

4 Project Objectives, Design Principles and Assessment Criteria

4.1 Program Objectives

The Pacific Highway Upgrading Program aims to:

- Significantly reduce road accidents and injuries.
- Reduce travel times.
- Reduce freight transport costs.
- Develop a route that involves the community and considers their interests.
- Provide a route that supports economic development.
- Manage the upgrading of the route in accordance with Ecologically Sustainable Development (ESD) Principles.
- Provide the best value for money.

4.2 Project Objectives

Following early consultation with the community (three Community Information Sessions held in the study area between 12 and 16 November 2004) and the CLG, it was considered necessary to amend the generic RTA project objectives to better reflect the unique needs of this particular study and community concerns.

Project-specific objectives (grouped by program objectives) are listed in **Table 4.1**. These objectives have been reviewed by the original and re-formed CLG established for the study.

Table 4.1 Project Objectives

RTA Program Objectives	Project Objective
Significantly reduce road accidents and injuries	<ul style="list-style-type: none"> • Develop a project that meets the following design criteria: <ul style="list-style-type: none"> - Four-lane divided carriage between Ross Lane and Ewingsdale joining the northern end of the proposed Ballina Bypass and the existing dual carriageway roadway at Ewingsdale with potential to expand to six lanes if required with minimal disruption. - Grade separation of local roads and the proposed highway. - Limited access conditions, i.e. no private access points along the proposed highway upgrade. - Concept design for a 110 km/h design speed for the vertical alignment and 110 km/h design speed for the horizontal alignment. - Concept design that incorporates pedal cyclists' requirements. • Develop a project with a target crash rate of a maximum of 15 crashes per 100 MVK over the project length. • Develop a project that retains or replaces existing rest areas within the study area and is consistent with RTA policies on rest areas. • Where possible, improve safety of travel on the existing Pacific Highway (through the study area) until the proposed upgrade is operational.

RTA Program Objectives	Project Objective
Reduce travel times	<ul style="list-style-type: none"> • Develop a project that reduces travel time for Pacific Highway traffic. • Develop intersections and interchanges designed to at least a Level of Service (LOS) C, 20 years after opening for the 100th Highest Hourly Volume. • Develop a project that provides adequate flood immunity on at least one carriageway, target 1:100 year flood event. • Develop a project that minimises disruption and delay during construction.
Reduce freight transport costs	<ul style="list-style-type: none"> • Develop a project that reduces overall freight transport costs. • Develop a project that meets freight transport vehicle requirements.
Develop a route that involves the community and considers their interests	<ul style="list-style-type: none"> • Meet the objectives of the Community Involvement Plan and the CLG. • Seek the experience, expertise, and input of the community to better inform each stage of the upgrade process. • Adopt a policy of transparency in the development and assessment of route options. • Investigate feasible routes in the initial stages of the study. • Minimise uncertainty in affected communities by undertaking the route selection process as efficiently as possible. • Mitigate the impact of noise levels associated with the project (including engine braking noise), and meet the EPA Target Noise Levels where it is reasonable and feasible to do so and implement the adopted recommendations from the Northern Pacific Highway Noise Taskforce. • Develop a project that takes account of air quality concerns at locations of sensitive receptors. • Develop a project that minimises impacts on the scenic value of the area. • Develop a project that is enjoyable for users, but minimises impacts on nearby residents. • Develop a project that minimises the physical impacts of the route, including community severance and access patterns. • Develop a project that minimises the impact on property. • Develop a project that minimises the impacts on heritage (indigenous and non-indigenous) places.
Provide a route that supports economic development	<ul style="list-style-type: none"> • Develop a project that minimises the impacts on prime agricultural lands. • Develop a project that improves accessibility for local industries, utilities and emergency services. • Develop a project that minimises the impacts on businesses dependent on Pacific Highway traffic.
Manage the upgrading of the route in accordance with Ecologically Sustainable Development (ESD) principles	<ul style="list-style-type: none"> • Develop a project that minimises the impacts on sensitive ecological constraints. • Assess route options with consideration of environmental, social and economic evaluation criteria. • Apply RTA and DEC Guidelines for managing environmental issues (biodiversity, water quality, Acid Sulfate Soils). • Assess and address cumulative environmental impacts. • Develop a project that addresses environmental safeguards and measures necessary to mitigate environmental impacts.
Provide the best value for money	<ul style="list-style-type: none"> • Minimise the Whole of Life Costs of the project. • Maximise the use of the existing road reserve and other road assets for duplicated sections of the project where possible.

4.3 Design Principles and Standards

4.3.1 Urban Design Approach

The urban design outcome must be an integrated cohesive best practice design in accordance with the *Pacific Highway Urban Design Framework* (RTA 2005a) and incorporating guidelines from the following RTA documents:

- *Beyond the Pavement - Urban and Regional Design Practice Notes* (RTA 1999a).
- *Noise Wall Design Guidelines* (RTA 2003c).
- *Bridge Aesthetics - Design guidelines to improve the appearance of bridges in NSW* (RTA 2003d).
- *Shotcrete Design Guidelines - Design guidelines to avoid, minimise and improve the appearance of shotcrete* (RTA 2005c).
- *Roadscape Guidelines* (RTA 1998).

The urban design approach to the project and all the upgrades of the Pacific Highway is defined in the Framework as:

The upgrade should be a sweeping, green highway providing panoramic views to the Great Dividing Range and the forests farmlands and coastline of the Pacific Ocean; sensitively designed to fit into the landscape and be unobtrusive; and characterised by simple and refined road infrastructure.

4.3.2 Urban Design Objectives and Principles

The following design objectives and principles are based upon the objectives and principles in the Framework and seek to integrate the road infrastructure into the landscape as much as possible, whilst providing an attractive driving experience for the motorist. They are a series of broad principles that would also influence road design decisions and potentially mitigate some of the visual impacts of a new highway alignment. They include, but are not limited to, the following:

- **Selection of an alignment which conforms to the prevailing landform:**
 - Follow the existing land formation to create a flowing alignment which is responsive to the landscape.
 - Avoid crossing steep and exposed ridges and spurs to minimise deep cuttings.
 - Avoid deep valley crossings where large embankments or viaduct structures are required.
 - Independently grade (horizontally and vertically) the north and southbound carriageways to limit the extent of cuttings and embankments and thereby reduce the footprint of the highway.
 - Where steep cuttings or embankments are necessary, align the road on a sweeping curve to reduce the extent of the cutting or fill embankment being visible from any one point.
 - Arrange the alignment as a series of reverse curves and avoid long straight sections of road.
- **Selection of an alignment which responds to the landscape character:**
 - Follow landscape edges such as boundaries between crops, plantations, forested areas and open paddocks.
 - Avoid dissecting formal landscapes such as orchards and plantations.
 - Avoid large stands of trees which are prominent features in the landscape.
 - Avoid prominent features in the landscape including landmarks or culturally significant elements/structures.

- Avoid crossing large water bodies.
- Minimise the number of intersections with existing roads to reduce the highway and local road footprint.
- **Selection of an alignment which minimises the visual impact of the highway:**
 - Avoid the visual catchments of key public places e.g. lookouts (where possible).
 - Avoid the immediate visual catchments of towns and villages (where possible).
 - Minimise the visibility of the highway from farms and homesteads (where possible).
 - Align the cuttings to avoid them being silhouetted against the skyline.
 - Utilise landforms to screen sections of the highway from key viewpoints.
- **Selection of an alignment which provides an attractive driving experience and easy orientation for the motorist:**
 - Select an alignment which provides a sequence of road characters (topography, land uses, etc) varying from regional views to total enclosure for enjoyment and reduced driver fatigue.
 - Select an alignment where the motorist can see landmarks and features, such as ocean views, for orientation.
 - Horizontally and vertically split the north and southbound carriageways to limit the extent of cuttings and embankments to reduce headlight glare and a 'motorway' appearance of the road.
 - Select an alignment which is separate from the local road system to preserve the small scale character of the local roads.
- **Selection of an alignment which improves local access and connectivity between settlements separate from the highway:**
 - Minimise the number of intersections to improve highway efficiency and improve local road traffic flow.
 - Utilise landform to provide efficient grade separated intersections.

4.3.3 Highway Design Standards

The design standards for the Tintenbar to Ewingsdale upgrade of the Pacific Highway are comprehensive and incorporate the standards/guidelines required to achieve the program goals and project objectives, particularly in relation to road safety and overall performance in terms of design life, level of access, level of service and flood immunity. They are based on the design standards that have been adopted for the Pacific Highway Upgrading Program and accommodate other influences including environmental issues, land management requirements, and service provision. The overall objective is the development of a 'value for money' project from a broad community perspective.

The primary design criteria for the upgrading of the Pacific Highway from Tintenbar to Ewingsdale are defined in the following documents:

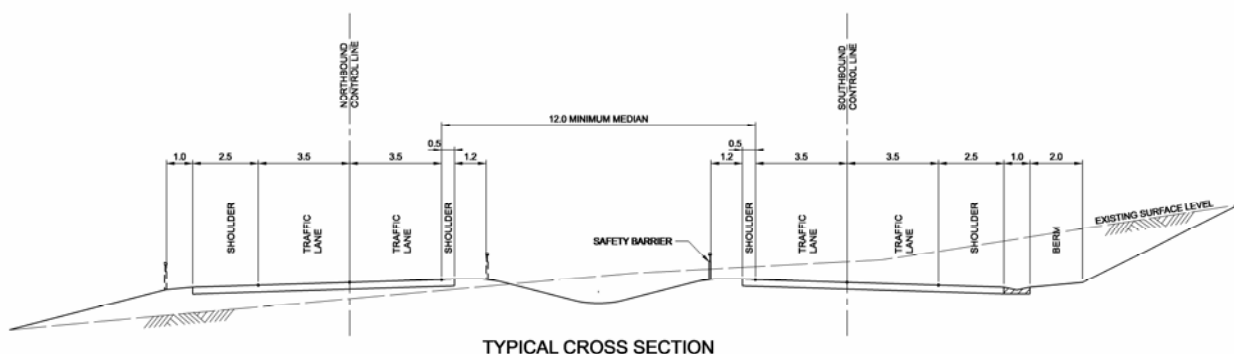
- *Upgrading the Pacific Highway, Upgrading Program beyond 2006, Design Guidelines Issue 1.2 (UPH Design Guidelines) (RTA 2005b).*
- Austroads standards, including *Rural Road Design – A Guide to the Geometric Design of Rural Roads* (Austroads 2003).
- *Road Design Guide* (RTA 1996) including various updates.
- *Grade Separated Interchanges (A Design Guide)* (NAASRA 1984).

Key standards applying to this project are summarised in **Table 4.2** and a typical cross-section for the upgraded highway is shown in **Figure 4.1**.

Table 4.2 Road Design Standards

Feature	Upgraded Highway	Other Roads including Existing Pacific Highway
Design speed	110 km/h horizontal and vertical. Absolute minimum vertical design speed of 100 km/h may be considered at certain locations and subject to Pacific Highway Office approval.	100, 80 and 60 km/h dependent on function.
Cross section	Dual carriageway with two 3.5 m wide lanes, inner shoulders 0.5 m, outer shoulders 2.5 m, minimum median width varies from 2.6 m to 12 m depending on median barrier type.	Two lane single carriageway with maximum 2 m shoulders dependent on road function.
Vertical grades	Desirable maximum grade 4.5%. Absolute maximum grade 6% (desirable maximum length 500 m). Climbing lanes may be required depending on length of sustained grades above 4.5%.	Not specified, refer <i>Road Design Guide</i> (RTA 1996).
Flood immunity	1 in 100 year desirable or 1 in 20 year absolute minimum across floodplain. Effects of Probable Maximum Flood to be assessed.	No change to existing conditions.
Intersections	Grade separated, no at-grade intersections permitted.	At-grade.
Access to highway	Restricted.	Unrestricted.
Local access	Alternative routes to be provided.	Service roads or local arterial road networks to provide an alternative routes for local traffic.
Clearances above highway	5.3 m for the full road width including shoulders (5.3 m for any pedestrian bridges). 7.5 m above railway.	5.3 m desirable, 4.6 m minimum.

Figure 4.1 Typical Cross-Section of Upgraded Highway



Further details of the proposed design criteria are described below:

- Development of the highway must include a strategy for the future upgrade from 2 to 3 lanes in each direction. The preferred strategy is to widen within the median; and median widths are set accordingly. Bridges minimum width of 11.5 m is required where additional width cannot be added later and provided there is off-road provision for cyclists (30 years, whole of life analysis). A strategy must be developed and approved by Pacific Highway Office if there is no off road provision for cyclists.
- Grade separation where the upgraded highway crosses local roads or the existing highway, and the elimination of direct access to provide freeway type conditions. The preferred standard for the highway upgrade is 'M Class' as designated in the UPH Design Guidelines. The project should therefore be designed to 110 km/h Freeway standard, and requires alternative routes to be available for local traffic through the provision of service roads or local arterial road networks. As an absolute minimum, if an 'M Class' project cannot be provided then the 'A Class' project requirements would apply. 'A Class' projects are to be designed as Controlled Access Roads, and must be developed with a strategy for conversion to 'M Class' standard in the future. Future conversion should not require changes to the alignments, although 'A Class' projects would generally be signposted at 100 km/h.
- Median widths dependant on assessed requirement for future widening as well as type of median barrier/fencing. Generally, desirable minimum median width 12 m to accommodate future widening to three lanes in each direction. Minimum median width of 5 m with wire rope barrier or 2.6 m with a Type F or VCB barrier subject to provision for widening on nearside (outside). Wider medians and/or independent carriageways should be considered where appropriate for example to preserve vegetation or provide a visual feature.
- Meet or exceed B-Double vehicle requirements as a through route, and, where appropriate, design interchanges and intersections for B-Double usage. However, there are currently no designated B-Double routes in the study area apart from the existing Pacific Highway and, assuming the upgraded highway is on a new alignment, it is expected that the old highway would lose its status as a B-Double route on opening of the upgrade.
- Interchanges and intersections with the highway are to achieve Level of Service C or better in accordance with Austroads Traffic Engineering Practice Series Part 2 for the 100th Highest Hourly Volume, 20 years after opening.
- Desirable flood protection from Q20 in the floodplain and Q100 elsewhere.
- On-road provision for cyclists (an alternative route must be provided if on road provision is not available).
- Lighting where safety standards require, such as at intersections and interchanges.

It should be noted that while desirable and minimum requirements have been proposed, they should not be regarded as absolutes. Where conditions are encountered such that the suggested design criteria cannot be fully implemented because of significant construction or financial constraints, a relaxation of the requirements may be appropriate while still maintaining the intended concepts of safety and design.

4.4 Assessment Process

The assessment process for the Tintenbar to Ewingsdale upgrade is outlined in **Section 2.1**. Criteria for the assessment of route options were developed by the Project Team in conjunction with the CLG and various agencies. Selection criteria, based on the Programme and Project Objectives, are listed in **Appendix A**. Application of the criteria is explained in **Sections 7.2 and 7.3**.