aboriginal heritage constraints have been taken into consideration in the development of the route options. Mitigation measures will be proposed, where necessary, to minimise impacts. Implementation of standard RTA environmental management practices during construction will ensure that any newly discovered artefacts are handled in accordance with requirements as defined in the *National Parks and Wildlife Act 1974* and the *Heritage Act 1977*. Consultation and liaison with the LALCs and community representatives would continue during the pre-construction and construction periods of the project.

E7 Northern Rivers Regional Development Board

E7.1 Strategic Approach to Transport Planning

The Development Board recognises the central importance of transport to the health of the Northern Rives, and advocates for the development of an integrated regional transport strategy that will ensure that the investment and consumption decisions of all transport stakeholders – the three tiers of government, transport operators, the business sector, households and visitors – complement and support the wider regional objective of delivering a balanced and environmentally sustainable pattern of development.

Transport is a key element of the Northern Rivers regional economy with major implications for both current and future public sector and commercial investment decisions and land use planning. Transport decisions therefore affect social equity and amenity and the health and wellbeing of our communities – where and how we live, work, learn and recreate. Effective transport planning and management is fundamental to our collective impact on the environment's life support systems and has far-reaching implications for income distribution and welfare dependency.

Approximately half the region's population is currently concentrated on the coast in the centres of Tweed Heads, Murwillumbah, Ballina, Lismore, Yamba and Grafton. However, the region has a dispersed settlement pattern, with 57% of the region's population living in the 300 small villages or localities scattered throughout the region. Planning work on the Northern Rivers Regional Strategy¹ and the DIPNR/Department of Planning Far North Coast Regional Strategy have recognised the village settlement pattern as a key element in past and future growth of the Northern Rivers region. Consequently, infrastructure provision and transport planning needs to be considered in terms of this settlement pattern and the unique opportunities and needs it poses.

The provision of sufficient strategic/economic enabling infrastructure to maintain appropriate conditions for continued employment and economic growth is critical for the region's communities. The Development Board has been facilitating the development of a Regional Industry and Economic Plan (RIEP) for the Northern Rivers and in this process has identified a need for investment in strategic infrastructure associated with transport and access. The RIEP² 17) identifies the required road infrastructure upgrading works, and notes a need for prioritisation of these is required. It is also noted that improving access to national and international gateways is a key requirement, noting the importance of the Pacific Highway and a need to link the northern NSW hinterland with the growth areas of South East Queensland and the Port of Brisbane.

The Development Board encourages government to consider the following principles in all matters related to transport planning, including upgrade of the Pacific Highway:

- ***a holistic, integrated and long-term approach to transport is needed to address the economic, social and environmental needs and challenges of the region;***
- ***environmental sustainability and the evolution of settlement patterns appropriate to the specific environmental, cultural and economic characteristics of the region should drive transport planning, investment and management decisions;***
- ***transport planning and development should aim to maintain a stable and predictable investment environment for regional industries including agriculture, tourism and residential development;***

- ***the importance to the region of efficient, cost effective and convenient transport links to South East Queensland must be central to transport planning and development;***
- ***transport planning is an integral part of a comprehensive approach to major infrastructure development including telecommunications, energy and water distribution;***
- ***transport development should balance the needs of stakeholders and avoid usage conflicts to ensure higher standards of safety and a more equitable sharing of transport costs and impacts;***
- ***triple bottom line evaluation including full cost accounting should be applied to all transport infrastructure projects; and***
- ***transport development should encourage behavioural change by all categories of users to achieve more energy efficient and environmentally sustainable outcomes.***

A particular need is the integration of transport planning with regional economic and land use – planning (ie through the Department of Planning’s Far North coast Regional Strategy) to minimise the negative impacts of transport development on land values and commercial investment planning in the broader regional economy. Greater integration is required between local, regional, state and national economic objectives and the needs of all categories of users including: local residents/workers, inter-urban travellers, inter-regional travellers, tourists, local and regional businesses, national freight forwarders is also required.

We note the importance of transport planning in the Northern Rivers area and the principles which your Development Board supports and encourages. Detailed agricultural land use and regional economic studies are being conducted by Hassall and Associates as part of the economic analysis of the shortlisted route options. These studies will significantly contribute to the comparison of the shortlisted options and the selection of a preferred route.

E7.2 Pacific Highway Upgrade

In term of the highway upgrade it is important to ensure:

Adequate consideration of the impacts of major highway development on the region’s secondary roads network

Traffic and Transport analysis and reporting throughout the project has and will continue to give adequate consideration to both the local and state road network.

Separation of local and interstate traffic to the greatest extent possible

One of the T2E evaluation criteria in the Route Options Development Report is ‘local traffic use of the highway’, where higher performing options have a lower local traffic use. The ‘M Class’ (or freeway) design standard does not allow local property access to the upgraded highway and requires grade separation of all intersections with the local road network. The design of the shortlisted route options incorporates interchanges in the vicinity of the southern and northern project extents only, further limiting the likelihood of local traffic using the upgraded highway for short trips. It is anticipated that the existing highway or a replacement service road will allow local access to occur in a manner similar to present activity without the issue of highway through traffic.

Elimination of known safety black spots and areas of conflict between different categories of users and utilisation of divided carriageways to separate traffic flow

The Pacific Highway upgrade from Tintenbar to Ewingsdale will bypass the two known accident blackspots of Tintenbar Hill and St Helena Hill. Following the upgraded highway opening, the existing Pacific Highway between Bangalow and Ewingsdale would fulfil a

regional road function rather than the current state highway function. It is envisaged that safety along this route would be enhanced through the following:

- A posted speed limit of 80 km/h with 60 km/h in parts which is more consistent with the design speed of the existing geometry
- A reduction in traffic volumes along the length of the route
- A reduction in the percentage and size of heavy vehicles along the route
- Minor works or treatments to ensure the road environment is consistent with the intended role, speed limit and usage of the route
- Greater consistency in the road environment between Bangalow to Ewingsdale and Bangalow to Lismore, compared with the relative inconsistency between Tintenbar to Ewingsdale and other upgraded sections of the Pacific Highway
- Greater consistency in driver behaviour with the removal of the Pacific Highway 'through' traffic.

It is expected that these factors would reduce the current accident rates to a level more consistent with typical rates for a rural 2-lane undivided road.

Adequate community engagement in transport planning, decision-making and management to ensure that the transport system reflects the social and cultural values of the community

A comprehensive community involvement program has been implemented on the Tintenbar to Ewingsdale project. This program has included Community Information Sessions, numerous meetings with the Community Liaison Group (CLG) and the Agricultural Focus Group (AFG), and State and local government agency input through Planning Focus Meetings. Additionally, all of these bodies were involved in the Corridor Assessment Workshop and the Value Management Workshop. Input on social and cultural values has been sought through these groups and meetings, and significant input was received on the development of the selection criteria for the project.

Management of the impact of freight movements to preserve residential amenity by, for example, the use of limited access zones and heavy vehicle curfews

The impact of freight movement on residential amenity is being managed through the separation of local and through traffic, reducing grades where possible, as well as the noise assessment and mitigation process. Options such as heavy vehicle curfews are outside the scope of this project.

The use of technical innovation to mitigate transport related noise, visual and air pollution

The project team is up to date on the latest practices available to mitigate impacts of new highways. These practices will be applied to the extent appropriate for this project.

The introduction of strategies to alleviate the environmental impacts of high traffic volumes and congestion

The higher traffic volume capacity of the dual carriageway roadway, combined with the reduction of grades, assists in the reduction of environmental impacts.

The alignment of transport planning and development with the protection of high value agricultural lands and environmental conservation values

The Tintenbar to Ewingsdale Route Options Development Report identified state significant farmland as a high constraint and impacts to this resource have been minimised, where possible. It should be noted that route options for this project were developed by attempting

to minimise the impacts on a whole range of high constraints, not just those relating to farmland. Most of the study area is designated regionally significant farmland and therefore impacts are unavoidable.

Preservation of natural and cultural landscape values as a necessary condition for transport infrastructure development

A comprehensive and detailed analysis of the natural landscape values is provided in Section 5.12 and 8.12 of the Route Options Development Report, October 2005. Four of the 39 selection criteria included in the selection of the short list of options addressed landscape and visual impacts of the options.

Additionally, an Aboriginal Focus Group has been established for the project and this group has addressed minimisation of impacts on the cultural landscape.

E7.3 Data Analysis

In the case of the Ewingsdale and Tintenbar proposals, all the proposed routes in this area have potential to negatively impact on the economic viability of businesses and industry sectors (horticulture, coffee, sugar cane etc) in the study area, with further flow on effects. The Route Options Report only assesses agricultural impacts in terms of the number of properties, area of land and type of agricultural land use. The Route Options Report does not quantify the current agricultural development investment, production or employment capacity and there is no modelling of the impacts of the proposed changes on the local economy. The Economic Model for the Tweed and Northern Rivers provides a mechanism to examine the impacts on local economic production, employment, imports and exports (but not investment) and it is recommended that this tool is used to undertake a full analysis of the economic costs and benefits and develop a thorough understanding of the costs to the local economy. The Tweed Economic Development Corporation could provide this service.

The analysis provided in the Route Options Development Report was of sufficient detail to enable comparison of the long list of options and select the best performing options to be carried forward as the short list of options. Comprehensive agricultural surveys were conducted in late 2005, and this information will supplement that contained in the Route Options Development Report to assess the comparative impacts of the shortlisted route options and to determine a recommended preferred route option. Hassall and Associates will be conducting this additional work and they will also be addressing regional economic impacts.

As noted in Hassall's presentation to NRRDB on 10 February 2006, the project team will be using regional multipliers from the economic model for the Tweed and Northern Rivers (TEDC) to assist in the analysis of economic impacts in the region.

E7.4 Agricultural Land Protection

In the case of the Ewingsdale and Tintenbar proposals, the Development Board encourages full consideration of the importance of the protection of regionally and state significant agricultural land. The identification and protection of regionally and state significant agricultural land through the Farmland Protection Project is to ensure the long term protection of agricultural land for the purposes of agricultural, not residential or infrastructure development. Whilst the planning rules do not prevent the use of this land resource for infrastructure development, this should be primary consideration in the determination of route options.

As noted in Section A7.2, impacts to State Significant Land have been considered as a high constraint and impacts have been minimised. Where possible, further refinement to the

route options will address minimisation of acquisition and severance impacts to Regionally Significant Land.

E8 Rous Water

E8.1 General Comments on All Route Options

Policy 11.14 Pacific Highway Upgrade: Tintenbar to Ewingsdale

The RTA acknowledges the Rous County Council's policy adopted 18 May 2005. Emigrant Creek Dam is presently functioning as a water supply for the study area with the Pacific Highway in its present location. The existing highway runs through the catchment area and in most places does not contain design features to prevent road runoff from entering creeks. Any upgrade route option chosen would be designed and constructed to minimise impact on the Emigrant Creek water catchment, including the use of sediment detention ponds where required. The risks associated with potential spills will be addressed through the concept design development and EA phase of the project. The new highway would represent lower risks to the drinking water catchment than the present Pacific Highway situation.

To ensure the viability of Emigrant Creek Dam as a long term water supply, ensure that upgrade is designed, constructed and maintained in a manner which ensures the risks are identified and not increased.

Disturbances during construction and operation of the upgrade could lead to negative impacts to aquatic ecosystems and groundwater resources.

The preferred route would be designed, constructed and maintained in a manner that would result in a reduction of risks to the water supply compared to the present situation. Mitigation measures would be included in the concept design of the preferred route. Mitigation measures include structures that catch road run off and direct it away from waterways. Where appropriate, this may also involve the use of constructed sediment ponds which filter road run off. Aquatic ecology mitigation includes locating structures out of the stream bed, thus avoiding disturbances to creek banks from crossing support structures. Structures would also be built such that they do not impeded fish passage or reduce connectivity of waterways, mainly by correct size, type and positioning of smaller crossing structures such as culverts.

Preference of Rous Water is that the alignment of the upgraded highway be situation no closer to Emigrant Creek Dam than it is at present. The preferred alignment should be the option with minimum impact to aquatic ecosystems and water quantity and quality; i.e. the one that maximises the distance between and catchment disturbance and the dam itself.

RTA acknowledges Rous Water's preference.

E8.2 Comments on Specific Route Options

E8.2.1.1 Option A1

It is not clear why Option A1 deviates so significantly to the west of the existing highway in the vicinity of Emigrant Creek Dam.

The route options include specific engineering design criteria outlined in RODR which are reflected in the proposed alignments. As outlined in pages 19 and 20 of RODR the existing highway's horizontal and vertical geometry at this location does not meet the new highway design standards. Additionally, the development of the route options has taken into consideration social, economic, land use, and natural and cultural environmental constraints. The route options presented in the RODR were based on 250 m wide corridors. Development of the footprints of the route options provides opportunities for minimisation of these impacts.

Concerned about impacts of A1 in close proximity to important aquatic resources. Best management practices cannot guarantee that risks associated with potential impacts associated with runoff from highway surfaces and spills of chemicals/hazardous materials can be eliminated. Additional concern regarding periods of very high intensity rainfall.

The RTA acknowledges Rous Water's concern with the proximity of A1. These risks would be minimised through implementation of mitigation measures identified and through further consultation with Rous Water during the concept design development and EA phase.

Major construction disturbance along Option A1 has the potential to significantly impact on the quantity and quality of both groundwater and surface water flows. Concerned about issues within basaltic soils and rock profiles, etc.

The route options have the potential to impact on groundwater regimes at the location of deep cuts, in the following situations:

- If the cut penetrates below the groundwater table;
- If the cut coincides with the location of springs;
- If the cut is within the zone of influence of groundwater flow to a spring and impedes the groundwater flow to the spring, or
- If the cut cuts off natural drainage flows from springs uphill of the cut.

Cuts that extend below the groundwater table have the potential to cause local drawdown of the groundwater table, because they will behave like a drain. The drawdown will occur as seepage from the rock face, and the water will be collected in drains at the toe of the cut batters. The amount of drawdown will depend on the hydrogeological characteristics of the rock and the depth of the cut. The extent to which groundwater flows are impacted will depend on the topography at the cut and the depth of the cut below the groundwater table.

Along Option A and B the typical depth of cut within the Emigrant Creek catchment is expected to be less than 10 m, with one cut up to about 15 m. We have installed groundwater monitoring wells in two boreholes drilled along this section. These indicate that the groundwater table is at a depth of about 8 m in BH307 and 12 m in BH303.

Further information will be needed from groundwater monitoring wells installed at each cut to verify the depth of the groundwater table. However, on the basis of the data available for RODR, it is likely that the groundwater will be close to or below the base of most cuts along Options A and B. In this case, cuts along Options A and B are unlikely to significantly impact on the groundwater regime and quantity of groundwater flow.

Within the Emigrant Creek catchment there is one spring (shown on the spring map in the RODR) along Option A and B that may coincide with a cut.

Concept design of the preferred route will include appropriate mitigation measures to minimise impacts on groundwater and surface water.

Closer proximity to Emigrant Creek Dam increases the risks associated with air quality discharges.

Current advice and experience on Pacific Highway upgrades is that air quality along the new highway will meet current guidelines for all route options, however this issue will be examined in more detail including air quality modelling during the EA phase.

E8.2.1.2 Option B1

Major disturbances to areas in close proximity to Emigrant Creek Dam, destruction of important aquatic, riparian and terrestrial habitat areas along Emigrant Creek and a series of crossing of Emigrant Creek.

The riparian vegetation along Emigrant Creek has been mapped as a high constraint due to its habitat values and the importance of the riparian vegetation for maintenance of the water catchment area ecosystem. No riparian vegetation along Emigrant Creek is directly impacted by Option B1. However, it is recognised that Option B1 impacts on terrestrial habitat in close proximity to Emigrant Creek. It is also recognised that Option B1 is in close proximity to the Killen Falls Big Scrub remnant.

All concerns noted for Option A1 are also concerns for B1, except that the magnitude of risks is far greater for B1.

The responses provided for general comments and Option A1 also apply to Rous Water's concerns for B1. The final road footprint is unlikely to be as wide as the corridor width (250 m) resulting in minimisation of impacts and design refinement. The risks associated with potential spills will be addressed through the concept design development and EA phase of the project.

In the vicinity of Newrybar, there are also dams and wetlands of local significance to the water catchment that would be destroyed.

Option B1 would represent a 36% reduction in the size of the constructed wetland at 'Yarrenbool'. Farm dams impacted could be relocated outside any potential influence from road run off. Where springs intersect the new highway, impacts would be mitigated to minimise impact on ground water flow. This issue will be addressed through the concept design development and the EA phase of the project.

E8.2.1.3 Section C/D

Avoids water catchment area of Emigrant Creek Dam, consistent with Council's policy.

RTA acknowledges Rous Water's preference.

E8.2.1.4 Option C1

Option C1 would disturb a series of springs and wetlands at the headwaters of Emigrant Creek, the origin of Emigrant Creek water supply and may disrupt aquatic habitats in this location.

Along Option C there are likely to be several deep cuts in excess of 25 m deep along the escarpment section. A monitoring well installed near to the point that Option C crosses Old Byron Road indicates a groundwater depth of about 15 m. Hence there is a high likelihood that cuts along Option C will encounter groundwater and may impact significantly on the groundwater regime. There are also several springs shown under the corridor along the escarpment section of Option C.

Mitigation of impacts to springs and the groundwater regime at deep "double-sided" cuts may be difficult and it is possible that some springs could be lost. A hydrogeological study of each deep cut, supported by further investigation of the depth of groundwater and groundwater flow regime will be required to assess the likely extent of the impacts, including the drawdown and the impact that this drawdown has on the quantity of groundwater flow through water bearing horizons within the cut.

There are some situations in which it may be possible to mitigate the potential impacts on the groundwater regime at the location of deep cuts, as illustrated in the attached sketches. For the case where the spring is uphill of a hillside cut or where springs are located in a

hillside cut, it may be possible to construction drainage blankets and channels to maintain the groundwater flow and redirect the flow beneath the highway to the natural drainage path. The feasibility will depend on the topography at each cut and will need to be assessed on a cut-by-cut basis.

Emigrant Creek's feeder creeks that would be crossed by Option C are small waterways that can be crossed without disturbance to water flow, water volume and water quality.

E8.2.2 Option D1

Completely avoids the water catchment area of Emigrant Creek Dam. Clearly consistent with Council's policy.

RTA acknowledges Rous Water's preference.

E8.2.2.1 Northern Portion of Study Area

Concerns of Proposed Lismore Source, select route with provides minimum impact to aquatic ecosystems.

The RODR has addressed the impacts associated with the Proposed Lismore Source. All comments provided in earlier sections pertain to potential impacts in this area.

E8.2.2.2 Other Comments

Additional criteria should be presented in the extent of aquatic/riparian habitat impacts.

Riparian and aquatic habitats are considered in the constraints mapping in the terrestrial vegetation category. However, there is some merit to considering aquatic and riparian habitat impacts separately. The RTA will consider this recommendation.