13 Traffic

This chapter summarises impacts of the proposed upgrade on highway and local traffic, transport and access, and outlines management measures to address any impacts. More detailed assessment of these issues is included in Working Paper 6 – Traffic and Transport.

Environmental assessment requirement	Where addressed
> demonstration of how the project design meets the traffic and transport objectives of the Pacific Highway Upgrade Program;	Section 13.2
> assessment of operational traffic and transport impacts to the local and regional road network, including direct impacts from traffic rerouting and modified access to the upgraded highway, and indirect impacts from the increased accessibility of the Ballina and Byron Shires;	Sections 13.4.1, 13.4.2, 13.4.3 ,13.4.4 and 13.4.5.
> assessment of construction traffic impacts (including spoil haulage).	Section 13.4.6

13.1 Assessment approach

To undertake the assessment, background data was gathered from a number of sources, including:

> Historical and current traffic count data.
> Heavy vehicle facilities and usage.
> Reported accident history.
> Previous relevant traffic studies in the area.
> Existing and proposed pedestrian and bicycle facilities.
> Public transport facilities and operation.

An additional survey to identify the volume and movement patterns of traffic on local roads was undertaken in December 2004. Specific surveys related to Ewingsdale interchange were conducted in December 2006 and January 2007.

The data collected for the traffic study were used to evaluate the overall effect of the proposed upgrade on traffic volumes and patterns on the proposed upgrade and on local roads.

13.2 Project objectives

Objectives for the Tintenbar to Ewingsdale Pacific Highway upgrade have been developed to guide the project's development and related directly to the overall objectives of the Pacific Highway Upgrade Program.

The project objectives relevant to traffic and transport issues are as shown in **Table 13.1.**

Table 13.1 - Project objectives

Pacific Highway Upgrade Program objectives	Specific Tintenbar to Ewingsdale project objectives
Significantly reduce road accidents and injuries	> Develop a project that meets the following design criteria: > Four-lane divided carriageway 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. > Design for a 110 km/h design speed > Design that incorporates pedal cyclists requirements. > Develop a project with a target crash rate of a maximum of 15 crashes per 100 million vehicle kilometres 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.
Reduce travel times	> Develop a project that reduces travel time for Pacific Highway traffic. > Develop intersections and interchanges designed to at least a level of service C, 20 years after opening for the 100th Highest Hourly Volume. > Develop a project that provides adequate flood immunity on at least one carriageway. > Develop a project that minimises disruption and delay during construction.
Reduce freight transport costs	> Develop a project that reduces overall freight transport costs. > Develop a project that meets freight transport vehicle requirements.

13.3 Existing traffic patterns

13.3.1 Traffic volumes

Data from permanent and temporary RTA count stations along the existing highway alignment and surrounding major roads have been used to provide historical traffic volume and composition data.

The most recent annual average daily traffic (AADT) figures and historical counts on the Pacific Highway and surrounding major roads are presented in **Table 13.2, Table 13.3** and **Figure 13.1**. AADT volumes refer to axle pairs rather than vehicles. These indicate that the Pacific Highway to the north of Bangalow carries higher traffic volumes than to the south, with higher volumes again to the north of Ewingsdale Road.

Ewingsdale Road itself carries almost as much traffic as the highway south of the Ewingsdale interchange. It also experiences considerable congestion approaching the Byron Bay town centre during peak periods.

Bangalow Road to the west of the Pacific Highway (to and from Lismore) also carries significant traffic volumes. This traffic accesses and departs the highway through Granuaille Road, with around 75 percent of vehicles travelling to and from the north on the highway. This accounts for the differences in traffic volumes to the north and south of Bangalow. In 2004 there was a difference of around 6000 axle pairs between the RTA count stations at Knockrow and south of the Ewingsdale interchange (see **Table 13.2**).

Table 13.2 - Existing Pacific Highway traffic volumes (AADT) (blank boxes are where no data exists for a particular year)

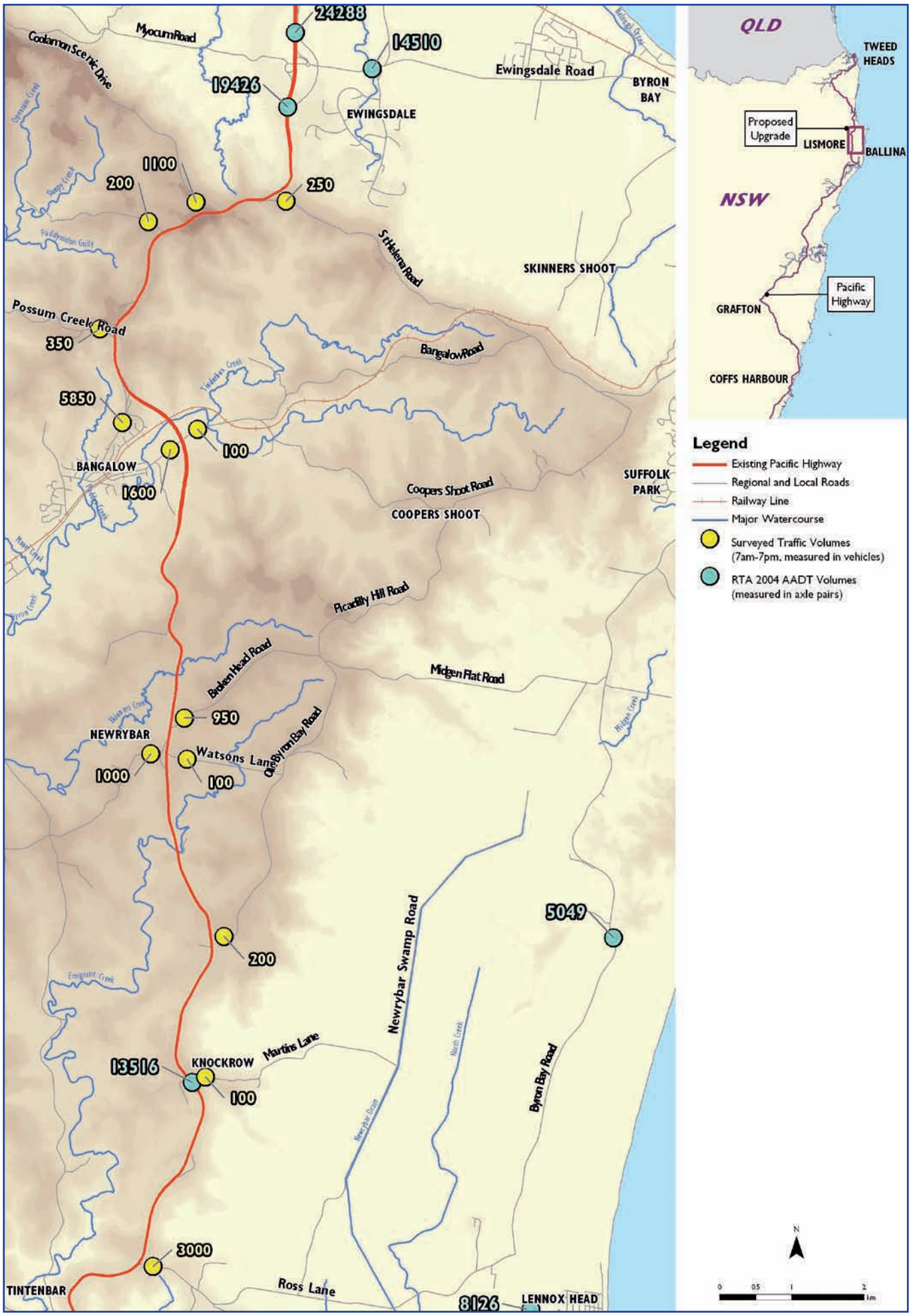
Location	Year						
	1998	2001	2002	2003	2004	2005	2006
Ewingsdale – N of Ewingsdale Rd	-	17,535	-	-	24,288	-	-
Ewingsdale – S of Ewingsdale Rd	13,831	11,188	-	-	19,426	-	-
Knockrow – S of Martins Lane	8,550	9,862	11,420	12,841	13,516	13,665	TBA
E of SH16, Bruxner Highway	19,477	20,922	-	-	23,787	-	-

Table 13.3 - Traffic volumes on surrounding roads (AADT)

Location	Year						
	1998	2001	2002	2003	2004	2005	2006
Ewingsdale Road Ewingsdale – E of SH10, Pacific Highway	11,410	11,876	-	-	14,510	-	-
Bangalow Road Byron Bay – N of Broken Head Road	6,573	7,689	-	-	6,549	-	-
Bangalow Bangalow – 6.4 km W of SH10, Pacific. Highway	5,781	6,366	6,859	7,295	7,457	7,493	TBA
Byron Bay Road At Ballina Shire boundary	4,736	5,690	-	-	5,049	-	-
The Coast Road Lennox Head – 1.5 km S of Ross Lane	6,891	9,366	-	-	8,126	-	-

Since 2001, Byron Bay Road (the road between Lennox Head and Byron Bay, which depending on the section is also known as The Coast Road, Broken Head Road and Bangalow Road) has experienced a reduction in traffic, as indicated in **Table 13.3**. Byron Bay Road is the coast road and tourist route between Ballina and Byron Bay. It also provides local and regional connections for the townships of Lennox Head, Broken Head and Suffolk Park. It is likely the Pacific Highway Upgrade Program and associated improvements in recent years have reduced the attractiveness of this route, transferring some of the traffic to the Pacific Highway.

Figure 13.1 - Traffic Volumes



13.3.2 Existing Pacific Highway – level of service

Level of service is a qualitative measure describing the operational conditions within the traffic stream, based on service measures such as speed and travel time, freedom to manoeuvre, traffic interruptions comfort and convenience. Different level of service categories are described below.

Level of service A describes the highest quality of traffic service for a highway section, when motorists are able to travel at their desired speeds. The highest quality usually results in average speeds of 90 km/h or more on two-lane highways in Class 1 (relatively high speed roads). A maximum flow rate of 490 passenger cars per hour total in both directions may be achieved with base conditions.

Level of service B characterises traffic flow with speeds of 80 km/h or slightly higher on level terrain Class 1 highways. Service flow rates of 780 passenger cars per hour total in both directions can be achieved under base conditions.

Level of service C describes further increases in flow, resulting in noticeable increases in platoon formation (travelling together in a group, usually involuntarily), platoon size, and frequency of passing impediments. The average speed still exceeds 70 km/h on level terrain Class 1 highways, and a service flow rate of up to 1,190 passenger cars per hour total in both directions can be accommodated.

Level of service D describes unstable flow conditions. The two opposing traffic streams operate separately at higher traffic volumes and passing becomes extremely difficult. Speeds of 60 km/h can still be maintained under base conditions for a Class 1 highway, with a maximum service flow rate of 1,830 passenger cars per hour total in both directions.

Level of service E characterises unstable traffic flow. Even under base conditions, speeds may drop below 60 km/h. Passing is virtually impossible at level of service E and platooning becomes intense. The highest volume attainable is generally 3,200 passenger cars per hour total in both directions.

Level of service F represents heavily congested flow with traffic demand exceeding capacity. Volumes are lower than capacity and speeds are highly variable.

Table 13.4 indicates the forecast traffic volumes and resulting level of service on the existing Pacific Highway between Tintenbar and Ewingsdale if no upgrade was to take place.

Table 13.4 - Forecast levels of service for existing highway

Year	AADV	Two-way peak hour volume	Level of service
2003	11,000	1,450	C
2012	15,050	1,750	D
2022	18,900	2,175	E
2032	22,750	2,600	E

This level of service forecast suggests that by 2012 the existing highway will be performing below the proposed upgrade objective level of service C.

13.3.3 Existing highway safety

Accident analysis has been undertaken and is based on accident history for the 5-year period from 1 May 2002 to 30 April 2007. It comprises RTA reported accident data on the Pacific Highway between Ross Lane and the Ewingsdale interchange overpass. During this period a total of 211 accidents were recorded along this section of the existing Pacific Highway.

The accidents included:

- 7 accidents resulting in one or more fatalities.
- 75 accidents resulting in injuries.
- 129 accidents not resulting in injury, but where a vehicle was towed away.

Existing at-grade intersection on the Pacific Highway at Newrybar.

The location of accidents is shown in **Figure 13.2.** The accident rate along this section of the highway during the five years is 36 accidents per 100 million vehicle kilometres travelled (MVKT). This rate is above the state-wide accident rate for a rural 2-lane undivided road of 32.8 accidents per 100 MVKT (RTA, 2004). However, the accident rate differs considerably when separating the study area into the two sections; Ross Lane to Bangalow, and Bangalow to Ewingsdale.

These rates are 23 accidents per 100 MVKT, and 56 accidents per 100 MVKT respectively. Factors influencing this disparity include the tighter horizontal and vertical geometry north of Bangalow and St Helena Hill (steep grades and sharp curve at the base).

13.4 Impacts of the proposed upgrade

13.4.1 Proposed upgrade – level of service

Based on forecast traffic increases (described in detail in *Working Paper 6 – Traffic and Transport*), it is predicted that the proposed upgrade would operate at level of service B in the nominal opening year of 2012 and reach level of service C during 2033 (**Figure 13.3**). As forecast level of service is based on peak volumes, traffic conditions for the majority of the time would be better than the identified level of service.

Figure 13.2 - Location of traffic accidents, May 2002-April 2007

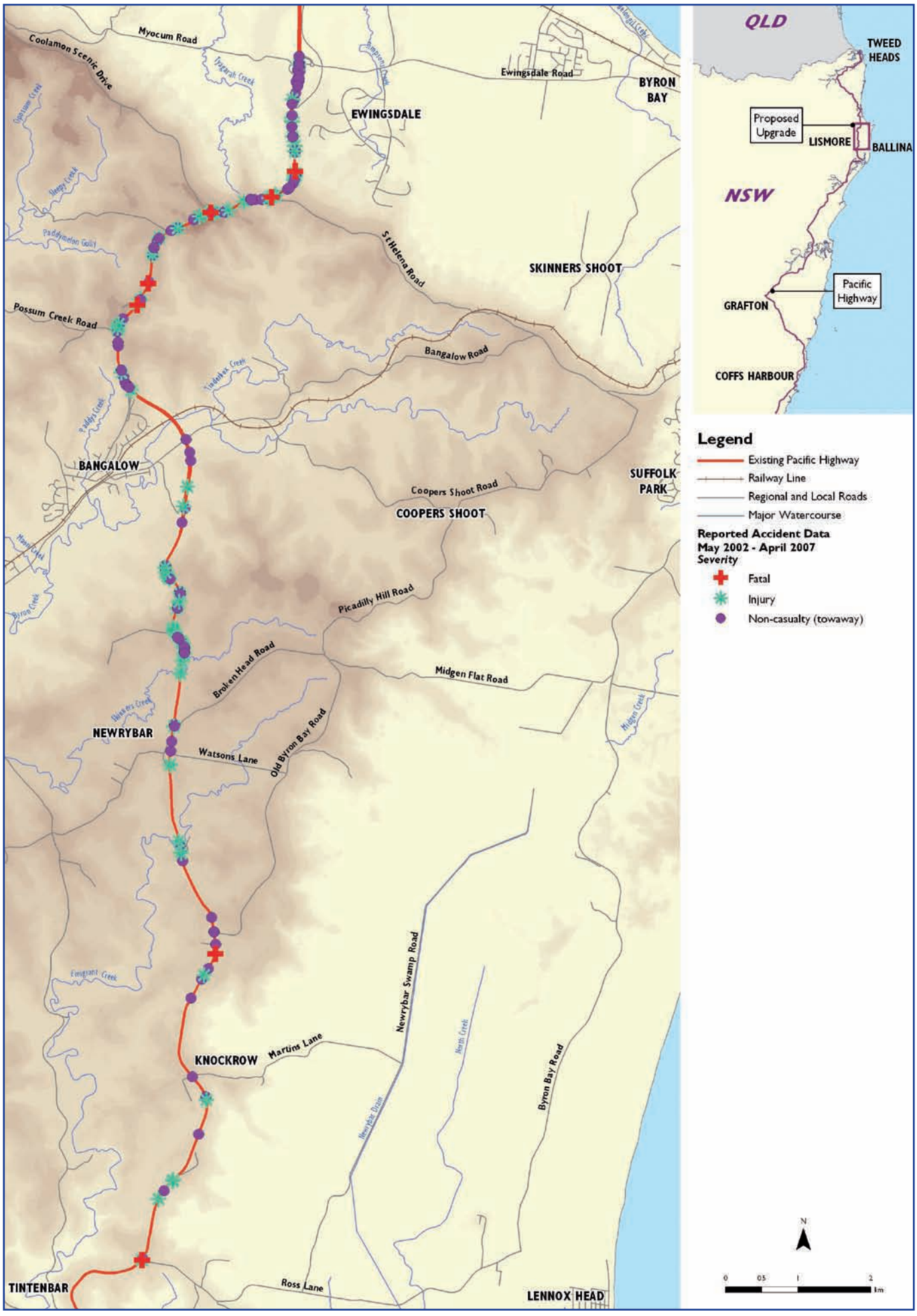
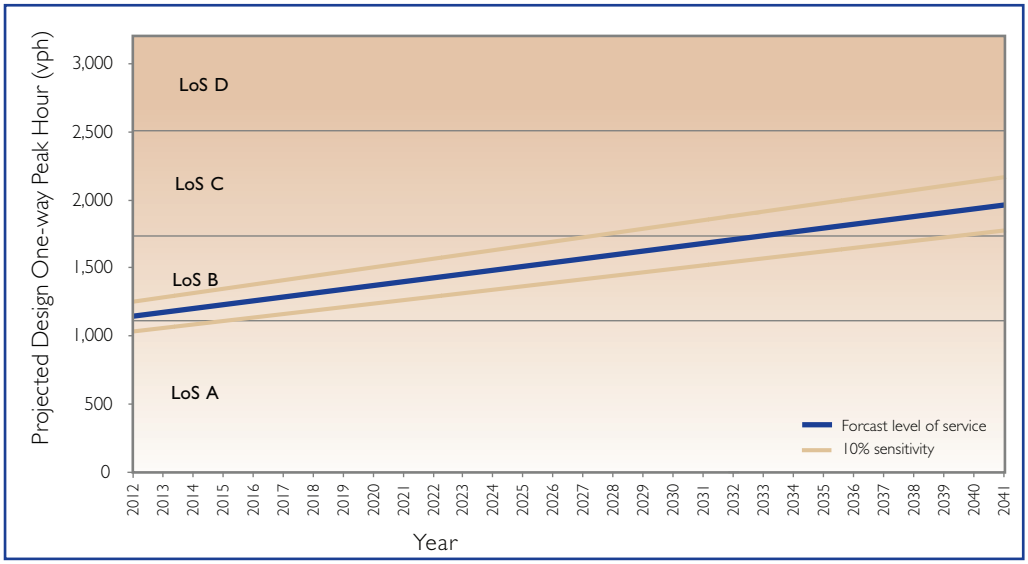


Figure 13.3 - Proposed upgrade – forecast level of service



13.4.2 Impacts on travel times and freight transport costs

The proposed upgrade would result in reduced typical travel times between Tintenbar and Ewingsdale of around two minutes for cars and around two and a half minutes for trucks. This time saving would be expected to be greater when comparing situations of higher traffic volumes where the existing highway conditions result in speed reductions.

Freight transport costs would be expected to reduce because of this distance and time saving. Cost savings for an individual trip would be small, but when considered in terms of the total volume of truck trips, would equate to considerable savings. Freight costs reductions would occur through:

> Time savings.
> Fuel savings.
> Reduced vehicle maintenance costs.
> Increased vehicle life.

13.4.3 Impacts on operation of the existing highway

Following construction of the proposed upgrade, the existing Pacific Highway would become part of the regional road network. To the north of Bangalow, the existing highway would still carry significant traffic volumes. Traffic travelling between areas north of Bangalow and Lismore via Granuaille Road would use the existing highway and travel through the Ewingsdale interchange for access to the Pacific Highway further north. Based on current travel patterns, just under 45 percent of the existing volume would still use the existing Pacific Highway north of Bangalow. With the proposed upgrade in place, the existing highway south of Bangalow is forecast to operate at level of service A until 2032. In 2032, the existing highway north of Bangalow is forecast to operate at level of service C which is considered acceptable.

Despite significant traffic volumes still using the existing highway north of Bangalow, heavy vehicle traffic usage of the existing highway would be significantly reduced. Regional through truck traffic would choose to use the upgraded highway. The reduction of heavy vehicle traffic on the existing highway would be particularly noticeable at night-time when noise is a major concern.

13.4.4 Impacts on operation of other local roads

In accordance with the Pacific Highway Design Guidelines (RTA 2005) local roads intersected by the proposed upgrade would be treated by either providing grade separation in the form of an overpass or underpass, or terminating the local road and providing an access road linking to another nearby local road with grade separation. This treatment would ensure that impacts on local access routes and connectivity are minimal.

Service roads would be provided to connect intersecting roads and property accesses, as well as providing local north/south connections. The concept for individual access for affected properties has been developed in consultation with the relevant property owners.

The proposed access arrangements for the local roads intersected by the upgraded highway is summarised in **Table 13.5 and Figure 13.4.**

Table 13.5 - Local road treatments

Local Road	Treatment
Ross Lane	Full interchange.
Martins Lane West	Access road with underpass connection to existing highway approximately 550 m south of Martins Lane.
Ivy Lane	Half interchange (north-facing ramps) with access maintained to western properties through the interchange to the existing highway.
Existing highway at Emigrant Creek	Localised realignment of existing highway and provision of an underpass of the upgraded highway.
Watsons Lane	Remaining open with an underpass.
Broken Head Road	Overpass of the upgraded highway.
Bangalow Road	Half interchange (north-facing ramps) and underpass of the upgraded highway.
Tinderbox Road	Localised diversion south-west to an underpass location.
St Helena Road	Existing road maintained – passes above tunnel.
Ewingsdale Road	Modification of existing interchange.

Forecast traffic volumes for local roads have been calculated in current terms (2006 traffic volumes) and are presented in **Table 13.6.**

Table 13.6 - Forecast Daily Local Traffic Volumes (2006)

Local road	Base case (no upgrade)	Upgraded highway
Ross Lane	3,680	4,520
Martins Lane	140	140
Old Byron Bay Road	240	240
Watsons Lane	130	130
Old Pacific Hwy, Newrybar	1,170	1010
Broken Head Road	1,050	740
Bangalow Road (east of interchange)	140	140
Bangalow Road (west of interchange)	2,100	2,100
Granuaille Road (on and off-ramps)	7,450	7,450
Possum Creek Road	410	370
Fowlers Lane	240	240
Coolamon Scenic Drive	1,210	890
St Helena Road	290	290
Ewingsdale Road (on and off-ramps)	5,110	2,660

A number of the local roads have low existing volumes and are not likely to be affected by the proposed upgrade. These roads include:

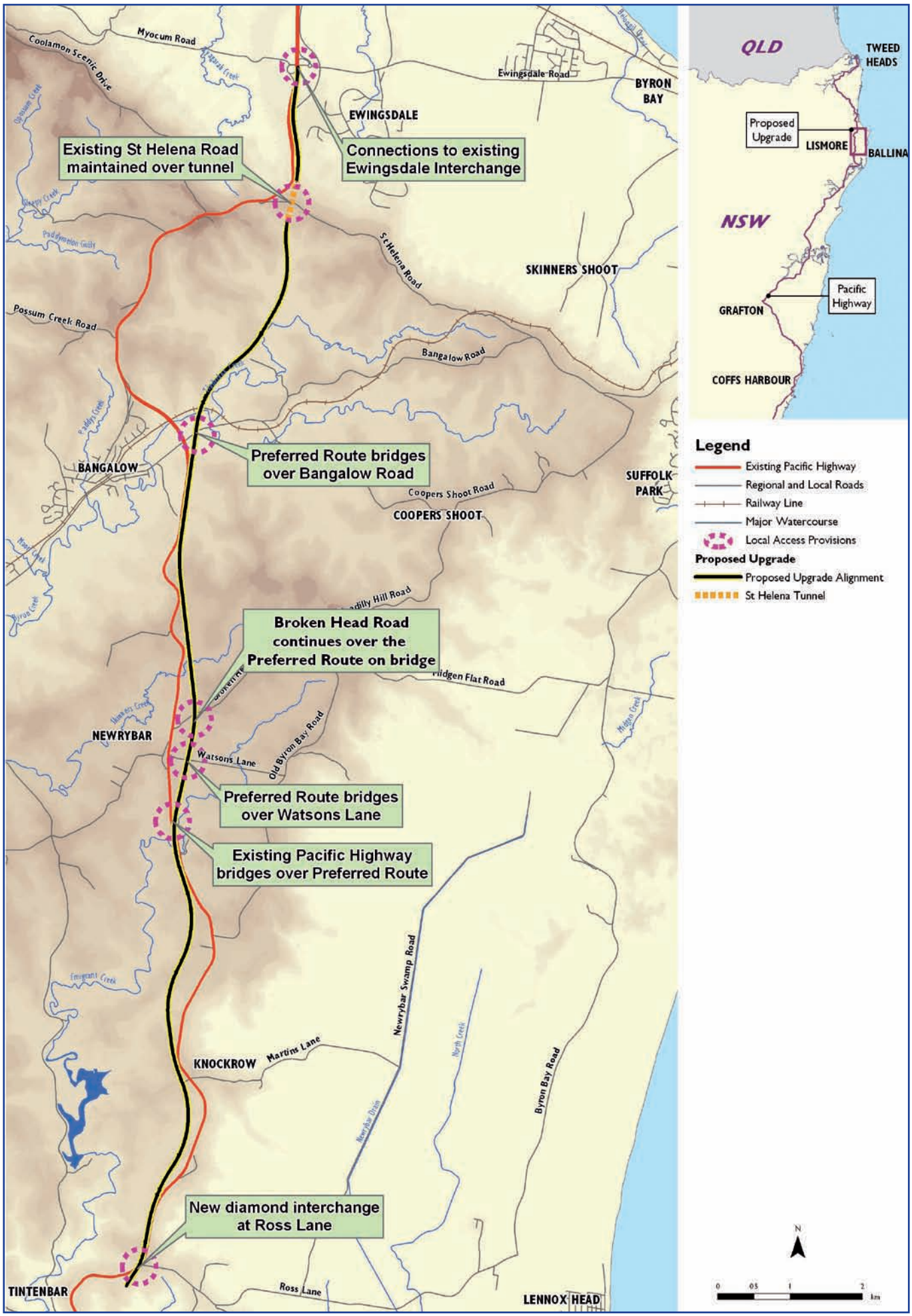
> Martins Lane.
> Old Byron Bay Road.
> Watsons Lane.
> Bangalow Road east.
> Fowlers Lane.
> St Helena Road.

Ross Lane, in conjunction with Tintenbar Road, provides an important east-west regional route. It provides local access to Lennox Head, Broken Head, Suffolk Park and the south of Byron Bay via Byron Bay Road (The Coast Road). As a result of the proposed upgrade and the proposed Ballina bypass, additional traffic is expected on Ross Lane due to the Ross Lane interchange and its function in providing local access for regional traffic movements.

Possum Creek Road and Coolamon Scenic Drive provide east-west connections between the existing highway and Friday Hut Road. The traffic volumes recorded on these roads indicate through traffic use of these connections. The provision of interchanges at Ross Lane, Ivy Lane, Bangalow and Ewingsdale may reduce the attractiveness of these routes causing some road users to adjust their travel patterns. As a result, decreased traffic volumes are forecast on these roads with the provision of the proposed upgrade.

Currently, a significant proportion of the traffic using the south-facing Ewingsdale interchange ramps travels through Bangalow (approximately 35 percent between 7am and 7pm). The proposed upgrade concept design includes the provision of a replacement local service road to connect the existing highway to the Ewingsdale interchange. This would result in a reduced number of vehicles using the south-facing Ewingsdale interchange ramps to and from the upgraded highway.

Figure 13.4 - Proposed local road connections



13.4.5 Indirect impacts from increased accessibility to Byron and Ballina shires

The proposed upgrade would generally improve accessibility to Byron and Ballina shires. Over time this is likely to increase traffic volumes on a range of roads within the area. Forecast Pacific Highway traffic volumes reflect the trend towards more visitation of areas along the coast that become more accessible with the overall upgrade of the Pacific Highway. The individual contribution of the Tintenbar to Ewingsdale upgrade to increased visitation is however difficult to quantify.

13.4.6 Impacts on highway safety

With the improved highway standard and the bypassing of the circuitous section of the highway north of Bangalow, it is forecast that the overall accident rate on the proposed upgrade would be reduced from the current rate of 36 accidents per MVKT travelled and meet the project target of 15 accidents per 100 MVKT. This forecast reduction is based on current accident rates experienced on sections of the Pacific Highway that have already been upgraded to similar standards as those proposed.

The number of accidents and the accident rate on the existing highway is also forecast to decrease, after the proposed upgrade, due to:

> Reduction in traffic volume.

> Predominantly local usage resulting in driver behaviour being consistent with the local road speed environment.

> Reduction in the percentage and size of heavy vehicles.

13.4.7 Construction impacts

There are no appropriate alternative temporary routes to the existing highway that could be used during construction. Provision for highway traffic therefore needs to be considered in the construction staging and construction methodology for all sections of the proposed upgrade.

Management strategies in construction may include provision for traffic use of temporary carriageways, temporary reductions in speed limits through worksites, use of traffic controllers and temporary signage. Control measures to manage traffic would be consistent with the RTA's *Traffic Control at Work Sites* manual (RTA 2003c).

Haulage may have an impact on local roads. It would include the transfer of fill material between sections as well as the delivery of construction materials such as pavement materials, asphalt, and concrete. Haulage would also take into account peak travel hours and times, particularly during school and public holiday periods, to minimise the potential for delays on the highway to the travelling public.

Much of the proposed upgrade would be able to be constructed with minimal disruption to existing highway traffic. However, there are a number of locations where one carriageway would not be clearly separate from the existing highway and construction activities would be required in close proximity to existing highway traffic. For example, construction of the integration with the existing Bangalow bypass section involves duplication alongside and in

close vicinity to the existing highway. Once the new carriageway is complete the existing southbound carriageway would be upgraded and some traffic disruption would occur.

Locations where work would be carried out in close proximity to the existing highway are:

> At the tie-ins at the southern limit of the project to the north of the Ross Lane interchange.
> At the Emigrant Creek bridge and the overpass of the existing highway.
> At the Bangalow Road overpass.
> Along the duplicated section of the existing Bangalow bypass.
> At the tie-in at the northern limit of the project at the Ewingsdale interchange.

The Broken Head Road overpass can be completed without affecting traffic on the existing highway, but the overpass construction would have impacts on users of Broken Head Road with the choice of alternative route depending on the trip destination.

Other local roads that cross the proposed upgrade may be subject to short term disruption. The precise nature of this disruption and measures to minimise it would be the subject of traffic management planning during detailed design.

In addition to speed restrictions and traffic controls, night work could be required for short periods at the above locations where the proposed new carriageway conflicts with the existing highway. Night work may be necessary to allow smooth transitions to be constructed and traffic diversions to be installed while minimising traffic impacts.

13.5 Management of impacts

Local traffic impacts during the operation of the proposed upgrade would be managed through the access arrangements that are an inherent part of the project design.

Management measures during construction would include:

> Identification of all public roads to be used by construction traffic.
> Methods to ensure construction traffic uses identified roads.
> Identification of all public roads that may be partially or completely closed during construction and the expected timing and duration of closures.
> Identification and management of impacts on existing traffic (including pedestrians, vehicles, cyclists and disabled persons).
> Temporary traffic arrangements including property access.
> Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads.
> A response plan for any construction traffic incident.
> Monitoring, review and amendment mechanisms.