

MAJOR PROJECT ASSESSMENT Pacific Highway Upgrade – Tintenbar to Ewingsdale



Director-General's Environmental Assessment Report Section 75I of the *Environmental Planning and Assessment Act 1979*

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Cover: - Knockrow looking north (Ross Lane is at the bottom of the photograph) - courtesy of RTA

EXECUTIVE SUMMARY

The NSW Roads and Traffic Authority (the Proponent) has sought the Minister for Planning's approval for the Pacific Highway Tintenbar to Ewingsdale upgrade project, a key component of the State and Commonwealth governments' commitment to upgrade the existing Pacific Highway between Hexham and the Queensland border. The proposal consists of approximately 17 kilometres of dual carriageway starting at Ross Lane to the north east of Tintenbar, and extending north to the existing Ewingsdale interchange, west of the town of Ewingsdale.

The proposal includes providing a half interchange at Bangalow, improving the existing interchange at Ross Lane, twin parallel tunnels under St Helena Hill, tying in with the Ballina bypass to the south (currently under construction) and upgrading the Ewingsdale interchange in the north to provide full access between the local road network and the highway.

The key benefits of the proposal include:

- a safer section of highway with improved access and connectivity for the local community;
- greater transport efficiency and safety for intra-state and inter-state movements;
- supporting growth and the long-term sustainability of the regional economy;
- improved amenity along the existing Pacific Highway;
- reducing financial costs associated with travel on the Pacific Highway; and
- reducing greenhouse gas emissions in the longer term and energy consumption relative to the base case of 'no upgrade

The capital cost of the proposal is approximately \$368 million (2007 dollars) if constructed in a single stage with a construction workforce of up to 500 engaged at any given time.

The Department received 352 submissions on the project including 343 from individuals, special interest groups or businesses, and nine from Government agencies and councils. Key issues raised included noise, water quality, air quality, traffic, visual amenity and the proposed interchanges at Ivy Lane and Bangalow.

The Department has assessed the Proponent's Environmental Assessment and Response to Submissions/ Preferred Project Report (including revised Statement of Commitments) and taken into consideration issues raised in private and public submissions. The Department is satisfied that the environmental assessment has considered the key issues to the greatest extent practicable, that mitigation measures are appropriate and that the residual impacts of the proposal are acceptable and manageable. Notwithstanding, it is understood that further refinement of the proposal will occur during detailed design which may result in impacts being reduced further, in particular water quality, visual impacts, and road traffic noise. For these reasons, the Department recommends approval of the project.

The Department has recommended conditions of approval which define performance standards and targets which the project must achieve as well as monitoring requirements which are chiefly aimed at measuring the effectiveness of the mitigation measures which the Proponent has committed to in order to minimise impacts. These include noise and vibration, ecological and water quality monitoring. The Department has also recommended further review of the water infrastructure design, which must be undertaken prior to construction commencing to confirm the mitigation measures (and their effectiveness). This would provide the community with certainty prior to works commencing.

In summary, the Department is of the opinion that on balance the project is justified and in the public interest. It is anticipated that the Proponent's Statement of Commitments and the recommended Conditions of Approval, implemented in parallel would ensure that the project is designed, constructed and operated to meet acceptable environmental and amenity limits.

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1. BACKGROUND

1.1 Pacific Highway Upgrade Program

The NSW Roads and Traffic Authority (the Proponent) propose to upgrade the Pacific Highway between Tintenbar and Ewingsdale in the Ballina and Byron local government areas. The project is part of the Pacific Highway Upgrade Program which is a joint commitment between the State and Commonwealth governments to provide a continuous four lane carriageway from Hexham to the Queensland Border.

The objectives of this program are to:

- significantly reduce road accidents and injuries;
- improve transport efficiency by reducing travel times and freight costs;
- develop a route that involves the community and considers their interests;
- provide a route that supports economic development;
- manage the upgrading of the route in accordance with Ecologically Sustainable Development (ESD) principles; and
- provide the best value for money.

As of October 2009, approximately 44% of the Pacific Highway is configured as dual carriageway (300 kilometres), with a further 54 kilometres under construction and 50 kilometres with contracts awarded or tenders invited. Current construction activities are to the south of Port Macquarie and west of Ballina. Recent Pacific Highway planning approvals include Kempsey to Eungai, and Sapphire to Woolgoolga to the south (approved July 2008 and January 2009, respectively) and Banora Point to the north (approved February 2009).

The length of the proposed upgrade would be approximately 17 km, starting at Ross Lane in Tintenbar and extending north to the Ewingsdale interchange, near the settlement of Ewingsdale. Adjoining the project to the south is the Ballina bypass, a section of approximately 12.5 km.

1.2 Location and Land Use

The project is located on the Alstonville plateau on the NSW far north coast within the Ballina and Byron local government areas. The area is characterised by inland towns and villages such as Bangalow, Newrybar and Ewingsdale, with closely settled rural properties supporting a range of agricultural land uses, mostly grazing and crops such as macadamias and coffee.

2. PROPOSED DEVELOPMENT

2.1 Project Description

The preferred route for the project extends for approximately 17 kilometres, starting at Ross Lane in the south to the existing Ewingsdale interchange in the north. At Ross Lane, the proposed upgrade would connect to the north end of the Ballina bypass (currently under construction). Between Ross Lane and Bangalow the upgrade predominantly follows the existing Pacific Highway, on its western side between Ross Lane and Emigrant Creek, and on its eastern side between Emigrant Creek and Bangalow. From Bangalow the proposal departs from the existing highway (which curves to the west before heading north) and moves northeast through the Tinderbox Creek valley, avoiding the steep grades of St Helena Hill by way of a tunnel (approximately 340 metres long and 45 metres below the ridge line). To the north of the tunnel the proposed upgrade would be located immediately to the east of the existing highway and ties into the interchange at Ewingsdale. The existing highway would be retained for local and regional traffic.

The proposal has an estimated capital cost of \$368 million (\$2007). Construction is anticipated to take approximately three years and the proposal may be constructed either in its entirety or in stages. Partial or total acquisition of 73 properties is required. The proposed alignment for which project approval is sought is shown in Figure 1.

Key components of the proposal include:

- four-lane divided carriageways (two lanes each way), with a wide median allowing for the future addition of a third lane in each direction;
- connection to the northern end of the Ballina bypass at the proposed Ross Lane interchange. A new
 northbound on-ramp and a new southbound off-ramp would be provided. The remainder of this
 interchange will be constructed as part of the Ballina bypass project;
- upgrading of the existing Ewingsdale interchange to provide full access between the modified local and regional road network and the highway;
- a half interchange at Bangalow. South-facing ramps would provide access between the local road network, including to Bangalow and Lismore, and the proposed upgrade to the south. This arrangement would replicate the arrangement with the existing Bangalow bypass which also has south-facing ramps only;
- six twin bridges and four underpasses allowing roads and creeks to pass underneath the proposed upgrade. These would include twin bridges above Byron Creek and the existing Casino-Murwillumbah railway on the northern side of Byron Creek;
- two bridges carrying local roads over the proposed upgrade, one for Broken Head Road and one about 500 m north of Lawlers Lane providing access to several properties east of the upgrade. Protection screens would be provided on both bridges;
- signage providing clear directions for traffic at the Ross Lane, Ivy Lane, Bangalow and Ewingsdale interchanges;
- the existing highway would be retained as a continuous road for local and regional traffic. It is further anticipated that between Ross Lane and Bangalow the existing highway would be handed over to the councils. Between Bangalow and Ewingsdale the existing highway would continue to function as a regional link between Lismore/ Bangalow and the north and would be retained by the Proponent;
- twin parallel tunnels under St Helena ridge (one tunnel for each carriageway). The tunnels would each be about 340 m long and about 45 m below St Helena Road;
- the potential for delivery of the project in discrete stages or packages; and
- relocation of a number of public utilities and services.



Figure 1 – Proposed Upgrade Alignment (Source: Figure 1.1 EA, RTA 2008)

2.2 Project Need and Context

The Environmental Assessment states that the Pacific Highway Upgrade Program is being undertaken to eliminate black spots, improve road safety conditions and reduce overall journey times along its length.

The *Far North Coast Regional Strategy* (NSW Department of Planning, 2006) identifies that the population of the Far North Coast is expected to grow from 228,000 in 2006 to 289,000 in 2031, an increase of 60,400 people (26% increase for the period 2006–31). The Far North Coast extends from Evans Head in the south to the Queensland border to the north, and west to Woodenbong and Tabulam. It includes the urban centres of Lismore, Ballina and Tweed Heads. Population in this area is expected to increase predominately within the Tweed, Richmond Valley, Ballina and Lismore local government areas. Population increase generally leads to increased residential and commercial development and results in increased traffic demand.

This predicted growth indicates an increased pressure on the existing road network, which currently comprises a single carriageway road with one lane in each direction, with the exception of the Bangalow bypass and Ewingsdale interchange. The existing alignment is further constrained by:

- the lack of passing opportunities, with overtaking lanes provided at intermittent locations;
- variable speed limits, the existing posted speed limit on this section of the highway is 100 km/h with the
 exception of the Tintenbar Hill to just north of Ross Lane and Skinners Creek to the southern end of the
 Bangalow bypass (both 80 km/h) and St Helena Hill (60 km/h);
- the road geometry does not meet current Road and Traffic Authority (RTA) standards, over 50% of the existing highway does not comply with at least one minimum standard; and
- as a result of poor geometry, requires many advisory speed signs posted along its length and provides insufficient sight distances, particularly at the 28 at-grade intersections and 75 property driveways directly accessing the highway along this section.

The proposal is consistent with NSW State Government policy and strategies. These include:

- the *NSW State Plan 2006*, which includes the key priorities of safer roads and maintaining and investing in infrastructure, with travel times between Hexham and the Queensland border as a key measure of the latter;
- the *NSW State Infrastructure Strategy 2006-07 to 2015-16*, which includes the Pacific Highway Upgrade Program; and
- the Far North Coast Strategy 2006, which cites the Pacific Highway Upgrade Program as a key factor in improving regional accessibility.

2.3 Route Selection Options

Route Selection

The Proponent's route selection process for the Tintenbar to Ewingsdale project commenced in October 2004 with the announcement of the original study area. The study area was revised (and expanded) in April 2005, as a result of the concerns raised by individuals, communities, community groups and agencies, regarding the extent of the study area.

Initially, a broad range of route options extending across the study area were investigated and progressively adjusted to avoid as many constraints (e.g. environmental, flora, fauna, property, etc.) as possible while still achieving the design criteria and maintaining project objectives and functionality. This was further narrowed to consider route selection and more detailed investigation of four route options (refer to Figure 2):

- option A, generally following the existing highway corridor along the escarpment;
- option B, on the escarpment in an entirely new corridor;
- option C, partially located on the eastern coastal plain in a route close to the foothills of the escarpment and climbing the escarpment by traversing a side slope; and
- option D, partially located on the eastern coastal plain in a route close to the foothills of the escarpment prior to moving further east and climbing the escarpment along a ridgeline.

All options incorporated a common tunnel option, which included two approach options (sub-options T1 and T2).



Figure 2 – Short List of Route Options (Source: Figure 2.8 EA, RTA 2008)

Public consultation and exhibition occurred via community updates, reports and information days and has included consultation by the Proponent on the original study area in 2004, the expanded study area in May 2005 and the short listed route options in October 2005. A value management workshop was held by the Proponent in May 2006, followed by the release of a response to submissions on route options in May 2006. The selection of the preferred route, released in September 2006, considered the outcomes of the value management workshop, issues raised in submissions from the community and government agencies and the technical assessment along side the cost of the options and value for money. The project application was lodged with the Department in April 2007. In January 2008 the Proponent amended the concept design for the preferred route by including additional ramps at Bangalow (south facing) and Ivy Lane (north facing).

Preferred Route

The preferred route uses the northern section of the approved Ballina bypass (Sandy Flat to Ross Lane) and would be in close proximity to the existing Pacific Highway corridor between Ross Lane and Bangalow. From Bangalow the upgrade would diverge to the northeast through Tinderbox Creek valley. North of the St Helena Hill tunnel the upgrade is located to the east of the existing highway before tying into the Ewingsdale interchange.

The preferred route comprises sections of both option A and option B (and utilising tunnel approach T2) was selected by the Proponent as the most feasible as it:

- provides the best overall balance between functional, ecological, heritage, social, and economic considerations and provides for staging opportunities;
- achieves high safety standards;
- provides for grade separation of the upgraded Pacific Highway and the local road system; and
- provides a good outcome in terms of transport efficiency.

3. STATUTORY CONTEXT

3.1 Major Project

On 5 December 2006, the then Minister for Planning declared the Pacific Highway Upgrade Program (including the Tintenbar to Ewingsdale segment) to be projects to which Part 3A of the *Environmental Planning and Assessment Act 1979* applies.

3.2 Critical Infrastructure Project

On 5 December 2006, the then Minister for Planning declared the Pacific Highway Upgrade Program (including the Tintenbar to Ewingsdale segment) to be critical infrastructure projects under Part 3A of the *Environmental Planning and Assessment Act 1979*.

3.3 Relevant Environmental Planning Instruments

As a critical infrastructure project, the Minister is only bound to consider and apply relevant State Environmental Planning Policies to the subject project. There are no State Environmental Planning Policies that apply to and substantially govern the carrying out of the project.

However, section 75J(3) of the *Environmental Planning and Assessment Act* 1979 provides that the Minister may take into account the provisions of other environmental planning instruments when assessing and determining the project. Relevantly in this case, and a matter that has been the subject of considerable concern and debate through the public exhibition and submissions process, is the issue of water quality and project related impacts in the Emigrant Creek Catchment.

Clause 24A of the *Ballina Local Environmental Plan 1987* prescribes matters which the consent authority must take into consideration in determining an application (under Part 4) on land zoned 7(c) Environmental Protection (Water Catchment). Clause 24A(2) states:

"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".

While the Minister is not bound to apply this clause of the local environmental plan, the Department considers that the heads of consideration articulated above are key aspects for assessment as part of the project. These matters have therefore been addressed as part of the Department's assessment of the project, and particularly in section 5.2 of this report (inter alia).

3.4 Commonwealth Legislation

The Proponent determined that the project may have a significant impact on a matter of National Environmental Significance (threatened species and migratory species) or potential habitat. A referral was made to the Commonwealth Department of the Environment, Water, Heritage and the Arts (DEWHA) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 28 September 2009. The DEWHA determination is pending.

As the State and (potential) Commonwealth assessment and approval processes have progressed separately (rather than in accordance with a Bilateral Agreement or by way of accredited process), there is no impediment to determination of the State application ahead of relevant Commonwealth decisions. If Commonwealth approval is required, the Proponent will need to seek such approval separately to State approvals.

3.5 Minister's Approval Power

The Environmental Assessment for the project was placed on public exhibition from 27 August 2008 to 29 September 2008 and subsequently extended to 31 October 2008 (for a total exhibition period of 66 days). The exhibition was advertised in the *Sydney Morning Herald, Daily Telegraph, Ballina North Coast Advocate, Byron Shire News, Byron Shire Echo* and the *Lismore Northern Star.*

The Environmental Assessment was exhibited on the Department's website; at the Department's head office in Bridge Street, Sydney; at the Proponent's offices in Surry Hills, Sydney and Grafton and the Ballina and Lismore Motor Registries; and the head office of the Ballina and Byron councils.

Submissions were invited in accordance with section 75H of the *Environmental Planning and Assessment Act* 1979. The Department has met all of its legal obligations in making the Environmental Assessment publicly available, so that the Minister can make a determination regarding the project.

It is also noted that the Environmental Assessment submitted in support of the proposal adequately addressed the Director General's Requirements issued for the project application.

4. CONSULTATION AND ISSUES RAISED

During the public exhibition period, the Department received 352 submissions on the project. Of these:

- nine were received from State and local government agencies;
- twelve were received from special interest/ community groups (including a petition with 226 signatures);
- seven were received from local businesses;
- one was received from a Member of Parliament; and
- the remaining 323 were received from members of the general public.

4.1 Submissions from State and Local Government Agencies

Submissions were received from the Department of Environment, Climate Change and Water, Industry and Investment NSW, the Department's Heritage Branch, the NSW Ministry of Transport, the Northern Rivers Catchment Management Authority, Rous Water, Ballina Shire Council, Byron Shire Council and Lismore City Council.

The **Department of Environment, Climate Change and Water (DECCW)** raised no objection but provided a number of issues for consideration as part of the assessment process:

- flora and fauna (fauna mitigation measures including types of fauna passage, timing of works in relation to breeding seasons/ hollow bearing trees, need for a threatened flora translocation plan);
- noise and vibration (operational noise assessment, mitigation, monitoring and contingencies; construction noise assessment, mitigation and monitoring);
- Aboriginal cultural heritage (community consultation and involvement, assessment methodology, mitigation strategies);
- water quality (has not addressed the relevant guidelines, existing and proposed water quality control, soil characteristics and sediment control, monitoring);
- groundwater (quality, treatment contingency measures and monitoring);
- air quality (timing of monitoring); and
- construction (ancillary sites, water sources, stockpiling, material resourcing consents and limitations, and consultation).

Industry and Investment NSW (I&I NSW) raised no objection but raised issues in the following areas:

- agriculture (management and retention of severed land in agricultural production, access to landlocked parcels, avoiding and reducing land use conflicts, biosecurity);
- soil and water (stormwater runoff impacting on agricultural production); and
- watercourse crossings (design bridges and culverts to avoid intrusion in waterways and ensure piles, scour protection or fauna trails are not constructed in waterways).

The **Department's Heritage Branch** supported the project and recommended the preparation of a management plan for non-indigenous heritage, appointment of an expert with heritage qualifications and experience, education of construction staff on heritage procedures and recording of affected heritage items.

The **NSW Ministry of Transport** requested further assessment be undertaken in relation to the role of public transport with the aim of achieving greater reliability, service performance and travel time for transport users.

The **Northern Rivers Catchment Management Authority** recommended subtropical rainforest and riparian revegetation and remnant or patch restoration occur in the locality to offset the impact of the proposal as there are few areas of rainforest remaining in the area.

Rous Water raised concerns regarding the following issues and impacts:

- groundwater (dewatering, licensing, groundwater impact assessment, management, mitigation and monitoring);
- hydrological changes (assessment of changes to the catchment hydrology);
- groundwater dependent ecosystems (assessment of impacts on aquatic fauna and flora); and
- water quality (assessment methodology, standards and guidelines, control measures).

Ballina Shire Council generally supported the project and consultation on a range of issues to date and made some general comments on issues, including:

- traffic (maintenance of the existing highway as an alternative to the upgrade);
- water quality (maximise efforts to ensure positive water quality outcome);
- noise (have regard to Pacific Highway Noise Taskforce recommendations and community expectations); and
- land use (maximise agricultural potential of remnant land).

Byron Shire Council sought ongoing consultation on a range of issues and impacts that it raised concerns with, which are summarised below:

- traffic and transport (should include consideration of a southern bypass of Bangalow);
- ecology (consideration and assessment of Camphor Laurel, loss of lowland rain forest vegetation, restoration of riparian zones, impacts to aquatic ecology);
- water, air, noise and vibration; and
- visual amenity (entrance to St Helena tunnel, more detail on the footprint of Ewingsdale interchange).

Lismore City Council supported Byron Council's submission that the southern Bangalow Bypass should be constructed as part of the project.

4.2 Public Submissions

The 343 submissions received from parties other than Government agencies consisted of 218 individuallyprepared letters (from local residents and businesses, the local member and special interest groups) and 125 form letters. The special interest groups making submissions included the Ewingsdale Progress Association, Bangalow 2020, Watercatchers & Waterdrinkers of Ballina Shire Inc, Bangalow Chamber of Commerce, Ewingsdale Progress and Public Hall Association Incorporated, Nature Conservation Council and several local community/ environment groups. Issues raised in these submissions are summarised in Figure 3 and detailed below.

Of the public submissions, 273 objected to the project (79.6%), 65 raised concerns about various aspects of the project (18.9%) and 5 stated support for the project (1.5%). Issues raised in public submissions are indicated below.



Figure 3 - Issues Raised in Public Submissions

Key issues raised in submissions related to justification for the project, requests for the removal of the interchanges at Ivy Lane and Bangalow, traffic operation (including separation of regional and local traffic, local traffic impacts and requirements), noise and vibration, water catchment and quality impacts, social and economic, and safety (including local road safety). Specific concerns were raised over a perceived lack of general consultation with the residents of Bangalow and Clover Hill and on a range of issues including the inclusion of the interchange at Ivy lane.

The Department received requests from residents, special interest groups and the State Member for Ballina to extend the submissions period for the project (many requests citing concerns over the timeframe to comment on a range of complex issues presented by the Proponent in the Environmental Assessment). The Department agreed to the requests and receipt of submissions was extended by a month. Submissions received after the extended deadline were also considered in the Departments assessment.

Key issues raised in the submissions are summarised below and further addressed in Section 5 of this report:

Traffic and Transport

- justification for inclusion of interchanges at Ivy Lane and Bangalow;
- increase in traffic on local roads;
- investigate a southern bypass of Bangalow; and
- traffic safety associated with the continued use of the St Helena Hill section of the highway.

Project Justification and Community Consultation

- coastal route should have been selected rather than the escarpment route;
- benefit and cost (particularly given the proximity of the Ross Lane/ Ewingsdale interchanges a few kilometres to the south and north of the lvy Lane and Bangalow interchanges, respectively);
- inadequate community consultation over the inclusion of Ivy Lane interchange; and
- study area should be widened to include Bangalow.

Noise and Vibration

- increase in traffic noise (entering/ exiting the interchanges and braking and accelerating);
- increase in traffic noise on local roads;
- adequacy of the noise mitigation measures at Clover Hill and Ewingsdale;
- construction noise impacts; and
- noise from compound sites, blasting and tunnel construction.

Soil and Water

- risk of contaminated water entering the Emigrant Creek catchment;
- water quality impacts on the drinking water catchments (Emigrant Creek and Byron Creek);
- justification for route through water catchments and water quality standards; and
- impacts on water supply for agricultural uses.

Visual Amenity

- impacts of continuous lighting at interchanges on sleep and amenity;
- increased construction footprint/ impact (from carriageway to interchange);
- impact of Arundel Hill cutting on Bangalow residents;
- landscaping and loss of vegetation at Clover Hill; and
- impact of tunnel and road on Tinderbox Creek valley.

Social and Economic

- architectural modifications to reduce noise will affect lifestyle changes loss of outdoor use of residences;
- reduction of property values because of proximity of road and increased traffic noise;
- impact on business from loss of trade from passing traffic;
- develop a signage policy to assist local businesses and tourist to visit the area.

The form letters received in relation to the project raised the following issues:

- impacts on the water quality of Emigrant Creek and Byron Creek, loss of vegetation and diesel particulate pollution;
- visual and acoustic impact on Clover Hill community;
- Bangalow interchange is unnecessary and should not be built;
- Ivy Lane intersection has few community benefits and should not be built; and
- redesign of the Ewingsdale interchange to prohibit heavy vehicles from using St Helena Hill, Granuaille Road and the Bangalow/ Lismore Road.

The submissions in support of the project based support on the need for the project generally and provision of the southern Bangalow bypass and the Ivy Lane interchange.

4.3 Submissions Report and Amendments to the Project

Following a review of the submissions, the Department requested a response from the Proponent on the issues raised in submissions. The Proponent's Response to Submissions Report includes consideration of the issues raised in submissions and a number of refinements to the proposal. These were:

- removal of the Ivy Lane interchange and development of a tourist signage strategy to help reduce the impact of the proposed upgrade on local businesses and villages between Tintenbar and Ewingsdale;
- construction of a landscape mound to help manage excess earthworks material between the existing highway and Clover Hill at Bangalow providing benefits through further noise reduction and visual buffering; and
- conversion of 8 of the 18 water basins in the Wilsons River catchment to bio-retention (sand filter) basins to provide a higher level of treatment.

The Department provided government agencies that had previously commented on the proposal with the opportunity to comment on the Submissions Report. DECCW provided a number of specific recommendations for conditions of approval in relation to biodiversity, Aboriginal cultural heritage, standard construction hours, blasting, operational noise and auditing, potential changes to groundwater and preparation of management plans. I&I NSW provided a number of recommendations on discharge from sediment basins, design of bridge and cultvert crossings, structures in waterways and fish crossings.

A number of further representations were received from the community on the Submissions Report. The majority of these expressed support for the removal of the interchange at Ivy Lane. Correspondence was put forward by the owner of the Macadamia Castle (tourist business located on the Pacific Highway at Knockrow); which included a petition and form/ individual letters of support for the Castle (generally from local businesses). The petition and letters expressed concerns over the survival of the Castle with the removal of the interchange at Ivy Lane and requested its reinstatement. Of the 1845 petition signatories, 345 were from the area local to the project (i.e. within an approximate10kilometre radius).

In addition, the Proponent provided the Department with a number of letters from residents, at their request, supporting the removal of the interchange at Ivy Lane and the development of the existing highway as a tourist route.

5. ASSESSMENT OF ENVIRONMENTAL IMPACTS

Key issues raised in the submissions in response to the public exhibition of the project and/ or identified during the Department's assessment included:

- traffic and transport impacts;
- noise and vibration impacts;
- hydrology, groundwater and water quality issues.
- ecological impacts;
- visual impacts including landscape and design; and
- Aboriginal cultural heritage impacts.

A range of other issues, including soil and air quality, social, economic and historic heritage impacts are briefly considered at the end of this section. All other issues raised in submissions are considered to have been adequately addressed in the Environmental Assessment (including technical papers), the Proponent's Response to Submissions/ Preferred Project Report (PPR) and/or revised Statement of Commitments.

5.1 Traffic and Transport Impacts

<u>Issues</u>

The existing Pacific Highway between Tintenbar and Ewingsdale carries significant traffic volumes for a two-lane undivided rural road. The RTA has provided the following criteria for Level of Service (LoS) – Good (A/B), – Satisfactory (C), Near capacity tolerable (D), At capacity incidents cause excessive delays (E), and Unsatisfactory with excessive queuing (F).

The forecast traffic volumes along the existing highway, assuming its current configuration, indicate that the highway will be operating at a level of service of D by 2012, and will degrade further to a level of service of E beyond that date. The Proponent seeks to improve this level of service to a minimum of C. Further, the existing highway configuration contributes to a current accident rate of 36 accidents per 100 million vehicle kilometres travelled (MVKT), which is above the State-wide average rate of 32.8 per MVKT.

The Proponent intends to address both the level of service and accident rate along the project corridor through a reconfigured dual carriage divided highway, including:

- upgrading of the existing Ewingsdale interchange to provide full access between the modified local and regional road network and the highway;
- a half interchange at Ivy Lane with north facing ramps providing access to the existing highway. Access to
 properties to the west would be provided via an underpass;
- a half interchange at Bangalow. South-facing ramps would provide access between the local road network, including to Bangalow and Lismore, and the proposed upgrade to the south. This arrangement would replicate the arrangement with the existing Bangalow bypass which also has south-facing ramps only;
- tie-in with the northern end of the Ballina bypass at Ross Lane. The southbound off-ramp would be constructed about one kilometre north of Ross Lane; and
- use of the existing highway for local and regional traffic.

The Proponent's Preferred Project Report removed Ivy Lane from the proposal as a result of further evaluation and assessment, prompted by community submissions on the Environmental Assessment. The Proponent's Preferred Project Report states that the main benefits resulting from the removal of the interchange at Ivy Lane are a reduction in the scale of infrastructure required and therefore reduced land requirements, and impacts associated with the visibility of the interchange. However, its removal would increase the travel time for traffic with an origin north of Ewingsdale and a destination in the Knockrow-Newrybar area (and vice versa) by 1 to 1.5 minutes along the existing highway. The removal of the interchange would also affect the Ross Lane and Ewingsdale interchanges. The estimated 860 vehicles/day (2-way in 2032) that would have used the Ivy Lane interchange would likely be divided between the other two interchanges. Due to the proximity of the Ross Lane interchange, approximately 3.5 km to the southbound off ramp and 4.5 km to the northbound on ramp, compared with the Ewingsdale interchange 13 km away, it is expected that the majority of vehicles would transfer to the

Ross Lane interchange. The Proponent does not expect the increase in vehicles using the Ross Lane interchange would affect its level of service.

The provision of a bypass to the south of Bangalow to enable traffic heading to and from Lismore to avoid Bangalow has been raised by both the Bangalow and Ewingsdale communities since the adoption of the preferred Tintenbar to Ewingsdale route by the Proponent. A number of submissions the Department received on the proposal also suggested/ recommended the Proponent provide as part of the proposal a southern bypass of Bangalow. Consequently, the Proponent has released a discussion paper on preliminary investigations into a southern Bangalow bypass. The discussion paper canvassed four potential outcomes for a southern bypass of Bangalow:

- bypass is not justified in the medium to long term (no further investigations).
- bypass is justified in the medium to long term (provide for a future interchange in the design of the upgrade).
- bypass is justified in the short term (commence development of a southern bypass with a view to complete construction at the time the upgrade has been completed).
- bypass is justified in the short term and should be developed as part of the upgrade project.

The key findings of the preliminary investigations include:

- an alignment along a two-kilometre long corridor to the north of Arundel Hill (Pacific Highway) and southwest of Rifle Range Road (Bangalow-Lismore Road) would be feasible in engineering terms;
- the interchange with the upgrade would likely provide north facing ramps;
- an estimated cost of about \$53 million;
- would result in a number of benefits:
 - result in a potential time saving of 2.5 minutes for cars and 3.5 minutes for heavy vehicles travelling between Lismore and Bangalow via Main Road 65;
 - improve the amenity within Bangalow (particularly around Granuaille Road and Bangalow Road) due to a reduction in traffic volumes and traffic noise and vibrations; and
 - reduction in the number of crashes on the existing highway north of Bangalow as through traffic is diverted to the upgrade and southern Bangalow bypass.
- would result in a number of adverse impacts:
 - require acquisition of about 20 hectares of agricultural land;
 - economic viability of a number of farms would become marginal;
 - removes native vegetation; and
 - increases noise levels at a number of residences.
- even with a southern bypass of Bangalow, the alternative route of the Pacific and Bruxner highways would attract traffic away from the Bangalow-Lismore Road because of improved capacity, safety and greater certainty of travel time. The benefits would be greater for heavy vehicles despite an additional 7 minutes of travel time via the Pacific/ Bruxner highways.

The Proponent would make a decision on the need and justification for the southern Bangalow bypass following consideration of the results of the investigations and feedback on the discussion paper. Any decision to implement a Bangalow bypass would be open to the Proponent in future, subject to securing the necessary approvals under the *Environmental Planning and Assessment Act 1979*. Such approvals would be separate to the current assessment process.

Submissions

Concerns about the preferred route and the location of proposed interchanges were raised in a number of submissions, with key concerns including:

- the eastern coastal route (Option D) would be a better route;
- the route selection process was flawed and the preferred route should be reconsidered;
- no demonstrated need for proposed interchanges at Ivy Lane and Bangalow;
- the additional interchanges are not supported by the community;
- provision of a southern Bangalow bypass should be included as part of the project to remove through traffic from Bangalow; and
- all truck traffic should be diverted from the Lismore Road to the upgrade and the Bruxner Highway.

Byron Shire Council gave in-principle support to an east-west link to the south of Bangalow as part of the project to provide direct access for the growing Lismore-Bangalow traffic. Council was also concerned that 44% of traffic would continue to use the St Helena Hill section of the existing highway, which has a poor safety record.

Lismore City Council supported the construction of a bypass to the south of Bangalow as part of the project.

Ballina Shire Council was satisfied that the route selection process was consultative, complete and would be constructed in a manner that determined the most sustainable economic, social and environmental outcome. Council also supported the proposed traffic arrangements and requested maintenance of the existing highway to allow its use as an alternative route to the upgrade

Consideration

With respect to traffic and transport issues, the Department considers there to be four key aspects for consideration as part of the assessment of the subject project: the preferred route alignment; the (deleted) lvy Lane exit; the Bangalow bypass; and local traffic impacts.

Escarpment (Preferred Route) vs. Coastal Route

The Department notes that the short list of options for the upgrade included two options on the escarpment (A and B) and two on the coastal plain (C and D). The four options were considered by three independent processes:

- community and agency submissions on the four options;
- a value management workshop which evaluated the short list options based on functionality, the natural and cultural environment, and social and economic perspectives; and
- technical assessment of the four options.

The independent processes also considered alternative routes for the section between Bangalow and the southern portal of the tunnel (A2 and B2) and alternative approaches to the northern portal of the tunnel (T1 and T2). The results of the three independent processes are summarised in Table 1.

Options	Public and Agency Submissions	Value Management Workshop	Technical Assessment
A, B C and D	Preference for A and B over C and D	C was the worst performing option D was marginal	Preference for A and B over C and D
A2 and B2	No definitive results	B2 performed poorly and should not be considered further	A2 preferred over B2
T1 and T2	T2 was preferred over T1	T1 and T2 considered similar	T2 was preferred over T1

Table 1 - Outcomes of Independent Processes

The Department understands the selection of the preferred route was based on a comparison of the outcomes of the independent selection processes together with cost estimates and value for money. The recommended preferred route comprised various sections of A and B between Sandy Flat Road and Bangalow, combined with A2 and T2. The escarpment route was chosen because it had:

- significantly lower cost estimates than the coastal routes;
- lower impact on the escarpment and visual amenity compared to the coastal options;
- lower impact on endangered ecological communities than the coastal options; and
- lower risk associated with soft soils, flooding and land slips compared to the coastal options.

The Department considers that the Proponent has undertaken a rigorous route selection process which included extensive public input (over 19,000 submissions made) on the short list of route options. The selection process involved detailed technical evaluation of all sections of the route options against safety and efficiency, social and economic and natural and cultural environmental criteria. A comparison of cost estimates and value for money was made for each of the route options, which ranged from the preferred option at \$385 million (2006\$) compared to \$468 million (option D) to \$497 million (option C) for the coastal options.

Proponent that the significant additional cost of a route along the eastern coastal plain would not be in the interest of the wider community, nor would it be a responsible use of public funds. Further, the additional cost of the coastal route options would not be accompanied by a significant improvement in environmental performance commensurate with the level of additional funding required.

Ivy Lane Interchange

The preferred route for the project, announced in 2006, had no provision for access to the upgraded highway between the two interchanges at each end of the project (Ross Lane and Ewingsdale). Since that announcement, a number of community representations were made to the Proponent about additional access to the upgraded highway.

The Proponent undertook a strategic review of alternative access options, examining interchanges at Ivy Lane, Watsons Lane, Lawlers Lane and Bangalow. North and south facing ramps were also considered for the Ivy Lane and Bangalow interchanges. The review considered vehicle kilometres transferred to the upgraded highway, geometry of proposed ramps, complexity of ramp arrangements, cost and land acquisition impacts, and effect on traffic flows through Bangalow. The outcome of the review, announced in January 2008, was a preference for two additional interchanges:

- Ivy Lane north facing ramps.
- Bangalow south facing ramps

The concept design of the preferred route was subsequently amended to include the additional interchanges at Ivy Lane and Bangalow.

The amended concept design for the preferred route generated significant objections from the community. Of the 218 individually-prepared submissions the Department received on the project, 131 submissions objected to the lvy Lane interchange (60%) and 34 submissions (15%) objected to the Bangalow interchange. All the form letter submissions objected to both the lvy Lane and Bangalow interchanges. One submission supported the lvy Lane interchange and requested the Proponent provide a full interchange instead of a half interchange. The Department notes that of the 131 objections to the lvy Lane interchange, over 72% were from the local area (Newrybar, Knockrow, Broken Head, Brooklet, Piccadilly Hill and Coopers Shoot). These objectors would potentially benefit from an interchange at lvy Lane which would give them direct access to the upgraded highway.

The key objections about the Ivy Lane interchange were:

- lack of community consultation on the addition of the interchange to the preferred route;
- justification for the interchange given its close proximity to the Ross Lane interchange;
- impact of street lights and visual impacts of the interchange;
- noise impacts;
- increase in traffic on local roads; and
- would only benefit the Macadamia Castle business.

The Proponent identified two options to address the concerns raised about the interchange: either develop an alternative interchange layout to reduce both real and perceived environmental impacts, or to remove the interchange from the scope of the project. An engineering review of the interchange design by the Proponent identified little opportunity to reduce the footprint or undertake other design changes that would make real differences to the impacts of the interchange. Because of the limited scope to make alterations to its design as well as the general community opposition to the interchange, the Proponent has decided to remove the Ivy Lane interchange from the project.

As a consequence of the removal of the Ivy Lane interchange and the proposed underpass at Ivy Lane, the access road on the western side of the upgrade has been extended by 1.5 km. This change would create a link road between Knockrow and Emigrant Creek for local access to the existing highway. The Proponent's Preferred Project Report considered that the extension of the western access road would not increase the environmental impacts of the proposal, and in fact, with the removal of the interchange, the environmental impacts of the proposal are significantly reduced in the vicinity of Ivy Lane.

The owner of the Macadamia Castle objected to the removal of the Ivy Lane interchange, stating that the tourist business would be financially affected by the decision to remove the interchange as tourists from the north would be required to exit the highway at Ewingsdale 14 kilometres from the Castle. Furthermore, the business is threatened by a reduction in passing trade as the number of vehicles using the existing highway is predicted to reduce from 13,920 vehicles to 1,750 vehicles per day. The owner submits the Castle is the only independently owned and operated rest stop on the highway between Ballina and Brisbane and contributes over \$2 million to the local economy from employees and visitors.

The Proponent notes that the removal of the Ivy Lane interchange would impact on access to the Castle and would likely affect its business as it has some reliance on passing trade. Southbound traffic would need to exit the highway at the Ewingsdale interchange and travel along the existing highway through Bangalow for approximately 13 kilometres. Northbound traffic would be less affected with the requirement to exit at the Ross Lane interchange unchanged. Alternatively traffic could remain on the upgrade and exit at Ross Lane before travelling north on the existing highway (vice versa for traffic with destinations to the north of Ewingsdale) to reach the Castle. Usage of the existing highway is expected to average 1,750 light vehicles per day in 2012, increasing to 2190 by 2,022. The Proponent states that it would pursue a tourist signage strategy for the project to help reduce the impact on local businesses.

The Department acknowledges there is a portion of the community that is opposed to the removal of the Ivy Lane interchange. The Department has reviewed the Proponent's decision-making process on the development of the preferred route, including the access report on the inclusion of the Ivy Lane interchange and concurs with the decision that the Ivy Lane interchange is not necessary. Alternative access to the upgrade is available for residents in the local area and the amended project with the Ivy Lane interchange removed is still consistent with the objectives of the project and that the additional traffic that would use the Ross Lane and Ewingsdale interchanges would not affect the level of operation of the interchanges. The Department is satisfied that the Proponent's commitment to develop a tourist signage strategy would assist local businesses (including the Macadamia Castle) during the construction and operation of the project.

Bangalow Interchange and Bangalow Southern Bypass

The community expressed a number of views about a potential interchange at Bangalow, including:

- no interchange at Bangalow (34 submissions);
- no through heavy vehicle traffic to Bangalow-Lismore Road via St Helena Hill and Granuaille Road (9 submissions);
- support for a Southern Bangalow bypass (26 submissions, including a petition with 226 signatures); and
- no Southern Bangalow bypass (10 submissions).

The form letter submissions also objected to the Bangalow interchange and requested redesign of the Ewingsdale interchange to prohibit heavy vehicles from using St Helena Hill, Granuaille Road and the Bangalow-Lismore Road. Bangalow 2020 (a special interest group), Byron Shire Council and Lismore City Council supported an investigation into the feasibility of a Southern Bangalow bypass.

The proposed Bangalow interchange would replicate the function of the existing interchange, with additional elements, most notably a roundabout at the same level as the existing highway. The Department notes that most of the elements of the new interchange would be further from nearby residents than the existing interchange (particularly the northbound off-ramp).

The Department considered that the location of an interchange provides a suitable balance between the needs of local highway users (including businesses and residents) and that of regional and interstate users (tourists and businesses). The Department notes that it would also reduce the volume of traffic using the existing highway between Ross Lane and Bangalow.

As part of the response to submissions the proponent undertook further evaluation of noise and visual mitigation options particularly at Clover Hill where concern had been raised that the increased foot print, noise and visual impacts would be significant. The Proponent considers that with appropriate noise and landscape treatment the Bangalow interchange will have minimal impact on nearby residents. The noise modelling undertaken for the environmental assessment included the Bangalow interchange and indicated that with the identified mitigation

measures, there would be an improvement in noise levels in Clover Hill. The Department has recommended conditions in relation to both noise and landscape design (more detail is provided in the relevant sections below).

A number of submissions raised concern that the upgrade did not remove through-traffic from Bangalow, particularly heavy vehicle traffic on the Bangalow-Lismore Road which would continue to use the existing highway on St Helena Hill and Granuaille Road through Bangalow. The key concerns were increased noise, traffic and safety impacts, and that the upgrade has no benefit for residents in Granuaille Road and Bangalow Road. The submissions suggested either the construction of a bypass linking the upgrade and the Bangalow-Lismore Road to the south of Bangalow to enable traffic on the Bangalow-Lismore Road to bypass Bangalow, or the prohibition of heavy vehicles from using the Bangalow-Lismore Road and forcing Lismore (or vice versa) traffic to use the upgraded Pacific Highway, Ballina bypass and Bruxner Highway.

The purpose of the Pacific Highway Upgrade Program is to provide dual carriageways between Hexham and the Queensland Border, to significantly improve the movement of freight and passengers between the capital cities (Sydney and Brisbane) and also inter- and intra-regional movement of goods and people. In meeting the objectives of the Upgrade Program the environmental assessment is focused on the Brisbane-Sydney corridor rather than connections to centres in the east and west. The current Tintenbar to Ewingsdale project separates through- and local traffic with existing access from the upgrade to centres and major east-west links maintained. While a southern bypass of Bangalow would allow through traffic travelling between Lismore and destinations to the north of Bangalow to access the upgraded highway without the need to travel through Bangalow or on the St Helena Hill section of the existing highway, it does not form part of the Tintenbar to Ewingsdale project.

Notwithstanding that there is considerable community support for a southern bypass of Bangalow and that an alignment along the identified corridor is technically feasible with apparent environmental benefits, the proposal would need to be separately assessed as it does not form part of the Pacific Highway Upgrade Program nor is it part of this project. The Department supports the rationale behind the community's request for a consideration of a southern bypass of Bangalow however the Proponent would need to undertake a separate environmental assessment of the construction and operation impacts of the bypass should it decide that it is warranted and it would be subject to a separate approval process. The Department understands that the RTA is currently considering this matter.

Local Traffic

A number of submissions raised concerns about the volume of traffic that would continue to use the St Helena Hill section of the existing highway. Currently traffic volumes to the north of Bangalow on the existing highway average over 16,000 vehicles daily, of which about 14% are heavy vehicles. The Proponent predicts that approximately 56% of the existing traffic would divert to the upgrade and the other 44% would continue to use the existing highway to Bangalow and Main Road 65 to Lismore. Traffic volumes on the St Helena Hill section of the existing highway (between Ewingsdale interchange and Granuaille Road) would reduce to about 9,500 vehicles daily by 2012, of which 8% (740 vehicles) would be heavy vehicles. The Proponent notes that heavy vehicle usage of this section of the existing highway would reduce by over 75% compared to pre-upgrade levels. Traffic volumes on Granuaille Road (which forms part of Main Road 65 between Lismore and Bangalow) are not expected to increase as a result of the upgrade. Any increase in heavy vehicles in Bangalow would be a result of overall growth in traffic volumes on the road network as a whole. As mentioned previously, the Proponent has released a discussion paper for a southern bypass of Bangalow, which if it proceeds as a separate project in future, would significantly reduce traffic volumes on the existing highway between Ewingsdale and Bangalow.

The existing highway would be retained as an alternative to the upgrade and would continue to be used by heavy vehicles transporting dangerous goods that are not permitted to use the tunnel. Should the tunnel be closed for maintenance or as a result of an accident then the existing highway would be used as an alternative road. The reduction in traffic volumes, particularly of heavy vehicles at night would improve the amenity of residences fronting the existing highway by a reduction in traffic noise levels. Access to the Pacific Highway for east-west traffic, between the highway and Lismore via Main Road 65 would be maintained through the Ewingsdale interchange.

The Department is satisfied that the reduction in the volume of traffic using the existing highway between Ewingsdale and Bangalow would result in a significant improvement in road safety for existing road users, particularly from a significant reduction in the number of heavy vehicles. The Department has recommended

conditions of approval that requires the Proponent to prepare and implement a Construction Traffic Management Plan to manage disruptions to highway and local traffic during construction and ensure existing property access is maintained or alternative access is provided.

5.2 Noise and Vibration Impacts

lssues

The existing highway passes through several small communities (Bangalow, Newrybar and Ewingsdale) and traverses predominantly rural areas, with many residences located along the whole corridor. The highway has moderate traffic volumes and is one of the major truck routes in the area, consequently sensitive receivers (residences and Newrybar Public School) close to the highway are already subject to high traffic noise levels. Noise levels at residences located away from the highway are generally low.

Construction Noise

The project is expected to have a construction period of two to three years, however, many construction activities would progress along the road corridor during the construction period (rather than being a continuous noise source at a single location) and a less stringent noise limit is appropriate for certain activities given their transient nature. The Proponent considers that for large construction projects such as this it would be appropriate to treat noisy stages of work (such as earthworks associated with bridge replacement) as discrete construction periods and assess them against the short- and medium-term guidelines (rather than in the context of the total construction period).

The construction of a dual carriageway road generally occurs in three stages, consisting of earthworks, construction of the road base and final laying of the pavement surface. The duration of earthworks is likely to be up to six months at some locations and the laying of road base and paving could also be up to six months at particular locations. Noise-generating activities include: construction of bridges, underpasses and culverts; earthworks including tunnelling, cutting and filling; paving and drainage works. These activities would require the occasional use of rock-breakers, jackhammers and concrete saws. Earthworks would include the use of buildozers, excavators and compactors, and bridge and embankment construction could include piling activities. Blasting is likely to be required for the construction of the St Helena Hill tunnels and some of the larger cuttings.

Other noise generating sources/ construction activities include:

- asphalt and concrete batching plant at several locations along the construction route noise from construction vehicle movements and use of plant and equipment;
- site/ construction compound for office, facilities and storage of material, plant and equipment primarily noise from vehicle movements;
- operation of rock crushing/ screening plant; and
- construction traffic over the whole project site and beyond the construction site itself traffic noise would be greatest where there is a concentration of traffic, such as at compound and batching plant locations and where construction is occurring at a given time.

The noise assessment has considered the noise criteria for construction projects set out in Chapter 171 of the Environment Protection Authority's *Environmental Noise Control Manual* (ENCM). The construction noise criteria for the project are:

- for construction periods less than or equal to four weeks, the L_{10(5-minute)} shall not exceed the background level by more than 20dB(A);
- for construction periods between four and 26 weeks, the L_{10(15-minute)} shall not exceed the background level by more than 10dB(A); and
- for construction periods of greater than 26 weeks, the L_{10(15-minute)} shall not exceed the background level by more than 5 dB(A).

The noise assessment has identified sensitive receivers at three locations, Newrybar Public School and residences in Clover Hill (Bangalow) and Ewingsdale. At these locations, there are approximately 170 residences in total that are within 150 metres of the road corridor. There is the potential for the construction noise criteria to be exceeded at these receivers during road construction activities.

The actual level of construction noise experienced at any residence, during the various phases of construction would depend on a number of factors, including distance from construction activities, intermittent shielding, type of activity occurring and equipment used. The Proponent predicts typical construction noise levels to be around 70 - 75 dB(A) (L_{A10}) at a distance of 50 metres from construction sites and 45 - 55 dB(A) at a distance of 150 metres.

The noise assessment has identified an indicative radius of about 200 metres from stationary construction plant such as compounds and batching plants and 300 metres from crushing/ screening plant, as areas where there may be exceedances of construction noise criteria.

Operational Noise

Operational road noise criteria are outlined in the Environment Protection Authority's *Environmental Criteria for Road Traffic Noise* (ECRTN). The operation of the project has been assessed against the ECRTN criteria summarised in Table 2 and the results for the project using this criterion can be found in Table 4.

Type of development	Noise level criterion		Where criteria are already
	Daytime (7.00am – 10.00pm) dB(A)	Night time (10.00pm – 7.00am) dB(A)	exceeded
New freeway or arterial road	55 LAeq(15-hour)	50 LAeq(9-hour)	The new road should be designed so as not to increase existing noise levels by more than 0.5 dBA
Redevelopment of existing freeway/ arterial road	60 LAeq(15-hour)	55 LAeq(9-hour)	In all cases, the redevelopment should be designed so as not to increase existing noise levels by more than 2 dBA

 Table 2 - ECRTN Criteria for Operational Traffic Noise at Residences

The Proponent adopted the noise criteria for a "new freeway or arterial road" for the assessment of potential noise impacts of the project between Tintenbar and Ewingsdale, except for a short section of the upgrade to the south of Bangalow between CH 145400 and CH 146000, which was assessed under the "redevelopment of existing freeway/ arterial road" criteria. In this section of the project, the existing southbound carriageway is proposed to be converted for use as the northbound carriageway of the upgrade and the existing northbound carriageway would be converted for two-way traffic to access the existing highway.

The noise assessment predicted that if the upgrade utilised a standard concrete pavement 314 residences would experience noise levels higher than the applicable ECRTN criteria. Additionally the noise assessment examined the benefits of utilising a low noise pavement surface on key sections of the upgrade and found that the number of residences in excess of ECRTN criteria would be reduced to 117 residences if this option was adopted.

The Proponent assessed the effectiveness of noise barriers for the Clover Hill noise catchment area in accordance with the ENMM. The assessment concluded the target noise level of 50 dB(A) could not be met with a barrier less than or equal to eight metres in height. The ENMM requires a barrier that is more than 5 m in height to provide at least 10 dB(A) of attenuation to be reasonable and feasible. Although an eight metre high barrier 150 metres in length could provide a noise reduction of up to 11 dB(A) at the most-affected property in Clover Hill, it was not considered to be reasonable or feasible in strict accordance with the ENMM (given its scale and relatively low incremental benefit compared with a lower noise wall). The assessed barrier for the purposes of the noise assessment of the Clover Hill catchment was 5.5 metres in height and provided a noise attenuation of 9 dB(A) at the most affected property (i.e. only slightly less that the eight-metre alternative).

The Proponent's noise assessment recommended:

- use of low noise road surfacing for the following sections:
 - \Rightarrow 300 metre south of Newrybar (CH 141750) to Skinners Creek (CH 143650);
 - \Rightarrow south of Bangalow (CH 145200) to 750 metres north of the proposed railway crossing at Bangalow (CH 147800);
 - \Rightarrow northern portal of the tunnel (CH 150400) to the Ewingsdale interchange (CH 152100); and

- \Rightarrow bridges over Minor Creek and Emigrant Creek.
- architectural treatment of 117 residences;
- provision of a 5.5-metre high noise barrier adjacent to the residences at Clover Hill;
- construction of an earth mound and two-metre high noise wall adjacent to the Ewingsdale residences; and
- construction of an earth mound on the eastern side of Newrybar Public School.

Vibration Impacts

Ground vibration and airblast (or blast overpressure) would be generated from blasting. The recommended limits for ground vibration are 5 mm/s peak particle velocity and for blast overpressure a maximum of 115 dB (peak). These limits are recommended by the ANZEC guidelines *Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration* (1990). These guidelines restrict blasting to the period 9.00am to 5.00pm (except Sundays) and recommend only one blast per day.

The Proponent expects blasting from construction of the tunnel and some of the larger cuts would generate noise (airblast overpressure) that is likely to be audible to nearby residences. Ongoing community consultation would be used to inform potentially affected residents of the scheduling of these short, infrequent events.

Ground vibration generated by other construction activities would be site specific and would be dependent on the ground type, particular equipment used and proximity of the construction activity to the receiver. The Proponent does not expect construction activities associated with general road construction to generate perceptible levels of ground vibration at nearby residences due to the considerable setbacks. No levels of vibration that could cause architectural damage have been predicted for any dwelling.

Monitoring would be conducted to ensure compliance with the blast overpressure and vibration criteria.

Submissions

Noise was the second most commonly raised issue in submissions from the general public, representing 14 percent of all issues raised. Both construction and operational noise impacts and specifically those impacts resulting from the proposed interchanges at Ivy Lane, Bangalow and Ewingsdale were raised, including:

- noise impacts from vehicles entering and exiting the Ivy Lane interchange and an increase in traffic noise on local roads;
- inadequate assessment of noise impacts on residential areas of Bangalow as only two noise monitoring locations were used in Bangalow;
- construction noise and traffic noise impacts on the residences in Clover Hill; and
- adequacy of the noise mitigation measures for Ewingsdale residents.

Other issues raised in the submissions on noise include:

- operational noise levels generated by traffic using the new highway;
- noise generated by the construction compounds, crushing activities and batch plants in close proximity to residential areas at Bangalow;
- concern that architectural treatment of houses will reduce ability to have an indoor/ outdoor lifestyle;
- construction noise impacts on animals at the Macadamia Castle zoo; and
- noise impacts on Newrybar Public School

Byron Shire Council raised concern that the ECRTN criteria may not be suitable for a majority of residences and night-time traffic movements may cause sleep disturbance. Council also requested that the Proponent minimise and inform residences of intrusive construction activities, optimise the use of low noise road surfaces, design grades to reduce hard acceleration/ exhaust braking and locate barriers close to noise sources.

Ballina Council requested that the Proponent have regard to the recommendations of the Pacific Highway Noise Taskforce and community expectations generally.

DECCW commented and requested clarification on a number of matters in the construction noise and operational noise assessment, including noise mitigation measures, noise from construction facilities, plant and equipment and blasting.

Consideration

Construction Noise

The Department notes that the noise assessment of construction activities was undertaken in accordance with the ENCM. In July 2009 DECCW published the *Interim Construction Noise Guideline* (the interim guideline) to manage noise generated by construction works. The changes to noise management levels in the interim guideline have been based on a DECCW review of achievable construction noise levels on recent major projects in NSW, as well as a review of international best practice in regulating the noise impact of construction works. The interim guideline is considered to manage noise more appropriately providing a better descriptor of annoyance and ensuring construction noise is managed in a manner consistent with other NSW noise policies. The noise management objectives of the interim guideline are set out in Table 3.

Table 3 - Construction Noise Management Levels for Residential Receivers

Construction Hours	Noise Management Level
	L _{Aeq} (15- minute)
Standard Construction Hours:	Noise affected
Monday to Friday 7.00am to 6.00pm	RBL + 10 dB
Saturday 8.00am to 1.00pm	Highly noise affected
No work on Sundays or public holidays	75 dB(A)
Outside standard construction hours	Noise affected
	RBL + 5 dB(A)

The acoustic assessment presented in the Environmental Assessment predicted typical construction noise levels of 59-61 dB(A) at 100 metres from construction, the Department notes approximately 104 residences are located within 100 metres of the road footprint and potentially impacted by the project.

The Department is satisfied that construction noise impacts were adequately considered under the previous guidelines (relevant at the time of assessment). However, the Department believes that the project should be consistent with current practise and be undertaken in accordance with the interim guidelines. The Department believes this would still achieve the anticipated outcomes. As such, although the Proponents assessment was based on construction noise criteria that have now been replaced, the Department has recommended conditions which require the Proponent to:

- implement measures to achieve the construction noise management levels in the Interim Guidelines; and
- prepare a Construction Noise and Vibration Management Plan which would identify mitigation and management measures to be adopted during construction of the project and how noise and the effectiveness of these measures would be monitored.

The Proponent has committed to minimising construction noise and vibration impacts and undertaking consultation with potentially affected residents with regard to the timing of noise generating activities. Reasonable and feasible mitigation and management measures would be developed and implemented to minimise construction noise at sensitive receivers. The Department found the noise assessment demonstrated that vibration impacts from blasting were likely to be minor and could be adequately managed as part of the project.

Noise Impacts on Animals and Native Fauna

The owner of the Macadamia Castle raised concerns about the impact of construction noise on native and farm animals in the Castle's animal park. The Proponent in the Submissions Report states that it does not specifically provide noise mitigation for domestic or native animals. During construction there may be opportunities to utilise excess material on land adjacent to the upgrade by forming landscaped mounds that would improve visual and noise amenity for adjacent properties. This could be considered for the Macadamia Castle property.

There is limited information on the impact of noise on native and farm animals, both in Australia and overseas, apart from studies on the impact of low level over-flights by defence aircraft on milk and egg production on commercial farms and impacts on wildlife in buffer zones of defence and spaceflight establishments. However, there are no studies of the impact of construction noise on native animals in Australia. High levels of noise may startle/ frighten animals causing behavioural or health changes or disrupt breeding or mating displays. Animals in the wild have the ability to move away from high noise sources, but animals that are kept in enclosures have limited ability to move away from noise sources.

The Department acknowledges that during construction hours noise may impact on the captive native and farm animals at the Macadamia Castle animal park, however, the Department is satisfied that the Proponent has committed to manage potential impacts by managing construction activities and implementing mitigation measures at source and at the receiver. The Department recognises the potential construction noise impacts on the Castle and to ensure that these impacts are addressed, the Proponent is required to provide details in the Construction Noise and Vibration Management Plan of the mitigation measures that will be implemented to minimise impacts on the Macadamia Castle property.

Out of Hours Work

The construction noise assessment is based on construction activities occurring during the standard construction hours outlined in Table 3. The Proponent states that from time to time some work may be scheduled outside these standard construction hours to reduce impacts on residents and road users. Any work planned outside the standard construction hours or on public holidays would be undertaken only after prior consultation with and/or notification of local residents and DECCW, and with the approval of the Department.

Previous approvals for Pacific Highway Upgrade Projects have identified a range of circumstances whereby construction works could be undertaken outside of standard construction hours. These have generally included: works which are inaudible to the most affected receivers, works which have been approved by either the Department or DECCW through a Construction Environmental Management Plan or Noise and Vibration Management Plan, and emergency works.

The Department is aware that there are instances where particular construction works cannot be undertaken during standard construction hours for technical reasons or other unforeseen circumstances. A recommended condition has been included for out of hours works to provide flexibility where certain activities, such as asphalting, pavement laying or saw cutting, or general construction over short periods (days to weeks) are required to be completed at night or other non standard hours, provided the appropriate approvals have been obtained. These works must be justifiable on technical grounds with appropriate mitigation measures and notification to the affected community.

Operational Noise

The operational noise assessment was undertaken in accordance with the ECRTN's "new freeway or arterial road" criteria, except for a section to the south of the Bangalow interchange which was assessed under the "redevelopment of an existing freeway or arterial road" criteria (outlined in Table 2 above). The highway upgrade is located in close proximity to the existing highway between Ross Lane and Bangalow at the southern end, and between the Ewingsdale interchange and St Helena Hill at the northern end. Within these sections of the highway some residents would continue to receive noise at the same façade as is currently exposed to road traffic noise whilst other residences would experience a new source of road traffic noise at façades which presently not have direct exposure to road traffic noise. The upgrade deviates away from the existing highway at Bangalow towards the north east through Tinderbox Creek valley to St Helena Hill which is traversed in a tunnel. This will result in receivers in this area becoming exposed to greater levels of road traffic noise than previously.

The Proponent, in responding to concerns raised by Clover Hill residents for more clarity in noise mitigation measures that would be implemented, submitted a Preferred Project Report which included the addition of a landscaped mound to the east of the Clover Hill residences to attenuate noise from the upgrade. The mound would be approximately 500 metres in length from a point about 100 metres south of the southern end of Blackwood Crescent to just south of the Bangalow Road. The mound would be approximately four metres above the ground level at the rear of the Clover Hill properties closest to the Bangalow bypass. The Proponent has undertaken additional noise modelling which indicates that on top of the noise reduction that would be achieved by the proposed upgrade compared to retention of the existing Bangalow bypass for residents in and around Clover Hill, the landscaped mound would further reduce noise levels between 7 to 11 dB(A) at residences closest to the proposed road. These reductions would be in addition to the noise benefits resulting from the road being setback further to the east (from 50 to about 75 m at the southern end to 50m to about 150 m at the northern end).

Residents in Ewingsdale raised concerns that the proposed mitigation measures at the Ewingsdale interchange were insufficient and that the Proponent should consider lowering the tunnel and northern approach roads to

further reduce noise impacts. The Proponent states the noise assessment predicted the traffic noise criteria would be achieved by a combination of low noise pavement, landscaped mound and a four-metre high noise wall. The existing noise wall to the east of the existing highway would be retained in part to reduce noise from traffic using the existing highway. The Proponent indicates that there may be opportunities for the placement of excess material on land adjacent to the upgrade to form landscaped mounds to improve noise amenity of nearby residents.

The Department is satisfied that the Proponent has addressed in the Submissions Report and Preferred Project Report the concerns raised by the Clover Hill residents about operational noise impacts and that adequate mitigation measures are proposed at the Ewingsdale interchange.

ECRTN Criteria	Future Existing 2012 (existing Pacific Highway)	Proposed Upgrade 2012 (no mitigation)	Proposed Upgrade 2022 (with mitigation i.e. low noise pavement and noise barriers)
Reasonable and feasible	Day/ Night	Day/ Night	Day/ Night
New freeway or arterial road	370	302	115
(55/ 50 LAeq(15-hour) or where	(exceed base criteria)	(215 exceed base criteria,	(54 exceed base criteria,
existing noise level exceed the		87 exceed acute criteria)	61 exceed acute criteria)
criteria + 0.5)		,	
Redevelopment of existing	9	12	2
freeway/ arterial road (60/ 55	(exceed base criteria)	(4 exceed base criteria, 8	(exceed acute criteria)
LAeq(15-hour) Or		exceed acute criteria)	
where existing noise level			
exceed the criteria +2)			

Operational noise levels based on future existing (the 'do nothing option'), noise level on opening in 2012, and noise level in 2022 (ten years after opening) were predicted for over 600 residences and other receivers along the upgrade route (summarised in Table 4 above). On the existing highway 379 receivers exceed the ECTRN base criteria; with the proposed upgrade (and no mitigation) 314 receivers exceed the criteria. With the use of atsource mitigation measures (such as mounds/ barriers/ low noise pavement) 117 residences will exceed the base criteria and require additional mitigation (such as architectural treatment) as a result. The Department notes of the 61 residences that exceed the acute criteria (in Table 4), 42 will experience an improvement on the existing noise level. The Department is satisfied that the mitigation measures proposed by the Proponent are appropriate and consistent with established guidelines and road traffic noise practice.

The Department supports the Proponent's commitment to mitigate operational noise impacts through the development and implementation of all reasonable and feasible mitigation measures to meet the noise criteria applicable to the project in consultation with potentially affected residents, and to apply at source mitigation measures, in particular use of low noise pavements, across the upgrade as they have greatest benefit to the community, and to undertake design and implement noise mitigation measures consistent with the ECRTN. In addition, the Proponent has committed to measuring operational noise along the project one year after opening, and implementing further reasonable and feasible mitigation measures in instances where noise levels exceed predicted levels.

To address possible changes to the project through detailed design the Department recommends a two staged approach. The first stage requires that the Proponent prepare and submit to the Director General for approval prior to construction, a review of the proposed operational noise mitigation measures based on the detailed design, rather than that put forward in the Environmental Assessment. This would include a review of predicted noise levels and feasible and reasonable noise mitigation based on design refinements. The second stage involves monitoring of actual noise levels, which is required to be carried out 12 months after opening of the project to traffic to confirm whether noise mitigation applied to the project is effective and that predicted noise levels can be achieved. Should noise monitoring indicate any substantial exceedances of predicted noise levels, mitigation measures must be reviewed and further feasible and reasonable measures implemented where available and appropriate. These requirements are included in the recommended conditions of approval.

The Department considers the noise assessment demonstrated that a combination of low noise road surfacing, barriers and architectural treatment would result in an acceptable internal noise amenity at all sensitive receivers along the proposed route.

5.3 Hydrology, Groundwater and Water Quality Issues

lssues

The proposed upgrade traverses an elevated rural region of low rolling hills and deeply incised valleys known as the Alstonville plateau. The main creek systems and their tributaries within the project area are Emigrant Creek, Skinners Creek, Byron Creek, and Tinderbox Creek. These creeks and a number of unnamed creeks and tributaries generally flow to the southwest.

Broken Head Road at Newrybar forms the boundary between the Emigrant Creek catchment (to the south) and the Wilsons River Catchment (to the north) (refer to Figure 4). The proposed upgrade passes through the drinking water catchment area for the Emigrant Creek dam (for a distance of 5.2 kilometres) between Martins Lane at Knockrow and Broken Head Road at Newrybar. Thereafter the proposed upgrade would be in the drinking water catchment of the Wilsons River Source (a new major drinking water source for the local government areas of Ballina, Byron, Lismore and Richmond Valley) for a distance of 7.2 kilometres. The existing highway traverses both drinking water catchments for a distance of 4.8 kilometres and 8.4 kilometres respectively.

Hydrology and Water Quality

The proposed upgrade crosses Emigrant Creek, Skinners Creek, Byron Creek and a tributary of Emigrant Creek and a tributary of Tinderbox Creek. Twin bridges are proposed at each of the creek crossings. Transverse culverts would be provided beneath the proposed upgrade to covey surface water and these would be designed to follow the existing waterway alignment where possible.

While the proposed upgrade does not pass through floodplain areas, creek overbank areas may be subject to localised flooding during large storm events. The flood extent is generally contained to within several hundred metres of the creek centreline. The potential impacts on flood behaviour include changes in:

- flood levels and events.
- inundation periods and/or rate of rise of floodwaters.
- flow velocity.

The hydrologic modelling of the project predicted there would be minimal change to flood regimes on existing receivers, infrastructure or development potential of land. The abutments of bridges over creeks would be located to minimise flood levels during flood events and the bridges would be designed to minimise change to inundation periods and flow velocities.

The Emigrant Creek dam catchment has a variety of land uses, including grazing and horticulture (mainly macadamia plantations) which together comprise over 77% of the total area. Other land uses include residential and other horticultural plantations and orchards. Only a small area of the catchment (7.7%) is bushland, most of which surrounds the lower half of the Emigrant Creek dam. A study in 2001 identified the major risks in the catchment as:

- septic tank/ infiltration systems.
- Macadamia Castle tourist development.
- cattle watering in creeks.
- pathogens from dairy farms.
- pesticide spills from farms.
- contamination from dip sites.

The land uses in the Wilsons River catchment in the vicinity of the upgrade are similar to that of the Emigrant Creek dam catchment (agricultural land uses such as grazing and plantations). Overall, water quality in the Wilsons River catchment reflects the rural nature of the area and is similar to water quality in the Emigrant Creek dam catchment.

Figure 4 - Drinking Water Catchments



Previous studies have identified the highest risk events that could affect water quality in the catchment are:

- runoff carrying harmful micro-organisms from sewerage systems;
- runoff from farmland; and
- low river flow and high nutrient concentrations leading to high algal concentrations.

The Proponent has reviewed several water quality criteria to assess the potential water quality impacts of the upgrade, including:

- ANZECC Guidelines for Fresh and Marine Water Quality;
- Australian Drinking Water Guidelines; and
- DECCW Urban Stormwater Quality (Road Construction) Guidelines.

The numerical guidelines in ANZECC and the Australian Drinking Water Guidelines were not considered to be appropriate by the Proponent to assess the water quality impacts of a road project. The ANZECC guidelines contain values for assessing aquatic ecosystem health, which are not meant to be applied directly to stormwater quality unless the stormwater system has ecological conservation value. The Australian Drinking Water Guidelines provide guidance for the quality of drinking water and no guidance values are provided in terms of the quality of water entering a water supply catchment or system.

The construction of the proposed upgrade has the potential to generate pollutants which could affect water quality. The primary potential impact would be due to increased sediment loads from exposed soil entering receiving waters during wet weather. Increased sedimentation of watercourses could smother aquatic habitats and organisms and increase levels of nutrients, metals and toxicants. Other potential sources of construction related pollutants include hydrocarbons and chemicals as a result of spillages and leaks from construction vehicles or fuel/ chemical stores on construction sites.

Water quality would be managed during the construction phase through the capture of stormwater runoff in sediment basins. Due to the proximity of the upgrade to the Emigrant Creek dam, the potential impact of the highway on the water quality in the Emigrant Creek catchment area is considered of higher consequence than in the Wilsons River catchment. Mitigation measures for the section of the proposed upgrade within the Emigrant Creek catchment have been designed to take this into account and as such sediment basins would consequently have a higher capacity, capturing all runoff from the 85th percentile five-day rainfall event. Outside the Emigrant Creek dam catchment (including the Wilsons River catchment) the basins would be designed to capture all runoff from the 80th percentile five-day rainfall event, in accordance with the guideline Managing Urban Stormwater (Landcom).

The operation of the proposed upgrade has the potential to impact on water quality as a result of pollutants contained in the surface water runoff. The pollutants that are likely to be present in highway drainage include sediments, hydrocarbons, metals and microbial. The Proponent also assessed the impact of a chemical or hydrocarbon spill from a road traffic accident, including the likelihood and consequences of a major spill from a vehicle carrying dangerous goods.

The DECCW has developed water quality guidelines which are applicable to new developments in NSW. The guidelines apply to the treatment of stormwater runoff and set targets for suspended solids, nitrogen, phosphate and oil and grease. The Proponent considers DECCW's pollutant retention targets are appropriate performance standards for water quality impacts of the upgrade in the Emigrant Creek dam catchment. For the remaining sections of the upgrade, including the Wilsons River catchment, water quality impacts would be managed in accordance with recommended minimum design standards for erosion and sediment control.

For the operational phase, water quality outside the Emigrant Creek dam catchment would be managed through the conversion of the construction sediment basins to operational wet basins in accordance with normal RTA practice. In the Emigrant Creek dam catchment the construction sediment basins would be converted to a permanent bio retention basin with a sand filter. A gross pollutant trap would be provided upstream of the sand filter to prevent large debris clogging the filters. Detailed water quality monitoring was carried out to predict the performance of the proposed sediment basins; the results predicted a net benefit outcome. The Proponent has committed to developing an Emergency Response Plan for major incidents on the upgrade which may impact on water quality.

Groundwater

The upgrade would require a total of 27 cuttings and twin tunnels beneath St Helena Hill. Potential impacts include drawdown of groundwater and reduction in recharge to the groundwater system and seepage of untreated runoff entering the groundwater system. The groundwater assessment identified three types of cuts:

- Type A Cut would affect groundwater regime because of significant depth of excavation, large length and area and deep penetration into the groundwater table.
- Type B Cut less likely to have an impact on groundwater as have moderate depth of excavation, small to moderate length and area less than four-metre penetration into the groundwater table.
- Type C Cut none or negligible groundwater impacts due to shallow depth of cut and little or no penetration into the groundwater table.

To manage and mitigate potential groundwater impacts, the Proponent has committed to long term monitoring of the groundwater regime in the vicinity of Type A and B cuts. If monitoring indicates that there are adverse impacts on groundwater flows then the implementation of mitigation measures may be necessary. These could include the collection of seepage water through the highway drainage system and water quality ponds before being released into watercourses or natural drainage systems downstream. Alternatively seepage water may be collected and transferred into the groundwater ecosystem immediately downslope of the cut.

Submissions

Impacts on water quality and the drinking water catchments were raised by a large number of submissions. The concerns included:

- risk of contamination of the water supply from accidents or spillage of dangerous goods.
- development of a road in a sensitive water catchment area.
- avoid further pollution of the Emigrant Creek water catchment.
- increase risks to water quality of Emigrant Creek and Byron Creek.
- no viable measures to mitigate impacts on drinking and groundwater.
- loss of water supply to farm and residential uses.
- flooding impacts on Byron Creek.
- should have stringent standards to ensure water entering the water catchment is of the highest standard.

The Watercatchers and Waterdrinkers of Ballina Shire Inc (WWBS) raised concern that the Proponent has not considered the prime objective of the 7(c) Environmental Protection (Water Catchment) Zone of the Emigrant Creek catchment to harvest and store water. The WWBS believed the Proponent should adopt the Australian Drinking Water Guidelines to protect the water quality in the Emigrant Creek dam catchment rather than adopt stormwater guidelines which did not mitigate water quality to the standard required for drinking water. They believe that the Proponent should ensure that stormwater runoff from the upgrade is of the highest quality rather than rely on the Water Treatment Plant to solve its problems. The ability of the sediment basins to capture and store runoff from the intense rainfall in the area was also questioned.

Byron Shire Council was generally supportive of the proposed water quality mitigation measures and suggested further improvement during the design stage: to ensure sediment basins are at the upper end of normal sizing requirements, flocculants do not impact on downstream ecology; use of sand filters reducing the size of basins; and need for adequate spill containment.

Ballina Shire Council acknowledged the positive outcomes to water quality as compared to the existing highway and encouraged the Proponent to maximise all efforts to ensure this outcome.

DECCW noted that pre-construction monitoring of surface water quality and groundwater levels would be undertaken however no timeframe has been provided. It is recommended that monitoring should occur for a period of 12 months prior to the commencement of construction to establish base line information.

Infrastructure and Investment NSW was satisfied with the assessment of impacts on waterways.

Rous Water raised concerns about the extent of any changes to conditions within the water catchment areas during the construction and operation of the upgrade, particularly those that have the potential to affect the

quantity and quality of surface water and groundwater resources. Such disturbances could lead to negative impacts to aquatic ecosystems and riparian environments and increase risks to the water supply system. Rous Water commented on the adequacy of the water quality assessment in terms of:

- assessment methodology and approach;
- comprehensiveness of the assessment;
- acceptability of the identified impacts;
- proposed management measures; and
- identification of errors or omissions in the assessment.

Consideration

The Proponent has provided a response in its Submissions Report to the issues raised by Rous Water. Rous Water has acknowledged that the majority of its issues have been satisfactorily addressed, however, differences of opinion remain on three issues: adequacy of the hydrological assessment, adequacy of the proposed water quality control measures given that the ANZECC Guidelines for Fresh and Marine Waters have not been considered and impacts on aquatic ecosystems.

Given the upgrade traverses two drinking water catchments and the significant concerns raised by Rous Water and the community regarding the impacts on water quality, the Department commissioned an independent expert, Mr Ian Joliffe of GHD Pty Ltd (GHD) to undertake a review of the Proponent's water quality assessment and the proposed mitigation measures. The independent report is attached as Appendix E, and is considered in the following assessment.

Provisions of the Ballina Local Environmental Plan

The Department considers that the project is permissible in the 7(c) Environmental Protection (Water Catchment) Zone under the *Ballina Local Environmental Plan 1987* and is not inconsistent with the objectives of that zone, being:

- 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.

Notwithstanding that section 75J(3) of the *Environmental Planning and Assessment Act 1979* does not require the Minister to take into account the provisions of a local environmental plan for this project, the Department has considered the zone objectives as part of its assessment. The primary objective of the zone is to prevent development which would adversely affect the quantity or quality of water and the secondary objective is to regulate the use of land to encourage agricultural uses, ensure development maintains the rural character of the locality and ensure development does not create unreasonable and uneconomic demands on public amenities or services. The only exceptions are public works and services with a demonstrated and overriding public need and subject to impacts on water quality and quantity being minimised.

In the case of the proposal, the upgrade of the Pacific Highway has been declared critical infrastructure which would deliver significant social benefits to the State and region by addressing safety concerns for all road users along the remaining single carriageway sections between Ross Lane and Ewingsdale. The upgrade has economic benefits to the State and region by significantly improving the performance, efficiency and freight competitiveness of the principal road freight and passenger corridor between Sydney and Brisbane. The Proponent has assessed the impact of the upgrade on the drinking water catchments and proposes to implement

measures to ensure that runoff is treated to minimise impacts on the quality of water in the catchment. In this context, the Department is satisfied that the proposal is consistent with the objectives of the 7(c) zone within the Emigrant Creek dam catchment.

The Department has also assessed the proposal against the heads of consideration under clause 24A of the Ballina local environmental plan in relation to development in the Emigrant Creek water catchment, as summarised below.

Clause 24A	Matter for Consideration	Comment
(a)	any potential adverse impact, including any incremental adverse impact, on the water quality within the catchment that may result from the development	 The Environmental Assessment assessed the potential impacts on water quality from the construction and operation of the proposal. Potential construction impacts include: increased sediment loads from exposed soil entering waterways during wet weather; spills and leaks of chemicals and hydrocarbons from construction vehicles or fuel/ chemical stores on construction sites; and litter and gross pollutants from construction materials and activities.
		The assessment of the operation of the proposal identified the potential for pollutants contained in surface water runoff to enter waterways in the catchment areas. Water quality modelling of key pollutants was undertaken for the existing highway and post-upgrade with the existing highway and the proposed upgrade. Spillage of chemicals and dangerous goods from a road traffic accident was also assessed. The modelling indicated the proposal would result in a reduced pollutant load entering the Emigrant Creek dam catchment.
(b)	whether adequate safeguards and other measures have been proposed to protect the water quality	The Proponent has developed a water quality management strategy for the construction and operation of the proposal. The strategy includes measures to improve the quality of water running off/ discharged from the site before it enters local waterways. The primary measure is a system of sediment basins to hold dirty water prior to discharge. The erosion and sedimentation controls would be designed in accordance with <i>Managing Urban Stormwater – Soils and Construction</i> (Landcom 2004) and DECCW's <i>Managing Urban Stormwater – Soils and Construction</i> . Basin design would be undertaken consistent with the criteria in the above documents and taking into account the location of catchments and proximity to the road corridor. In accordance with the above guideline, the Emigrant Creek dam catchment the basins would be designed to the 85 th percentile rainfall event (to provide greater storage capacity within the drinking water catchment). Basins elsewhere within the project would be designed to accommodate the 80 th percentile rainfall event. For the operation of the proposal, all the construction phase sediment basins in the Emigrant Creek dam catchment would be converted to water quality basins with sand filters. Water would be treated through a combination of gross pollutant traps, sand filter media and permeable piping. The Proponent has amended the proposal through the Preferred Project Report and would convert 8 of the construction sediment basins in the Wilsons River catchment to incorporate sand filters to provide a higher level of treatment.

Table 5 – Summary of Co	nsideration of LEP Heads of Consideration
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		During the operation of the proposal the Proponent would focus on the maintenance of sediment basins and the landscape treatments in the road reserve. A detailed emergency response plan would be developed to ensure an appropriate response is provided to any major incident on the highway which may impact on water quality. The Department considers that adequate safeguards have been proposed to ensure that the water quality in the catchment is not adversely affected by the construction and operation of the proposal
(c)	whether the proposed development would be more suitably undertaken on an alternative site	The Proponent has undertaken a thorough investigation of route options, taking into account environmental, heritage, social and economic constraints and opportunities. There has been wide consultation with the community and public authorities and a technical assessment of the route options. The preferred route was chosen after a detailed assessment of the outcomes of consultation, value management workshop, technical assessment and consideration of cost and value. An assessment of the potential impacts of the proposal on the drinking water catchment has been made and mitigation and management controls and measures proposed to ensure water quality is not significantly affected. The water quality assessment concluded the continued operation of the existing highway with minimal control measures and design deficiencies would have a greater risk to the drinking water catchment than the proposed upgrade.
(d)	any comments that have been provided in relation to the proposed development following consultation with the relevant water supply authority	The Proponent has held discussions with Rous Water in relation to comments the water supply authority made on the EA and the water quality assessment. Agreement was reached on many of the matters raised, however, differences of opinion remained on several issues – adequacy of the hydrological assessment, appropriate water quality standards and impacts on aquatic ecosystems. The Proponent believes its proposed construction and operational water quality measures are appropriate for the project and have committed to involve Rous Water in the design and implementation of the water quality management measures and emergency response plans. The Department commissioned an independent review of the water quality assessment of the proposal. The review concluded that with the implementation of recommended conditions the proposal would have acceptable long term water quality impacts. The Department is satisfied that the Proponent has responded appropriately to the matters raised by Rous Water.

The Department is satisfied that the Proponent's water quality assessment has addressed the matters for consideration in clause 24A of the Ballina local environmental plan, and that with appropriate conditions of approval, the performance of the proposal can be managed and any residual impacts mitigated, to ensure that the long term operation of the proposal would have minimal impacts on the water quality of the catchment. Consequently the Department considers the proposal has addressed and is consistent with clause 24A of the Ballina local environmental plan.

Hydrology

Rous Water initially raised concerns that the hydrological assessment did not quantify the potential impacts on downstream watercourses and aquatic ecosystems from increases in the velocity of runoff from paved surfaces and increased flows (total and peak) from intercepted groundwater. Rous Water has subsequently indicated that these concerns could be resolved through the Proponent using appropriate performance criteria and giving greater consideration to impacts during the design phase of project development. The Department has

recommended a range of conditions relating to performance criteria and has included a requirement to consult with Rous Water on these issues.

The introduction of additional paved areas into a catchment will modify the hydrologic characteristics of the catchment, potentially leading to more frequent runoff, increased peak rates of runoff and increased volume of runoff. The effect of the changes depends on the area converted to an impervious surface and becomes more pronounced closer to the area of the impervious surface. The Environmental Assessment indicates that approximately 4% of the Emigrant Creek dam catchment would form part of the road reserve, with approximately 0.6% of the catchment becoming paved surfaces. In the Wilsons River catchment the corresponding values are 0.2% and 0.03% respectively. When considered at this whole of catchment scale, the independent review considered the potential hydrological impacts to be relatively minor and the change in flow rates (peak rate, volume of runoff and change in frequency) to be within the potential margin of error in the quantification of these parameters.

The assessment has identified peak rates of runoff at various locations along each of the major creeks. However, the Proponent has not identified the local impact of the introduction of the additional impervious surface to the catchment nor confirmed the flow attenuation that would be achieved by water passing through either the sand filters or the permanent water quality basins. The independent reviewer did not consider that the lack of this information prevented completion of the water quality assessment.

GHD's review raised some concerns that peak discharge from the road corridor could result in adverse impacts on downstream watercourses and aquatic ecosystems. In response the Proponent has advised that measures such as scour protection would be provided downstream of water discharge points in the road corridor to minimise erosion and bed and bank scour. The Department has proposed conditions which require the Proponent to:

- minimise changes to afflux and flooding behaviour;
- minimise the impacts of any discharge from permanent water quality and other outlet points before entering the nearest waterway;
- undertake periodic monitoring of measures to manage discharge from permanent water quality and other outlet points; and
- implement corrective and ameliorative measures in the event that adverse impacts are identified.

The Department considers that these requirements would ensure that the construction and operation of the proposal does not result in increased impacts on downstream bank and bed erosion.

Water Quality

The issue of adverse impacts on water quality in the drinking water catchment, particularly the Emigrant Creek dam catchment, was raised by Rous Water and the community (including the Watercatchers and Waterdrinkers). Rous Water believes inadequate consideration has been given to the ANZECC Guidelines for Fresh and Marine Waters and that the entire waterway ecosystem should be protected to maximise the quality of the water in the catchment. The Proponent states that adequate consideration has been given to the guideline and that assessment of pollutant loads against the DECCW stormwater guideline is appropriate as they are the only practical quantitative criteria for road runoff.

The Proponent's water quality assessment contains a discussion of pollutants that could be exported off roads. The discussion is based on available local and overseas literature. The GHD review expressed caution about heavy reliance on overseas literature as there may be differences in tyre composition and brake pad material as well as use of de-icing compounds in some locations. Without critical review of the literature it could be possible to obtain misleading information on pollutant exports that could increase the projected impact of the project.

Rous Water sought an ecotoxicological approach to the assessment of residual impacts. GHD notes there is limited information available on the chemicals and concentrations of those chemicals in stormwater runoff from roads. Therefore the adoption of an ecotoxicological approach would have technical complexities.

It is also prudent to note that without the upgrade (or an equivalent work) then the future increased traffic volumes would use the existing Pacific Highway with there being a greater risk of an incident that may adversely affect water quality in the catchment. The Department considers the provision of maximum practical protection to

watercourses is a sound approach and is consistent with Rous Water's submission. The issue is then one of what level of water quality protection is practical and whether all discharges from the carriageway will have stormwater treatment.

The Environmental Assessment states that the sand filters in the Emigrant Creek dam catchment would capture 100% of the pavement and 100% of the fill batter runoff. In the Wilsons River catchment the basins would capture 100% of the pavement runoff and most of the fill batters resulting in the runoff from about 93% of the road corridor being directed to basins for treatment.

The water quality assessment (Working Paper 2) indicates that through modelling the permanent water quality treatment facilities achieve a level of treatment that satisfies the DECCW urban stormwater guidelines for road construction. The DECCW guidelines are less stringent than the Australian Drinking Water Guidelines which provide a framework for promoting good quality of drinking water supplies. The independent reviewer is of the opinion that the Proponent's standards for water quality treatment are relevant and applicable and that the application of the Australian Drinking Water Guidelines and ANZECC Guidelines in their entirety would be inappropriate without setting site specific water quality targets based on historical site specific data. The Proponent has considered aspects of the guidelines in the assessment, relating to catchment management, land use management, protection of catchment values and use of multiple barriers to protect water quality.

The Australian Drinking Water Guidelines provide both health-related and aesthetic guideline values for water delivered to the consumer. As such the Department, informed by GHD's review, does not consider it is appropriate or practical to achieve these water qualities for discharging from the road corridor. An evaluation of the water quality within the catchments against the Australian Drinking Water Guidelines would require an extensive monitoring program to reliably identify the existing quality. Should the water not meet the guideline values then there would be a need to identify the source of the non compliance. To then assess whether the proposed upgrade would lead to either a non compliance or a worsening of an existing non compliance would require an understanding of all the pollutants and likely concentrations of those pollutants that would discharge off the project area. GHD recommended that such an analysis not be part of the project evaluation due to the likely uncertainties within the evaluation.

The proposed measures appear to be reasonable but design advancement should seek to optimise the performance of the permanent works in spill containment and retention of any contamination from the carriageway. The Proponent should take all practical steps during detailed design to refine the performance of the water quality control measures during their life. This would involve the construction period controls, installation of the permanent works and importantly the long term maintenance of the permanent works. In addition, the Department has recommended the development of an Emergency Response Plan for the ongoing operation to minimise risks to the drinking water sources. Additionally further modelling (of likely pollutant loads) is required to be undertaken to confirm that the designed works achieve a condition of not increasing the pollutant loads off the road corridor.

The Department accepts the conclusions of the independent review that the adoption of the Australian Drinking Water Guideline in isolation of other issues within the catchment is inappropriate and that runoff should comply with the water quality values of the DECCW's stormwater guidelines. The Department is satisfied that appropriate consideration of the water quality impacts of the proposal on the drinking water catchments has been made by the Proponent and that through the implementation of mitigation measures the project would result in a neutral or beneficial impact on water quality.

The Department has recommended conditions that require the Proponent to implement all appropriate measures to prevent soil erosion and discharge of sediments and pollutants during construction of the project, in accordance with DECCW's *Managing Urban Stormwater* and Landcom's *Managing Urban Stormwater* guidelines. The Proponent is also required to:

- consider the ANZECC guidelines in the development of indicators or standards to assess water quality during the operation of the project;
- optimise the water quality performance of the final drainage strategy for the area north of Byron Creek and south of Tinderbox Road; and
- develop Emergency Response Plans for the construction and operation of the project, including the existing highway and the water treatment plant.

Groundwater

One of the matters raised by Rous Water is the impact of the project on the groundwater regime and groundwater dependent ecosystems. The impact of the upgrade on aquatic ecology is considered further in section 5.4.

The proposal includes a number of significant cuttings, one up to 30 metres deep and one about 19 metres deep and a tunnel under St Helena Hill. Cuttings have the potential to impact on groundwater flows as the cutting may intersect a layer of soil that is relatively porous and drain that layer causing the flow to become a surface flow. This would reduce the volume and rate of down gradient groundwater flow.

The Environmental Assessment does not consider groundwater intersection to be a major risk factor with the exception of the St Helena Hill twin tunnels. The Department notes that the design development needs to ensure that the groundwater catchment is not changed during the construction process. Should a significant aquifer be intersected it would be necessary to implement some form of mitigation measures.

The Proponent would undertake monitoring of groundwater levels and quality at existing monitoring wells, prior to, during and following construction of the project to provide base level data and as an indicator of the impact of construction on groundwater characteristics. New monitoring wells would be installed at Type A and B cuts where there are currently no monitoring wells. If monitoring indicates that groundwater mitigation is required the Proponent has identified two possible engineering measures – collection and transfer of seepage water downstream into water quality ponds before discharge into the natural drainage system and collection of seepage water and transfer to pipes below the carriageway and returned to the ground through absorption trenches or discharge to the surface water system.

The Proponent has submitted that the basis for the implementation of contingency measures is dependent on a proper investigation of potential groundwater impacts. This investigation requires additional geotechnical information to be obtained through pre-construction geotechnical drilling and development of the detail design using groundwater modelling. The Proponent suggests the groundwater infiltration rate should be developed and agreed with the relevant agencies, DECCW and NSW Office of Water (NOW).

The independent reviewer has agreed that this approach is appropriate for the determination of the basis for implementation of groundwater measures. The Department accepts that the need for groundwater mitigation as a result of the infiltration of groundwater from cuts and the tunnel should be determined through consultation with the appropriate agencies, DECCW and NOW following ground water monitoring and during the consideration of proposed mitigation measures. The Department also requires the Proponent to consult with Rous Water on the implementation of groundwater mitigation measures and that such measures should be implemented to the satisfaction of the Director-General. The Department also requires the Proponent to prepare and implement a Construction Groundwater Management Plan, which includes monitoring and mitigation requirements.

Rous Water's submission also considered that the Proponent had not adequately addressed hydrological impacts on riparian habitats, aquatic ecology and groundwater dependent ecosystems stating these are important indicators of the quality of water in the drinking water catchments. The Department notes that the Proponent's initiative to undertake a range of measures to improve general water quality by re-establishing riparian revegetation along waterways of properties purchased along the route, contributes to the long term objectives and outcomes for the water catchment area.

The Proponent has identified the potential impact of cuts on groundwater and likely impacts on groundwater dependent ecosystems. A range of engineering mitigation measures could be adopted should groundwater recharge be required. The Proponent has also committed to increase the extent and quality of riparian habitat in the drinking water catchments, through the restoration of riparian land within the road reserve and on land acquired by the Proponent for the project but outside the road reserve. The Proponent has identified an area of approximately 31 hectares which has potential to be restored with riparian vegetation. The Proponent would work with Rous Water to undertake further riparian restoration as land becomes available.

The Department is satisfied that aquatic ecology has been adequately assessed in the Environmental Assessment and working papers (groundwater and flora and fauna). The recommended conditions require the

Proponent to restore and rehabilitate riparian vegetation in and around watercourses affected by the proposal and on land acquired for the project.

5.4 Ecological Impacts

lssues

The project area comprises cleared agricultural land including cattle grazing land and macadamia plantations with some scattered native vegetation including isolated remnant trees and re-growth. Emigrant Creek, Tinderbox Creek and Byron Creek are the major creeks within the study area. Riparian vegetation along creek lines and rivers provides movement for terrestrial fauna within, and outside, the project corridor.

Flora Species

Three plant communities were recorded in the study area: Lowland Rainforest, Camphor Laurel and plantations. One of these, Lowland Rainforest, is listed as an Endangered Ecological Community (EEC) on the *Threatened Species Conservation Act 1995* (TSC Act). While the main species of Camphor Laurel is considered a noxious weed, the Proponent has identified it may have potential ecological values and role (such as fauna habitat), and has therefore taken these values into account within the assessment.

Forty-nine threatened plant species listed under the TSC Act and/or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), have been recorded or have potential habitat within 10 km of the study area. Of these, 36 have potential habitat within the study area and as such were considered in the assessments (see Table 9 in Technical Paper 4 of the Environmental Assessment). Four threatened plant species were recorded in the study area: *Diploglottis campbellii* (listed as endangered under both the TSC and EPBC Acts), *Macadamia tetraphylla, Syzygium moorei* and *Tinospora tinosporoides* (all three are listed as vulnerable under both the TSC and EPBC Acts).

The Proponent has identified a potential direct loss of 2.0 ha of Lowland Rainforest EEC vegetation, in addition it is estimated that edge effects may have an impact of 3.6 ha. Of the four identified threatened plant species, the project proposes to remove individual trees in specified locations, the majority of which are planted (not naturally occurring).

Subsequent to the exhibition of the Environmental Assessment, the Proponent identified that Hairy Joint Grass (*Arthraxon hispidus*), was present in the project area (see Figure 5). This species is listed as vulnerable under the TSC and EPBC Acts. The Proponent has undertaken additional assessment of Hairy Joint Grass and it is noted that the proposed project was referred to the DEWHA under the EPBC Act on 28 September 2009. Hairy Joint Grass assessment in the context of the project considers the proposal is unlikely to have a significant impact in the context of the species (as a whole) and its local extent within the NSW North Coast Bioregion.

Three patches of Hairy Joint Grass will be directly and indirectly impacted (see table below). However, in the context of the local population occurring in the study area, potential impacts (direct and indirect) of 16.81 percent are not considered significant.

Property identification	Total area of patch (ha)	Area of patch directly affected (ha)	Area of patch indirectly affected (ha)	Proportion of patch affected %
346	2.4	0.51	0.26	32.08
336; north section	0.4	0.01	0.02	7.50
336; south section	3.6	0.09	0.1	5.28
353	0.38	0.07	0.08	39.47
Population Totals	6.78	0.68	0.46	16.81

The Proponent's assessment acknowledged that some threatened species may have been seasonally absent in the area during surveys. As a result, the assessment and evaluation for the potential for threatened species to occur in the area, was based in part on the presence or absence of suitable habitat, not on individual records. This was a precautionary approach to impact evaluation and the development of mitigation measures.

Fauna Species

Assessments of the likely impacts of the project on threatened fauna species, and migratory bird species occurring or likely to occur within 10 kilometres of the project area, were conducted in accordance with the relevant State and Commonwealth guidelines. This assessment identified an additional 58 species listed under the EPBC and TSC Acts, including 10 listed as endangered species and one endangered population under the TSC Act, and six listed as endangered species (one migratory) under the EPBC Act. Of these, 47 have actual or potential habitat within the study area, and as such potential impacts were considered in the assessment.

Surveys undertaken for the project assessment, recorded the following five fauna species (listed as vulnerable under the TSC Act in the study area): Masked owl (*Tyto novaehollandiae*); Black Flying-fox (*Pteropus alecto*); Grey-headed Flying-fox (*Pteropus poliocephalus*); Little Bentwing-bat (*Miniopterus schreibersii*); and Large-footed myotis (*Myotis macropus*).

The Grey-headed Flying-fox is also listed as "vulnerable" under the EPBC Act. Two additional fauna were recorded, the Cattle egret (*Ardea ibis*) and the Black-faced monarch (*Monarcha melanopsis*), both listed as "migratory" under the EPBC Act.

Aquatic Ecology

The *Fisheries Management Act 1994* (FM Act) identifies two threatened freshwater species whose range potentially includes waterways traversed by the proposal. These are the endangered eastern freshwater cod (*Maccullochella ikei*) and oxleyan pygmy perch (*Nannoperca oxleyana*). However, while records of these are found within the Richmond River system, none of these records were within the Emigrant Creek, Skinners Creek, Tinderbox Creek or Byron Creek catchments. The proponent's assessment concludes it is unlikely that suitable habitat occurs given the eastern freshwater cod has only been recorded well downstream and in larger watercourses than exist in the vicinity of the proposed upgrade, and the oxleyan pygmy perch only occurs in low-lying Banksia dominated ecosystems, a habitat that does not occur in the vicinity of the proposed upgrade.

A further two freshwater species and four marine and estuarine species listed under the FM Act with the potential to occur in the study area or exist downstream of the proposal were considered in the aquatic ecological assessment.

The potential impacts of the proposal on flora and fauna include removal of riparian vegetation and diversion of watercourses (culverts and realignment/ diversion of creeks), installation of in stream structures, shading of waterways and run-off into watercourses. The Proponent would implement mitigation measures to minimise impacts on the aquatic ecosystem and incorporate measures such as new culverts to facilitate fish movement.

Submissions

A number of submissions received from the community raised concern about the loss of vegetation, in particular around Clover Hill as a result of clearing for the alignment. In summary, the issues and questions relate to:

- protection of fauna including concern regarding fauna connectivity and requirement for fauna crossings; and
- vegetation clearance and its replacement along the alignment.

DECCW suggested revision to the Proponent's Statement of Commitment's including specific amendments to commitments relating to threatened flora translocation, pre-clearance surveys and clearing outside of breeding seasons, location of ancillary facilities, bridge/ culvert design for fish and fauna passage and new commitments in relation to revegetation and landscaping with specific reference to the proposed tunnel at St Helena.

Byron Shire Council's submission requested further surveys for the threatened plant, Hairy Joint-grass (*Arthraxon hispidus*), and argued that the surveys should be conducted during the growing season for this plant citing evidence of occurrences as a result of recent work in the vicinity of the project by the Ballina Bypass Alliance and

the Ballina Shire Council. Council recommended that should it be identified, then translocation should be considered in the proposed translocation plan.





Consideration

The Proponent has identified fifteen individual vegetation patches in the project corridor consisting of 10 patches of lowland rainforest (two of which also contain camphor laurel), four patches of camphor laurel and one patch of (roadside eucalypt) plantation within the study area (see Figure 6). Of these 15 vegetation patches, one patch of lowland rainforest is considered to be in moderate condition, two patches of Lowland rainforest (lowland rainforest, camphor laurel) are considered to be in poor to moderate condition and the remainder (lowland rainforest, camphor laurel and plantation) are considered to be in poor condition. Assessment of condition was based on the level of weed intrusion and the representation of a natural structure and species composition.

Approximately 2.0 hectares of Lowland Rainforest EEC, in moderate, and moderate to poor condition, would be directly impacted by the proposed upgrade and as such the proposed upgrade is not likely to significantly impact the long-term viability of Lowland Rainforest in the area.

The Proponent has undertaken additional assessment in relation to Hairy Joint-grass and, while the impacts are not considered significant, has three proposed mitigation measures:

- study/ research on the life history and ecology of Hairy Joint-grass to inform management;
- translocation using salvage of impacted plants and propagules;
- protection and management of in-situ Hairy Joint-grass.

Additionally, the proponent has committed to investigating the need for an offset in the event that research suggests that on-site management will not meet the aim of maintaining a viable population. The Department has recommended a condition requiring an offset package for Hairy Joint-grass detailing compensatory measures to be developed in consultation with DECCW and DEWHA.

The proposal will also result in the removal and/or modification of a small area of potential habitat for threatened flora and fauna. Impacts to threatened species are considered to be relatively minor given the small area to be directly impacted, the poor state of existing habitat and the extent of similar habitats within the local area.

The proposed upgrade will result in the direct removal of a few individuals of some threatened plant species (one *Syzygium moorei*, one *Tinospora tinosporoides* and two planted individuals of *Diploglottis campbellii*). These species occur in numerous locations in the area, and the removal of a few individuals is unlikely to reduce the long term viability of these threatened species. Notwithstanding, the Department has recommended a condition requiring the proponent to prepare a strategy to minimise the impacts on this species.

In lieu of offsets, the Proponent has committed to the restoration, regeneration and rehabilitation of areas of native vegetation where it remains within the proposed road reserve. In addition restoration of riparian vegetation would be undertaken where creek lines occur on land that is acquired as part of the proposed upgrade including land outside the construction footprint resulting in a net benefit outcome as a result of the upgrade. This commitment is reinforced in the Department's recommended conditions of approval.

To minimise potential impacts on threatened fauna species, the Proponent has committed to implementing a number of mitigation measures including minimising the disturbance/ removal of potential fauna habitat where possible, and staging works to avoid disturbance to threatened fauna that may potentially inhabit the area during their breeding. These commitments are reinforced in the Department's recommended conditions of approval, along with the requirement to document specific management procedures for all threatened fauna species as part of the Construction Flora and Fauna Management Plan for the project.

Figure 6 – Vegetation Along the Road Corridor



In addition the Department recommends that the Proponent be required to:

- limit the clearing of native vegetation to the minimal extent practicable required for the construction of the project;
- detail the procedures for clearing vegetation and minimising the extent of clearing within vegetated corridors as part of the Construction Environmental Management Plan; and
- document the measures to be undertaken to control weed spread.

Overall, the Department considers that the construction and operation of the project will avoid significant ecological impacts and is satisfied that the potential impacts of the proposal are acceptable provided the Proponent implements all the nominated environmental commitments and the Department's recommended management measures defined in the conditions of approval.

5.5 Visual Impacts, Landscaping and Design

<u>Issues</u>

The study area is generally appreciated, by locals and visitors to the area, for its scenic values and visual diversity. Set against a backdrop of coastal plains, local coastal ranges such as the elevated plateau that dominates much of the study area provide the dominant visual feature in the landscape.

The Proponent states that the landform of the study area combined with a long agricultural history and limited levels of urban development creates a varied scenic landscape of high lifestyle and (eco) tourism value which continues to attract growing numbers of people to live and visit. This perspective is reflected in the submissions received on the proposal.

The diversity of the study area led the Proponent to divide it into five precincts for evaluation (refer to Table 6). The Proponent's Environmental Assessment considers the visual impact of the upgrade on the various precincts in the study area ranges between 'moderate' for precincts 1, 2 and 5 (Knockrow, Emigrant Creek and Ewingsdale) and 'moderate to high' for precincts 3 and 4 (Bangalow and Tinderbox Creek valley). These ratings have considered the local conditions, the scale of the proposed infrastructure and the level of visibility from surrounding viewpoints within each precinct's setting. Visual impacts range from substantial increases in road infrastructure (Precinct 1 at Ross Lane, significant earthworks including large cuttings (particularly at Arundel property in Precinct 3).

Precinct	Road infrastructure and visual Impacts	Visual Sensitivity
1. Knockrow (Ross Lane to Martins Lane)	 increase in road infrastructure, particularly immediately north of the Ross Lane interchange, and road infrastructure located on fill embankments will be highly visible. 	Low to moderate - upgrade would be visible from the existing highway alignment and from new local access roads.
2. Emigrant Creek Martin Lane to Broken Head Road	 construction of the creek crossings and associated works including the realignment of the existing highway near Emigrant Creek, the removal of vegetation (including agricultural plantations); and the large cuttings and fill embankments.). 	Moderate - upgrade would be visible from a range of locations including the existing highway alignment, local access roads, local residences and properties and possibly from Newrybar (the Public School and Harvest Café).
3. Bangalow, running from Broken Head Road to Byron Creek	 significant amount of earthworks, specifically the major cutting through the 'Arundel' property; works around the existing Bangalow bypass; crossing of Broken Head Road; and the severing of agricultural plantations. 	High - upgrade would be highly visible from local roads such as the existing highway alignment (including the Bangalow bypass), the new local access road, Bangalow Road and Broken Head Road, and part of Bangalow.
4. Tinderbox Creek Valley, running from Byron Creek to St Helena	 significant earthworks, including large cuttings, from the construction of the tunnel portals; and the construction of the bridge over the Tinderbox Creek tributary and associated Tinderbox Road diversion. 	upgrade would be visible from residences and properties, ridgeline roads that surround the valley, in particular St Helena Road and Bangalow Road will provide distant views.

Table 6 - Visual Analysis

Ridge		
5. Ewingsdale	 increase in road infrastructure on the Ewingsdale spur and the associated large fill embankments; and the construction of the tunnel portals and associated excavation works. 	The upgrade and associated works would be readily visible from sections of local roads including the existing highway alignment, St Helena Road, Myocum Road and Coolamon Scenic Drive, as well as from the proposed upgrade itself. The works would also be visible from McLeods Shoot Lookout, a popular tourist destination and rest stop which offers spectacular panoramic views over the coastal lowlands, the Pacific Ocean and mountain ranges in the background.

Submissions

A large number of the submissions raised concerns in regard to the visual impact of the project, both in relation to cuttings through the landscape and the tunnel at St Helena Hill. Many submissions stated that the landscape, in which the project is situated, is predominately rural and have specifically requested that the visual impact of the proposal be softened through the use of plantings and vegetation.

In summary the submissions raised issues in relation to:

- the visual impact of cuttings and a tunnel on the landscape;
- concerns regarding privacy as the road traverses land that is currently under pasture;
- the interchanges including concerns over the footprint size, the need for 24 hour lighting (with regard to both visual and sleep disturbance), specific reference is made to Ivy lane interchange;
- visual impact on Bangalow, as a historic town, and the region;
- the cutting at Arundel Hill;
- interruption of significant views as a result of the location of the project; and
- requests that vegetation be considered as a mitigation, and where used vegetation to be readily reestablished.

Consideration

The Proponent's own assessment acknowledges the likelihood of the upgrade to remain the dominant feature in the landscape with mitigation measures only partially able to mitigate its large scale. The visual impacts are unavoidable in meeting the safety requirements such as achieving satisfactory vertical alignments.

The Department's consideration has included the area's diverse scenic qualities, its growing popularity as a place to live and visit and is generally satisfied that the Proponent has identified a range of design and landscape solutions that will assist towards mitigating construction and operational design, visual and landscaping impacts.

Notwithstanding, the Department recognises that additional improvements to the design and landscaping of the project can be undertaken to further mitigate impacts. To ensure this, the Department has recommended conditions of approval that requires the Proponent to prepare an Urban Design and Landscape Management Plan, to be approved by the Director General. The Plan is to provide an integrated urban design for the project and provide for the ongoing rehabilitation and management of affected areas.

Additionally, the Proponent has committed to investigating a tourist signage strategy for the existing highway, as part of the Upgrade, to encourage tourism and reduce impacts on local businesses.

The Department considers that the finalisation of the urban and landscape design, and the investigation of a tourist route strategy, in consultation with councils will also ensure that local considerations and council strategies are suitably integrated into the final design solutions and reflect local values.

Based on the revised proposal, the Proponent's proposed management and mitigation measures, and the Department's recommended conditions of approval, the Department considers that the project can be designed and constructed so as not to have significant impacts on the visual amenity and landscape of the locality. The residual impacts associated with the project are considered acceptable when compared to the objectives of the proposal and the net benefits the project will achieve.

5.6 Aboriginal Cultural Heritage Impacts

lssues

The Proponent's environmental assessment identified three Aboriginal sites containing Aboriginal objects (two isolated finds and one artefact scatter) and 36 potential archaeological deposits (PADs). The Proponent has proposed that the large number of PADs is conservative and based on the limited knowledge of the area stating that the relative lack of previous studies undertaken on the Alstonville plateau has resulted in a difficulty to accurately predict the likelihood of archaeological deposits occurring.

Since the assessment and exhibition process has begun the Proponent has undertaken test excavations (under a permit issued by the DECCW under section 87 of the *National Parks and Wildlife Act* 1974) at some, but not all, of the Aboriginal PAD locations. Archaeological test excavations were undertaken at 13 of the 36 PADs. Excavations have resulted in the identification of an additional five Aboriginal objects (three flakes and two cores) at four separate locations (now Aboriginal sites). As a result of the excavations, there are now seven confirmed Aboriginal sites within the 17km project boundary. Of the seven sites identified, one isolated find will not be impacted by the proposal. All of the 36 PADs identified will be impacted by the project, with 24 PADs being wholly destroyed and 12 partially destroyed.

The Proponent has indicated that the majority of heritage items (Aboriginal and historic) identified in the Environmental Assessment will be impacted (directly, partially or indirectly) by the highway upgrade.

Submissions

The DECCW submission for Aboriginal heritage recommended the preparation of a Heritage Management Plan that includes detailing any salvage strategies, management of any Aboriginal objects recovered, the procedures to be implemented during construction works in relation to training of personnel and the identification of previously unknown heritage items.

Consideration

The Proponents' assessment indicates that current understanding of the study area's Aboriginal cultural and archaeological values area is limited due to a lack of previous studies. Additional excavation of some of the remaining PADs and comprehensive consideration of the results has the potential to significantly increase our understanding of Aboriginal occupation and/or resource use of this area, particularly the area to be impacted by the project. Therefore the Department has recommended, after consultation with DECCW, a condition that requires the excavation of five additional PADs (to those investigated under a under a permit issued by the DECCW), with further consideration of additional archaeological excavations and minimising impacts, should the PADs prove to contain evidence of Aboriginal use or habitation (i.e. the presence of Aboriginal objects). Any further excavation of the remaining PADs will be determined as a result of the additional PAD investigations proposed.

It is noted that while the Environmental Assessment identifies Aboriginal burials as being of high or exceptional significance to the Aboriginal community no detailed assessment and consideration as to the likelihood of burials occurring has been provided. As such the Department has recommended that any impacts to any human remains are excluded from the approval and would require additional assessment and approval.

The Proponent has committed to the preparation of a Heritage Management Plan. The Department supports the preparation of a Heritage Management Plan and has recommended a condition of approval requiring the Proponent to prepare a plan as part of the Construction Environmental Management Plan. The recommended condition includes the development of a procedure to be implemented in the event that previously unidentified Aboriginal heritage items are uncovered.

The Department believes that the recommended conditions of approval will ensure that impacts to Aboriginal cultural heritage as a result of the project will be appropriately mitigated and managed.

5.7 Other Issues

Non-Aboriginal Heritage Impacts

Eighteen historic sites have been identified by the Proponent - the historic sites identified are indicative of the settlement and development of the area (such as houses, farms, dairies and schools) and include recreational facilities such as a cricket pitch. The EA indicates that of the 18 sites identified, 12 will be impacted by the project, however only two (2) sites are identified as being of local (heritage) significance – the Arundel farm complex and plantings (T2E H13) and a weatherboard house (T2E H23). While the Proponent has indicated that the majority of historic heritage items identified in the Environmental Assessment will be impacted (directly, partially or indirectly) by the highway upgrade, the Department notes that 10 of the 12 items identified are considered below the heritage significance threshold and as such do not have identified heritage value. Therefore the Department considers the impact on two locally significant heritage items is acceptable.

The Department notes that none of the sites identified within the area of the proposed upgrade are listed on Commonwealth government heritage registers, the NSW State Heritage Register, or the heritage schedules of Local Environmental Plans.

In its submission, the Departments' Heritage Branch recommended the preparation of a Heritage Management Plan detailing the procedures to be implemented during the works in relation to training of personnel and the identification of previously unknown heritage items.

The Department has recommended a condition requiring archival recording of all affected heritage items, as identified in the specialist reports, to be undertaken prior to the commencement of any construction activity impacting the item. Additionally, to facilitate the appropriate level of archival recording, the Department recommends that the proponent undertake archival research on the two locally significant properties (the Arundel farm complex and plantings and the weatherboard house). This is reflected in the recommended conditions of approval which includes a requirement relating to the lodgement of the recordings with local and State heritage organisations.

The Proponent has committed to the preparation of a Heritage Management Plan. The Department supports the preparation and has recommended a condition of approval requiring the Proponent to prepare a plan as part of the Construction Environmental Management Plan. The Department has also recommended that the Proponent cease works in the event that previously unidentified significant non-indigenous heritage items or relics, including human remains, are uncovered.

The Department believes that the recommended conditions of approval will ensure that the project will not significantly affect Aboriginal and historic heritage in the project area.

Air Quality Impacts

Submissions from the Bangalow community raised concerns about the air quality impacts of the upgrade, in particular diesel particulate pollution. Various submissions stated the air quality analysis was inadequate as local climatic conditions were not used in the modelling. The air quality modelling used background information collected at a monitoring location at the Pacific Highway near Coffs Harbour but the assessment and modelling of the upgrade was based on local climatic conditions. The traffic volumes at the Coffs Harbour monitoring location are much higher than the levels predicted for the project, therefore the concentration levels of the background air quality data was considered by the Proponent to be a conservative indication of the air quality that would be experienced by residents close to the upgrade route. The air quality modelling indicated that carbon monoxide (CO_2), nitrogen dioxide (NO_2) and particulate matter (less than 10 µm and less than 2.5 µm) would be well below the relevant air quality goals. The air quality goals are met at the kerbside and pollutant concentrations would drop to half within 10 metres of the road.

The Department and DECCW are satisfied that these issues were adequately addressed in the Environmental Assessment where it was predicted that the ground level concentrations for the upgrade at 10 metres from the kerb are less than the existing highway with no upgrade and less than the DECCW standards. The Department

has also recommended inclusion of a condition of approval for the Proponent to design, construct, and commission, operate and maintain the project in a manner that minimises dust emissions.

Social and Economic Impacts

The Tintenbar to Ewingsdale Upgrade is located in a rural environment and a popular tourist destination. The project area falls within a mixture of small towns and villages with relatively closely settled rural properties in the surrounding areas (farm land and plantations). Settlements in the project area consist of Bangalow (the largest town, located to the west), Newrybar (a small village located along the Pacific Highway) and Ewingsdale (located to the north, on the lower escarpment slopes overlooking Byron Bay). In addition residential properties occur along the local roads through the study area, with a number of recent residential subdivisions taking advantage of the spectacular rural and coastal views.

During construction, impacts range from delays and disruption to access to services, to safety and amenity impacts associated with changes to traffic, transport, and local access (including an increase in heavy vehicles). Local businesses may experience temporary negative impacts such as traffic congestion, increased noise, dust and visual amenity. Businesses may also experience a positive short-term increase in trade associated with construction facilities located nearby.

Submissions from the community raised issues relating to access to and from the highway and access to amenities (both during construction and after completion of the upgrade), business/ tourism impacts (centred around noise and access) and the impact to a general quality of life. Concern was also raised in regard to a loss of the character area including the rural landscapes, and historic township of Bangalow.

The Department acknowledges that there will be some adverse long term impacts resulting from the project, specifically in relation to visual amenity and access restrictions resulting from the interchanges. In addition there will be both positive and negative impacts in regard to noise amenity for residences. Notwithstanding, the long term positive impacts in relation to road safety and transport balance the negative impacts.

The long term economic impact is seen as having a neutral effect. The Proponent has committed to investigating a tourist signage strategy for the existing highway, as part of the Upgrade, to encourage tourism and reduce impacts on local businesses. Additionally the Department has recommended a condition requiring the Proponent prepare a Business Signage Strategy to ensure further consideration of those businesses impacted by changed access arrangements to the Upgrade. The Department also notes that the Proponent has committed to ongoing consultation with the community during construction.

Factors relating to transport, traffic and access including impacts on the community have been considered elsewhere in this report. The Department considers other matters related to social and economic impacts have been adequately addressed by the Proponent in its response to submissions and through its Statement of Commitments.

On balance, the long term benefits of the upgrade far outweigh the residual amenity and environmental impacts which can be adequately managed through the recommended conditions of approval.

6. CONCLUSIONS AND RECOMMENDATIONS

There is recognition at all levels of Government and within the community that the Pacific Highway is a major transport node for the country, which in its current form is no longer fit for purpose. The community and motoring groups consider the highway to be one of the worst in Australia in terms of injury and mortality rates which would likely increase as a result of population, tourism and economic growth in the region should the upgrade not proceed.

The Department is satisfied that the project is justified as part of the Pacific Highway Upgrade Program which has been declared critical infrastructure by the Government for various benefits to the State and region. This is further supported by the Commonwealth Government's commitment to partial funding of the required upgrade works. The Pacific Highway Upgrade, and Tintenbar to Ewingsdale project specifically, are also identified in a range of government policy documents as infrastructure required to improve services in and to the Far North Coast and to which the Government is committed to providing.

The Pacific Highway between Ballina and Ewingsdale experiences heavy traffic conditions due to its use by both local and regional through traffic. In addition the existing horizontal and vertical alignment is below the standard of other upgraded sections of the highway, exacerbating the traffic difficulties. These conditions further deteriorate during holiday periods when traffic volumes double resulting in an unsatisfactory level of service and delays.

The Department acknowledges that there is a proportion of the community which opposes the removal of the Ivy Lane Interchange. The Department has reviewed the decision making process undertaken by the RTA in developing the preferred route, including the original inclusion of the Ivy Lane interchange and concurs that the interchange is not required. It is accepted that the option presented (including the preferred project report), removing Ivy Lane interchange fulfils the objectives of the project.

Based on its assessment, the Department is satisfied that the project is necessary to alleviate the current traffic congestion and safety issues associated with the existing highway. The Department believes that the project will provide benefits to local users through the provision of a local traffic route to separate local traffic from higher speed through traffic, as well as meeting the Pacific Highway Upgrade objective of providing a high standard and efficient motorway to aid in the efficient movement of traffic between Sydney, the North Coast region and Brisbane.

The Department has assessed the Environmental Assessment, Statement of Commitments, Submissions Report and submissions to the proposal having regard to the objects and principles of the *Environmental Planning and Assessment Act 1979* and is satisfied that the likely impacts of the proposal can be mitigated or managed to an acceptable level of environmental performance subject to the implementation of recommended conditions.

The Department recognises that there will be both construction and, to a less degree, operational noise impacts for the community even with mitigation in place. Potential noise impacts associated with the project can be adequately managed through the design of the final alignment and through further investigations required prior to construction commencing. Construction noise is an unavoidable consequence and the current construction noise criteria are difficult to achieve for a construction over a long period (greater than 26 weeks), however the Department recommends noise goals that the Proponent must aim to achieve using all feasible and reasonable measures. There is greater opportunity to mitigate road traffic noise, a factor considered in road design and which will be finalised with input from directly affected receivers and the Department is of the opinion that the proposed approach to managing this is appropriate.

The proposal traverses two drinking water catchments with potential impacts from the construction and operation of the road. The Proponent has committed to implementing measures to minimise impacts on downstream watercourses and water quality. The upgrade would significantly reduce the risk of pollutants entering the drinking water catchment from surface water runoff or from an incident happening in the water catchments by the improved road geometry and water containment and treatment measures, which is a significant improvement on the existing highway.

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Flora and fauna impacts have been avoided during route selection planning to the greatest extent practicable. Notwithstanding, the Proponent have committed to a Riparian Revegetation Strategy as part of the project, which will provide a net improvement in the general area.

The Department recognises that there is potential for visual impact of the proposal and this is a subjective matter. The design of project elements, which integrate into the wider landscape, supported by appropriate endemic vegetation in consultation with the community, is considered in this instance to be an appropriate balance in the context of the need for the upgrade generally.

Overall, the Department is satisfied that with the implementation of the mitigation measures proposed in the Environmental Assessment and in the Statement of Commitments as well as additional measures outlined as part of the recommended conditions of approval, potential impacts from the Project can be mitigated or managed to an acceptable level.

Accordingly, the Department recommends that the Minister approve the project, subject to the conditions in the recommended conditions of approval provided in Appendix A.

Chris Wilson Executive Director Major Projects Assessment Richard Pearson Deputy Director-General Development Assessment & Systems Performance

Sam Haddad Director-General

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APPENDIX A – RECOMMENDED CONDITIONS OF APPROVAL

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