NSW Roads and Maritime Services

WOOLGOOLGA TO BALLINA | PACIFIC HIGHWAY UPGRADE

ENVIRONMENTAL IMPACT STATEMENT

MAIN VOLUME 1B

Chapter 21 – Justification and consultation

Chapter summary

The Pacific Highway Upgrade Program has brought major improvements to road conditions, road safety, travel times and transport efficiency along the highway. It is also improving connections between areas forecast to experience significant population growth and are major tourist destinations.

For example, the upgrades completed to June 2006 were estimated to have saved about 80 minutes of travel time for heavy vehicles and 70 minutes for light vehicles, between Newcastle and the Queensland border. Upgrading the remaining sections of the Pacific Highway is expected to produce a further 90 minutes in travel time savings.

The section of highway between Woolgoolga and Ballina is an important part of the Pacific Highway Upgrade Program. The benefits of the program would not be fully realised until the entire program – including the section between Woolgoolga and Ballina – is completed.

Upgrading the highway would:

- Improve road safety (RMS has calculated that the expected reduction in crash rates would be likely to result in the avoidance of over 8039 crashes over the next 30 years if the entire Pacific Highway were upgraded by 2016)
- Accommodate increasing traffic volumes on the Pacific Highway; and specifically intra-regional freight and local travel
- Reduce travel times and transport costs
- Improve the performance of the NSW economy and drive economic growth in regional NSW
- Reduce the risk of the highway flooding
- Improve the quality of life would decline in towns where the highway passes through (eg South Grafton, Ulmarra, Woodburn, Broadwater and Wardell) due to reduced traffic volumes.

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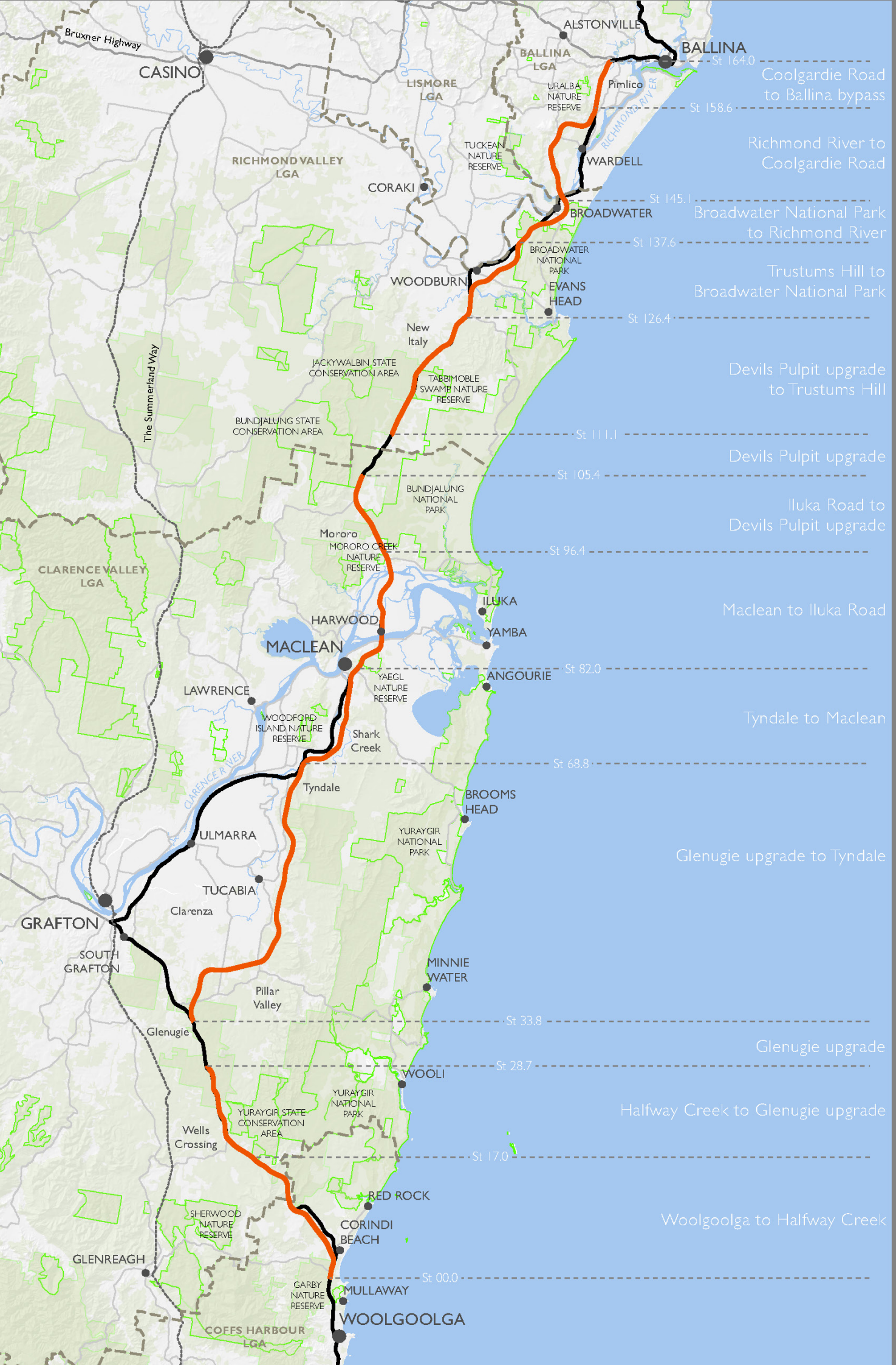
Bruxner Highway
CASINO
ALSTONVILLE
BALLINA
BALLINA LGA
LISMORE LGA
URALBA NATURE RESERVE
Pimlico
RICHMOND RIVER
TUCKEAN NATURE RESERVE
WARDELL
RICHMOND VALLEY LGA
CORAKI
BROADWATER
BROADWATER NATIONAL PARK
WOODBURN
EVANS HEAD
New Italy
JACKYWALBIN STATE CONSERVATION AREA
TABBIMOBLE SWAMP NATURE RESERVE
The Summerland Way
BUNDJALUNG STATE CONSERVATION AREA
BUNDJALUNG NATIONAL PARK
Mororo
MORORO CREEK NATURE RESERVE
CLARENCE VALLEY LGA
ILUKA
HARWOOD
YAMBA
MACLEAN
ANGOURIE
YAEGL NATURE RESERVE
LAWRENCE
WOODFORD ISLAND NATURE RESERVE
Shark Creek
CLARENCE RIVER
Tyndale
BROOMS HEAD
YURAYGIR NATIONAL PARK
ULMARRA
TUCABIA
Clarenza
GRAFTON
SOUTH GRAFTON
MINNIE WATER
Pillar Valley
Glenugie
WOOLI
YURAYGIR NATIONAL PARK
YURAYGIR STATE CONSERVATION AREA
Wells Crossing
RED ROCK
SHERWOOD NATURE RESERVE
CORINDI BEACH
GLENREAGH
GARBY NATURE RESERVE
MULLAWAY
WOOLGOOLGA
COFFS HARBOUR LGA
St 164.0
St 158.6
St 145.1
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St 126.4
St 111.1
St 105.4
St 96.4
St 82.0
St 68.8
St 33.8
St 28.7
St 17.0
St 00.0
Coolgardie Road to Ballina bypass
11
Richmond River to Coolgardie Road
10
Broadwater National Park to Richmond River
9
Trustums Hill to Broadwater National Park
8
Devils Pulpit upgrade to Trustums Hill
7
Devils Pulpit upgrade
Iluka Road to Devils Pulpit upgrade
6
Maclean to Iluka Road
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21 Justification and conclusion

This chapter presents a justification of the project and a conclusion to the environmental impact statement. It considers a range of issues including project benefits, protection of the environment, the objects of the EP&A Act, including ecologically sustainable development and community consultation.

Director General's requirements	Where addressed
The Environmental Impact Statement (EIS) must include a justification for the project having regard to the suitability of the chosen alignment and whether or not the project is in the public interest.	Section 21.1 Section 21.2 Section 21.2.5 Section 21.2.6 Section 21.3
Detail how the principles of ecologically sustainable development will be incorporated into the design, construction and ongoing operation phases of the project.	Section 21.2.7
Justification for the preferred project taking into consideration the objects of the EP&A Act.	Section 21.2.8
The cumulative and synergistic impacts associated with the Pacific Highway Upgrade Program as a whole.	Section 21.2.9

21.1 Strategic justification

The project is consistent with relevant NSW Government planning and transport policies as well as the strategic priorities of Infrastructure Australia. These aspects are discussed in detail in Chapter 3 and reviewed below.

21.1.1 Consistency with NSW Government policy and strategy

The Woolgoolga to Ballina upgrade is consistent with the NSW Government's land use and transport policy framework. The project is clearly aligned with the transport goals of NSW 2021 – A Plan to Make NSW Number One (NSW Government, 2011a) and the NSW State Infrastructure Strategy (NSW Treasury, 2008; Infrastructure NSW, 2012) as it would reduce travel times, improve road safety, increase the reliability of journey times and improve freight productivity. Together, these benefits would improve the performance of the economy, drive regional growth and increase the competitiveness of doing business in NSW.

The Woolgoolga to Ballina upgrade is consistent with the draft Infrastructure NSW's State Infrastructure Strategy 2012-2032.

The draft State Infrastructure Strategy (Infrastructure NSW, 2012) provides a strategic direction on priority infrastructure investments and reforms required to drive productivity and economic growth in NSW over the next 20 years. The duplication of the Pacific Highway has been identified in the strategy as being critical for economic growth along the NSW North Coast.

In addition, the Pacific Highway is recognised as the primary north–south corridor for inter- and intra-regional movements in the Mid North Coast Regional Strategy (DoP, 2009) and the Far North Coast Regional Strategy (DoP, 2006). Because the project would improve accessibility, it would be one of the key supports to population growth in these regions.

Further details on how the project is consistent with the strategic planning framework are presented in Section 3.4.

21.1.2 Consistency with Infrastructure Australia priorities

The Woolgoolga to Ballina upgrade is consistent with the priorities of Infrastructure.

In June 2012, Infrastructure Australia reconfirmed it assessment that the Pacific Highway Upgrade Program, of which the Woolgoolga to Ballina upgrade is a part, was in the category of 'ready to proceed'. This category contains projects that meet all of Infrastructure Australia's criteria, namely:

- They make a strong contribution to strategic policy goals
- They are supported by a methodologically robust cost-benefit analysis that suggests the benefits would considerably outweigh the costs (the cost to complete the rest of the Pacific Highway Upgrade Program is $6.67 billion (in 2008 dollars) and the program has an estimated benefit-cost ratio of 1.5)
- They have a robust delivery plan in place.

The Woolgoolga to Ballina upgrade would make a major contribution to the realisation of Infrastructure Australia's strategic priorities, as it would complete a significant portion of the Pacific Highway Upgrade Program. It would therefore add to the road safety and travel efficiency benefits of already upgraded highway sections and provide substantial economic and community benefits.

Further details on how the Pacific Highway Upgrade Program aligns with the priorities of Infrastructure Australia are presented in Section 3.5.

Photo 1: Pacific Highway at Broadwater

21.2 Project justification

The project's justification is established by the following criteria:

- The degree to which the project objectives are satisfied
- The strength of the project need
- The degree to which it addresses the elements of the project need
- The performance of the project relative to potential alternatives
- The suitability of the project alignment
- The degree to which the project is in the public interest
- The incorporation of ecologically sustainable development principles
- The consideration of the objects of the EP&A Act.
- The cumulative impacts associated with the Pacific Highway Upgrade Program

These criteria are addressed in more detail, below.

21.2.1 How the project would satisfy the project objectives

The project objectives are outlined in Section 3.2. They focus on reducing road crashes and injuries, reducing travel times, increasing freight efficiency, improving accessibility, minimising environmental impacts, and considering the needs of the community. The way in which the project satisfies these objectives is presented in Table 21-1.

Table 21-1: How the project meets the project objectives

Project objective	Comment
Reduce crash rates to 15 crashes or less per 100 million vehicles per kilometres travelled (MVKT).	The Pacific Highway Upgrade has nominated achieving a reduction in crash rates to15 crashes per 100 million vehicles kilometres travelled. The provision of divided, limited access carriageway is expected to achieve at least this level of crash improvement, representing a 27 per cent reduction in overall crashes.
Provide a dual carriageway highway with limited or controlled access points and improved overtaking opportunities.	Bypasses of some towns along the route would reduce conflicts and rationalise access points. Access to the motorway would be provided via 10 new interchanges. Access to sections initially constructed to arterial road standard (Class A) would generally allow for direct access from local roads. All sections of the project would provide a divided, dual carriageway as minimum that allows overtaking opportunities along the entire length.
Provide appropriate emergency access facilities.	The project would have a shoulder 2.5 metres wide and a one-metre clearance to the gutter to allow for vehicles to pull over. Combined emergency U-turn bays, maintenance crossovers and stopping bays would be provided every three kilometres.
Retain existing or provide appropriate driver rest areas.	Five rest areas would be constructed (two northbound and three southbound) at intervals of about 50 kilometres. These would be located at Pine Brush, Tyndale, north of Mororo Road and Richmond River. These would provide additional rest areas to the existing ones available.
Provide a continuous alternative route to class M road sections to maximise the separation of local traffic from through traffic.	Service roads would provide continuous alternative routes for local and regional traffic, and access to and from the upgraded highway at interchanges. This would separate higher speed traffic from lower speed local traffic. As part of the staging strategy, initially some sections would be built as arterial standard and would not have service roads. The project approval is for the ultimate upgrade that features separation of local traffic through use of service roads.
Increase the capacity of the highway by replacing a two-lane undivided road with a four-lane divided road.	The project would comprise a divided road with two lanes in each direction and a median sufficiently wide to allow further upgrade to three lanes in each direction (six lanes in total), if required. This capacity is likely to be sufficient for the total design life of the highway.

Project objective	Comment
Provide a route and design that improves traffic flow and allows for consistent travelling speeds.	Posted speed limits would be at least 100 kilometres per hour where the highway is upgraded to arterial road standard, and 110 kilometres per hour where it is upgraded to motorway standard. As a limited access design, traffic flow will be unimpeded by entering or departing traffic. Appropriately located interchanges will ensure that the majority of traffic that does not use the full length of the project will have access to the region without hampering through traffic. The continued upgrade of the highway would improve travel times. At project opening, travel time over the full length of the project is expected to decrease by 25 minutes or 19 per cent for all vehicles. By 2036, the project would save about 3850 hours of travel time per day for all vehicles or 15 per cent. Interchanges provided at key node points with the arrangement and function considering the anticipated traffic volumes and preferred desire lines eg 'free-flow' half interchanges at Tyndale and Glenugie supporting majority access into Grafton.
Provide a level of flood immunity that minimises the risk of delays due to flooding.	The project carriageway would be flood-free for the 1 in 20-year flood event on the Clarence River and Richmond River floodplains in the ultimate motorway upgrade. Elsewhere, it would be flood-free for the 1 in 100-year flood event.
Provide facilities for managing and maintaining traffic flow in the event of incidents.	In the event of an incident, the road shoulder and emergency U-turn and stopping bays would enable traffic to continue to flow with minimal interruption. In addition the divided carriageway would provide more opportunity to set-up a contra-flow system in the event of a major emergency, including a major flood.
Provide a route and design that increases travel efficiency through reductions in length and improvements in alignment.	The horizontal radius of the project would range between 750 metres and 1200 metres and the vertical grade would range from 4.5 per cent to a maximum of 6 per cent. Condition of road surfaces would be improved. Compared to the existing alignment, the project would reduce the total distance between Woolgoolga and Ballina from 180km to167 kilometres, a saving of about 13 kilometres.
Provide a route that improves inter-regional connections and access.	Ten interchanges are proposed to enable access to and from the project and to improve inter-regional connections to key towns and regional centres. Reliability and safety of the Pacific highway as a major transport corridor would be improved
Provide a design standard that meets or exceeds B-double truck requirements.	The project has been designed to accord with Pacific Highway Design Guidelines (RTA, 2009). This ensures consistency with completed sections of the Pacific Highway Upgrade Program. This encompasses B-double operation and Higher Mass limit freight vehicle access.
Continue to consult with community stakeholders during each stage of project planning.	RMS has consulted with the community throughout project planning, and would continue consultation throughout detail design, proposed staging of the upgrade and during construction. Project development has had a consultation focus that aims to develop a collaborative relationship with landholders, members of local communities and other stakeholders.
Provide an upgrade that continues to cater for the access and transport needs of existing communities and property.	The project would provide improved accessibility and transport efficiency for the benefit of existing communities and property.

Project objective	Comment
Minimise adverse impacts on existing industries, businesses, towns, properties, residents and lifestyles.	The development of the project has sought to minimise the social and economic impacts. There would be changes to access and connectivity for some of the community, in addition to changes in land use and the acquisition of properties. Strategies to avoid, mitigate and manage potential impacts have been also identified and developed in this EIS.
Provide a route that maintains or improves access to regional and interstate markets.	Ten interchanges are proposed to provide access to and from the project enabling regional connections to be maintained and supporting economic development. The project is consistent with regional strategies that support economic development.
Provide a route that maintains or improves access to existing towns, tourist centres, businesses and industries.	The project's interchanges would provide the greatest level of accessibility between existing towns, tourist centres, businesses and industries. Provision of a service road along the project ensures intra-regional connectivity, as well as accessibility to interchanges onto the project.
Integrate environmental, social and economic considerations into project planning and assessment.	Environmental, social and economic considerations were considered in the design of the project from the outset (ie during corridor evaluation, route options investigation and refinements to the proposed route). The extensive consultation with relevant community groups and changes to the design as a result of those discussions demonstrates the integration of these factors into the project. Both climate change and generation of greenhouse gasses has been consider in the environmental assessment of the project.
Provide the best outcomes, taking into account the balance of environmental, social and economic factors.	The project would balance the needs of road users (eg reduced travel times and increased road safety), financial constraints (ie a design that achieves value for money) and the need to minimise, as far as possible, the impacts on the environment (including the social and natural environment). Refinements to the projects design have continued to address the balance of social, economic and environmental issues.
Avoid adverse impacts as far as practical and provide measures to minimise, mitigate and offset impacts.	The approach of 'avoid, minimise, mitigate and offset' has been considered for all identified impacts The project would not avoid all adverse impacts. For example, there would be adverse impacts on biodiversity and Aboriginal heritage and a large number of residents would experience increased road traffic noise. Measures to minimise and offset adverse impacts would be implemented as part of the project.
Provide a route and design that use existing highway infrastructure where feasible and consistent with other project objectives.	Where feasible and in accordance with the objectives of the project, the route would use the existing highway as one carriageway for one half of the new dual carriageway road, thereby minimising the amount of land acquisition required, minimising impacts on the surrounding landscape and construction resource requirements. Where this is not possible, the existing highway would be retained as a local service road.
Provide a design that allows for future upgrades or modifications, if required.	The project has been designed so that it can be upgraded to three lanes in each direction if needed. The project includes a wide central median to accommodate extra lanes, and overpasses have been designed to allow for the construction of these future lanes.
Provide a strategy for staging the delivery of the project in accordance with upgrade need and availability of funding.	The construction of the project would be staged to include both arterial standard sections and motorway standard sections. For sections of the project initially upgraded to arterial standard, the design allows for these sections to be upgraded to motorway standard in the future.

21.2.2 The need for the project

The strength of the need for the project

The Pacific Highway is part of the National Land Transport Network (a network of national and inter-regional transport corridors connecting ports, airports, rail and roads which are of critical importance to national and regional economic growth) as it is of major importance to national and regional growth and is a major contributor to Australia's economic activity. It is a key north–south freight route along Australia's east coast and provides a vital link between Sydney and Brisbane as well as regional connections along the Mid North Coast and Far North Coast of NSW.

The Woolgoolga to Ballina upgrade forms an essential component of the Pacific Highway Upgrade Program. The program, which began in 1996, is delivering major improvements in road conditions, which are in turn reducing accident rates and travel times. The project is considered essential to the State for economic and social reasons and was therefore declared as critical State significant infrastructure under section 115V of the EP&A Act.

The section of the Pacific Highway to be targeted by the project caters for through traffic between Coffs Harbour, Grafton and Ballina, as well as through traffic between Sydney and Brisbane. The route is also important for inter-regional traffic, linking with other major roads, in addition to providing access to many small towns, villages and properties located along its length.

The project is needed to address current deficiencies in road conditions, cater for future traffic growth resulting from population growth along the NSW North Coast, improve travel efficiency (including freight efficiency) and reduce accident rates. The project would also contribute to fully realising the substantial economic and community benefits of the program.

Consequences of not proceeding with the project

If the project were not built, the following consequences could be expected:

- As vehicle growth increases vehicle accident rates and fatalities would increase or, at best, there would be a continuation of the existing unacceptable accident and fatality rates
- The level of service of the highway would decrease over time due to increased traffic growth
- There would be a lack of consistency in road standard between Woolgoolga and Ballina and the rest of the upgraded Pacific Highway
- The reliability of transport times for freight and other vehicles would continue to deteriorate
- The objectives of Commonwealth and State planning and transport strategies would not be met, particularly those of the Pacific Highway Upgrade Program.

21.2.3 How the project addresses the elements of the project need

The way in which the project addresses the elements of the project need are presented below, with particular emphasis on:

- Travel demand
- Road network efficiency and travel time
- Connections to local and regional roads
- Freight
- Safety.

Travel demand

Traffic modelling indicates that annual average daily traffic through the project area is forecast to grow by about 42 per cent from 2012 to 2036 with an annual average daily traffic volume of around 30,000 vehicles expected between Woolgoolga and Ballina. This traffic growth will be spurred by:

- Increased development on the NSW Mid and Far North Coast, which will result in increased travel demand between regional centres throughout the year

- Increased tourism, which will lead to congestion on the highway during peak holiday periods.

The project would address this growing traffic demand and would improve inter- and intra-regional traffic and transport performance.

Road network efficiency and travel time

Traffic modelling indicates that at project opening travel time over the full length of the project is expected to decrease by 25 minutes or 19 per cent for all vehicles. There would be:

- A saving of over 7.7 per cent for heavy vehicle kilometres travelled (heavy vehicle kilometres travelled along the highway between Woolgoolga and Ballina is anticipated to grow by 15.7 per cent to 2016, but with the project it would result in a net increase of only 6.8 per cent)
- A saving of six per cent for all vehicle kilometres travelled, which would equate to a saving of about 150,200 kilometres.

These savings in kilometres travelled would continue into the future. By 2036, the proposed upgrade would save about 3850 hours of travel time or 15 per cent for all vehicles using the route.

Therefore, despite increased traffic volumes on the highway, the project would result in reduced travel time due to higher speed limits, the greater capacity and reduced length of the highway following the upgrade, improvements to traffic flow, and the introduction of consistent travelling speeds.

Connections to local and regional roads

The project would include 10 interchanges to provide safe and efficient connections between the highway and regional roads. Existing access to local properties and businesses would be maintained. Where required, service roads would be provided and local roads and accesses would be realigned to maintain local access and minimise traffic impacts from the project. Specific changes to the local road network are detailed in Section 14.3.2.

Freight

Road-based freight transport represents 76 per cent of the Sydney–Brisbane inter-capital freight. On the section of the Pacific Highway between Woolgoolga and Ballina, heavy vehicles (trucks, articulated vehicles and B-doubles) make up more than 20 per cent of the total daily traffic. About 50 per cent of these are long-distance vehicles travelling through the area.

The project would provide an efficient, high-standard route between Woolgoolga and Ballina and, together with already completed sections of the highway to its north and south, provide a vital link in the inter and intra-state north–south freight corridor.

Safety

The majority of the Pacific Highway between Woolgoolga and Ballina is a two-lane, single carriageway road with substandard horizontal and vertical geometry, narrow shoulders and limited overtaking opportunities. Between January 2006 and 2010, this section of highway had an average crash rate of about 21 crashes per 100 million vehicle kilometres travelled, which is well above the Pacific Highway Upgrade Program target of 15 crashes per 100 million vehicle kilometres travelled. Traffic and road conditions along the Pacific Highway between Woolgoolga and Ballina are expected to deteriorate over time as population and traffic volumes increase.

The project would significantly contribute to the road safety and travel efficiency benefits already provided by the Pacific Highway Upgrade Program as well as providing specific benefits for highway users between Woolgoolga and Ballina. The project would reduce the crash rate along the entire length of the route to less than 15 crashes per 100 million kilometres travelled, consistent with the Pacific Highway Upgrade Program objectives. By 2036, the project would reduce the forecast 183 crashes (if the project does not proceed) to 132 crashes; a 28 per cent decrease.

The adjoining sections of the Pacific Highway (south and north of the project) are currently being upgraded as part of the Pacific Highway Upgrade Program. In addition, between Woolgoolga and Ballina, the Pacific Highway has been upgraded at Glenugie and the Devils Pulpit section of the highway (between Grafton and Ballina) is being upgraded. The project would convert the remaining sections of single carriageway highway between Woolgoolga and Ballina into a dual carriageway, which would provide a safer driving experience between Woolgoolga and Ballina.

21.2.4 The performance of the project relative to potential alternatives

Upgrading the Pacific Highway between Woolgoolga and Ballina as part of the Pacific Highway Upgrade Program was selected as the preferred option as it would best meet the strategic planning and transport policies of the NSW and Australian governments, and achieve a balance between environmental, social and economic impacts and benefits.

There is no other transport alternative that would address the project need and objectives as effectively as the upgrade of the Pacific Highway.

Before coming to this conclusion, the NSW Government considered the following alternatives to determine which would best meet the transport, environmental and social objectives and provide the best value for money:

- Existing highway routes
- Air freight
- Sea freight
- Rail.

The NSW Government selected the Pacific Highway upgrade as the preferred alternative because:

- It would best meet the needs of the interstate and intrastate freight travel industry; in particular, it would be the best alternative for transporting regional non-bulk freight
- It would best meet the needs of the rapidly growing population living along the NSW North Coast
- It would be similar to the other alternatives considered in terms of capital expenditure, and environmental and social impacts
- Studies have repeatedly demonstrated the need for an upgrade to this section of the national highway route.

The project history, and the benefits of the alignment, are summarised in Section 4.2 of this EIS.

21.2.5 Suitability of the project alignment

After selecting the highway upgrade as the preferred alternative, a number of different highway alignments were assessed. The identification and selection of the project alignment began in 2004. The assessment process involved:

- Extensive consultation with local communities, government agencies and stakeholder representatives
- Investigations into biophysical, economic and social issues
- Value management assessments to ensure the best value for money would be obtained.

Based on the findings of this process, many of the project's potential adverse impacts have been avoided or minimised. Key constraints that were avoided are discussed in Section 4.2. (Examples of where the design of the project has been refined in response to environmental constraints and social concerns during the preparation of this EIS are detailed in Table 4.8.)

This work enabled the then RTA to select the preferred alignment. This alignment is assessed in this EIS.

The selection of the preferred alignment was based on the following environmental, economic and social considerations:

- Maximising the use of the existing Pacific Highway to minimise the amount of new road required to create a dual carriageway
- Minimising land acquisition and the impacts on both agricultural land and natural environments
- Minimising resource requirements (eg earth and rock material) to construct the project
- Facilitating connections to the existing dual carriageway and key towns and villages
- Minimising construction and operational costs
- Maintaining the existing and recognised road transport corridor serving coastal communities
- Considering the overall community needs and values.

The project alignment is considered to be the optimum alignment from the point of view of balancing engineering, social, environmental and economic constraints.

Despite all efforts to minimise impacts, it is recognised that no single project alignment can be developed without there being environmental costs or disadvantages. Some of the remaining key constraints that challenge the current project alignment are the need to:

- Traverse the floodplain areas associated with the Coldstream and Shark Creek basins, and the Clarence and Richmond rivers, which would pose engineering challenges
- Traverse greenfield areas where communities are currently unaffected by amenity issues associated with a major highway
- Traverse areas of productive land, some of which is regionally significant and contributes to the socio-economic fabric of the region
- Widen the highway corridor where it traverses towns and villages, which would have consequential impacts on the character and the communities of those places
- Traverse areas of environmental sensitivity, including areas that support high levels of biodiversity and important ecological functions
- Traverse sensitive Aboriginal cultural areas and directly affecting sites considered significant to the Aboriginal community.

21.2.6 The public interest of the project

It is a basic principle that major development proposals should be demonstrated to be in the public interest before being allowed to proceed. The Pacific Highway Upgrade Program, including the Woolgoolga to Ballina upgrade, meets this public interest requirement.

The Pacific Highway is a route of strategic national significance serving intrastate and interstate road users and is the main highway linking Sydney and Brisbane. It is of genuine significance to the economies of NSW and Australia, and is recognised as a key component of the National Land Transport Network.

The highway is also a key artery for the NSW North Coast region, providing an important route for communities and tourists between Sydney and the Queensland border. It provides equitable access to employment, services and facilities, and contributes to the quality of life, the sustainability and wellbeing of the communities it serves.

More specifically, the Pacific Highway Upgrade Program, including the Woolgoolga to Ballina upgrade, responds to many national priorities by:

- Accommodating projected increases in the State's population, and the consequent growth in traffic
- Improving freight efficiency and productivity, and accommodating the predicted threefold increase in the freight task between Sydney and Brisbane expected over the next 20 years
- Responding to and stimulating economic growth, which would, in turn, provide employment opportunities
- Providing a safer road network. Recently completed upgrades to the highway have already reduced crash rates and saved lives. Fatal crash rates on the Pacific Highway have fallen from the

high forties to the low twenties per annum, despite a 50 per cent increase in traffic on much of the highway. This is largely attributable to the upgrading of the highway to a four-lane divided road.

Each of these benefits shows that the project and the Pacific Highway Upgrade Program is in the public interest. This is the case despite the unavoidable adverse environmental and social impacts of the upgrade.

Photo 2: Pacific Highway crossing of Clarence River at Harwood

21.2.7 How the project relates to ESD principles

Ecologically sustainable development (ESD) refers to using, conserving and enhancing the community's resources so that ecological processes are maintained and the total quality of life, both now and in the future, can be increased. It requires effective integration of environmental and economic considerations in decision-making and implementation of the following four principles:

- Precautionary principle
- Inter-generational equity
- Conservation of biological diversity and ecological integrity
- Improved valuation, pricing and incentive mechanisms.

The construction of major transport infrastructure of the scale and nature of the project cannot be undertaken without environmental impacts. Extensive investigations have been undertaken throughout the development of the project with regard to route selection and concept design to avoid, minimise and mitigate potential impacts. These investigations have provided an understanding of the environmental constraints within the study area and have allowed for appropriate environmental management measures to be incorporated into the project.

The principles of ESD have been considered throughout the process of developing the project and assessing its benefits and potential adverse effects, and environmental issues have been afforded equal importance along with economic and engineering issues.

Preliminary consideration of ESD principles commenced during route options identification. This involved gathering information through specialist investigations and community feedback. Following route identification, a broad range of social, environmental and design factors were used to assess the suitability of the route options. These factors have been further considered as part of the concept design refinements and this EIS.

The project would deliver many benefits to the study area and to the broader region. Taking into consideration the environmental management measures and offsets outlined in this EIS, the project would deliver an acceptable environmental planning outcome consistent with ESD principles. The application of the four principles of ESD to the project is discussed in the following sections.

Precautionary principle

The precautionary principle provides that, "if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation". Further, clause 7(4) of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* states that, in applying the precautionary principle, decisions should be guided by:

- "Careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment
- An assessment of the risk-weighted consequences of various options".

The project satisfies these principles in the following ways:

- The lack of full scientific certainty has not been used as a reason for postponing measures to prevent environmental degradation. As detailed in each impact assessment chapter, mitigation measures are proposed to manage identified risks/threats of environmental damage. For example, targeted threatened species that were not found during the field surveys have been assumed to be present in the study area (see Chapter 10)
- This EIS documents the careful evaluation of environmental impacts associated with the project and has been undertaken using the best available technical information and adoption of best practice environmental standards, goals and measures to minimise environmental risks. The impact assessments have been undertaken in collaboration with key stakeholders and relevant statutory and agency requirements (see Chapter 7)
- Investigations in the study area have been ongoing since 2004 and information obtained during this time has allowed for potential impacts to be identified. The development of the project involved a number of different phases of investigation, consultation and assessment to ensure that, on balance, the most appropriate route alignment was selected (see Chapter 4)
- Conservative 'worst case' scenarios were considered while assessing environmental impact. Where potential adverse impacts could not be avoided, specific mitigation and management measures to protect the surrounding environment have been identified, including the provision of offsets for biodiversity. Mitigation measures are included in Chapter 19. The EIS identifies issues that may cause serious or irreversible environmental damage as a result of the project, and where there is scientific uncertainty as to the nature of the damage. (Further information on the way the project has considered the conservation of biodiversity and ecological integrity is provided in the following section titled 'Conservation of biological diversity and ecological integrity'.)

In addition, the need to avoid adverse environmental impacts as far as practicable, and minimise and mitigate any residual impacts that cannot be avoided, has been a key consideration and has informed the refinements of the final design. Project refinements have been made to:

- Avoid sensitive vegetation, areas with known threatened flora and fauna communities, and key habitat areas
- Avoid known items or areas of Aboriginal and European cultural heritage significance
- Realign the route alignment in specific areas in accordance with flood modelling results

- Minimise impacts on agricultural lands and associated infrastructure, on existing residential properties and other existing land uses while also considering potential impacts on proposed future land use.

As outlined in Chapter 6, it is expected that the project would be constructed in stages utilising a number of contractors. Each contractor would be required to prepare a detailed construction environmental management plan before starting construction and this would include the relevant mitigation measures outlined in Chapter 19. This would ensure that the project achieves a high level of environmental performance during its construction in accordance with the assessment undertaken as part of the EIS.

Environmental performance during construction and operation would be assessed through independent environmental audits and monitoring to ensure the adequacy of mitigation measures and to identify whether additional measures are required.

Inter-generational equity

Clause 7(4) of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* provides that the principle of inter-generational equity is, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

The project would benefit both existing and future generations by providing a safer road with improved traffic flow. This would bring economic and social benefits over a wide area.

In addition:

- The route alignment has been selected to minimise environmental impacts and to ensure that sensitive areas (such as those with ecological and heritage values) are conserved for future generations, to the extent possible (potential environmental impacts that have been avoided through the project development phase are described in Chapter 4)
- The project includes water quality, fauna connectivity and hydrological measures to ensure that the impacts on the distribution of flora, fauna and ecological communities within sensitive ecological areas are minimised both for the short and long term (see Chapter 10)
- The project includes a number of measures to enable it to adapt to climate change flooding and sea level rise (see Chapter 8).

In spite of these measures, the project would have high, long-term impacts on ecology and Aboriginal heritage and on a small number of residents and businesses across the project corridor. In particular, the project would:

- Result in the clearing of 948 hectares of native vegetation, including 337.7 hectares of threatened ecological communities, which contain threatened flora species (refer the following subsection: Conservation of biological diversity and ecological integrity) (see Chapter 10)
- Impact on 38 archaeological sites, one potential archaeological deposit (PAD), and 11 Aboriginal cultural places. To lessen any disadvantage to future generations or any particular sector of the community, the project includes measures to protect remaining Aboriginal heritage sites, and to collect and analyse artefacts that would otherwise be destroyed (even with the implementation of these measures, the residual impact of the project on heritage would be significant) (see Chapter 12)
- Result in direct impacts on about 386 hectares of regionally significant farmland. However, this amount represents about 0.14 per cent of this land identified in the Northern Rivers and Mid North Coast areas. A number of measures have been taken to minimise these impacts, including locating ancillary construction sites within the project footprint wherever possible (see Chapter 17).

Other specific measures to ameliorate adverse impacts are outlined in Chapter 19. These measures would help to maintain the health, diversity and productivity of the environment for the benefit of existing and future generations.

Conservation of biological diversity and ecological integrity

The conservation of biological diversity and ecological integrity has been a fundamental consideration during the project development phase (including route selection and concept design development) and has been given specific consideration in this EIS (refer to Section 10.3 and the Working paper – Biodiversity). Ecological investigations and findings were a key influence on the selection of the preferred route. All ecological data collected in the study area informed the route selection processes and the preliminary design of the alignment and considered total potential vegetation and habitat loss in addition to habitat condition and the presence of species and ecological communities of conservation significance. Issues raised through the project development process, and recommendations from specific investigations to avoid or further reduce impacts on biodiversity, were further considered as part of the preparation of the EIS and during project refinement.

Impacts on biological diversity and ecological integrity have been avoided to the greatest extent practicable. However, the project would result in a significant impact on biodiversity. The severity of the impact would be minimised to a degree by the fact that major portions of the project involve an upgrade or duplication of the existing Pacific Highway where the existing highway would be used as one of the carriageways of the project.

Notwithstanding that the overall project was developed with consideration for the protection of biodiversity, this EIS finds that a loss of around 948 hectares of remnant vegetation in moderate to good condition would occur, a third of which (337.7 hectares) comprises listed threatened ecological communities. A further 25 hectares of remnant native vegetation could also potentially be removed as a result of additional ancillary facilities located outside the project footprint, should these sites be required.

Other impacts on biodiversity would include:

- Loss of terrestrial, riparian and aquatic habitat for protected and threatened fauna, including the removal, fragmentation and isolation of habitats (including links to national parks and State forests)
- Loss of hollow-bearing trees, likely to be greatest where the project deviates from the existing Pacific Highway in sections 3, 9 and 10, which are a critical habitat feature providing breeding and/or sheltering habitat for a number of threatened species
- Loss of foraging resources for fauna, particularly forest-dependent species such as Squirrel Glider, Yellow-bellied Glider, Brush-tailed Phascogale, Koala, Rufous Bettong, and insectivorous bats
- Direct mortality of fauna. The project would impact populations of Coastal Emu, Rufous Bettong, Brush-tailed Phascogale, Yellow-bellied Glider, Squirrel Glider, Spotted-tailed Quoll, Koala, Long-nosed Potoroo, Giant Barred Frog, Green-thighed Frog and Wallum Froglet
- Loss of connectivity for protected and threatened flora and fauna species and populations with the degradation of wildlife and habitat corridors (including links to national parks and State forests)
- Direct impacts on a range of threatened flora species including *Angophora robur, Arthraxon hispidus, Eucalyptus tetrapleura, Melaleuca irbyana, Maundia triglochinoides, Cyperus aquatilis,* and *Lindsaea incisa*
- Changes to water quality as a result of works in or adjacent to aquatic habitats and alterations to natural hydrological flows, including impacts on several freshwater fish species, such as the Oxleyan Pygmy Perch
- Invasion and spread of terrestrial and aquatic weeds and pest fauna species
- Potential spread of disease pathogens
- Fragmentation of terrestrial, arboreal and aquatic habitat and edge effects from road noise, light and wind turbulence
- Potential impacts on groundwater-dependant ecosystems and wetlands (including SEPP 14 and nationally important wetlands)
- Regional cumulative impacts affecting the long-term viability and survival of common and threatened species, populations and ecological communities and their habitats.

Photo 3: Pacific Highway at Bonville upgrade showing median widening for fauna connectivity

The project would form a barrier to movement corridors for fauna and fragment habitat. The effects of this impact focused on all fauna within the study area. However, the Coastal Emu was specifically addressed as there are two separate groups that would be impacted by the project between the Glenugie upgrade and Maclean (sections 3 and 4).

Where impacts could not be avoided, specific measures would be implemented to reduce and manage impacts as far as practicable. These would include identifying locations for fauna underpasses, overpasses and arboreal crossings in the project design at key corridors; fauna exclusion fencing; the provision of widened medians; landscaping, re-vegetation and site rehabilitation.

While these measures would reduce residual biodiversity impacts, they are not likely to ameliorate the significance of the impact entirely. Therefore, a Biodiversity Connectivity Strategy and a Biodiversity Offset Strategy are included as part of the project. These strategies aim to identify possible compensatory measures, habitat or offsets for the loss incurred by the project.

The objective of the Biodiversity Offset Strategy is to deliver a package of offsets to achieve a neutral or net beneficial biodiversity outcome for the region as a result of the project. The Biodiversity Offset Strategy identifies the method for determining the offset amounts and location and the most effective options for implementing the offsets with a principle of replacement of 'like for like'. The strategy takes into account the identified loss of vegetation types and also considers the condition of the habitat being lost, the species being impacted and the regional scale cumulative impacts in order to determine the ratio amount to apply the offset. The strategy has been designed for consistency with the principles for biodiversity offsets in NSW.

Other measures aimed at conserving biological diversity and ecological integrity include:

- The development of a landscape strategy that includes native and species of locally endemic flora to ensure that biological diversity in the local area is maintained
- Connectivity measures that target all species likely to occur in the area affected by the project
- Site selection criteria for construction phase facilities that include minimising native vegetation clearance.

These and further measures are included in Chapter 19 (Mitigation and management).

Improved valuation, pricing and incentive mechanisms

Clause 7(4) of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* provides that the principle of improved valuation, pricing and incentive mechanisms requires that environmental factors should be included in the valuation of assets and services, such as:

- Polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement
- The users of goods and services should pay prices bases on the full life cycle of costs of providing goods and services, including disposal of any waste
- Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

The implementation of this principle requires consideration of all environmental resources that may be affected by a project, including air, water, land and living organisms.

While it is often difficult to place a reliable monetary value on the residual, environmental and social effects of the project, the value placed on environmental resources within and around the corridor is evident in the extent of environmental investigations, planning and design of impact mitigation measures to prevent adverse environmental impacts.

In addition, the costs associated with the planning and design of measures to avoid or minimise adverse environmental impacts and the costs to implement them have been built into the overall project costs. For example:

- The project would involve biodiversity offsets to mitigate impacts on protected areas and these costs have been factored into the overall project costs. Other environmental mitigation and protection measures are incorporated into the overall cost of the project as a cost contingency (see Chapter 10)
- The value of the project to the community in terms of improved safety has been recognised (see Chapter 14)
- The project includes major water quality treatment measures to protect water quality and minimise the potential for adverse effects on both aquatic ecosystems and human water uses. Where construction would take place in areas adjacent to sensitive receiving environments, the design criteria for sedimentation basins have been made more stringent to increase the level of treatment provided to construction runoff before its release (see Chapter 9)
- Vegetation considered representative of old growth forest (High Conservation Value Old Growth Forests) would be impacted by the project. These forests are considered rare and valuable as ecosystems that show limited signs of human disturbance and provide valuable ecological functions, and because they provide historical context to the region. The project would impact on 2.14 hectares (around 0.001 per cent) out of a total 172,257 hectares of listed area in the NSW upper north-east region. Although this removal of trees would have low impact on the historical significance of the entire heritage item due to the small area of clearing, the potential to further reduce this area of impact would be considered during detailed design (see Chapter 13)
- The project would have impacts on property and reduce the yield of some cane farms due to fragmentation of land parcels, changes to property access or management practices as a result of access changes. These impacts would be managed through the implementation of a remnant land use strategy to mitigate or manage the impacts on property and land use from the acquisition of land. RMS is obliged to pay compensation for the acquisition of land in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* (see Chapter 16).

During construction, the majority of the greenhouse gas impact would be from clearing vegetation. Much of the cleared vegetation would not be replaced and the carbon stored in the vegetation would be lost. Another substantial impact would be linked to the manufacture of construction materials. However, this impact would be offset to some degree by the operation of the project. Initial estimates indicate the project would reduce greenhouse gas emissions from traffic by 15,000 tonnes of carbon dioxide per year (from 2026 onwards) and that it would take about 70 years to offset the greenhouse gas impact of the project during construction (see Chapter 18).

The economic value of State forests was considered and the area of State forest directly affected by the project has been minimised. The project would directly impact on seven State forest areas, requiring the acquisition of about 204 hectares of State forest land, as outlined in Section 16.3.14.

Commitments have been provided so that, during construction, waste generation is avoided, resources are recovered where possible and any wastes generated are managed appropriately according to relevant legislation to minimise potential adverse impacts on the environment. Examples of this on this project include:

- Re-using existing pavement materials within the construction of new highway formation
- Carefully logging forested areas within the project footprint and using the timber at mills
- Achieving a balance of earthworks materials within the project so that excavated material is re-used as fill, which would limit the need to import general fill materials from areas outside of the project.

The environmental risk analysis carried out as part of the EIS (Chapter 20) has enabled the environmental issues and corresponding mitigation and management measures to be identified to the greatest extent practicable.

Further ways in which the project recognises the value of natural resources and seeks to avoid impacting on them are:

- Reduced impacts on Picanniny Creek
- Elimination of bridge piers in waterways potentially having threatened fish habitats
- Development of a management strategy for the Endangered Coastal Emu Population
- Development of a Biodiversity Offset Strategy
- Development of a Biodiversity Connectivity Strategy
- Provision of major bridge structures as dedicated connectivity points for emu movements
- Reduction in design footprint in areas located adjacent to *Angophora robur*
- Completion of Aboriginal heritage surveys and subsurface testing for almost the entire alignment
- Relocation of the southbound rest area at Mororo one kilometre north to avoid sensitive vegetation
- Change of some waterway culverts to bridges to reduce impacts on potential Oxleyan Pygmy Perch habitat.
- Reduction in remnant parcels of land or land serialisation through boundary amendments
- Provision of wide medians at three locations (Corindi, Halfway Creek and Tabbimobile) to facilitate the movement of arboreal fauna
- Realignment of the main carriageway north of the Richmond River to avoid impact on a number of Aboriginal heritage items.

Photo 4: Pacific Highway at Woopi Creek showing riparian and wetland restoration works

21.2.8 How the project satisfies the objects of the EP&A Act

The objects of the *Environmental Planning and Assessment Act 1979* (EP&A Act) are set out in section 5 and provide a framework for considering whether implementation of the project is justified. The ways in which the project would meet the objects of the EP&A Act are outlined in Table 21-2.

Table 21-2: How the project satisfies the objects of the EP&A Act

Objectives of the EP&A Act	Comment
To encourage the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment.	The project design, and the management and mitigation measures detailed in this EIS, allow for the proper management, development and conservation of natural and artificial resources. The main objectives of the project are to improve road safety and transport efficiency by upgrading the existing Pacific Highway (see Chapter 3). Nevertheless, areas of agricultural land (854 hectares), State forest (204 hectares) and national park (21.5 hectares) would be lost. There would also be a loss to the mineral resources in the region through the resumption and sterilisation of quarries.
To encourage the promotion and co-ordination of the orderly and economic use and development of land.	Overall, the project is expected to result in regional economic benefits by reducing freight costs, improving inter-regional connections and accessibility, and creating job opportunities during construction (see Chapter 17). While no future urban release areas identified for future residential and employment land would be directly impacted by the project, it would support the development of these future growth areas, particularly near Maclean and Townsend, Gulmarrad and James Creek, by improving access and connectivity to major regional centres (see Chapter 16). However, the project would put a relatively small portion of regionally significant farmland out of use. The project would also bypass a number of towns, which could result in the loss of income for some businesses that rely on passing highway traffic (see Chapter 17).
To encourage the protection, provision and co-ordination of communication and utility services.	The project would impact on infrastructure and utilities including electricity transmission, telecommunications, water supply and sewerage infrastructure. Any communication or utility services potentially affected by the project would be adjusted, relocated and/or protected. All relevant utility service providers would be consulted on this matter. In many instances these utilities would be relocated to be within a protected zone within the proposed highway corridor (see Chapter 16).
To encourage the provision of land for public purposes.	The project itself is proposed for a public purpose namely a public road.
To encourage the provision and co-ordination of community services and facilities.	The project would impact on the amenity of and access to some community services and facilities. However, overall, the project would result in increased accessibility, and improved road and safety conditions between regional centres. It would therefore improve the provision and co-ordination of community services and facilities (see Chapter 17).

Objectives of the EP&A Act	Comment
To encourage the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats.	The project has been designed and developed from the outset to minimise impacts on the environment, including threatened species, populations and ecological communities and their habitats. Nevertheless, the project would result in a significant impact on biodiversity in the study area. Mitigation measures have been identified to manage and offset residual impacts on biodiversity as part of the project, and these would be implemented during construction and operation (See Chapter 10).
To encourage ecologically sustainable development (ESD).	ESD has been considered at all stages of project development (refer to Section 0) and would continue to be considered during the detailed design and construction stages.
To encourage the provision and maintenance of affordable housing.	Not relevant to the project.
To promote the sharing of the responsibility for environmental planning between different levels of government in the State.	Not relevant to the project.
To provide increased opportunity for public involvement and participation in environmental planning and assessment.	The project development process has involved extensive consultation with the community and relevant parties involving the dissemination of information, participation at workshops and various project meetings. Community and stakeholder feedback has been considered wherever possible in the development and refinement of the preferred alignment. Consultation with the local community and relevant government agencies and specific groups would continue during the detailed design and construction stages of the project. Community involvement is described in Chapter 7 of this EIS.

21.2.9 Cumulative and synergistic impacts associated with the project

Cumulative impacts are likely to arise from the interaction of the construction and operation of the project and other proposed activities, locally and regionally. Cumulative impacts can be described as the effect of continually adding the same impact to produce an accumulated effect. Synergistic impacts can be described as the effects of two or more impacts working together to produce effects that were not predicted.

The project would contribute cumulatively and synergistically to both the positive and negative impacts of the Pacific Highway Upgrade Program. The project is one of the last remaining sections of the upgrade being prepared for construction and with its completion would result in many of the overall program objectives and benefits being realised. While the Pacific Highway Upgrade Program and project both seek to achieve the greatest benefits with the least negative effects, a range of potential negative impacts, some of which could be cumulative and/or synergistic could also result.

Table 21-3 provides a strategic assessment of the likely cumulative impacts of the project in the context of potential interaction with the wider upgrade program. The interactions of effects to the social, economic or biophysical environment have been derived from previous chapters in this EIS. Mitigation measures to reduce direct impacts are already detailed in previous chapters. These measures, and associated processes such as consultation with stakeholders, would provide sufficient mitigation to offset both direct impacts, and potential cumulative impacts.

Table 21-3: Strategic assessment of cumulative impacts relative to the Pacific Highway Upgrade Program (PHUP)

Key potential project impacts	Cumulative with PHUP	Cumulative interaction
Social environment		
Amenity effects during construction, such as noise disturbances, visual changes, and local air quality deterioration	Unlikely	There would be possible disturbance to the area's natural environment and landscape values and changes to the rural character and amenity due to increased noise and dust from construction activities. Amenity impacts are not likely to extend beyond a local area.
Access disruptions across project and between projects	Likely	There would be impacts on the local road network (eg enforced speed zones, traffic diversions and congestion delays) in areas adjacent to other upgrades may be exacerbated during construction.
Traffic delays due to haulage and delivery of materials across the upgrade during construction	Likely	Construction traffic would increase between projects, with potentially some projects obtaining materials form the same suppliers thereby increasing the traffic on that route.
Severance effects on communities where highway is duplicated	Unlikely	The impact of severance would affect only the community directly impacted and is not likely to result in broader, regional impacts.
Land use changes where land outside of the highway acquisition boundary is used temporarily for construction	Unlikely	There would be localised land use changes only.
Induced traffic increasing traffic volumes during operation	Likely	Although no empirical assessment has been untaken on this aspect of traffic change it is recognised that completion of the project would provide travel time and efficiency benefits and this may have the effect of encouraging a greater number of vehicle trips and increased vehicle kilometres travelled. This may result in increased traffic on highway feeder routes and may also negate any greenhouse gas benefits arising from the project.
Change in character and lifestyle of communities and towns during operation	Likely	There would be advantages and disadvantages for the towns and communities situated on the Pacific Highway. Some would be bypassed; others would have a wider highway corridor. Bypasses provide opportunities for enhanced community cohesion and settlement patterns. The design of appropriate interchanges that serve these towns is key to ensuring preferred access is maintained. These changes may extend to the broader region.
Amenity effects during operation, such as noise disturbances, visual changes, and air quality deterioration	Unlikely	There would be potential impacts on rural character and heritage and local amenity, due to the realignment of the highway away from the existing alignment and closer to communities such as Pillar Valley, Tucabia, Coldstream and Gulmarrad. Amenity impacts are not likely to extend beyond the affected local area.

Key potential project impacts	Cumulative with PHUP	Cumulative interaction
Changed settlement patterns in rural areas as a result of induced settlement	Likely	Settlement in some of the local government areas may change or the current direction of change may accelerate as a response to the completion of the highway upgrade program. This is especially relevant to new land release areas or industrial / commercial centres along the project route.
Increased knowledge of Aboriginal cultural heritage in the study area as a result of project investigations	Likely	The project assessment has contributed to an understanding of the cultural value of the broader landscape within which the project is located. Investigations for the Pacific Highway Upgrade Program are often the largest investigations in the regions they traverse, and add greatly to our understanding of archaeology and Aboriginal occupation in these regions, and thus provide a positive legacy. Thirty-eight Aboriginal heritage sites and one potential archaeological deposit would be directly or indirectly impacted by the project. Given the relatively low number of sites and places that would be directly impacted by the project, (in comparison to the number of sites and areas of potential sites existing within the region) the regional loss of cultural heritage resources due to the project is considered to be low.
Improved employment and skills training	Likely	The highway upgrade program has provided opportunities for employment in areas with higher unemployment than the national average. The upgrade program aims to foster a learning culture from project to project. The project would contribute to this.
Improved townscape and visual character of towns	Likely	The removal of through traffic from bypassed towns would be a positive change to the visual character of the towns. Some aspects of the project design (eg major river crossings) may become a future attraction and focus for the area.
Improved emergency access for major incidents	Likely	The highway upgrade program is improving flood immunity, decreasing travel times and providing an evacuation route in the event of a major incident. The project would make a major contribution to this ongoing improvement.
Improved accessibility to services	Likely	The project would be situated between major centres of commercial activity and community services. The interchange improvements and local road connections would benefit many of the road users in the community.

Key potential project impacts	Cumulative with PHUP	Cumulative interaction
Economic environment		
Increased demands on resources, such as quarried materials	Likely	Construction of the project by the end of 2016 would require construction activities to be underway on all project sections concurrently. This would significantly increase the demand on local quarries. Coupled with other activities in the region, this high level of resource demand could exceed local supply. Consequently, there could be increased prices for these resources and increased costs for freight (if supplies need to come from outside the local area). However, the cumulative impact would not result in serious depletion of resources.
Induced demand for the development or expansion of quarries in the region to supply material	Unlikely	There may be a small change to local and regional economic activity stemming from the need to supply goods and services for construction activities and workforce needs. Due to the staged approach to construction, and the proximity of large regional centres such as Coffs Harbour, Grafton, Ballina and Lismore, the contribution of the project to this change is expected to be small.
Increased demand for accommodation during construction, driving prices higher	Likely	Should all project sections be constructed concurrently, while other upgrades are also underway, this may affect supply for suitable accommodation and lead to rate increases.
Decreased tourism in some areas due to temporary changes in amenity and access	Unlikely	Construction of the Pacific Highway Upgrade Program is typically managed such that the community is well informed of possible traffic delays and such delays are timed outside of the peak periods. Amenity changes are temporary (and typically not near tourism attractions) and not expected to affect the attractiveness of the region to tourists.
Changes to land use and loss of productive land, including fragmentation of agricultural lands	Unlikely	The loss of productive land regionally would be small as a direct result of the project. The upgrade program would result in loss of agricultural lands directly and potentially through induced development. No comparison has been made of the loss overall for the program given the different data sets involved across the NSW North Coast. The interaction is not expected to be synergistic at a regional level.
Reduced incentive to transfer freight from road to rail during operation	Likely	Improved travel times on the upgraded highway could result in a potentially significant transfer of freight from rail to road due to reduced road transport costs, leading to an increase in heavy vehicles on the road (and associated safety and amenity implications). Increased use of high productivity vehicles across the Pacific Highway would offset some of this increase in terms of vehicle numbers.

Key potential project impacts	Cumulative with PHUP	Cumulative interaction
Impact on business reliant on passing trade during operation	Unlikely	The project would impact directly on a small number of highway-based businesses due changed access or impacts resulting from bypasses. The highway reservation has been in place for many years and business operators have had the opportunity to factor the construction of the project 'bypass' into their business plans. Across the upgrade program, this impact is likely to be relatively small given adaptation to the changes by businesses.
Uplift in local economies	Likely	The project would improve economic prosperity during construction due to increased growth and employment opportunities and increased spending in the region; during operation, there would be improved connectivity between suppliers and markets and a reduction in the cost of congestion.
Flood immunity during the 20-year ARI flood even from majority of highway and greater protection against effects of climate change on the national highway	Likely	A key outcome of the upgrade program is to provide improved levels of flood immunity for the highway, which is improving access, travel efficiency and the safety of road users. The project would also provide this benefit.
Reduced travel time and greater certainty of trip duration	Likely	The current travel time estimate for vehicles travelling the full project length between Woolgoolga and Ballina is 2 hours 10 minutes. This would decrease to around 1 hour 45 minutes once the upgrade is complete – a 25-minute saving. The upgrade would also improve traffic flow and create more consistent travel speeds. Since 1996, almost 90 minutes has been saved from journey times between Sydney and Tweed Heads as a result of the upgrade program. Projects currently funded would save a further 30 minutes. This brings a total saving time of up to two and a half hours for the complete upgrade program.
Increased safety of travel, with lives saved each year as a direct result of the project	Likely	By 2036, the project would reduce the forecast number of crashes by 28 per cent from 183 (if the project had not proceeded) to 132 crashes. It is estimated that completion of the upgrade program would avoid over 565 road deaths during the next 30 years, and the project would make a substantial contribution to this saving in lives.
Improved water crossings: longer bridges, increased spanning and enlarged culverts	Likely	The upgrade program has been designed to stringent RMS road design standards. This has resulted in existing bridges over waterways being augmented or replaced with new structures. These structures provide greater clearances and a lower footprint-to-structure ratio, and allow for improvements to the riparian habitats they traverse. The project would cross about 50 waterways. Overall, the project would make a positive contribution to the health and recovery of regional drainage and waterway systems.

Key potential project impacts	Cumulative with PHUP	Cumulative interaction
Net economic benefits: locally, regionally and nationally	Likely	The likely economic benefits of the project and of the upgrade program would be wide-ranging and cover broad regions. The project would provide an economic stimulus during construction due to increased growth and employment opportunities and increased spending in the region; during operation, there would be improved connectivity between suppliers and markets and a reduction in the cost of congestion Both the project and the upgrade program would provide cost savings from reduced travel times and lower vehicle operating costs and also reduce the costs associated with road crashes and road trauma. Broader economic benefits of the upgrade program include improved freight efficiency and productivity across the economy, resulting in cost savings and efficiency improvements for suppliers and manufacturers transporting both raw materials and end products to markets. The upgrade program aligns with the State Government's goals of improving the performance of the State economy and driving economic growth in regional NSW.
Improved accessibility leading to residential and commercial growth	Likely	The upgrade program will improve accessibility for regional and local centres along the North and Mid North Coast and help improve amenity, and boost economic growth and employment in the region. Equally, the project would improve access for local residents, businesses and tourists, and reduce travel times between some centres and towns. This is likely to provide opportunities for growth of these areas.
Improved amenity of bypassed towns leading to economical sustainability	Likely	The project would improve local amenity of bypassed towns and villages, due to a reduction in the volume of traffic and consequential improvement in local air quality, levels of traffic noise and pedestrian safety and amenity. A reduction in through traffic in towns bypassed by the project would also enhance tourism opportunities in these towns by making them more attractive for travellers to stop. This may strengthen the sustainability of these towns, allowing them to capitalise on their improved environmental and recreational values. This affect across the upgrade program has been well documented. The upgrade program would involve the bypass of about 30 towns once complete. Although there is typically an initial reduction in highway-based trade in those towns, the bypass makes them more attractive for tourism and industries.

Key potential project impacts	Cumulative with PHUP	Cumulative interaction
Biophysical environment		
Impact of vegetation clearing on regional biodiversity	Likely	The Pacific Highway Upgrade Program has resulted in the total clearing of about 1574 hectares of native vegetation, as defined within the conditions of approval for those projects. The project would see an additional 948 hectares cleared and increase the total clearing for the Pacific Highway Upgrade Program to 2615 hectares. This total includes 621.7 hectares of listed threatened ecological communities. The cumulative and potentially synergistic affects of this vegetation clearing may contribute to the decline of long-term viability and survival of common and threatened species, populations and ecological communities. To mitigate this impact, the upgrade program and the project include a biodiversity offset strategy that involves securing substantial areas of land for biodiversity conservation.
Reduced greenhouse gas emission	Likely	Greenhouse gas generated from the project would be high during construction, mainly due to vegetation clearing and the loss of this carbon sink. Although greenhouse gas emissions are predicted to reduce over time during operation, the impact from construction would not likely be offset for 70 years (2086). Any operational reductions extend to the upgrade program with the bypass of urban areas and more efficient travel of vehicles (especially freight) resulting in reduced emissions. The landscaping and revegetation of the project and disturbed areas, and the permanent conservation of vegetation through biodiversity offsetting would also offset CO2 generated by vegetation clearing and this loss of a carbon sink.
Reduced extent of threatened flora populations	Unlikely	The project would reduce the extent of a number of threatened flora populations, most notably *Angophora robur* and *Eucalyptus tetrapleura*. The project represents a large contribution to the cumulative impacts of major projects (including the upgrade program) on threatened flora in the region. However, given distribution of flora species and populations across the NSW North Coast it is unlikely that the upgrade program would impact on any one species individually and cause a significant decline.
Increased relative vulnerability (the threatening processes) of any of the species and/or habitat types affected	Likely	Significance assessments indicate that the project is likely to have a significant impact on five endangered ecological communities, 11 threatened flora species, 16 threatened fauna species and one endangered fauna population. Cumulative and synergistic impacts on some species may occur as a result of the upgrade program, such as those susceptible to mortality due to vehicle strike or those with a high sensitivity to fragmentation of habitats.

Key potential project impacts	Cumulative with PHUP	Cumulative interaction
Disruption of key fauna movement corridors	Likely	The upgrade program and the project would impact regional and climate change fauna movement corridors. Species with high dispersal characteristics, yet dependent on these key corridors, may be affected over the long term, should the upgrade program present a barrier to movement.
Increased pollutant load in surrounding waterways	Unlikely	The upgrade program includes the upgrading of surface water management facilities, which would improve water quality. Although this improvement may be offset by adverse cumulative effects resulting during construction, overall, any impacts (should they occur) are likely to be localised.

21.3 Conclusion

21.3.1 Environmental, social and economic outcomes of the project

The project seeks to achieve the greatest benefits with the least adverse environmental effects. Although there are a number of environmental risks and adverse effects associated with the project, these have been minimised wherever possible. The project is expected to significantly improve road safety by substantially reducing the number of vehicle accidents.

Many of the benefits and adverse effects of the project would be cumulative with the overall Pacific Highway Upgrade Program and with other developments occurring within the project region.

The main environmental, social and economic outcomes of the project are described below.

Environmental outcomes

Vegetation clearing and associated impacts on biodiversity would be minimised by incorporating the existing Pacific Highway into the project where practicable to minimise the project footprint and, in locations where the project deviates from the existing highway, avoiding sensitive areas. Nevertheless, the project would have adverse impacts on biodiversity. In particular:

- The project would cause the direct removal of an estimated 948 hectares of native vegetation, with about 377 hectares listed as a threatened ecological community
- The project under a motorway standard upgrade is likely to significantly increase the barrier effects of the current highway for fauna movement, especially in areas where a new route alignment is proposed. In some instances this could result in the road kill of some species. The barrier effects of the motorway would be mitigated by providing fauna overpasses and underpasses so that fauna can safely cross the upgrade.
- The project would cause edge effects and fragmentation of larger stands of flora and fauna habitat, which would place species populations in the region that are currently threatened at further risk of decline.

The project would also result in changes to flooding behaviour, particularly where it passes through floodplains and waterways. However, the use and design of bridges and culverts would minimise any flooding impacts. (The project would also improve the flood immunity of the highway, providing a more reliable travel route.)

The project would also have impacts on a number of Aboriginal heritage sites, PADs or cultural places. Appropriate management measures would be implemented to manage these impacts, in consultation with Aboriginal stakeholders, but the residual impact would be significant. Many more sites and places that were identified during environmental investigations would be avoided.

Social outcomes

The project would provide a number of positive social outcomes. The project would support future development, both locally and regionally, through improved access to major regional centres such as Coffs Harbour and Ballina and areas outside the region such as south-east Queensland.

In particular, it would:

- Provide a safer, more reliable transport route
- Divert highway traffic away from local roads
- Improve the reliability of inter-regional travel
- Improve access to regional markets for local businesses, which would provide flow-on employment benefits
- Create business savings and opportunities resulting from reduced transport costs
- Generate local employment during the construction period.

In addition, the project would seek to maintain and in many instances improve accessibility to rural communities, services and properties. The separation of local and through traffic would result in improvements in local amenity and potentially improved tourism opportunities. In areas where the project would bypass towns and communities, the bypass would provide the opportunity to improve the amenity of these areas through the reduction of noise, air pollution and visual impacts.

Although the project design specifically aims to reduce potential social impacts, there would be a number of impacts, particularly property acquisition and noise impacts on individual properties and communities closest to the project.

About 564 property lots would be affected by the project and require either partial or full acquisition and current land uses would change. A number of structures, including about 60 residences as well as machinery and farm sheds would require demolition. Changes to property access and the potential severance and fragmentation of larger properties, particularly agricultural land are other key social impacts that would result from the project.

In addition, where the project deviates from the existing highway alignment, it would introduce a new noise source into a predominantly rural environment.

During construction, on average, about half of the residential receivers in the project area would experience construction noise levels above the noise management levels (background plus 5 dBA) and a large number of receivers would exceed the highly noise affected criteria (75 dBA). Possible mitigation measures during construction include community consultation, temporary barriers, provision of respite periods, utilising quieter construction methods, and the temporary relocation of residents.

During the project's operation, about 219 residences would be considered for noise mitigation. Given that the receivers requiring noise mitigation are generally located away from the highway and are separated by large distances, noise barriers are not recommended. Instead, the following noise mitigation measures would be implemented:

- A noise-reducing pavement is proposed close to sensitive receivers, where required, through areas of closely spaced residences to reduce noise generated from the pavement
- Individual residences would be treated to minimise this noise intrusion.

In addition, the project would require the acquisition of land for the highway and may be the catalysis for new induced development along the route eg within future service centre areas. As well as agricultural land, State forest land and land reserved for national parks and nature reserves would need to be acquired.

Where the project duplicates the existing alignment, it would result in an incremental change, which would generally have a moderate impact on the social environment. However, there would be moderate to high impacts at:

- Harwood, where significant widening of the existing highway corridor would adversely impact the amenity of this town. Some important community facilities may also be affected by noise, in addition to the direct loss of land
- Maclean and New Italy, where widening of the existing highway corridor would result in various adverse amenity impacts, particularly traffic noise.

Overall, the expected social impacts of the project would be balanced with the anticipated social benefits and public interest considerations.

Economic outcomes

The project would result in some adverse economic impacts. For example, there would potentially be impacts on:

- Agricultural farms, which would be impacted by direct land acquisition, fragmentation of plots and loss of direct access to the highway
- Businesses within bypassed towns that cater for highway travellers, which would be impacted by loss of trade.

Mitigation measures for these impacts have been identified and would be implemented.

Overall, however, the project would have beneficial impacts on the regional and State economy. In particular, the project would:

- Bypass some towns, which would improve amenity and provide the opportunity for new businesses
- Improve inter-regional and interstate connections and access, resulting in benefits for freight and industry, particularly the tourism industry, with flow-on benefits to service industries and communities
- Increase traffic capacity and level of service, which would improve traffic flows and reduce travel times, especially during peak holiday periods
- Improve road safety and travel efficiency, which would reduce travel costs for freight and other vehicles (these benefits are particularly significant given the Pacific Highway is one of the key freight routes and transport corridors along the east coast of Australia)
- Increase economic activity and employment during construction, which would generate regional and local economic benefits. These economic benefits would include those associated with the provision of support services by local businesses and input to the local economy through expenditure by construction personnel.

21.3.2 Concluding statement

This EIS has addressed the requirements issued by the Director General of the Department of Planning and Infrastructure under Part 5.1 of the EP&A Act.

This EIS confirms that the project has a strong justification for proceeding considering the significant transport efficiency and safety benefits it would provide. The project is a major and essential component of the Pacific Highway Upgrade Program and is consistent with the objectives of this program.

The project is also consistent with Australian and NSW government planning strategies and policies. The project would address transport deficiencies along the corridor, including safety and congestion issues, while also providing infrastructure in response to significant future economic and population growth expectations for the Mid North Coast and Far North Coast of NSW. In meeting the objectives of Australian and NSW government planning strategies and policies, the project is expected to have significant functional, environmental, social and economic benefits on a local and regional scale.

Project development has considered avoiding or minimising potential adverse impacts, incorporating the principles of ESD and taking full account of community input.

The key benefits of the project have been described in section 21.3.1 and against these benefits are a number of predicted environmental impacts. For this EIS, a range of specialist investigations were undertaken and, as would be expected from a major and complex infrastructure development, significant potential impacts have been identified. This EIS addresses these potential impacts on the biophysical and socio-economic environment and identifies a range of management and mitigation measures to avoid, minimise, mitigate and offset potential adverse impacts. These include specific measures to assist in fauna connectivity across the corridor, as well as an offset strategy for residual impacts that cannot be mitigated. These measures are summarised in Chapter 19 and the implementation of these measures would seek to manage the adverse impacts of the project.

The project fulfils the objectives of the Pacific Highway Upgrade Program and would deliver substantial economic and road user benefits while seeking to minimise environmental and social impacts.

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