



Upgrading the Pacific Highway

Technical review of inland corridor (via Summerland Way)

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Prepared by: Pacific Highway Office,
Motorways Directorate,
Roads and Traffic Authority
21 Prince Street
Grafton NSW 2460

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EXECUTIVE SUMMARY

The purpose of this report is to assess an inland corridor between Grafton and Tyagarah/Ewingsdale as an alternative to upgrading the Pacific Highway to dual carriageways.

The Member for Ballina and others suggested a four-lane dual carriageway inland corridor that follows the Summerland Way to south of Casino, then follows a new east-west route to join the Pacific Highway at Tyagarah/Ewingsdale, near the turn-off to Byron Bay. The group also supported safety upgrades on the Pacific Highway, such as a Ballina Bypass.

Two options for the inland corridor were put forward, and have been further developed by the Roads and Traffic Authority (RTA) in order to achieve engineering standards and minimise impacts where possible. Alternatives A and B are described in this report.

The advocates of the inland corridor believe it has the following advantages over upgrading the Pacific Highway:

- Much less expensive.
- Would be completed in one third the time because of lower costs.
- Would separate interstate traffic from local traffic.
- Less impact on wetlands, high conservation value land and prime agricultural land.
- Would affect fewer people.
- Would provide an upgrade of the Bangalow – Lismore road.
- Would provide a long-term freight link to a Beaudesert freight terminal.

A similar proposal for an alternative inland corridor (via the Summerland Way) for the Pacific Highway was examined in 1992. The 1992 investigation found the alternative would:

- not attract enough traffic away from the present coastal corridor (ie. the Pacific Highway); and
- reduce overall safety benefits for a north-south route by diverting funds away from upgrading the existing Pacific Highway and/or splitting the available funds for upgrading works between two routes.

It also found that an upgrade of the Pacific Highway would provide:

- the most cost-effective solution and the highest performance in terms of safety and traffic flow; and
- a positive contribution towards economic development by supporting the network of coastal towns and regional centres.

However, at the request of the (then) Minister for Roads, the Hon Joe Tripodi MP, a fresh look at the issues surrounding the inland corridor was undertaken in the first half of 2006 by the RTA.

Findings

The RTA's assessment concludes that there is no compelling evidence to favour an inland corridor.

Building an inland road will not stop the coastal road being used, nor will it obviate the need for the existing Pacific Highway to be upgraded. There will always be demand for a coastal route from the growing local population, the freight industry and tourist traffic.

An inland corridor would still impact on towns/villages, private dwellings, agricultural land and waterways, however against some criteria to a lesser degree. The inland corridor would introduce impacts on a community previously unaffected by a transport route, including introducing:

- new and discernable noise impacts to those communities which do not currently have high traffic volumes, particularly at night;
- new and discernable visual impacts, including road lighting and changing views, and major cuttings and fills to cross the more variable terrain even though the impact would be mitigated in selected areas by tunnels.
- new social amenity issues; and
- loss of agricultural land and issues of economic impact.

The Pacific Highway would still need upgrading.

For those communities on the Pacific Highway (which would still receive almost twice the traffic volume as an inland corridor, if built), the key issues are likely to be:

- ongoing safety concerns as local traffic continues to mix with through traffic;
- continuing noise impacts, compounded by reduced funding to address noise mitigation measures; and
- continuing impacts on the amenity for shoppers and business owners in town centres until some form of bypass is constructed.

However, with more development along the coast than along an inland corridor, there would be twice as many communities which would both benefit and be potentially affected by upgrading the Pacific Highway than an inland corridor.

As expected, there are a higher number of dwellings along the Pacific Highway upgrade that are within 300 metres of the existing or proposed highway, and which would experience road noise. Overall, there would be more agricultural land impacted by an upgrade of the Pacific Highway than an inland corridor, as the Pacific Highway traverses the floodplains of the Clarence and Richmond rivers.

Town centre amenity is also a major community issue. The potential amenity benefits to towns along the Pacific Highway due to the removal of through traffic may not eventuate if heavy vehicles find the longer, steeper inland corridor less desirable. Some long-term loss of passing trade for businesses in these towns on the Pacific Highway may result.

An inland corridor would have similar impacts on areas of environmental significance, but much greater impact on State Forest than an upgrade of the Pacific Highway. The number of fauna corridor and waterway crossings are similar for both an inland corridor and an upgrade of the Pacific Highway albeit the crossings on the Pacific Highway upgrade are more extensive.

In terms of cost, the inland corridor is not “much less expensive”, as claimed by one proponent, than the Pacific Highway upgrade. The inland corridor is estimated to cost between \$3 billion and \$3.2 billion. After adding the cost of safety upgrades of the Pacific Highway, the total cost is estimated to be between \$4 billion and \$4.2 billion.

The cost of upgrading the Pacific Highway to dual carriageways is estimated to be between \$3 billion and \$3.5 billion, depending on the route and standard of road.

Because the inland corridor is more expensive than the Pacific Highway upgrade, there is no basis for arguing it could be built more quickly and thereby save lives. The rate of construction of either route will be dependent on the availability of funds. The Pacific Highway upgrade will save lives because it can be staged, whereas the inland corridor must be wholly completed before traffic can start to divert to it.

In terms of traffic, the inland corridor is forecast to attract relatively little traffic from the Pacific Highway. The Pacific Highway (north of Grafton) carries about 7,600 vehicles per day. Of these, a maximum 1,900 vehicles per day would be attracted to use the inland corridor. These 1,900 vehicles are the 'through traffic' between Grafton and Tyagarah/Ewingsdale that could possibly be attracted to the inland corridor.

As the travel times and distance of the inland corridor and the Pacific Highway (if it was not upgraded to dual carriageway) are about the same, the amount of traffic attracted to using the inland corridor would be less than 1,900 vehicles per day.

The majority of traffic between Grafton and Tyagarah/Ewingsdale has either an origin or a destination along this section of the highway and therefore would not divert but continue to use the Pacific Highway.

However, given the nature of the inland alternatives, in particular Alternative B, the actual number of vehicles to transfer to the inland alternative is likely to be less than 1,900.

In terms of heavy vehicles, about 900 vehicles per day (included in the 1,900 vehicles noted above) could divert to the inland corridor, however, again considering similar distances and travel times, together with steeper grades, the inland corridor would likely only attract less than 900 vehicles per day. The argument that the Summerland Way would connect to Beaudesert in Queensland has to be seen as a very long term strategy, given the current program commitments described in the *South East Queensland Infrastructure Plan and Program 2005 – 2026* by the Queensland Government, and the difficulties of the mountainous border crossing.

In summary, the inland corridor is not a viable alternative to upgrading the Pacific Highway between Grafton and Tyagarah/Ewingsdale because:

- It would not take traffic off the Pacific Highway.
- The traffic that would use the Summerland Way would not justify the cost.
- It would cost more than the Pacific Highway upgrade.
- The Pacific Highway would require upgrading even if the Summerland Way was built.
- The majority of traffic remaining on the Pacific Highway would require continuing investment to upgrade the highway even if the inland corridor was built.
- It would have to be completed in one stage, which means that other sections of the Pacific Highway identified for upgrade would be delayed.

I. Introduction

I.1 Background

The Pacific Highway between the F3 Freeway near Beresfield, west of Newcastle, and Tweed Heads on the New South Wales/Queensland border is the key interstate transport corridor for:

- transporting freight and people between Sydney and Brisbane; and
- servicing the rapidly expanding coastal communities on the north coast and mid-north coast of New South Wales.

It is presently 677km in length. At the end of August 2006, some 233km of highway north of Hexham is to a four-lane, divided highway standard. A further 380km of new highway are under construction, have been approved for construction or have had a preferred route identified, including the redevelopment of existing 4-lane highway sections (eg. F3 to Raymond Terrace, Coffs Bypass and Banora Point). Planning is proceeding to identify a preferred route on the remaining 103km. The NSW Government is progressing the planning of the remaining undeveloped sections of highway to:

- provide planning certainty for local communities; and
- prepare for a construction program to complete the upgrade of the Pacific Highway.

As part of the upgrading program, the RTA is planning a 187km section of the Pacific Highway between Wells Crossing (halfway between Coffs Harbour and Grafton) and Ewingsdale (near Byron Bay). **Table I-1** describes the projects being planned and their status at the end of June 2006.

TABLE I-1: STATUS OF PACIFIC HIGHWAY UPGRADE (WELLS CROSSING TO TYAGARAH)

SECTION/PROJECT	HIGHWAY LENGTH (km)		CURRENT STATUS
	Existing highway	Proposed route	
Wells Crossing to Iluka Road: Wells Crossing to Harwood section	70.3	61- 69 #	Planning commenced in October 2004. Route options developed and under consideration. #Length of proposed route ranges from shortest (modified green) to longest (orange).
Wells Crossing to Iluka Road: Harwood to Iluka Road section	9.9	9.9	Planning commenced in October 2004. Preferred concept design being developed along existing highway alignment.
Iluka Road to Woodburn	32.4	32.4	Planning commenced in October 2004. Preferred concept design being developed along existing highway alignment.
Woodburn to Ballina	34.4	36.2	Planning commenced in October 2004. Preferred route announced on 30 November 2005.
Ballina Bypass	14.9	8.8 #	Project approved on 23 May 2003 and being prepared for construction to commence in 2006/07. Tenders being assessed for initial contract to start stabilising critical soft soil sections. # 2.5 km Sandy Creek to Ross Lane section included in Tintenbar to Ewingsdale project.
Tintenbar to Ewingsdale	22.5	19.8 – 22.0 #	Planning commenced in October 2004. Route options developed and under consideration. #Length of proposed route ranges from shortest (option A) to longest (option D).
TOTAL	184.4	168.1 – 178.3	
Ewingsdale to Tyagarah	2.7	2.7	Currently constructed to arterial highway standard (Class A).
TOTAL	187.1	170.8 – 181.0	

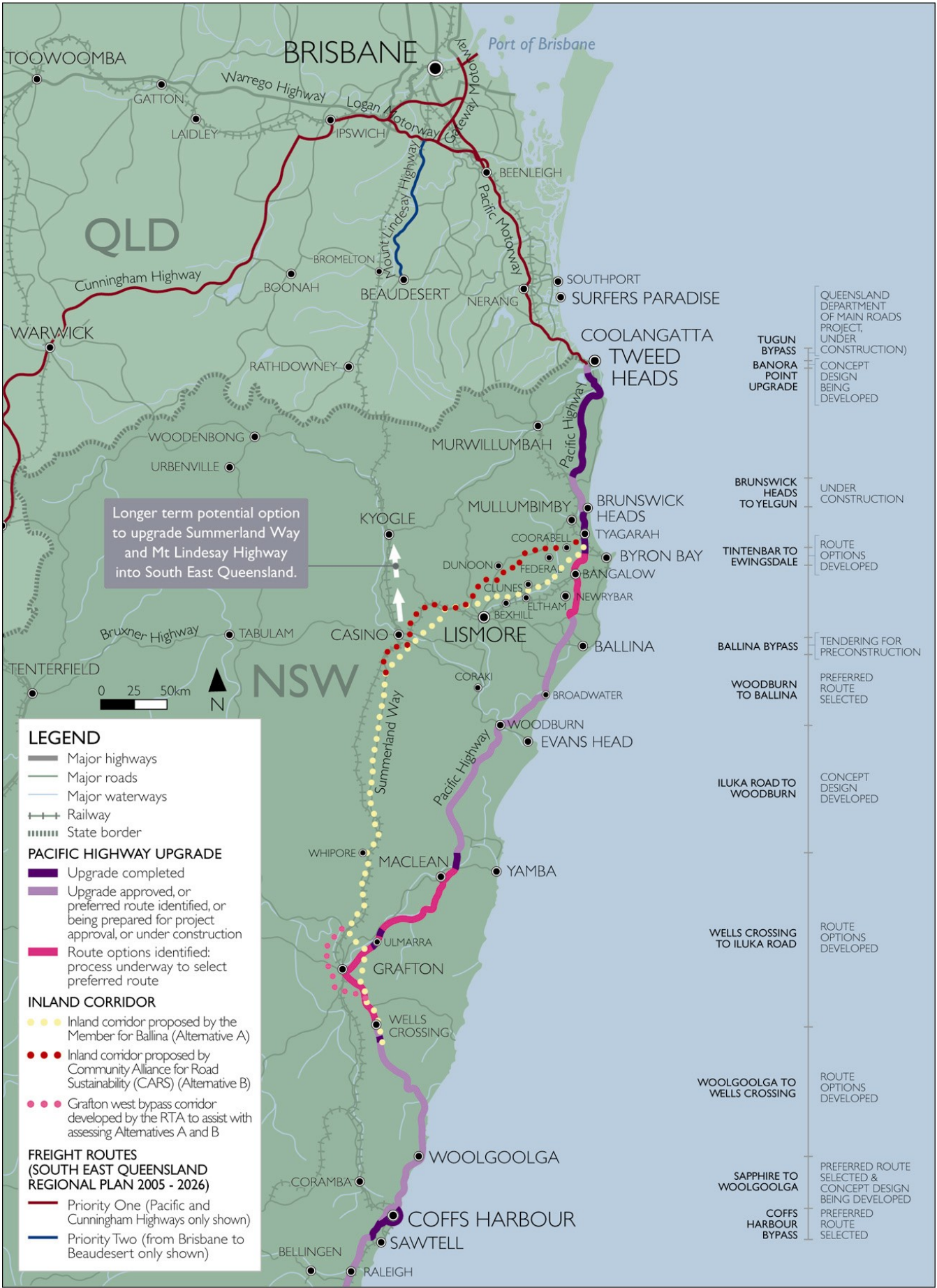


Figure I-1: Locality map

At a public forum in Grafton on 24 November 2005, the Member for Ballina put forward a proposal for an inland corridor (via the Summerland Way) rather than the present Pacific Highway upgrade. The proposal was:

- In the short term, to provide an alternative highway route to the present Pacific Highway upgrade by:
 - upgrading the Summerland Way from Grafton to south of Casino; and
 - building a new route from south of Casino to join with the existing Pacific Highway at Ewingsdale with bypasses of Casino and Lismore.
- In the longer term, to upgrade the Summerland Way from north of Casino to the New South Wales/Queensland border, to provide an upgraded link into South East Queensland.

The key features of the short term route (refer **Figure I-1**) were claimed to be:

- It would be a four-lane, divided highway, with an approximate length of 165km.
- It would cost \$1 billion, based on an estimate prepared by a reputable person from the construction industry.
- It would be cheaper because it would be going through NSW State Forest, which is owned by the government.
- Because it was cheaper, it could be built much more quickly.
- The location of the highway at Grafton required resolution.
- The purpose of the route was to carry heavy vehicles currently using the existing Pacific Highway.

The Member for Clarence and the Member for Lismore attended the meeting and stated their support for such a proposal. All three members made representations to the then Minister for Roads on 17 November 2005 for a feasibility investigation into the alternative inland corridor. Further details of the proposal, which was submitted by the Member for Ballina to the inquiry into the Pacific Highway by the General Purpose Standing Committee No. 4 from the Legislative Council of the NSW Parliament, are provided in **Appendix A**.

On 30 November 2005, the then Minister for Roads announced the preferred route for the Woodburn to Ballina section of the highway. As part of the announcement, the Minister advised that, while the RTA continued with planning of the highway upgrade along the coastal corridor, it would undertake a preliminary assessment of the inland corridor put forward by the Member for Ballina.

At a meeting at Bangalow on 6 January 2006, representatives of a group known as Community Alliance for Road Sustainability (CARS) put forward another inland corridor alternative, further to that proposed by the Member for Ballina, (Refer **Figure I-1**) to the Pacific Highway General Manager. Further information on this proposal is also provided in **Appendix A**.

1.2 Purpose of technical review

The purpose of the technical review is to:

- undertake an assessment of the two inland alternatives; and
- compare the outcomes of the assessment against the outcomes of planning investigations for upgrading the Pacific Highway between Wells Crossing and Tyagarah.

In general terms, the inland corridor would comprise a four-lane, dual carriageway upgrade of the Summerland Way, bypassing Grafton, and a new four-lane, dual carriageway road from south of Casino to Tyagarah/Ewingsdale near the coast. This report compares the inland corridor with the NSW Government's upgrade of the Pacific Highway, which provides for a four-lane, dual carriageway upgrade from south of Grafton to Ewingsdale, comprising upgrades of the existing road and deviations to the existing highway.

I.3 Approach to review

The following activities were adopted for the technical review of the inland alternatives:

- Review of previous and current investigations into the Summerland Way as an alternative to the Pacific Highway.
- Examination of the key physical and engineering features of the two inland alternatives and, where considered necessary, refinement of the two alternatives to ensure they meet relevant design guidelines and RTA requirements for safety and traffic performance while providing value for money. Issues that have been considered include:
 - horizontal and vertical radii of curves;
 - gradients;
 - earthworks including depths of cuts and fills; and
 - possible local access arrangements including intersections and grade separation between local roads and the highway.
- Analysis of traffic and transport performance of the two inland alternatives including consideration of traffic volumes, travel times and attraction for heavy vehicles.
- Assessment of the two inland alternatives in terms of a range of social issues and its likely benefits and adverse impacts in terms of amenity, land use, property, road traffic noise and accessibility issues.
- Assessment of the inland corridor in terms of natural environment issues.
- Preparation of strategic cost estimates and broad economic analysis to determine road user costs and benefits of the inland corridor.
- Broad comparison between the outcomes of the technical review of the inland alternatives and the outcomes of planning investigations to date for the Pacific Highway upgrade between Wells Crossing and Ewingsdale, in terms of:
 - key physical and engineering features;
 - traffic and transport performance;
 - human and natural environment; and
 - strategic cost estimates and economic analysis.

While community consultation has not been undertaken with the communities potentially affected by the inland corridor, likely issues can be identified.

The RTA carried out the technical review with the assistance of independent experts in the areas of flora and cost estimating. For the Pacific Highway upgrade, the RTA used information obtained from current planning investigations.

2 Previous and other current transport and planning investigations

2.1 Previous investigations

There were a number of significant transport and planning studies carried out in the 1990s that have formed the basis for upgrading the Pacific Highway along a coastal corridor on the north coast of New South Wales. The studies include the:

- *North Coast Road Strategy – Final Technical Report (RTA, 1992).*
- *State Road Network Strategy (RTA, 1994).*
- *North Coast Urban Planning Strategy, Into the 21st Century (Department of Planning, 1995).*
- *Upgrading the Pacific Highway, Discussion Paper (1997).*
- *Integrated Transport Plan (1998).*

A proposal for an inland corridor via the Summerland Way as an alternative to the Pacific Highway was examined by the RTA in 1992. The RTA considered a range of options for the road network on the north coast between Grafton and the New South Wales/Queensland border. The following three network options were identified for evaluation:

Network Option A: Upgrade the Pacific Highway from Hexham to Tweed Heads as the primary north-south route, with the following routes as complementary to an upgraded highway:

- the Summerland Way from Grafton to Casino;
- the Bruxner Highway from Casino to Lismore and Ballina; and
- the Lismore-Bangalow Road.

Network Option B: Upgrade the Pacific Highway from Hexham to Grafton and then from Grafton to the New South Wales/Queensland border via the Summerland Way.

Under this option, the Pacific Highway between Grafton and Tweed Heads would have a strong complementary role.

Network Option C: Upgrade the Pacific Highway from Hexham to Grafton and then from Grafton to the Pacific Highway at Bangalow via:

- the Summerland Way from Grafton to Casino;
- to the Pacific Highway at Bangalow via the Bruxner Highway from Casino to Lismore and the Lismore-Bangalow Road from Lismore to Bangalow; and
- major bypasses of Casino and Lismore.

Under this option, the Pacific Highway between Grafton and Bangalow would have a strong complementary role.

Network Option C is similar to the inland corridor alternatives proposed by the Member for Ballina and the Community Alliance for Road Sustainability.

The evaluation of the three network options is contained in *North Coast Road Strategy - Final Technical Report (RTA, 1992)*.

Table 2-1 is an extract from the report summarising the estimated traffic volumes in the year 2016.

TABLE 2-1: ESTIMATED YEAR 2016 TRAFFIC VOLUMES FOR NETWORK OPTIONS A, B and C

SECTION	STANDARD NETWORK (vehicles per day)	NETWORK OPTION		
		Option A (vehicles per day)	Option B (vehicles per day)	Option C (vehicles per day)
Pacific Highway:				
South of Murwillumbah	8,600	10,300 ¹	7,400	8,700
Cowper, NE of Grafton	6,300	7,200	4,400	5,500
South of Grafton	9,700	10,700	10,600	9,700
Summerland Way:				
North of Mt Lindesay	900	800	4,200 ²	900
Whiporie, north of Grafton	1,400	1,400	4,300	2,100
New England Highway:				
North of Tenterfield	4,300	3,300	3,300	4,100

Source: *North Coast Road Strategy*, RTA, 1992.

Supporting Notes:

- 1 Volume of the proposed route between Billinudgel to Chinderah.
- 2 Volume on the proposed new “Lions Road” route between The Risk and Laravale.

Table 2-2 provides a brief summary of the outcomes of the evaluation in terms of traffic and transport, economic and financial, and environmental and community impacts.

The report concluded that:

- Both **Network Options B** and **C** would:
 - not be cost-effective in attracting traffic away from the present Pacific Highway; and
 - divert funds away from upgrading the existing Pacific Highway and/or split the available funds between two competing routes so as to limit the overall safety benefits for a north-south route.
- **Network Option A** (i.e. upgrading the existing corridor) would provide the most cost-effective solution and the highest performance in terms of safety and traffic flow. **Network Option A** would also provide a positive contribution towards economic development by supporting the network of coastal towns and regional centres.

TABLE 2-2: SUMMARY OF EVALUATION OF NETWORK OPTIONS A, B and C

CRITERIA	NETWORK OPTION		
	Option A	Option B	Option C
Traffic and transport	<ul style="list-style-type: none"> Provides improved traffic conditions for the greatest number of trips since it focuses major projects on the route which carries the most traffic. Provides good safety benefits as a consequence of these projects. Improves competitiveness of road-based freight transport against rail. 	<ul style="list-style-type: none"> Option B offers better conditions for trips to and from Brisbane, and provides substantial benefits for traffic using the corridor. However, it would be difficult, on the basis of these volumes, to justify the cost of upgrading the Summerland Way route. Would divert funds away from the Pacific Highway, particularly through reduced duplication, which would limit safety benefits for the corridor. By greatly shortening the Sydney-Brisbane road route, it would have the potential for major impact on the rail share of freight, since it would result in a shift from rail to road transport. Further upgrading of the existing Pacific Highway south of Grafton would be required in order to accommodate the additional freight traffic resulting from route (and modal) diversions. 	<ul style="list-style-type: none"> Not expected to attract sufficient traffic off the Pacific Highway to justify its cost. It offers no reduction in road distance, and so would have the least impact on rail. Would reduce safety benefits on the Pacific Highway between Grafton and Bangalow because of the diversion of funds from the existing Pacific Highway. The Grafton-Casino-Bangalow route would provide little real improvement in overall traffic conditions, except for local and regional traffic between Casino and Bangalow.
Economic and financial	<ul style="list-style-type: none"> Supports economic development in areas along the Pacific Highway which rely on it for access. Expected to be the most cost-effective solution, because it concentrates road investment where traffic volumes are greatest. 	<ul style="list-style-type: none"> Favours economic development in the Casino-Kyogle area (and in the Beaudesert area of South East Queensland) Although it will provide substantial benefits from interstate traffic, the majority of traffic will receive less benefit than under Option A. 	<ul style="list-style-type: none"> Strongly supports economic development in the Casino-Kyogle area but is unlikely to be cost effective, since it is not expected to attract traffic away from the Pacific Highway.
Environment and community impacts	<ul style="list-style-type: none"> Prone to flooding where it crosses major river systems. As occurs largely on the existing Pacific Highway alignment and reinforces the linkages to major population centres in the entire corridor, it will have the least adverse environmental impact while ensuring optimal regional accessibility for the North Coast community. The proposed new route between Chinderah and Billinudgel (opened to traffic in August 2002) will provide a high standard facility and ensure fast access between Lismore-Ballina-Byron Bay triangle and Tweed Heads-Gold Coast. 	<ul style="list-style-type: none"> Avoids long duration flooding of the lower Clarence, Richmond and Tweed river systems but is affected by major flooding at Grafton and Casino. 	<ul style="list-style-type: none"> Bypasses the lower Clarence floodplain, but still prone to flooding from the Richmond and lower Tweed rivers.

Source: *North Coast Road Strategy*, RTA, 1992.

The *1992 North Coast Road Strategy* considered the complex issues associated with developing a road network to support economic development and population growth in the north coast. The network vision comprised the following:

- Upgrading of the Pacific Highway along the present corridor to four-lane dual carriageway (either by incremental development or through the provision of a high standard, controlled-access tolled motorway).
- Maintaining the Summerland Way:
 - as a complementary route to the Pacific Highway and as an alternative route between Grafton and Casino during flooding; and
 - encouraging its use as an alternative freight route to the Pacific Highway in the longer term, but only if this was financially feasible through private investment and only if it was compatible with the long term planning for the Richmond-Tweed region as a whole.
- Improving other complementary major roads such as the Bruxner Highway between Casino and Ballina and the Lismore-Bangalow Road.

The above vision and subsequent studies and strategies mentioned earlier formed the basis for upgrading the Pacific Highway along the coastal route.

In relation to the Summerland Way specifically, there have been a number of previous studies assessing the role and importance of the route as well as improvement options under various funding scenarios. A 1993 report, *Planning for a Freight Route – The Summerland Way, Queensland Transport*, identified the following three viable options for a border crossing:

- Collins Gap (existing highway crossing of the Border Ranges, located west of Mt Lindesay);
- King George Crossing (the original road crossing of the Border Ranges, located east of Mt Lindesay); and
- Richmond Gap (Lions Road crossing of Border Ranges).

A decision has not been made on a suitable crossing.

2.2 Other current investigations

There have been a number of other significant planning and transport studies either completed in recent years or still in progress which have also been considered as part of this review. Those studies are:

(a) South East Queensland

The Queensland Government released a Regional Plan, *South East Queensland Regional Plan 2005-2026* (Queensland Office of Urban Management, June 2005), to set out the future pattern of development for South East Queensland to the year 2026. An accompanying document, *South East Queensland Infrastructure Plan and Program 2005-2026* (Queensland Office of Urban Management, April 2005), was released to provide certainty on infrastructure development for the whole community by establishing priorities over the next 10 years but within the 20-year planning horizon.

For the southern part of the Greater Brisbane and Gold Coast sub-regions, the regional priorities and initiatives for road transport are:

- improving road connections such as the Pacific Motorway and Mt Lindesay Highway (but only as far as Jimboomba, north of Beaudesert) which would support preferred patterns of development, greater public transport usage and economic development, including improved freight links and a greater emphasis on freight rail.

- developing priority freight routes (Refer **Figure I-1**) as follows:

Priority One freight routes such as the Pacific and Cunningham highways to facilitate high volume, business-to-business freight movements.

Priority Two freight routes such as the Mt Lindesay Highway, but only from Brisbane to as far as Beaudesert, to allow freight to be distributed from factories or distribution centres to retail outlets or warehouses.

- investigating future transport links such as further development of the Pacific Highway, extension of the Gateway Motorway south to Browns Plains, and Mt Lindesay Highway/north Beaudesert areas.

In summary, the Queensland Government's investment priority for roads in the southern part of the Greater Brisbane and Gold Coast sub-regions over the next 20 years is towards:

- further improvements to the Pacific Motorway between Brisbane and the New South Wales/ Queensland State border; and
- upgrading the Mt Lindesay Highway to no further south than Beaudesert to service future patterns of development.

At this stage, there are no indications of funding or investigations over the next 20 years for improving road connections and freight transport on the Mt Lindesay Highway between Beaudesert and the State Border (*Mt Lindesay/North Beaudesert Study Area – Summary of the Draft Study Report; Setting a vision for the future, Queensland Office of Urban Management, October 2005*).

(b) Far north coast of New South Wales

The NSW Department of Planning released the *Draft Far North Coast Regional Strategy (NSW Department of Planning, March 2005)* to manage the expected growth in the far north coast of New South Wales in a sustainable manner while protecting the unique environmental assets, cultural values and natural resources of the region. The draft strategy builds on previous planning work including the Northern Rivers Regional Strategy, local council settlement strategies in the local government areas of Ballina, Byron, Kyogle, Lismore, Richmond Valley and Tweed and planning for the rapid growth occurring in South East Queensland.

The draft regional strategy plans for an overall population of 289,000 by 2031, representing an additional 60,400 people, or 26 per cent increase for the period 2006-2031. The key drivers of growth in the region have been identified as follows:

- in-migration from the Sydney greater metropolitan region;
- population flow from South East Queensland; and
- greater accessibility through upgrading the Pacific Highway, resulting in opportunities for economic development and growth.

The greatest future population growth pressures are expected to be around the regional centres of Tweed Heads and Ballina, and within the other coastal settlements east of the Pacific Highway. The draft plan also introduces initiatives to support and maintain the development of inland settlements to reduce pressure on coastal population growth.

In terms of regional road transport, the draft strategy recognises the importance of upgrading of the Pacific Highway to provide greater transport efficiency and safety for residents, and for intra and interstate movements. It also recognises the planned investigation of significant employment lands and housing at Bromelton to the north-west of Beaudesert and that the *Draft Far North Coast Strategy* should be regularly reviewed to progressively identify and link the transport needs between the far north coast of

New South Wales and South East Queensland. This includes investigating improved road links from Summerland Way to South East Queensland (to the future employment lands of Bromelton).

2.3 Summary

In the early 1990s, the RTA considered the issues associated with developing a road network to support economic development and population growth on the north coast. Various road network options were considered including similar inland corridor alternatives to those proposed by the Member for Ballina and the Community Alliance for Road Sustainability group.

The investigations showed the most cost-effective road network solution involved an upgrade of the Pacific Highway from Hexham to Tweed Heads via a coastal corridor as the primary north-south route, with the following routes being complementary to an upgraded highway:

- the Summerland Way from Grafton to Casino;
- the Bruxner Highway from Casino to Lismore and Ballina; and
- the Lismore-Bangalow Road.

This road network performed highest in terms of safety and traffic flow, and provided a positive contribution towards economic development by supporting the network of coastal towns and regional centres.

It also found that while upgrading of the full length of the Summerland Way offered better conditions for trips to and from Brisbane, it would be difficult, based on the likely traffic volumes, to justify the cost of upgrading the Summerland Way.

Since the early 1990s, the New South Wales and Queensland governments have progressively upgraded the Pacific Highway. Of the 343km of highway between Wells Crossing (south of Grafton) and the Brisbane central business district, 173km (50%) has been completed or is under construction to dual carriageway standard, with planning in progress on the remaining 170km (50%). This is compared to the 362km Summerland Way/Mt Lindesay Highway corridor where 37km (10%) is presently to dual carriageway standard.

More recent planning investigations in both South East Queensland and the far north coast of New South Wales also support the continued upgrading of the Pacific Highway with the Summerland Way providing a complementary route.

Under the *South East Queensland Infrastructure Plan and Program 2005-2026*, the priority over the next 20 years is towards further improvements to the Pacific Motorway between Brisbane and the New South Wales/Queensland State border and upgrading the Mt Lindesay Highway to as far south as Beaudesert to service future patterns of development. There are no indications of funding or investigations for improving road connections and freight transport on the Mt Lindesay Highway between Beaudesert and the State border.

Under the *Draft Far North Coast Regional Strategy*, the importance of upgrading of the Pacific Highway is recognised, along with a regular review of the need to provide improved transport links between the far north coast of New South Wales and South East Queensland.

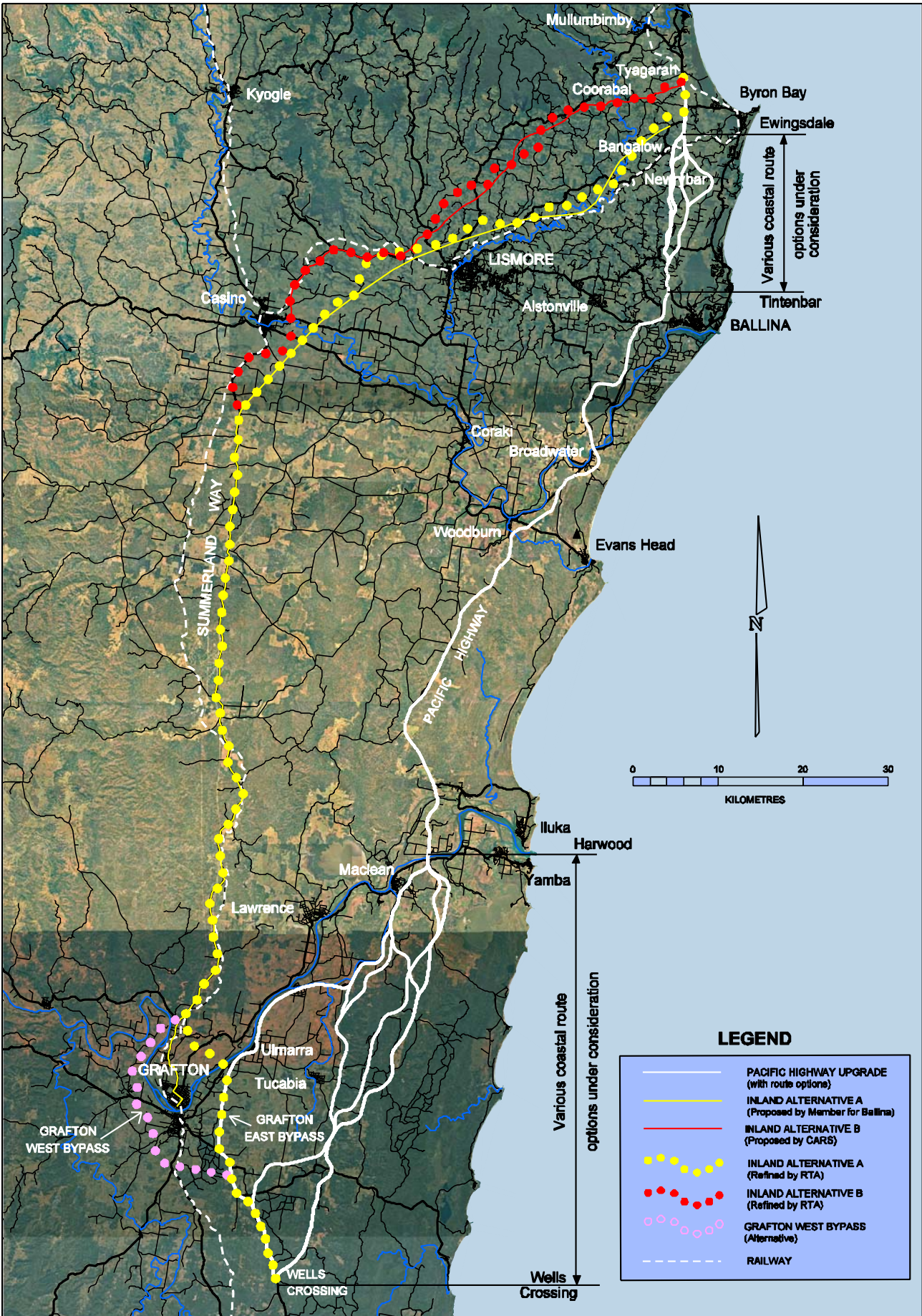


Figure 3-1: Pacific Highway route options and inland alternatives (Wells Crossing to Tyagarah)

Technical Review

Inland Corridor (via Summerland Way)

3 Review of the inland corridor alternatives

3.1 Approach to review

This technical review examines the feasibility and implications of two alternatives for an inland corridor put forward by community representatives as described in Section 1.1 of this report.

Both Inland Alternative A, proposed by the Member for Ballina, and Inland Alternative B, proposed by the Community Alliance for Road Sustainability group, commence at the city of Grafton and follow the alignment of the Summerland Way to the southern outskirts of Casino (Refer **Figure 3-1**). Both alternatives then generally follow a new route in a north-easterly direction. Alternative A rejoins the Pacific Highway at Bangalow and Ewingsdale while Alternative B rejoins the Pacific Highway at Tyagarah.

For the Casino to the Pacific Highway alignment, Alternative B is located further north of Alternative A to avoid a number of rural settlements and villages. Both alternatives would involve major bypasses of Casino and Lismore.

Neither alternative put forward included a bypass route for Grafton.

For this review, the RTA examined both alternatives at a strategic level to quantify the key physical features of each in terms of road length and width, horizontal and vertical alignment, the extent of earthworks cut and fills and key physical, environmental and social constraints.

The design standards adopted for the examination of each alternative are similar to those adopted for other Pacific Highway projects and include:

- dual carriageway construction (two lanes in each direction) with a horizontal and vertical alignment to suit a design speed of 110km/hr;
- horizontal alignment is curvilinear with desirable minimum curve radius of 1000 metres although this could be reduced to as low as 750 metres;
- maximum vertical grade of 6%;
- crest and sag vertical curves to provide desirable minimum stopping distance of 110 km/hr although this may be reduced to 100km/hr for economic reasons; and
- the use of tunnels where highway cuts are generally greater than 50 metres in depth and viaducts where embankments are greater than 30 metres in height.

The approach was to compare:

- four-lane dual carriageway upgrade of the Summerland Way and a new four-lane dual carriageway from south of Casino to Tyagarah, including limited improvements on the Pacific Highway; with
- an upgrade of the Pacific Highway.

The corridor alternatives put forward by the Member for Ballina and the Community Alliance for Road Sustainability and the refinements made to achieve the above requirements are shown in **Figure 3-1**. More information on the changes to the alternatives for the Casino to Ewingsdale/Tyagarah link is shown in **Figure 3-2**.

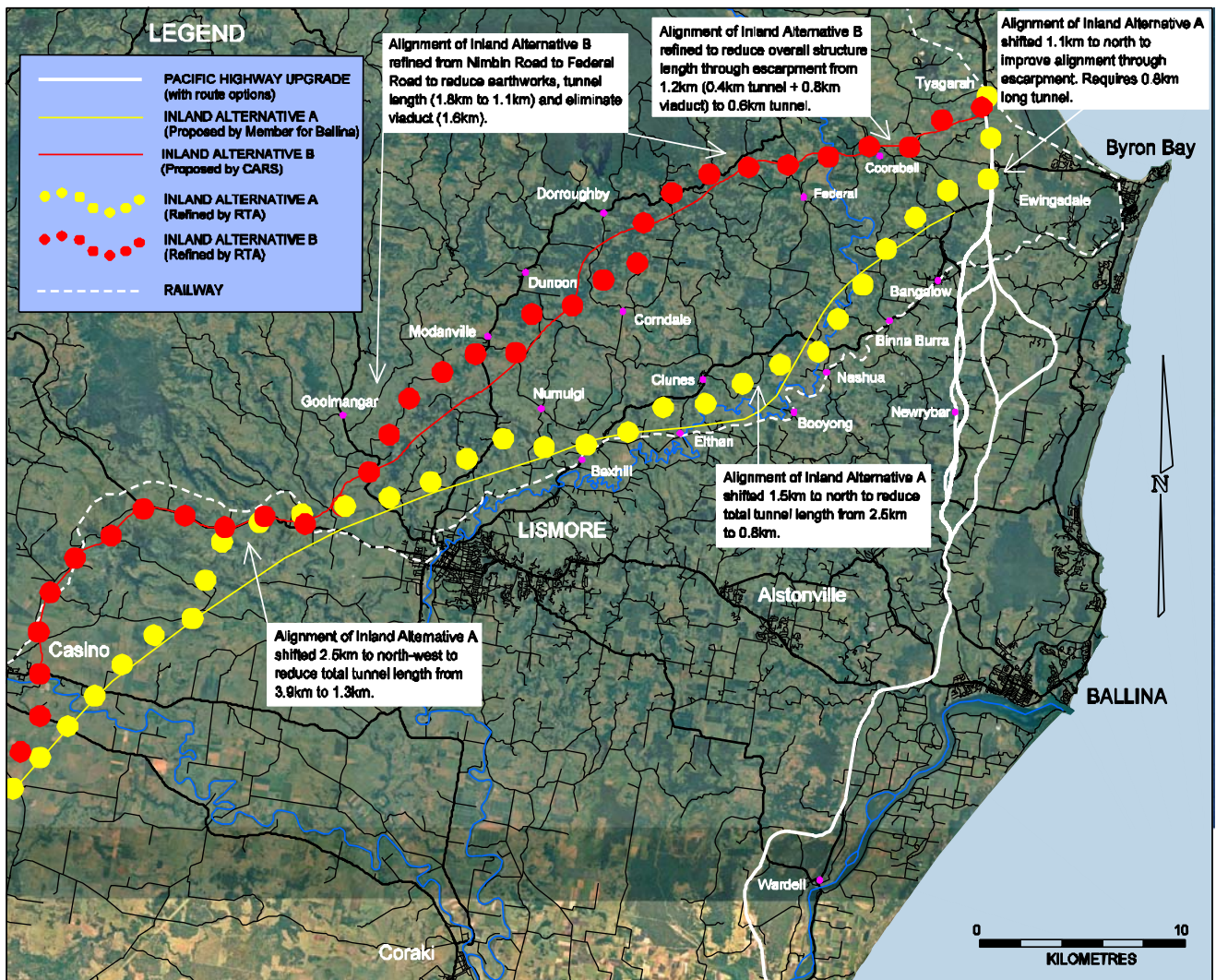


Figure 3-2: Inland alternatives (Casino to Tyagarah)

The inland corridor alternatives were refined as follows to ensure they were feasible and would meet design standards.

(a) Provision of a bypass of Grafton to connect an upgraded Pacific Highway south of Grafton to an upgraded Summerland Way north of Grafton

Two bypass options have been considered for Grafton and are shown on **Figure 3-1**.

The eastern bypass is 19.5km long and involves a major crossing of the Clarence River floodplain downstream of Grafton, near the villages of Swan Creek on the southern bank and Southgate on the northern bank. The bypass commences approximately 7km south of Grafton and deviates in an easterly direction along Four Mile Lane (following the orange route identified as a short-listed option on the Wells Crossing to Iluka Road planning project) before crossing the existing Pacific Highway near Swan Creek. The route then crosses the Clarence River and heads in a north-westerly direction to rejoin the Summerland Way at Mountain View, 13km north of Grafton.

The western bypass is 30.5km in length and, while 11km longer than the eastern bypass, would involve a much shorter crossing of the Clarence River floodplain near Mountain View, upstream of Grafton. The bypass commences 10km south of Grafton and deviates in a westerly direction to skirt around South Grafton, crossing both the Orara Way and then the Gwyder Highway at Waterview Heights. It then

generally follows Seelands Drive to cross the Clarence River and rejoin the Summerland Way at Mountain View, 13km north of Grafton.

At this stage of the investigation, the RTA has no preference for either alternative.

(b) Alignment changes on both inland corridor proposals between Casino and Tyagarah to meet design standards and minimize the extent of earthwork cut and fill depths.

Given both alternatives would involve considerable cuts and fills on the Casino to Tyagarah link to meet design standards, it is pertinent to consider better treatments in relation to previous designs and construction in similar circumstances. A report prepared for the RTA, *Coffs Harbour Highway Planning – Review of the Coastal Ridge Way Proposal (Connell Wagner, February 2004)* investigated the desirability and risks of major open excavations and deep fills. It is clear from the report that having cuttings greater than 45 to 50 metres and fill embankments greater than 30 to 35 metres is undesirable from a constructability/basic engineering feasibility viewpoint, and presents potential construction risks as well as onerous ongoing maintenance commitments. Such large cuts and fills impact on the natural environment because of the width of land clearing required.

Both inland alternatives involve cut depths of up to 112 metres and fill heights of up to 33 metres. To reduce cut depths to less than 50 metres and fill heights to less than 35 metres, the following tunnels and viaducts would be required:

- For Alternative A, three (3) tunnels would be required totalling 6.4km in length.
- For Alternative B, two (2) tunnels would be required totalling 2.2km and two (2) 2.4km viaducts totaling 2.4km would be required.

For the purposes of this review, the horizontal and vertical alignments of both alternatives have been refined to minimise the extent of earthworks including depth of cut and fill. The major refinements are shown on **Figure 3-2**. The length of tunneling for Alternative A has been reduced to 2.9km (over 3 tunnels) and for Alternative B to 1.7km (over 2 tunnels) with no viaducts. An additional tunnel of 0.8km in length has been included at the northern end near Coolaman Scenic Drive to provide a route through the escarpment that would meet the design standards.

(c) Provision of connection at the southern and northern ends in order to make a comparative assessment between inland alternatives and the Pacific Highway.

For the purpose of undertaking a comparative assessment between the two alternatives and also with the Pacific Highway, common start and end points for each corridor have been adopted.

The start point is Wells Crossing, approximately 26km south of Grafton, and the end point is Tyagarah, approximately 2.5km north of the Byron Bay turnoff at Ewingsdale.

3.2 Key features of the alternatives

3.2.1 Physical and engineering

The refined inland corridors are now called Alternative A and Alternative B.

Both alternatives would be between 183km and 198km in length and start at Wells Crossing, 26km south of Grafton and finish at Tyagarah on the Pacific Highway, approximately 2.5km north of the Byron Bay turnoff at Ewingsdale. These start and finish points were selected to compare the inland alternatives (via Summerland Way) and the Pacific Highway.

The key physical and engineering features of each link section are described below.

(a) Grafton bypass

Two alignments have been identified for a bypass of Grafton, one to the east and one to the west.

The eastern bypass of Grafton is 19.5km in length and skirts the expanding city of Grafton to the east, crossing the Clarence River between Swan Creek and Ulmarra on the southern bank, and near Southgate on the northern bank.

The crossing of the Clarence River is 9km downstream of the city of Grafton, which is protected from flooding by a levee system. The crossing would be designed for a 1-in-20 year flood immunity consistent with the crossing of other major floodplains on the Pacific Highway.

From hydrological and hydraulic investigations undertaken as part of route planning for the Wells Crossing to Iluka Road project, this is a difficult area to achieve a design with acceptable flood impacts. Any impacts from a crossing of the Clarence River floodplain have the potential to propagate upstream to Grafton and affect its levee system. Any minor increases in flood level in the river adjacent to Grafton has the potential to result in much higher increases inside the levee system (as much more water is able to overtop Grafton's levee system and pond inside the levee system).

Three possible grade-separated interchanges would be located at the following junctions where the eastern bypass:

- leaves the Pacific Highway near Four Mile Lane south of Grafton;
- crosses the Pacific Highway at Ulmarra; and
- joins the Summerland Way at Mountain View north of Grafton.

Overpasses and underpasses would be provided where the eastern bypass crosses local roads.

The eastern bypass option crosses the Clarence River south of Ulmarra in the same geological setting as the Ulmarra Bypass section of the Wells Crossing to Iluka project. The floodplain contains a series of Quaternary sediments, including soft estuarine clays. The soft clays would require specific engineering solutions to control both the stability of embankments and long term settlement performance.

The western bypass of Grafton is 30.5km long (11km longer than the eastern bypass) and would provide a flood free route on high ground to the west of Grafton, crossing the Clarence River 13km upstream of Grafton at Mountain View. While the western bypass is on a flood free route, it passes through the rural residential communities of Waterview Heights and Seelands. Four possible grade-separated interchanges would be located where the western bypass:

- leaves the Pacific Highway south of Grafton;
- crosses the Orara Way;
- crosses the Gwyder Highway; and
- joins the Summerland Way at Mountain View north of Grafton.

Similar to the eastern bypass, overpasses and underpasses would be provided where the western bypass crosses local roads.

There are no significant geotechnical constraints on the western bypass of Grafton.

(b) Grafton to Casino

The link is 74.5km in length and commences at Mountain View north of Grafton and then follows the alignment of Summerland Way to a point just south of Casino. The small village of Whiporie would require a bypass. This link is common to both inland corridor alternatives.

It would be proposed to build a new two-lane carriageway next to the existing roadway and rebuild the existing two-lane road as the other carriageway. Sections of the existing roadway would need to be realigned to achieve the design standards described in Section 3.1

For the Grafton to Casino link along the Summerland Way, the route is situated within undulating topography of sedimentary rocks of the Clarence-Morton basin. The alignment may intersect basalt ridges in the northern part of this section, with similar constraints as noted for the Alstonville Plateau. However, the remainder of this section would not have significant geotechnical constraints.

(c) Casino to Tyagarah

Two alignments have been identified for this section. **Figure 3-2** shows the location of the inland alternatives. **Appendix D** provides a longitudinal section of both alternatives.

Alternative A (proposed by the Member for Ballina) is 69.2km in length. It would start 13km south of Casino and head in a general north-east direction to bypass Casino to the east and Lismore to the north-west. The alternative would cross the upper floodplain of the Richmond River and would require a 1.3km long tunnel through the escarpment to the west of Lismore. It would then continue in a north-east direction towards Bangalow following close to the communities of Bexhill, Clunes and Bangalow, rejoining the Pacific Highway through a new route involving a 0.8km long tunnel through the escarpment at St Helena. The short section of the link from Ewingsdale to Tyagarah would follow the existing four-lane divided Pacific Highway. A further 0.8km long tunnel would be required to the north of Lismore under Dunoon Road near Modanville, west of Bexhill.

Four possible grade-separated interchanges would be located where Alternative A:

- leaves the Summerland Way south of Casino;
- crosses the Lismore-Kyogle Road, providing a western access to and from Lismore;
- crosses the Lismore-Bangalow Road near Bexhill, providing an eastern access to and from Lismore; and
- rejoins the Pacific Highway at the existing interchange at Ewingsdale, which would require significant upgrading so as to provide effective links to Byron Bay, the existing Pacific Highway and Alternative A.

Alternative B (proposed by the Community Alliance for Road Sustainability) is 79.4km in length and would start closer to Casino to limit the crossing of the Richmond River floodplain. It would generally follow in the same direction as Alternative A, but would travel further to the north in much higher terrain to rejoin the Pacific Highway at Tyagarah. Two major tunnels would be required, including a 1.1km long tunnel near Modanville and a 0.6km long tunnel through a saddle in the St Helena escarpment at the small village of Coorabell.

Four possible grade-separated interchanges would be located where Alternative B:

- leaves the Summerland Way south of Casino;
- crosses the Lismore-Kyogle Road, providing a western access to and from Lismore;
- crosses the Lismore-Nimbin Road, north of Lismore, providing a northern access to and from Lismore; and
- rejoins the Pacific Highway at Tyagarah.

Overpasses and underpasses would be provided where both alternatives cross local roads.

Both alternatives involve a number of long tunnels with two of the long tunnels on Alternative A having gradients of between 5% and 6%. Such long tunnels introduce a degree of complexity to the construction and operation of a project, including the excavation method through varying geological formations, tunnel structure, treatment of vehicle emissions and safety systems.

Another complexity would be managing the risk associated with dangerous goods. Such vehicles may be prevented from using the alternatives and would then continue to use the Pacific Highway.

The effect of long climbs on average speeds would be expected to be more significant on Alternative B than Alternative A, particularly for heavy vehicles. (Refer **Appendix D** for a comparison of both alternatives). This would increase the travel time and operating costs for these vehicles and potentially reduce the attractiveness of such an inland route for these vehicles as they prefer routes which provide travel time and cost savings.

Both alternatives between Casino and Tyagarah are predominantly contained within the rocks of the Lismore Basalt, which forms the Alstonville Plateau. The basalt was formed from successive lava flows with intervening periods of weathering and soil formation. This has resulted in variations in and between layers in strength, weathering, fracturing and permeability. The plateau is dissected by the floodplains of the Richmond River and tributaries. The plateau comprises low hills dissected by moderately deeply incised gullies and valleys.

The alternatives would require a combination of deep cuttings, tunnels and high embankments. High strength basalt layers would require drill and blast techniques for excavation. Secondary lining and waterproofing would also be required due to the variable strength of the basalts and the complexity of the hydrogeology.

The variable nature of the basalts would make deep excavation susceptible to slope instability. Deep cuttings are likely to require significant engineering support and/or flat batters to maintain stability.

The northern extremity of the area contains steep escarpments of basalts overlying lower sedimentary units. The escarpment is prone to slope instability and landslides.

The Richmond Valley floodplain in the Casino to Lismore section of Alternative A is assessed as being predominantly alluvial and it is unlikely that it would be a major constraint to road construction with respect to embankment stability and/or settlement.

The key physical and engineering features and attributes of both alternatives are outlined in **Table 3-1**.

TABLE 3-1: COMPARISON OF INLAND ALTERNATIVES – PHYSICAL AND ENGINEERING FEATURES

FEATURE	INLAND ALTERNATIVES			
	Alternative A		Alternative B	
	(via Grafton East Bypass)	(via Grafton West Bypass)	(via Grafton East Bypass)	(via Grafton West Bypass)
Start point	Wells Crossing, 25.7km south of Grafton			
End point	Tyagarah, 2.5km north of the Byron Bay turn-off			
PHYSICAL AND ENGINEERING FEATURES				
Length of corridor (km)	183	191	190	198
Highest point above sea level with tunnels (m)	110		180	
Length of route in flood prone land (km)	21.1	9.1	12.2	0.2
Grade:				
Length greater than 6% (km)	Nil		Nil	
Length greater than 4.5% (km)	1.6		9.2	
Earthworks:				
Quantity of cut (million m ³)	17.3	19.1	24.1	25.9
Deepest cutting with tunnels (m)	36		46	
Quantity of fill (million m ³)	13.2	14.4	17.6	16.4
Highest embankment (m)	25		33	
Major structures:				
Tunnels (number / total length)	3 / 2.9		2 / 1.7	
Major bridging (km > 30 metres)	5.7	3.3	3	0.6
Grade separated interchanges (number)	7	9	7	8
Road underpasses / overpasses (number)	44	51	37	44
Ability to construct in stages	Limited as Grafton Bypass and Casino to Tyagarah links would require opening to traffic at the same time and the pavement on the Summerland Way link from Grafton to Casino would require strengthening at an early stage after opening to carry heavy vehicles.			
FUNCTIONAL PERFORMANCE				
Travel time (mins)	106	110	109	113

3.2.2 Traffic and transport

In order to assess the viability of the alternatives, both from the point of view of whether they achieve the desired transport objectives for the north coast of New South Wales and beyond, and also whether they provide an acceptable economic return on the investment required, it is necessary to identify the volume of traffic using or expected to use the options. This assessment quantified the traffic that an inland corridor via the Summerland Way would carry, including traffic attracted currently using the Pacific Highway.

Current traffic volumes for both heavy and light vehicles on the north coast road network were reviewed to re-assign traffic likely to use the two inland corridor alternatives. The steps involved:

- reviewing the modelling undertaken for the *North Coast Road Strategy – Final Technical Report (RTA, 1992)* and in particular the working paper *North Coast Corridor - Travel Forecasting Final Report (RTA, 1991)*;
- comparing the forecast above with actual traffic data published in *Traffic Volume Data 2004 - Hunter and Northern Regions (RTA, 2005)* to test the accuracy of those forecasts and hence the validity of the conclusions of the *North Coast Road Strategy* report; and
- re-assigning Pacific Highway traffic based on various origin and destination surveys undertaken as part of route development studies for the Pacific Highway along the coastal corridor between Wells Crossing (south of Grafton) and Tyagarah.

(a) Review of modelling for the North Coast Road Strategy

Under the *North Coast Road Strategy – Final Technical Report*, travel forecasting considered:

- population and land use and predicted changes in 82 different zones in 8 'sectors' between Sydney and Brisbane;
- a network of roads connecting the zones and the conditions along each link in that network.
- available traffic data and results of commissioned traffic counts;
- roadside interviews with drivers about origin, destination and trip purpose; and
- interviews with freight operators, local government officers and Department of Planning staff.

The relevant findings regarding traffic from the *North Coast Road Strategy - Final Technical Report* follow.

- Although the Pacific Highway is widely assumed to function mainly as a through route for long distance travel, in fact the vast majority of travel is local or regional in character. The traffic study found that in 1990 only around 1400 trips per day from south of Newcastle to north of Tweed Heads.
- With the low numbers of long distance through vehicles, alternative routes that only cater for long distance traffic (such as the Summerland Way) are not expected to attract significant traffic numbers and hence would not have a major impact on other routes (such as the Pacific Highway) nor would they generate a good return on investment.
- Long distance freight uses the Pacific and New England Highways in roughly equal proportions (in 1990) and improvements to one or other route would result in a shift in this proportion.

The *North Coast Road Strategy – Final Technical Report* also evaluated a route (known as **Network Option C**) that would follow the Summerland Way north of Grafton, bypasses Casino and Lismore and rejoins the Pacific Highway near Bangalow. The reasoning at the time was that this route could provide better access to Lismore (than the Pacific Highway), supported Casino and its potential role as a rail/road interchange, and was reasonably achievable.

The conclusions regarding this route at the time were that while it would support development of Lismore and Casino it would:

- not attract sufficient traffic from the Pacific Highway to justify its cost;
- provide no overall improvement in travel conditions except for local and regional traffic between Casino and Bangalow;
- divert necessary funding from the Pacific Highway; and
- not attract enough traffic to justify its construction.

It should be noted that traffic forecasting was based on only nominal improvements being made to the road network (including the Pacific Highway). Since the report, there has been significant improvement to the Pacific Highway and resultant traffic changes, the main ones being the opening of the entire Pacific Highway to B-Double use and the shift of long distance freight vehicles from the New England Highway to the Pacific Highway. These network changes need to be considered in any comparison of the forecasts to actual traffic.

(b) Comparison of forecasts with actual traffic data

The predicted traffic flows from the *North Coast Road Strategy – Final Technical Report* were based on a number of population growth scenarios. These ranged from low growth scenarios of an additional 100,000 persons on the north coast by 2016, to high growth scenarios of 350,000 additional persons by 2016.

Between the 1991 and 2001 censuses, the population within the study area has increased by 86,373. Assuming the growth continues at the same rate, the north coast population would have increased between 1991 and 2016 by around 215,000, half way between the upper and lower bounds of population increase examined in development of the strategy. This increase is very close to two of the scenarios tested, which were for an increase of 200,000 persons, but with growth distributed differently (scenarios F2 and F5).

Figure 3-3 compares the traffic volumes predicted on specific links for 2016 for the two inland alternatives with the current traffic volumes on those links. It should be noted that the 'predicted' volumes represent inter-centre volumes and are not directly comparable in most cases with traffic volumes collected at a point along the link. Actual volumes on those routes would be higher to varying degrees considering traffic joining or leaving those links between centres (for example, the figure for the Lismore to Ballina link is only a fraction of the actual use measured on the Bruxner Highway to the west of the Pacific Highway, as it does not consider traffic to or from Goonellabah or Alstonville).

Observations of this comparison shown in **Figure 3-3** are that:

- traffic volumes predicted for 2016 for the Summerland Way between Grafton and Casino exceed the measured 2004 traffic volumes (which is an expected outcome);
- the traffic volumes measured on the Pacific Highway between Grafton and Ballina in 2004 exceeds the volume predicted by the study for 2016, (i.e. growth on the Pacific Highway has been greater than predicted);
- traffic predicted for Casino to Lismore is slightly lower than the actual volumes measured in 2004; and
- there were no predictions made for the Lismore-Bangalow Road.

It is concluded that the traffic growth has been greater on the Pacific Highway. There is no reason to expect any change in this trend, in view of the expected population growth along the eastern seaboard of Australia.



Source: North Coast Road Strategy, RTA, 1992.

Figure 3-3: Comparison of predicted traffic flows with actual flows (year 2016)

(c) Traffic reassignment for the inland corridor alternatives

Origin and destination surveys were carried out for a number of planning projects for the upgrading of the Pacific Highway between Wells Crossing and Tyagarah. These surveys demonstrate the amount of traffic that is local, and the amount of through traffic between Wells Crossing and Tyagarah. Origin and destination surveys were undertaken between October and December 2004 on the following highway sections:

- Wells Crossing to Iluka Road.
- Iluka Road to Woodburn.
- Woodburn to Ballina.
- Tintenbar to Ewingsdale.

Table 3-2 summarises through vehicles compared to total vehicle volumes together with an assessment of the potential number of vehicles that would use an alternative inland corridor (via Summerland Way).

TABLE 3-2: SUMMARY OF ASSESSED TRAFFIC VOLUMES (2004 YEAR) ON PACIFIC HIGHWAY WELLS CROSSING TO EWINGSDALE

PROJECT & LOCATION	ASSESSED DAILY TRAFFIC VOLUMES (2004 YEAR)								
	All vehicles			Light vehicles (LV)			Heavy vehicles (HV) – rigid and articulated trucks		
	Annual Average veh/day	Through Vehicles Veh/day	% of all veh	Annual Average LV/day	Through LV Veh/Day	% of LV	Annual Average HV/day	Through HV Veh/Day	% of HV
WELLS CROSSING TO ILUKA ROAD PLANNING PROJECT									
South of Grafton	8,220	2,210	27%	6,590	1,380	21%	1,630	830	51%
North of Grafton	7,600	2,210	29%	6,040	1,380	23%	1,560	830	53%
North of Iluka Road	6,950	2,210	32%	5,330	1,380	26%	1,620	830	51%
Conclusions:									
Approximately half of the heavy vehicles using this section of the Pacific Highway are through vehicles between Wells Crossing and north of Iluka Road and could be attracted to an alternative inland corridor. The number (1,380 vehicles/day) and percentage (less than 30%) of 'through' light vehicles as part of total traffic is quite low.									
There are additional vehicles making trips between Grafton (and environs) and the Pacific Highway, north of Iluka Road. The survey identified 1,740 light vehicles and 280 heavy vehicles per day in this category.									
Therefore the total of vehicles from this section that could potentially use an alternative inland corridor is 3,120 light vehicles (i.e. 1,380 + 1,740) and 1,110 heavy vehicles (i.e. 830 + 280), totalling 4,230 vehicles per day.									
ILUKA ROAD TO WOODBURN PLANNING PROJECT									
North of Iluka Road	6,940	6,550	94%	5,380	not known	not known	1,560	not known	not known
North of Gap Road	7,150	6,550	92%	5,570	not known	not known	1,580	not known	not known
Conclusions:									
A very high proportion of traffic using this section is through traffic, as the population centres near this section are few and small in any case. For the purposes of this assessment, it has been assumed that all (100%) traffic on this section is through traffic.									
WOODBURN TO BALLINA PLANNING PROJECT									
North Woodburn	7,300	5,800	79%	5,750	4,540	79%	1,550	1,260	81%
Broadwater	8,600	5,800	67%	6,960	4,540	65%	1,640	1,260	77%
Wardell Bridge	8,600	5,800	67%	6,980	4,540	65%	1,620	1,260	78%
South of Bruxner Hwy	9,700	5,800	60%	8,020	4,540	57%	1,680	1,260	75%
Conclusions:									
The results demonstrate a relatively high proportion of both light and heavy vehicles on this section are 'through' vehicles. This is expected given that the centres of Woodburn, Evans Head, Broadwater and Wardell are not major centres.									
TINTENBAR TO EWINGSDALE PLANNING PROJECT									
South of Bangalow	11,454	2,942	26%	9,621	1,442	15%	1,833	1,500	82%
South of Ewingsdale	16,463	2,942	18%	14,158	1,442	10%	2,305	1,500	65%
Conclusions:									
The results for this section are similar to that for the Wells Crossing to Iluka Road section in that only a small proportion of light vehicles are 'through' vehicles. However, the proportion of through heavy vehicles is higher.									

While the four origin and destination surveys do not directly provide information on the number of vehicles that would be attracted to use an inland corridor as an alternative to the Pacific Highway, it is apparent that the vehicles that could use an inland corridor would be less than the ‘through’ vehicles recorded for any one of the origin and destination studies above. This is because a proportion of those vehicles would have either an origin or destination beyond the individual survey bounds but within the Wells Crossing to Ewingsdale length. Other destinations within, or near, this length include the traffic generating centres of Grafton, Lismore and Ballina and lesser centres such as Yamba, Woodburn, Evans Head, Broadwater and Coraki.

Two approaches have been taken to assess the traffic volumes that could potentially be attracted to the inland alternatives. Based on the information in **Table 3-3**, upper and lower bounds of traffic that could use the inland route have been identified.

- **Upper bound approach**

An upper bound is derived by adopting the traffic volumes for the planning section of the Pacific Highway with the least number of through vehicles and using those vehicle numbers as being representative of the through vehicles that could be attracted to an inland corridor.

From **Table 3-3**, the Tintenbar to Ewingsdale project has the lowest number of through light vehicles at 1,442 per day.

Also from **Table 3-3**, the Wells Crossing to Iluka Road project has the lowest number of through heavy vehicles north of Grafton with 1,110 vehicles per day. This figure is made up of 830 vehicles that use the Pacific Highway between Wells Crossing and Iluka Road and a further 280 that used the highway between Grafton and Iluka Road.

This is considered to be an upper level as it gives no consideration for the through light vehicles identified that would actually have an origin or destination outside the section between Bangalow and Grafton or “through” heavy vehicles that have an origin/destination between Iluka Road and Ewingsdale.

- **Lower bound approach**

A lower bound is derived by applying the proportion of through vehicles from each of the remaining surveys to the “through” vehicles identified in the upper bound assessment. This is on the basis that the through vehicles on one survey length would be equally distributed in the traffic stream on the next survey length. For example the 1,442 light vehicles counted at Ewingsdale would form part of the 6,980 light vehicles counted at Wardell, of which only 65% are through vehicles.

Applying information from **Table 3-3**, there are 1,442 through light vehicles immediately south of Bangalow. Of these 65% would pass through Wardell giving 937 through light vehicles between south of Wardell and south of Ewingsdale. Of these 937, 100% (assumed through vehicle proportion for the Iluka Road to Woodburn survey), would pass Iluka Road on their trips. Similarly, of this 937, 52% would pass north of Grafton on their trip giving 487 (say 500) through vehicles between south of Maclean (presumed to be Grafton as it is the major generator of traffic) and south of Ewingsdale.

Using the same approach for heavy vehicles, there are 1,110 heavy vehicles that travel through between Grafton and Iluka Road. Applying, as done for light vehicles, 100% for the proportion of through vehicles between Iluka Road and Woodburn, 78% at Wardell and 82% at Bangalow, the number of Grafton to Ewingsdale and visa versa through heavy vehicles is 710 (say 700).

The actual number of through vehicles could be lower than in the “lower bound” scenario above, but cannot be higher than the figures in the “upper bound” scenario.

Based on these two alternative approaches, the range of total daily traffic that could be attracted from the Pacific Highway to an inland corridor is between 1,200 and 2,552. This total daily traffic is estimated to comprise 500 to

1,442 light vehicles with 700 to 1,110 heavy vehicles. For the purpose of further analysis, a mid-point estimate of 1,900 total daily traffic (comprising 1,000 light vehicles and 900 heavy vehicles) has been adopted.

Based on this approach, **Table 3-3** provides an assessment of the maximum daily traffic volume for each link of the two inland alternatives being investigated.

TABLE 3-3: ESTIMATED TRAFFIC VOLUMES (2004 YEAR) ON INLAND ALTERNATIVES

INLAND ALTERNATIVE	LINK/ LOCATION	ESTIMATED MAXIMUM AVERAGE DAILY VEHICLES (vehicles/day in 2004 Year) ¹		
		Light vehicles	Heavy vehicles	Total vehicles
Alternative A	Grafton to Casino	2,000	1,030	3,030
	Casino to Lismore	4,220	1,220	5,440
	Lismore to Ewingsdale	4,220	1,150	5,370
Alternative B	Grafton to Casino	2,000	1,030	3,030
	Casino to Lismore	1,920	990	2,910
	Lismore to Tyagarah	1,970	970	2,940

Supporting note:

1. The estimated maximum average daily vehicles figures assume all through traffic (1,900 vehicles per day) that could divert from the Pacific Highway actually does divert.

The basis of reassignment for each link is:

(a) Grafton to Casino: This section of the inland alternatives is in the main, an upgrade of the existing Summerland Way, with bypasses of Grafton at the southern end and of Casino at the northern end. Traffic on this link would be made up of the existing traffic using the Summerland Way plus the through traffic that currently travel the Pacific Highway between Grafton and Ewingsdale/Tyagarah. Given this section of the Summerland Way carries 1,130 vehicles per day (1,000 light vehicles and 130 heavy vehicles), the maximum estimated total traffic using an inland alternative on this link is around 3,030 vehicles (2,000 = 1,000 existing + 1,000 transferred) light vehicles and 1,030 (130 existing + 900 transferred) heavy vehicles).

(b) Casino to Lismore: This section of the inland alternatives is to the east of Casino, on a new alignment. This new alignment is expected to attract traffic away from the Bruxner Highway between Lismore and Casino, as well as the traffic attracted from the Pacific Highway. Both proposed inland alternatives deviate to the east of Casino and to the north of Lismore, with potential connections at the Bruxner Highway east of Casino (for access to and from Casino) and on the Blakebrook and/or Dunoon roads (providing Lismore access).

For **Alternative A**, the travel distance between Lismore and Casino would be 0.4km longer than the existing Bruxner Highway route. For **Alternative B**, the travel distance would be over 5km longer than the existing Bruxner Highway. **Alternative B** would be less attractive for Lismore to Casino traffic than **Alternative A**. **Alternative B** may attract traffic between Tyagarah and Casino. Based on this analysis, it is estimated 70% and 20% of the 5,060 (4,600 light vehicles + 460 heavy vehicles) which travel between Lismore and Casino would use **Alternative A** and **Alternative B**, respectively. The estimated traffic flows on the alternative inland alternatives for this link are highlighted in the following table:

INLAND ALTERNATIVE	Light Vehicles/day			Heavy Vehicles/day			Total Vehicles/day		
	Through	Bruxner Hwy	Total	Through	Bruxner Hwy	Total	Through	Bruxner Hwy	Total
Alternative A	1,000	3,220	4,220	900	320	1,220	1,900	3,540	5,440
Alternative B	1,000	920	1,920	900	90	990	1,900	1,010	2,910

(c) Lismore to Ewingsdale: With the connections outlined above, **Alternative A** would be attractive to Lismore to Byron Bay local traffic as it would be 3km shorter than via the current Lismore-Bangalow Road. **Alternative B** would be less attractive to Lismore to Byron Bay local traffic as it is over 2km longer travelling via the Lismore-Bangalow Road and would involve 'doubling back' to the Byron Bay turnoff. In addition, it is expected only a small proportion of local traffic generated from the small villages along the Lismore-Bangalow Road would use the alternative inland corridors, particularly **Alternative B**. Based on this analysis, it is estimated 50% and 15% of the 6,950 (6,440 light vehicles + 510 heavy vehicles) which travel between Lismore and Casino would use **Alternative A** and **Alternative B**, respectively. The estimated traffic flows on the inland alternatives for this link are highlighted in the following table:

INLAND ALTERNATIVE	Light Vehicles/day			Heavy Vehicles/day			Total Vehicles/day		
	Through	Lismore-Bangalow	Total	Through	Lismore-Bangalow	Total	Through	Lismore-Bangalow	Total
Alternative A	1,000	3,220	4,220	900	250	1,150	1,900	3,470	5,370
Alternative B	1,000	970	1,970	900	90	990	1,900	1,040	2,940

	LINK/ LOCATION	ESTIMATED MINIMUM AVERAGE DAILY VEHICLES (vehicles/day in 2004 Year)		
		Light vehicles	Heavy vehicles	Total vehicles
Pacific Highway	North of Grafton	5,040	660	5,700
	Wardell	5,960	740	6,700
	South of Bruxner Highway	7,020	780	7,800
	South of Bangalow	8,621	933	9,554

The revised daily traffic flow on the Pacific Highway would reduce by the 1,900 (comprising 1,000 light vehicles and 900 heavy vehicles) to reflect the maximum number of through vehicles diverting to inland alternatives.

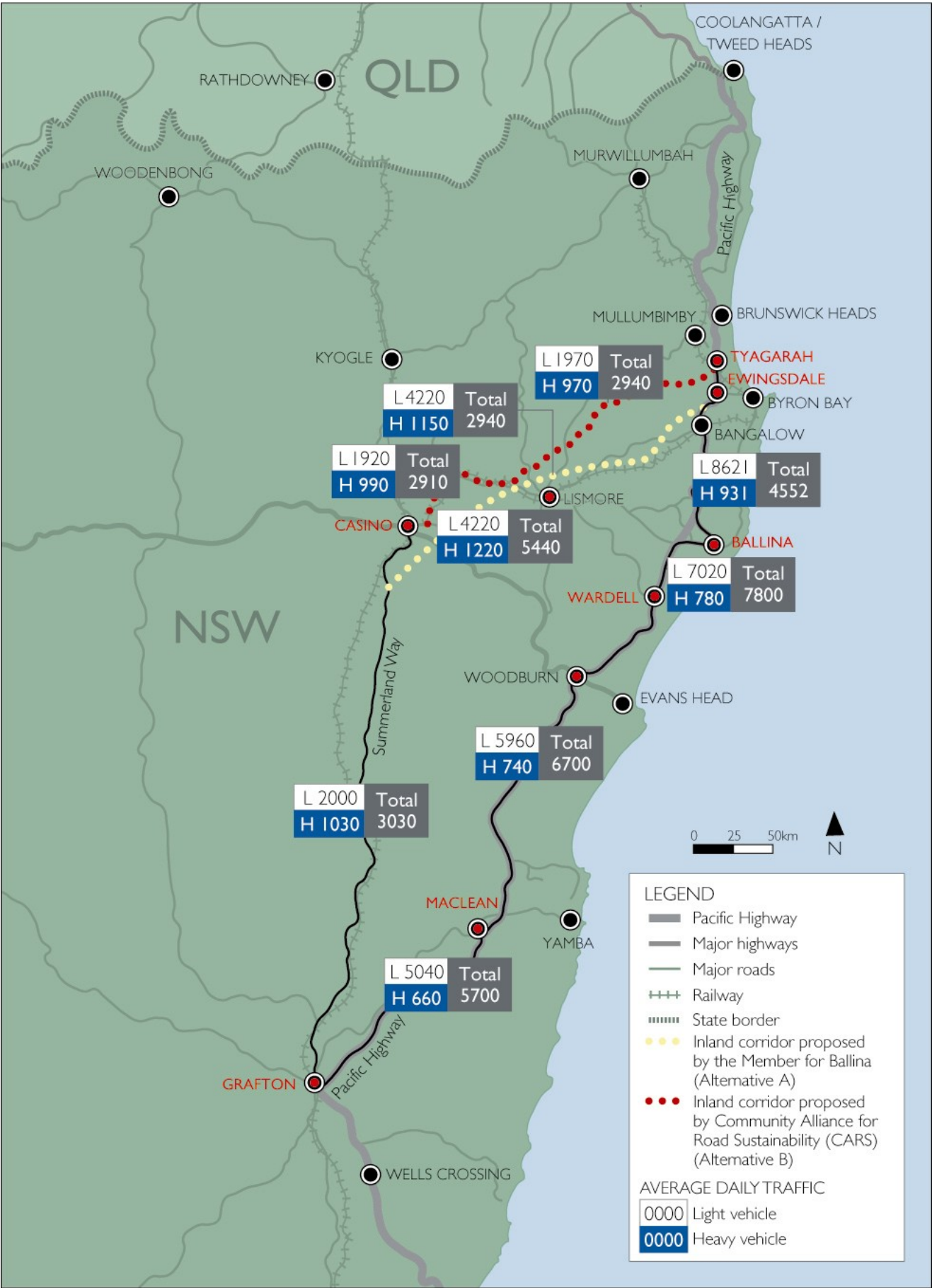


Figure 3-4: Estimated traffic volumes for inland alternatives and the Pacific Highway (from Table 3-3)

3.2.3 Human environment

Generally, an assessment of community impacts for highway projects requires community consultation with those communities and government agencies potentially benefiting from, and affected by, a proposal. However, likely community issues such as community cohesion, amenity effects, visual impact, access and movement patterns, land use and property impacts and effects on business, including agriculture, can often be identified in advance of community consultations through desktop assessment.

For those communities who live on or in close proximity to an inland corridor (which do not currently have major transport route), the key human environment issues are likely to be:

(a) Grafton bypass:

Both bypass alternatives of Grafton are located in the local government area of Clarence Valley. Grafton is the administrative and economic centre of the Clarence Valley and has a population of close to 19,000. Grafton is also located at the crossroads of the Pacific Highway, Gywdir Highway and Summerland Way and is an important rail head and freight centre for the region.

Both inland alternatives bypass the city of Grafton itself, but would have some amenity impacts on a number of outlying villages and suburbs.

The eastern bypass would pass largely through rural areas but would have some amenity impacts on a number of small villages at Swan Creek and Ulmarra on the southern bank of the Clarence River, Southgate on the northern bank and Trenayr and Mountain View where it rejoins the Summerland Way. The villages of Swan Creek and Ulmarra are located on the existing Pacific Highway and already experience high levels of road noise at night. For an eastern bypass, these villages would experience road noise from a different direction. Residences of Southgate would experience significantly higher noise levels than currently is the case due to the likely low existing background noise levels. Overall, the operational noise impacts would be expected to be less compared to the western bypass.

The western bypass would introduce new road traffic noise impacts to isolated and rural residential properties on the southern outskirts of Grafton as well as likely high operational road noise impacts on Fairways Estate and the eastern parts of the rural residential areas of Waterview Heights and Seelands. The western bypass would also have large noise impact on the urban investigation area approximately 7km north of Junction Hill and Mountain View.

Both bypasses would involve significant deviations around the city with access via grade-separated interchanges at key junctions of major highways. Local road connections would be maintained by building overpasses or underpasses. Both bypasses would remove existing Summerland Way traffic from the central business district and inner suburbs of Grafton (which is around 1,130 vehicles per day) but are not expected to significantly improve local traffic movements across the Clarence River between South Grafton and the central business district.

In terms of agricultural impacts, the eastern bypass would cross the fertile floodplains of the Clarence River, which is used for both grazing and agriculture.

(b) Grafton to Casino:

Both inland alternatives would generally follow the existing alignment of the Summerland Way.

The majority of holdings are rural residential and those dwellings close to the existing Summerland Way are already likely to have some exposure to road traffic noise impacts. However, the large increase in heavy vehicles particularly during the night periods would likely result in significant increases above existing traffic noise levels. Both inland alternatives would deviate approximately 250m to the west of

Whiporie and would be likely to have operational noise impacts on this village, as the traffic noise would come from a different direction.

The highway would be upgraded to two lanes in each direction where property and local road accesses would be rationalised to at-grade intersections at specific locations.

In terms of agricultural impacts, both inland alternatives traverse significant lengths of State Forest and grazing land.

(c) **Casino to Tyagarah:**

Both inland alternatives are located in the local government areas of Richmond Valley, Lismore and Byron Bay. Lismore is the major regional centre for the area and is supported by a major town at Casino and surrounding catchments of rural villages and settlements.

The region's economy is largely based on service industries, manufacturing, construction and agriculture. It is serviced by significant regional roads including the Bruxner Highway, Summerland Way and the Lismore-Bangalow Road.

In terms of amenity impacts:

- Alternative A would pass to the south east of Casino and north-west of Lismore through rural land but close to villages of Spring Grove, Tuncester, Bexhill and Clunes before rejoining the Pacific Highway at Ewingsdale. This inland alternative would introduce significant new noise and visual impacts to these villages as well as rural residential dwellings. There would also be new noise impacts on North Lismore, Woodlawn, Bexhill, Clunes and Binna Burra. Dwellings impacted would experience significantly higher noise levels than currently is the case due to the likely low existing background noise levels.
- Alternative B is closer to Casino than Alternative A but located further north to lessen the impact on villages. Given the low background noise levels that currently exist (particularly at night), there would be new traffic noise impacts to rural residential properties at South and South Eastern and North Casino as well as the villages of Fernside, Leychester, Modanville, Rosebank, Federal, Coorabell, Myocum and Tyagarah before it rejoining the Pacific Highway at Tyagarah. Inland Alternative B poses particularly large traffic noise impacts for the community of Modanville as the alignment passes through the outskirts of this community and Coorabell where it passes through a saddle in the escarpment.

Alternative A would impact on the identified new release areas to the west and north of Lismore.

As both inland alternatives would involve deviations away from the existing regional road network, they would be built to a highway motorway style with access being restricted to grade separated interchanges to service Casino and Lismore. Local road connections would be maintained by building overpasses or underpasses.

Figure 3-5 highlights the potential impacts of both inland alternatives on prime agricultural land.

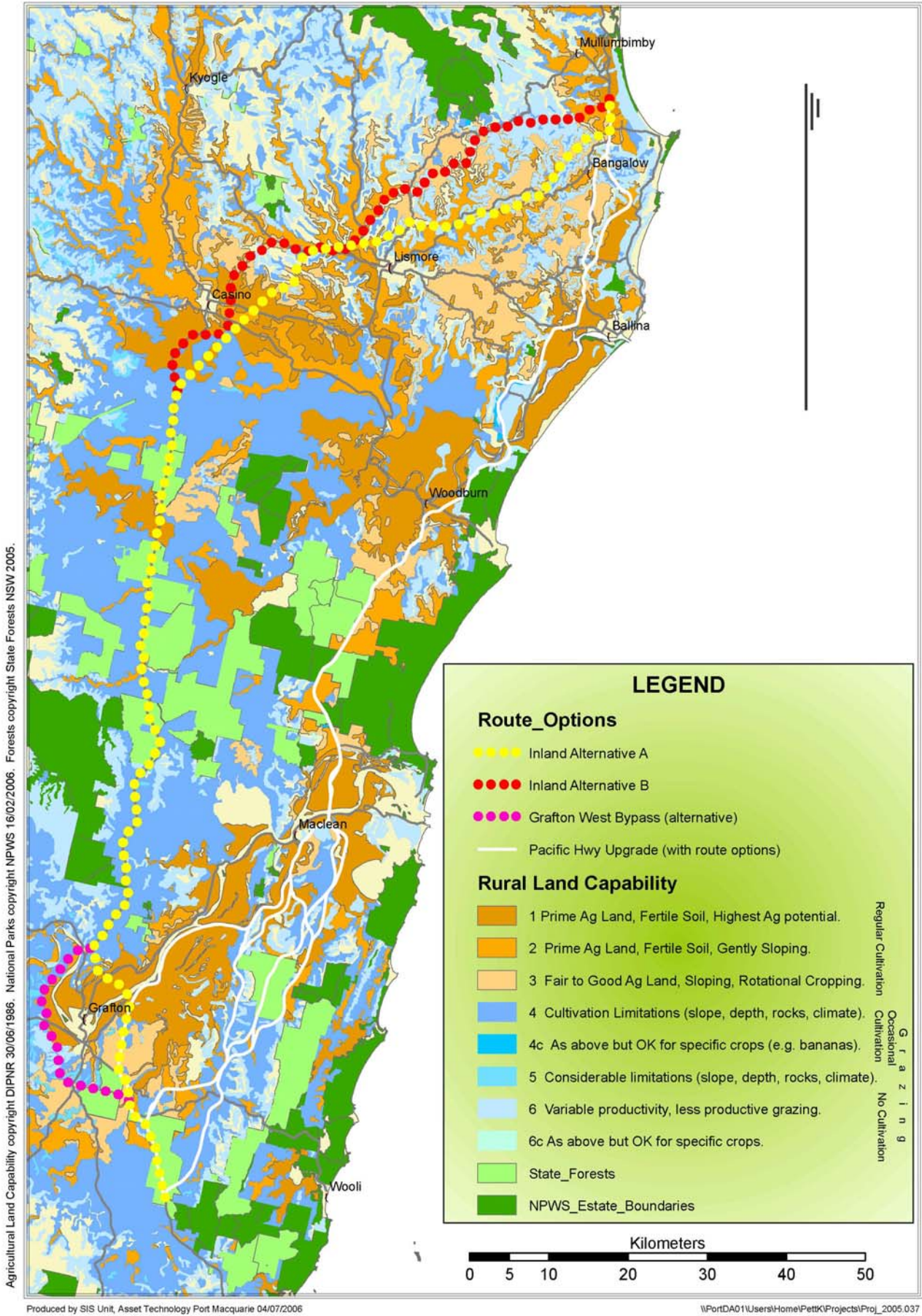


Figure 3-5: Impacts on agricultural land

The desktop assessment has been undertaken of both inland alternatives to determine the impacts on a number of properties from which land is required, amenity impacts (i.e number of villages/towns/cities within two (2) km of the inland alternatives and dwellings within 300 metres) and impact on prime agricultural land. **Table 3-4** provides a summary of the assessment for each of the inland alternatives.

TABLE 3-4: COMPARISON OF INLAND ALTERNATIVES - HUMAN ENVIRONMENT

FEATURE	INLAND ALTERNATIVES			
	Alternative A		Alternative B	
	(via Grafton East Bypass)	(via Grafton West Bypass)	(via Grafton East Bypass)	(via Grafton West Bypass)
PROPERTY IMPACTS				
Properties from which land is required (number)	487	483	568	564
AMENITY				
Villages/towns/cities within 2km of route (number)	13	13	16	16
Dwellings within 300m of proposed route (number)	106	108	183	185
IMPACT ON AGRICULTURAL LAND				
Impact on prime agricultural land (km)	47	39	51	48

3.2.4 Natural environment

A desktop assessment has been undertaken of both inland alternatives to determine the impacts on areas of environmental significance, native vegetation habitat, State Forest, wildlife corridors, and waterway crossings. This preliminary assessment is based on data sourced from Department of Environment and Conservation, NSW State Forests and the RTA's geographic information systems. **Table 3-5** provides a summary of the assessment for each of the inland alternatives.

TABLE 3-5: COMPARISON OF INLAND ALTERNATIVES - NATURAL ENVIRONMENT

FEATURE	INLAND ALTERNATIVES			
	Alternative A		Alternative B	
	(via Grafton East Bypass)	(via Grafton West Bypass)	(via Grafton East Bypass)	(via Grafton West Bypass)
Impact on areas of environmental significance: ¹				
National parks / nature reserves traversed (km) ²	0	0	0	0
SEPP 14 wetlands traversed (km)	0	0	0	0
Native vegetation habitat traversed (km)	63	64	67	68
State Forest traversed (km) ¹	49	50	49	50
Fauna corridors traversed (number)	18	19	20	21
Waterways crossed (number)	33	29	29	25

Supporting notes:

1. Based on potential impact in distance.
2. Inland alternative would be shifted to avoid any national parks/nature reserves.

In addition, a preliminary field investigation was undertaken on the vegetation issues likely to be encountered along each of the inland alternatives. Refer **Appendix B: *Vegetation Issues on Two Corridor Options Involving the Summerland Way and Connection Back to the Pacific Highway*** (Ecos Environmental Pty Ltd, April 2006).

In terms of vegetation and endangered ecological communities (EEC's), the key natural environment issues are:

- The greatest impact on native vegetation would be in the productive lowland forests along the Summerland Way between Grafton and Casino, which it is understood represents by far the largest area of productive lowland ecosystem remaining on the upper North Coast.
- The main EEC that would be affected by the inland alternatives is 'Subtropical Coastal Floodplain Forest' and there would be some affect on small remnants of the EECs 'Subtropical Rainforest on Floodplain', 'Lowland Rainforest' (north coast bioregion), 'Freshwater Wetland' and 'Swamp Sclerophyll Forest'.
- Extensive clearing of the EEC 'Subtropical Coastal Floodplain Forest' (as well as spotted gum-ironbark forest) would be required within the road reserve along the Summerland Way between Whiporie and Leeville.
- A large population of the threatened species slaty red gum (*Eucalyptus glaucina*) occurs in the road reserve between Myrtle State Forest and Leeville.
- At least 30 threatened plant species potentially occur in vegetation types intersected by the inland alternatives which generally are likely to occur in small populations.
- The invasive roadside grass pigeon grass or setaria (*Setaria sphacelata*), which is prevalent closer to the coast, appears to be absent from the Summerland Way.
- Further refinements to each of inland alternatives could be made to reduce the impact. for example, a more easterly crossing of the range of hills dividing the Back Creek Valley (west of Lismore) from the Richmond floodplain (Alternative A) would have a less fragmenting effect on the range ecosystem.
- Between Casino and the Pacific Highway, Alternative A has a lower ecological impact than Alternative B in terms of forest clearing, potential impact on threatened plant populations and fragmentation of the Back Creek Range.
- There are a significant number of koala records from the proposed inland alternatives, particularly the Summerland Way link, and a large amount of poorly surveyed, good quality koala habitat exists close to the inland corridor. The increased threat of road strike due to greater traffic volume and the barrier represented by a widened road would be key management issues for this species.

Given the extent of impact on vegetation and natural habitat, it is expected there would be similar significant impacts on threatened fauna species.

3.2.5 Project cost

Preliminary project cost estimates for both inland alternatives are contained in **Appendix C**.

The estimates have been prepared in accordance with the *RTA Project Estimating Manual (December 2001)*, which sets out the methodology and procedures for preparing strategic, concept and detailed estimates of cost and provides guidance on the selection of appropriate contingencies for various stages of development of a project and the identified risks. The RTA specified format for a strategic cost estimate divides the project cost into six major cost categories:

1. Project development (covering the work required to obtain project approval).
2. Investigation and design (covering design and documentation to prepare the project for construction).
3. Property acquisitions.
4. Public utility adjustments.
5. Construction (typically this category often accounts for 80% to 90% of a major rural road project with the main elements being earthworks, pavements, structures and drainage and other minor elements such as environmental works, site management during construction, client representation etc).
6. Handover (covering project completion and the handing over of completed assets to the responsible maintaining Authority).

Table 3-6 and **Table 3-7** summarise the estimated project cost in today's dollars (\$2006) for Alternative A and Alternative B, for the shortest route via an eastern bypass of Grafton or the longest route via a western bypass of Grafton. Costs assume a combination of part motorway style (Class M) and part arterial style (Class A) highway.

TABLE 3-6: ESTIMATE OF COST (\$2006) FOR ALTERNATIVE A

LINK	DESIGN STANDARD / ESTIMATED COST (\$2006)			
	Highway standard (km)			Project cost (\$M)
	Class M	Class A	Total	
SHORTEST INLAND CORRIDOR: WELLS CROSSING TO TYAGARAH via GRAFTON EAST BYPASS				
Link A I (Grafton East Bypass)	36.3	-	36.3	759
Link B (Grafton to Casino)	-	74.7	74.7	644
Link C I (Casino to Ewingsdale)	70.2	-	70.2	1,790
Link D (Ewingsdale to Tyagarah)	-	2.4	2.4	-
Link C2 (Casino to Tyagarah)	-	-	-	-
TOTAL	106.5	77.1	183.6	3,193
LONGEST INLAND CORRIDOR: WELLS CROSSING TO TYAGARAH via GRAFTON WEST BYPASS				
Link A I (Grafton West Bypass)	44.4	-	44.4	694
Link B (Grafton to Casino)	-	74.7	74.7	644
Link C I (Casino to Ewingsdale)	70.2	-	70.2	1,790
Link D (Ewingsdale to Tyagarah)	-	2.4	2.4	-
Link C2 (Casino to Tyagarah)	-	-	-	-
TOTAL	114.6	77.1	191.7	3,128

TABLE 3-7: ESTIMATE OF COST (\$2006) FOR ALTERNATIVE B

LINK	DESIGN STANDARD/ ESTIMATED COST (\$2006)			
	Highway standard (km)			Project cost (\$M)
	Class M	Class A	Total	
SHORTEST INLAND CORRIDOR: WELLS CROSSING TO TYAGARAH via GRAFTON EAST BYPASS				
Link A I (Grafton East Bypass)	36.3	-	36.3	759
Link B (Grafton to Casino)	-	74.7	74.7	644
Link C I (Casino to Ewingsdale)	-	-	-	-
Link D (Ewingsdale to Tyagarah)	-	-	-	-
Link C2 (Casino to Tyagarah)	79.4	-	79.4	1,619
TOTAL	115.7	74.7	190.4	3,022
LONGEST INLAND CORRIDOR: WELLS CROSSING TO TYAGARAH via GRAFTON WEST BYPASS				
Link A I (Grafton West Bypass)	44.4	-	44.4	694
Link B (Grafton to Casino)	-	74.7	74.7	644
Link C I (Casino to Ewingsdale)	-	-	-	-
Link D (Ewingsdale to Tyagarah)	-	-	-	-
Link C2 (Casino to Tyagarah)	79.4	-	79.4	1,619
TOTAL	123.8	74.7	198.5	2,957

The following comments are made in relation to the estimates:

(a) Strategic cost estimates

The estimated cost of Alternative A is between \$3.15 billion and \$3.2 billion (\$2006), depending on which bypass of Grafton is selected. The cost of Alternative B is estimated at \$3 billion (\$2006).

The above costs amount to a range of between \$15.8 million and \$18.5 million per kilometre (including contingencies) over the full length of both inland corridors. **Appendix C** and **Table 3-9** provide more detailed cost per kilometre rates on a link by link basis. These rates are consistent with the more recent upgrading projects currently under construction on the Pacific Highway as outlined in **Table 3-8**.

TABLE 3-8: SUMMARY OF KILOMETRE RATES FOR RECENT PACIFIC HIGHWAY UPGRADING PROJECTS

Project	Length (km)	Description	Date of Contract Award	Estimated Cost (\$M)	Cost per road km (\$M/km)
Brunswick Heads to Yelgun	8.7km	Upgrade of existing highway in urban/rural area to Class M standard involving 26 bridges including major crossings of Brunswick River, two major interchanges and extensive environmental measures.	February 2005	256	29.4
Bonville Upgrade	9.6km	Deviation to Class M standard in an semi-urban environment with two major interchanges and significant environment measures	May 2006	245	25.5
Karuah to Bulahdelah (Section 1)	11km	Upgrade of existing highway in a rural environment to a Class A standard.	June 2004	114	10.4
Bundacree Creek to Possum Brush	9.7km	Upgrade of existing highway in a rural / semi-urban environment to a Class A standard with grade separated interchange at Nabiac.	May 2004	115	11.9

(b) Contingency levels

The RTA’s *Estimating Guidelines* require a risk-based approach in the preparation of cost estimates. Individual project elements within an estimate are required to be increased by an appropriate contingency cost to allow for risk factors including variations in quantities/rates used to calculate the base cost. This contingency allowance is generally expressed as a percentage of the base cost.

For the strategic or preliminary concept stage of a project’s development, the RTA’s contingency allowance as a proportion of the total base cost should in the range from 35% to 50%. However, the contingency allowance for individual project elements may vary, depending on the level of information available and the assessed risks.

TABLE 3-9 is an extract from the independent estimator’s report showing the contingency level for the various links as well as the \$/km for the individual links.

TABLE 3-9: SUMMARY OF CONTINGENCY LEVELS AND KILOMETRE RATES FOR INDIVIDUAL LINKS OF THE INLAND ALTERNATIVES

LINK	LENGTH (km)	ESTIMATE (including contingency) (\$1,000)	COST PER ROAD KILOMETRE (\$M/km)
Link A1 (Grafton East Bypass)	36.3	\$759,413	\$20.9
Link A2 (Grafton West Bypass)	44.0	\$693,835	\$15.8
Link B (Grafton to Casino) – Class A/M	74.7	\$644,448	\$8.6
Link C1 (Casino to Ewingsdale – Member for Ballina, Refined)	70.20	\$1,790,220	\$25.5
Link C2 (Casino to Tyagarah – CARS, Refined) – Class M	79.4	\$1,619,238	\$20.4

Source: *Report on Cost of Inland Corridors (Refined) for the Pacific Highway Upgrading*, MacDonald International, June 2006.

The strategic cost estimates for the inland corridors have contingency allowances of between 35% and 65% with an overall contingency of between 49% and 51% being added to the overall cost of each inland corridor option.

The relatively high level of contingency is normal given the preliminary nature of the investigations completed to date. The construction element of the strategic estimate ranges from 82% to 89% of the total cost estimate and where the RTA has collected any detailed survey or geotechnical information. Construction items depend on geotechnical and survey information such as the major items of earthworks and drainage and therefore have a 50% contingency with tunnels slightly higher at 65%. Other major construction items such as bridges and pavements are not as sensitive to geotechnical and survey details and accordingly have attracted contingencies of 45% and 35% accordingly.

(c) Improvements to existing Pacific Highway

Section 3.2.2 notes the Pacific Highway would still carry significantly more traffic than an inland corridor. If Alternative A or Alternative B was developed as an alternative to the Pacific Highway, the existing two-lane Pacific Highway between Wells Crossing and Ewingsdale would require improvement (albeit to a lower standard) to maintain capacity and improve safety. The scope of the proposed improvements would comprise:

- maintaining the present two-lane highway between Wells Crossing (23.2km south of Grafton) and Bruxner Highway intersection (5.6km south of Ballina) with:
 - two-lane bypasses of South Grafton and the villages of Ulmarra, Woodburn and Broadwater;
 - improvements to the alignments on selected sections;
 - intersection improvements to selected intersections; and
 - installation of median wire rope to reduce the number of cross-over accidents between opposing traffic.

- upgrading the current two-lane highway between the Bruxner Highway intersection (6km south of Ballina) and Ewingsdale to a four-lane arterial style highway (Class A) along its present alignment except for a major bypass at Ballina and grade-separation of key intersections at the Bruxner Highway, at Cumbalum and Ross Lane.

Table 3-10 outlines the scope of improvements and an estimate of cost of \$970 million in \$2006.

TABLE 3-10: SCOPE AND ESTIMATE OF COST (\$2006) FOR LIMITED UPGRADING OF THE EXISTING PACIFIC HIGHWAY

SECTION	LENGTH (km)	SCOPE OF WORKS	ESTIMATED COST (\$M2006)
Wells Crossing to Bruxner Highway	146.9	Bypasses (two lanes): ¹	
		Grafton (2.5km @ \$10M/km)	25
		Ulmarra (3.5km @ \$10M/km)	35
		Woodburn (3.0km @ \$10M/km)	30
		Broadwater (5.0km @ \$10M/km)	50
		Realignment / reconstruction / widening of highway (two lanes):	
		Devils Pulpit (3km @ \$8M/km) ¹	24
		Other sections (5km @ \$8M/km) ¹	40
		Intersection improvements (8 @ \$1.5 million each) ¹	11
		Installation of median wire ropes including intersection upgrades 104km @ \$2.5M/km ²	260
Sub totals	146.9		475
Bruxner Highway to Ewingsdale	37.6	Four lane upgrades:	
		Ballina Bypass: Bruxner Highway to Ross Lane (12.6km @ \$26.3M/km) ³	331
		Ross Lane to Bangalow (11km @ \$8M/km) ⁴	88
		Bangalow to Ewingsdale (4.7km @ 16M/km) ⁴	75
Sub totals	37.6	Sub Total	494
TOTALS	184.5		970

Supporting notes:

1. Estimates include contingency allowance of 50%.
2. Costs are known from recent highway works between Maclean and Ballina.
3. An overall contingency of 23% has been applied as project is at the detailed design phase.
4. A lower contingency of 40% has been applied as scope is more defined.

(d) Staging issues

Both inland alternatives would provide limited opportunity for staging of construction as:

- bypasses of the major centres of Grafton, Casino and Lismore and to a lesser extent the villages of Bexhill, Clunes and Bangalow would need to be provided before heavy vehicle traffic could use a new corridor;
- a new link between Lismore and Bangalow would need to be provided to avoid heavy vehicle traffic traveling on the Lismore-Bangalow Road, which is of a much standard than the existing Pacific Highway; and
- the pavements on the Summerland Way and Bruxner Highway would require significant strengthening to support the heavy vehicles currently using the Pacific Highway.

As a minimum, the Grafton bypass and a Casino to Ewingsdale/Tyagarah link to any of the inland alternatives should be opened to traffic at the same time as well as a strengthening of the pavement on the Summerland way link between Grafton and Casino.

4 Comparison of inland corridor with the Pacific Highway upgrade

4.1 Overview

This section of the technical review provides a comparison between the two inland alternatives and upgrading the Pacific Highway in terms of:

- physical and engineering;
- traffic and transport;
- human environment;
- natural environment ; and
- project cost and economic evaluation.

Section 3 of this report describes the technical review of the two inland alternatives.

The RTA has advanced planning the upgrade of the Pacific Highway between Wells Crossing and Tyagarah. Of the 187km of highway:

- 12km is already completed to a dual carriageway standard (Swan Creek upgrading, Cowper Bypass and Mororo upgrading on the Wells Crossing to Iluka Road project, Ewingsdale Interchange project, and Ewingsdale to Tyagarah projects);
- another 9km has project approval with preconstruction well advanced (Ballina Bypass project);
- another 67km has an identified preferred route (Iluka Road to Woodburn and Woodburn to Ballina projects); and
- with the remaining 103km at the route option stage where the RTA is still considering a preferred route (Wells Crossing to Iluka Road and Tintenbar to Ewingsdale projects, including review of the 2.5km Sandy Creek to Ross Lane section of the Ballina Bypass project).

The RTA is presently considering the results of value management workshops, submissions from the community and government agencies and the outcomes of technical investigations to determine a preferred route for these two sections of highway.

To compare with the inland alternatives in **Section 3** of this report, the shortest and longest route options for the Pacific Highway have been identified.

With the Iluka Road to Tintenbar and Ewingsdale to Tyagarah sections common to both:

- the shortest route would follow a modified green route option on the Wells Crossing to Iluka Road project and route option A on the Tintenbar to Ewingsdale project; and
- the longest route uses the orange route option on the Wells Crossing to Iluka Road project and the follows route option D on the Tintenbar to Ewingsdale project.

Background information on the planning of the individual projects is available from the following reports.

- *Wells Crossing to Iluka Road: Route Options Development Report (RTA, October 2005)*
- *Community Update: Wells Crossing to Iluka Road – value management workshop outcomes (RTA, May 2006)*
- *Iluka Road to Woodburn: Concept Design Report (RTA, March 2006)*
- *Woodburn to Ballina: Preferred Route Report (RTA, November 2005)*
- *Ballina Bypass: Environmental Impact Statement (Connell Wagner, February 1998)*
- *Ballina Bypass: Representations Report (RTA, August 1999)*
- *Tintenbar to Ewingsdale: Route Options Development Report (RTA, October 2005)*

In March 2006, the RTA undertook a review of project cost estimates for highway upgrading projects to reflect latest industry pricing. These estimates are included in this comparison.

TABLE 4-1 provides a comparison of the inland alternatives with the Pacific Highway, between Wells Crossing south of Grafton and Tyagarah approximately 2.5km north of the Byron Bay turnoff.

TABLE 4-1: COMPARATIVE ASSESSMENT OF INLAND CORRIDOR WITH PACIFIC HIGHWAY UPGRADE (Wells Crossing to Tyagarah)

FEATURE	INLAND CORRIDOR		PACIFIC HIGHWAY UPGRADE			
	Alternative A	Alternative B	Short route	Long route		
PHYSICAL AND ENGINEERING FEATURES						
Length of corridor (km)	183 - 191	190 - 198	171	181		
Highest point above sea level (m)	110	180	90	90		
Length of route in flood prone land (km)	9.1 - 21.1	0.2 - 12.2	39.6	74.7		
Grade:						
Length greater than 6% (km)	Nil	Nil	Nil	Nil		
Length greater than 4.5% (km)	1.6	9.2	4.3	4.3		
Earthworks:						
Quantity of cut (million m ³)	17.3 - 19.1	24.1 - 25.9	10.4	10.2		
Deepest cutting - with tunnels (m)	36	46	25	19		
Quantity of fill (million m ³)	13.2 - 14.4	16.4 - 17.6	11.3	11.3		
Highest embankment (m)	25	33	17	17		
Major structures:						
Tunnels (number / total km)	3 / 2.9	2 / 1.7	1 / 0.3	1 / 0.3		
Major bridging (km > 30 metres)	3.3 - 5.7	0.6 - 3.0	8.9	17.1		
Grade separated interchanges	7 - 9	7 - 8	9	10		
Road underpasses / overpasses	44 - 51	37 - 44	30	30		
Ability to construct in stages	Limited opportunity to obtain early benefits from staging		Good opportunity to obtain early benefits from staging			
TRANSPORT AND TRAFFIC						
Travel time (mins)	106 - 110	109 - 113	96	102		
Daily Traffic Volumes - 2004 year: (vehicles per day)	INLAND CORRIDOR			PACIFIC HIGHWAY UPGRADE		
	Light vehicles	Heavy vehicles	Total	Light vehicles	Heavy vehicles	Total
Inland Corridor (north of Grafton)	2,000	1,030	3,030	1,000	130	1,130
Pacific Highway (north of Grafton)	5,040	660	5,700	6,040	1,560	7,600
HUMAN ENVIRONMENT						
Properties from which acquisition is required (number)	483 - 487	564 - 568	525	735		
Amenity:						
Villages/towns/cities within 2km of route (number)	13	16	26	26		
Dwellings within 300m of proposed route (number)	106 - 108	183 - 185	496	829		
Impact on prime agricultural land (km)	39 - 47	48 - 51	79	99		
NATURAL ENVIRONMENT ¹						
Impact on areas of environmental significance:						
National parks/nature reserves traversed (km)	0	0	2.6	2.6		
SEPP14 wetlands traversed (km)	0	0	0.1	0.1		
Native vegetation habitat traversed (km)	63 - 64	67 - 68	74	57		
State Forest traversed (km)	49 - 50	49 - 50	17	24		
Fauna corridors traversed (number)	18 - 19	20 - 21	18	19		
Waterways crossed (number)	29 - 33	25 - 29	20	20		
PROJECT COST						
Capital cost (\$2006M)	3,193 - 3,128	2,957 - 3,022	3,007	3,465		
Limited upgrade of existing Pacific Highway (\$2006)	970	970	-	-		
Total cost (\$2006)	4,163 - 4,098	3,927 - 3,992	3,007	3,465		

Supporting notes:

1. Length of impact on natural environment has been measured in km where noted and rounded to nearest whole number.

Technical Review

Inland Corridor (via Summerland Way)

4.2 Key comparisons

4.2.1 Physical and engineering

In terms of physical and engineering features:

- **Overall corridor length:**

The Pacific Highway is between 2km and 27km shorter than either of the refined inland corridors. The actual amount of the difference is dependent on which:

- route option is chosen as the preferred route for the Wells Crossing to Harwood section of the Wells Crossing to Iluka Road project and the Tintenbar to Ewingsdale projects (the longest route is 10km longer than the shortest route);
- bypass of Grafton is adopted (a western bypass would be 11km longer out of flood prone land than an eastern bypass); and
- inland corridor is adopted for the link between Casino and Tyagarah (Inland Alternative B is 8km longer than Inland Alternative A).

- **Elevation and grade of corridors:**

As shown in **Appendix D**, the elevation and grade of the Pacific Highway (for both the shortest and longest route) and Inland Alternative B are very similar overall. Through the use of tunnels on the steepest sections, the highest elevation for both corridors would be in the range 90 to 110 metres and grades greater than 4.5% have been kept to between 1.6km and 4.3km in total length.

For Inland Alternative B where the Casino to Tyagarah link is situated further to the north of Inland Alternative A in order to minimise the impact on villages, towns and the city of Lismore, the road rises to elevations of over 180 metres and has some 9.2km of road with significant lengths of gradients greater than 4.5%. This elevation is comparable to the range sections of old highway (north of Bulahdelah and Burringbar Range) before the deviations were built to reduce the elevation to between 100 and 120 metres. Inland Alternative B is situated on higher ground with a much reduced length in the floodplains of the Clarence and Richmond rivers.

Both inland alternatives A and B involve much more extensive cut and fill earthworks than the Pacific Highway. The Pacific Highway has longer lengths through the flood plains of the Clarence and Richmond rivers.

- **Structures**

All corridors would require the use of tunnels on the more elevated sections. The Pacific Highway requires a very short tunnel of approximately 300 metres to traverse the escarpment at St Helena. For both Inland Alternatives A and B, longer tunnels are required on the Casino to Tyagarah link to reduce the size of cuttings and achieve a more appropriate vertical alignment. Three (3) tunnels totaling 2.9km in length are required on Inland Alternative A and two (2) tunnels totaling 1.7km are required on Inland Alternative B. The longer length of the tunnels would require specific treatments to manage ventilation and safety requirements.

In contrast, much more extensive bridging is required on the Pacific Highway primarily because of the need to cross the flood plains of the Clarence and Richmond rivers.

The number of grade-separated interchanges at key road junctions is comparable for all corridors. More overpasses and underpasses would be required on the inland alternatives than the Pacific Highway.

- **Staging**

The Pacific Highway provides good benefits for road users from staging the upgrading of construction.

The inland alternatives would provide limited benefit for road users, as much of the corridor would need to be completed before it can be opened to through vehicles (particularly heavy vehicles). Bypasses of Grafton, Casino and Lismore would be required to be in place at the same time as a new route between Casino and Ewingsdale/Tyagarah. The pavement on the Summerland Way link from Grafton to Casino would require early strengthening to carry heavy vehicles.

4.2.2 Traffic and transport

In terms of traffic and transport:

- **Outcomes of previous and recent traffic analysis**

Based on the recent traffic analysis, the range of total daily traffic that could be attracted from the Pacific Highway to an inland alternative is estimated to be 1,900 total daily traffic (comprising 1,000 light vehicles and 900 heavy vehicles) has been adopted. As highlighted in **Table 4-1**:

- there is a relatively small proportion of light vehicle traffic on the Pacific Highway between Grafton and Ewingsdale that could be attracted to use an inland alternative;
- the proportion of trucks that could be attracted to an inland alternative would be substantially greater than that for light vehicles; and
- traffic numbers on the Pacific Highway would continue to be higher (roughly double) than that experienced on an inland alternative.

This technical review supports the 1992 findings.

The actual diversion of traffic from a limited Pacific Highway upgrade to an inland alternative would likely be less than 1,900 vehicles per day, as:

- the Pacific Highway would be shorter by up to 17km, with two-lane bypasses and the Ballina Bypass in place;
- for tourism and business reasons, vehicles could continue to use the Pacific Highway;
- the introduction of a number of long tunnels and, in the case of Inland Alternative B, more mountainous terrain;
- the estimated travel time for light vehicles between Wells Crossing and Tyagarah would be:
 - 106 to 110 minutes for Alternative A;
 - 109 to 113 minutes for Alternative B; and
 - 113 minutes for the limited upgrade of the Pacific Highway; and
- the estimated travel time for heavy vehicles between Wells Crossing and Tyagarah would be:
 - 115 to 122 minutes for Alternative A;
 - 122 to 129 minutes for Alternative B; and
 - 114 minutes for the limited upgrade of the Pacific Highway.

- **Overall benefits to regional and local traffic**

The *Draft Far North Coast Strategy* for the Tweed, Byron, Ballina and Richmond Valley local government areas identifies and promotes a settlement strategy based around both coastal and inland areas. If current trends continue, around 75 per cent of the Region's future housing would be located within the coastal area, which is to the east of the Pacific Highway. The draft regional strategy is proposing to reduce the proportion of additional dwellings in the coastal areas to around 60 per cent. This is to allow a greater population spread across the region and to strengthen inland towns and centres. The strategy also identifies new release areas in a number of inland areas around Casino and the major regional centre of Lismore and the major town of Casino.

Tweed Heads and Lismore are the two current regional centres for the area. Ballina, which is located on the coast, will develop as a third regional centre, recognising the importance of its airport, river and coastal lifestyle centre.

While both of the inland alternatives would improve accessibility to residences and businesses around Lismore and Casino, the draft strategy supports the State and Australian governments' policy to continue the planning and upgrading of the Pacific Highway in order to provide greater transport efficiencies for both intra- and interstate movements.

4.2.3 Human environment

Generally, an assessment of community impacts for highway projects requires community consultation with those communities and agencies potentially benefiting from, and affected by, a proposal. However, likely community issues can often be identified in advance of community consultations through desktop assessment.

For those communities along an inland corridor (where a major highway transport route does not currently exist), the key issues are likely to be:

- new and discernable noise impacts to those communities which do not currently have high traffic volumes, particularly at night;
- new and discernable visual impacts, including road lighting and changing views, and major cuttings and fills to cross the more variable terrain even though the impact would be mitigated in selected areas by tunnels;
- new environmental amenity issues; and
- loss of agricultural land and issues of economic impact.

For those communities on the Pacific Highway (that will still receive almost twice the current traffic volume as an inland corridor) the key issues are likely to be:

- ongoing safety concerns as local traffic continues to mix with through traffic;
- continuing noise impacts, compounded by reduced funding to address noise mitigation measures; and
- continuing impacts on the amenity for shoppers and business owners in town centres until some form of bypass is constructed.

While community consultation has not yet been undertaken, this report provides a good basis of information for communities to respond to the debate on an inland corridor.

Table 4-1 highlights:

- While it depends on which option is compared, there is generally more property acquisition required on the Pacific Highway upgrade than on the inland alternatives;
- with more development along the coast than along an inland corridor, there are twice as many communities which would both benefit and be potentially affected by upgrading the Pacific Highway than an inland corridor;
- as expected there are higher number of dwellings along the Pacific Highway upgrade which live within 300 metres of the existing or proposed highway, and which would experience road noise; and
- overall, there is more agricultural land impacted by an upgrade of a Pacific Highway than an inland corridor, as the Pacific Highway traverses the floodplains of the Clarence and Richmond rivers.

Town centre amenity is also a major community issue. The potential amenity benefits to towns along the Pacific Highway due to the removal of through traffic may not eventuate if heavy vehicles find the longer, steeper inland corridor less desirable. Some long term loss of passing trade for businesses in these towns on the Pacific Highway may result.

4.2.4 Natural environment

Both the inland corridor and the Pacific Highway upgrade are situated in areas of very high biodiversity where vegetation communities are very diverse and habitats support a high diversity of fauna species.

As highlighted on **Table 4-1**:

- While it depends on which option is compared, both the inland alternatives and the Pacific Highway upgrade have the same order of impact;
- The inland alternatives have a much greater impact on State Forests than the Pacific Highway upgrade;
- the number of fauna corridor crossings are similar for both an inland corridor and an upgrade of the Pacific Highway; and
- there are more crossings of waterways on the inland alternatives than the Pacific Highway upgrade.

4.2.5 Project cost

Project cost estimates for the Pacific Highway have been updated to \$2006 costs by the various consultants.

The updated cost estimates have been prepared in accordance with the *RTA Project Estimating Manual (December 2001)*, which sets out the methodology and procedures for preparing strategic, concept and detailed estimates of cost and provides guidance on the selection of appropriate contingencies for various stages of development of a project and the identified risks.

The RTA specified format for a strategic cost estimate divides the project cost into six major cost categories:

1. Project development (covering the work required to obtain project approval).
2. Investigation and design (covering design and documentation to prepare the project for construction).
3. Property acquisitions.
4. Public utility adjustments.
5. Construction (typically this category often accounts for 80% to 90% of a major rural road project with the main elements being earthworks, pavements, structures and drainage and other minor elements such as environmental works, site management during construction, client representation etc).
6. Handover (covering project completion and the handing over of completed assets to the responsible maintaining Authority).

Table 4-2 summarises the estimated project cost in \$2006 for upgrading the Pacific Highway as follows:

- The shortest route is via the modified green option on the Wells Crossing to Harwood section of the Wells Crossing to Iluka Road project and route option A on the Tintenbar to Ewingsdale project; and
- The longest route is via the orange option on the Wells Crossing to Harwood section of the Wells Crossing to Iluka Road project and option D on the Tintenbar to Ewingsdale project.

The routes on all other sections of the Pacific Highway between Wells Crossing and Tyagarah are common for both the short and long option.

TABLE 4-2: ESTIMATE OF COST (\$2006) FOR PACIFIC HIGHWAY UPGRADE

LINK	DESIGN STANDARD / ESTIMATED COST (\$2006)			
	Highway standard (km)			Project cost (\$M2006)
	Class M	Class A	Total	
SHORTEST ROUTE: WELLS CROSSING TO TYAGARAH				
Wells Crossing to Iluka Road: Wells Crossing to Harwood section (modified green route option)	61.0	-	61.0	1,107
Wells Crossing to Iluka Road: Harwood to Iluka Road section	-	9.9	9.9	316
Iluka Road to Woodburn	-	32.4	32.4	236
Woodburn to Ballina	30.2	6.0	36.2	652
Ballina Bypass	8.8	-	8.8	292
Tintenbar to Ewingsdale (route option A)	19.8	-	19.8	404
Ewingsdale to Tyagarah	-	2.7	2.7	-
TOTAL	119.8	51.0	170.8	3,007
LONGEST ROUTE: WELLS CROSSING TO TYAGARAH				
Wells Crossing to Iluka Road: Wells Crossing to Harwood section (orange route option)	52	17	69.0	1,460
Wells Crossing to Iluka Road: Harwood to Iluka Road section	-	9.9	9.9	330
Iluka Road to Woodburn	-	32.4	32.4	236
Woodburn to Ballina	30.2	6.0	36.2	652
Ballina Bypass	8.8	-	8.8	292
Tintenbar to Ewingsdale (route option D)	22.0	-	22.0	495
Ewingsdale to Tyagarah	-	2.7	2.7	-
TOTAL	113.0	68.0	181.0	3,465

Table 4-1 summarises the total overall cost of upgrading for:

- an upgrade of the Pacific Highway, for both the short and the long route, to dual carriageway standard, as shown in **Table 4-2**;
- an upgrade of Alternative A plus limited upgrade of the Pacific Highway; and
- an upgrade of Alternative B plus limited upgrade of the Pacific Highway.

5 Conclusions

The purpose of this report is to assess an inland corridor between Grafton and Tyagarah/Ewingsdale, as an alternative to upgrading the Pacific Highway to dual carriageway.

The RTA's assessment concludes that there is no compelling evidence to favour an inland corridor.

Building an inland road will not stop the coastal road being used nor will it obviate the need for the existing Pacific Highway to be upgraded. There will always be demand for a coastal route from the growing local population, the freight industry and tourist traffic.

An inland corridor would still impact on towns / villages, private dwellings, agricultural land and waterways, however against some criteria to a lesser degree. The inland corridor would introduce impacts on a community previously unaffected by a transport route, including introducing:

- New and discernable noise impacts to those communities which do not currently have high traffic volumes, particularly at night.
- New and discernable visual impacts, including road lighting and changing views, and major cuttings and fills to cross the more variable terrain even though the impact would be mitigated in selected areas by tunnels.
- New social amenity issues.
- Loss of agricultural land and issues of economic impact.

The Pacific Highway would still need to be upgraded.

For those communities on the Pacific Highway (which will still receive almost twice the current traffic volume as an inland corridor), the key issues are likely to be:

- Ongoing safety concerns as local traffic continues to mix with through traffic.
- Continuing noise impacts, compounded by reduced funding to address noise mitigation measures.
- Continuing impacts on the amenity for shoppers and business owners in town centres until some form of bypass is constructed.

With more development along the coast than along an inland corridor, there would be twice as many communities which would both benefit and be potentially affected by upgrading the Pacific Highway than an inland corridor.

As expected, there are a higher number of dwellings along the Pacific Highway upgrade which are within 300 metres of the existing or proposed highway, and which would experience road noise and, overall, there would be more agricultural land impacted by an upgrade of the Pacific Highway than an inland corridor, as the Pacific Highway traverses the floodplains of the Clarence and Richmond rivers.

Town centre amenity is also a major community issue. The potential amenity benefits to towns along the Pacific Highway due to the removal of through traffic may not eventuate if heavy vehicles find the longer, steeper inland corridor less desirable. Some long-term loss of passing trade for businesses in these towns on the Pacific Highway may result.

An inland corridor would have similar impacts on areas of environmental significance, but much greater impact on State Forest than an upgrade of the Pacific Highway. The number of fauna corridor and waterway crossings is similar for both an inland corridor and an upgrade of the Pacific Highway, albeit the crossings on the Pacific Highway upgrade are more extensive.

In terms of cost, the inland corridor is not “much less expensive” than the Pacific Highway upgrade. The inland corridor is estimated to cost between \$3 billion and \$3.2 billion. After adding the cost of safety upgrades of the Pacific Highway, the cost is estimated to be between \$4 billion and \$4.2 billion.

The cost of upgrading the Pacific Highway to dual carriageways is estimated to be between \$3 billion and \$3.5 billion, depending on the route and standard of road.

Because the inland corridor is more expensive than the Pacific Highway upgrade, there is no basis for arguing it could be built more quickly and thereby save lives. The rate of construction of either route would be dependent on the availability of funds. The Pacific Highway upgrade will save lives because it can be staged, whereas the inland corridor must be wholly completed before traffic can start to divert to it.

In terms of traffic, the inland corridor is forecast to attract relatively little traffic from the Pacific Highway. The Pacific Highway (north of Grafton) carries about 7,600 vehicles per day. Of these, a maximum 1,900 vehicles per day would be attracted to use the inland corridor. These 1,900 vehicles are the ‘through traffic’ between Grafton and Tyagarah/Ewingsdale that could possibly be attracted to the inland corridor.

As the travel times and distance of the inland corridor and the Pacific Highway (if it was not upgraded to dual carriageway) are about the same, the amount of traffic attracted to using the inland corridor would be less than 1,900 vehicles per day.

The majority of traffic between Grafton and Tyagarah/Ewingsdale has either an origin or a destination along this section of the highway and therefore would not divert but continue to use the Pacific Highway.

In terms of heavy vehicles, about 900 vehicles per day (included in the 1,900 vehicles noted above) could divert to the inland corridor, however, again considering similar distances and travel times, together with steeper grades, the inland corridor would likely only attract less than 900 vehicles per day. The argument that the Summerland Way would connect to Beaudesert in Queensland has to be seen as a very long term strategy, given the current program commitments, as described in the *South East Queensland Infrastructure Plan and Program 2005 – 2026* by the Queensland Government and the difficulties of the mountainous border crossing.

In summary, the inland corridor is not a viable alternative to upgrading the Pacific Highway between Grafton and Tyagarah/Ewingsdale because:

- It would not take traffic off the Pacific Highway.
- The traffic that would use the Summerland Way would not justify the cost.
- It would cost more than the Pacific Highway upgrade.
- The Pacific Highway would require upgrading even if the Summerland Way was built.
- The majority of traffic remaining on the Pacific Highway would require continuing investment to upgrade the highway even if the inland corridor were built.
- It would have to be completed in one stage, which means that other sections of the Pacific Highway identified for upgrade would be delayed.

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