

# 14. Traffic, transportation and access

## 14.1 Assessment approach

PB completed a traffic and transport assessment in December 2006 to assess existing traffic patterns and historic crash trends, project future traffic conditions and determine the likely impacts of the proposed upgrade on the adjacent road network. The study included an assessment of patterns of local and through traffic in and around Kempsey.

In order to develop an understanding of existing and future travel behaviour, a travel demand model was developed using TransCAD, a transportation planning package with geographic information system capability. The model covered a corridor around the existing and proposed highway alignments, including the towns of Kempsey and Frederickton. The model accounts for projected growth in urban development on the north coast and predicted pressures at various points on the existing Pacific Highway.

The assessment also addresses the role of the proposed upgrade in the Pacific Highway upgrade program and how traffic on the proposed upgrade is likely to be affected by external and cumulative factors, for example, a general increase in the attractiveness to heavy vehicle transport, particularly in comparison to alternative routes such as the New England Highway.

The outcomes of the assessment are detailed in the unpublished technical report: *Upgrading the Pacific Highway Kempsey to Eungai - Traffic and Transport Assessment* (NSW Roads and Traffic Authority 2006b) and are summarised in this Chapter.

## 14.2 Key existing local and regional characteristics

### 14.2.1 Road and pedestrian networks

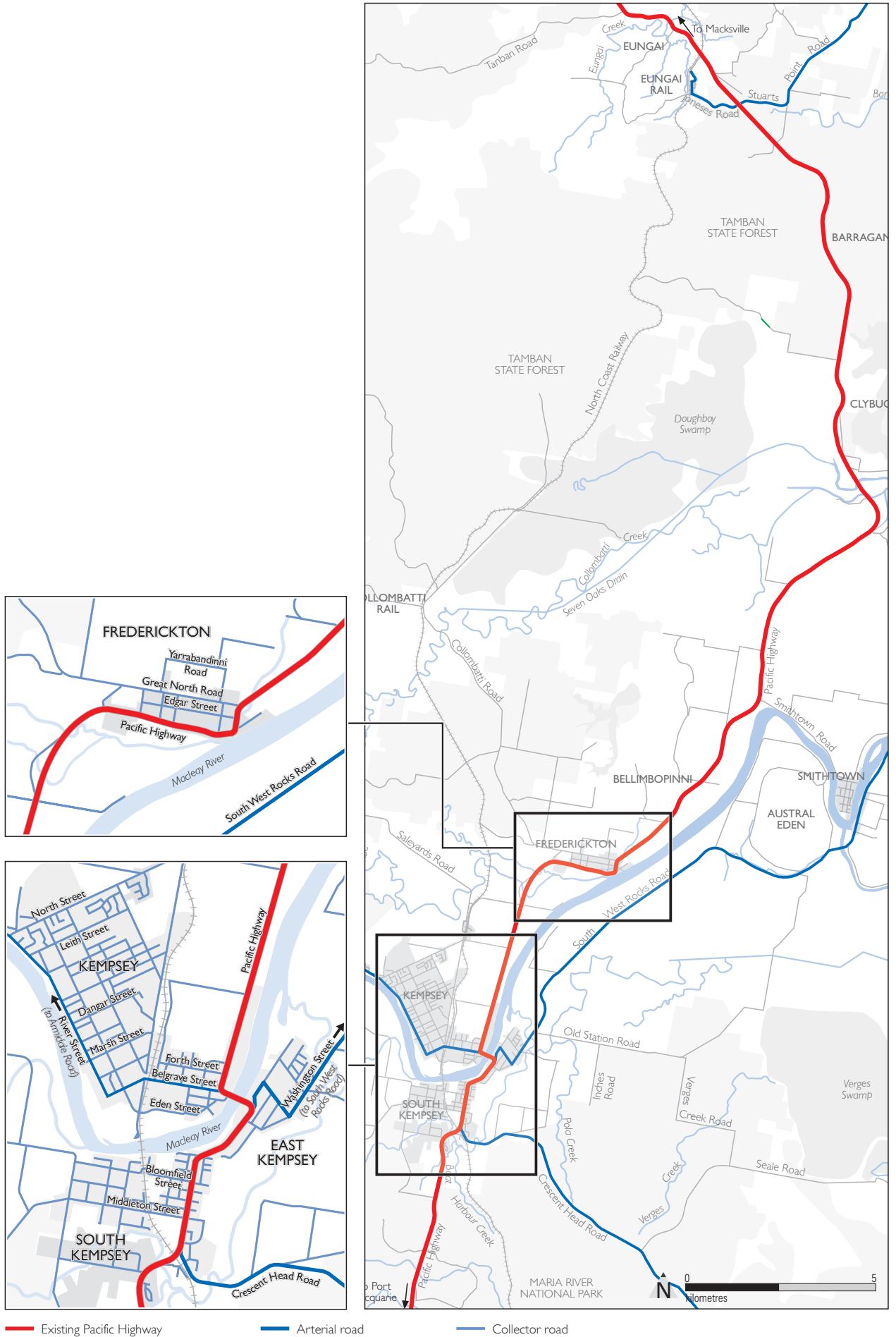
The Pacific Highway is the main road transport corridor in the NSW North Coast region. Together with the New England Highway it provides the main north-south road transport link between Newcastle and Brisbane.

The Pacific Highway also carries significant amounts of local traffic and freight. The highway provides for the majority of north-south traffic movements through the town of Kempsey. South West Rocks Road (Main Road (MR) 198), is an alternative north-south route, providing access to Smithtown and Gladstone, avoiding the Macleay River bridge at Kempsey. The existing road network is illustrated in Figure 14-1. The key arterial roads in the area include:

- MR198, South West Rocks Road, from Kempsey to South West Rocks.
- MR556, Smithtown Road from Pacific Highway to Smithtown and Gladstone on MR198.
- RR7737, Crescent Head Road from Kempsey to Crescent Head.
- MR75, Armidale Road from Kempsey to Armidale.

These roads provide connections between Kempsey and other coastal and rural villages and townships in the region. The road network within Kempsey consists mainly of urban collector roads and local roads that provide local access to the Pacific Highway and other arterial roads.

Figure 14-1 Existing road network



Existing Pacific Highway conditions in Kempsey that affect the safe and efficient operation of the highway include:

- The narrow bridge over the Macleay River.
- Limited intersection capacity at Smith Street and Belgrave Street that congests during weekday and holiday peak periods.
- Conflicts between through and local traffic.

Holiday traffic presents particular problems, with frequent congestion at the traffic signals at the intersection of Belgrave and Smith Streets.

### **Pedestrian and cycle networks**

Kempsey has an extensive pedestrian network along the major roads of the town, linking the main pedestrian generators, such as schools, shopping areas, the hospital and other community facilities. Kempsey Shire Council has prepared a Pedestrian Access Mobility Plan, a comprehensive strategic action plan that has guided the development of policies and resulted in the construction of some pedestrian facilities (Kempsey Shire Council 2003a).

Identified pedestrian routes rely on the provision of street crossing facilities, connecting paths with missing links and the installation of traffic signals on major routes to ensure safety. The majority of pedestrian movements are concentrated around the town centre of Kempsey (Smith Street), where the Pacific Highway passes through Kempsey.

Kempsey Shire Council has a cycle plan that it continues to develop. The Pedestrian Access Mobility Plan has assisted the development and implementation of the cycle plan by defining shared routes, particularly along the Macleay River from the railway bridge to the town centre. Kempsey has a number of existing cycle facilities, comprising off-street shared pedestrian/cycle paths. These paths link trip-generating destinations within Kempsey.

### **Public transport network**

Buses are the primary mode of public transport within Kempsey and between Kempsey and the surrounding towns and hinterland. In addition, bus and rail services provide intra- and inter-state public transport links to key destinations such as Sydney and Brisbane.

The bulk of local bus services are provided by Cavanagh's Bus and Coach Service, which operates five routes, three serving the west and one each in the north and east. The buses operate on a 'hail and ride' system, picking up and dropping off passengers at any location, provided it is safe to do so. This system does not apply to the Kempsey town centre, where marked bus stops are located on Belgrave and Smith Streets. Cavanagh's services operate 6 days per week, with no Sunday service and very limited Saturday service.

A limited service is also provided to South West Rocks. The towns of Stuarts Point, Eungai, Hat Head and Austral Eden are mainly serviced by school bus services.

The other bus service provider in the area is Busways North Coast. All routes provided by this service operate to outlying areas, mainly as school bus services. Busways also provides the inter-town link to Port Macquarie and Settlement City. Busways services operate from the Belgrave and Smith Streets bus stops in the centre of Kempsey.

Community transport in Kempsey is provided by Macleay Community Transport to cater for the disadvantaged and less mobile.

Long distance coaches service Kempsey on routes between Sydney and Brisbane, with daily services provided by Greyhound and Premier Motor Service stopping at Kempsey. These

services provide links to intermediate destinations including Grafton, Newcastle and the Gold Coast. All long distance coach services use the facilities provided at the 24 hour Shell service station on the Pacific Highway at Kempsey.

**Traffic volumes**

Two different measures of traffic volume have been used in the assessment of traffic impacts: **annual average daily traffic (AADT)** and **morning peak hour traffic**.

AADT numbers give an indication of the number of vehicles using the road spread over a 24-hour period averaged over the full year. This measurement can be taken in axle pairs. This means the number of pairs of axles crossing a point on the road.

Average weekday 1 hour morning peak hour traffic indicates the average number of vehicles travelling on the road during the period of the day that experiences the highest volumes of traffic.

Average weekday 1 hour morning peak figures give a clearer indication of road/traffic behaviour under worst-case scenario conditions. AADT is more often used for long-term forecasts of traffic volumes.



**14.2.2 Existing traffic volumes and patterns**

**AADT**

Historical AADT volumes on the Pacific Highway at the Macleay River bridge and south of First Lane are shown in Table 14-1.

**Table 14-1 AADT (in axle pairs) on the Pacific Highway at Kempsey, 1986 to 2004**

Year	Macleay River bridge	South of First Lane
1986	17,442	8,856
1990	19,315	n/a
1995	21,535	11,736
1998	22,887	11,560
2001	n/a	13,225
2002	n/a	n/a
2003	n/a	n/a
2004	21,538	16,147

Source: NSW Roads and Traffic Authority (2006b)

AADT levels on the Pacific Highway north of the Kempsey town centre (south of First Lane) increased from around 9,000 axle pairs in 1986 to 16,000 in 2004, an increase of about 4.6% per year. In comparison, AADT on the Macleay River bridge was about 17,500 axle pairs in 1986, increasing to about 21,500 in 2004, an increase of about 1.3% per year. These figures indicate that traffic on the Pacific Highway in South Kempsey has increased at a rate more than three times that of traffic in the Kempsey town centre. In 2004, AADT volumes on the Macleay River bridge were more than 30% greater than at First Lane. This difference is due to greater volumes of local traffic on the Macleay River bridge.

**Average weekday traffic**

The Pacific Highway to the north and south of the Kempsey town centre currently carries average daily weekday traffic volumes of about 10,000 to 12,000 vehicles (based on the results of RTA and PB sourced classified counts carried out in 2004). Further north, near Eungai Rail, the average weekday traffic is about 8,000 vehicles per day. In the centre of Kempsey, highway traffic reaches about 24,000 vehicles per day. Average weekday traffic (Monday to Friday – 6am to 10pm) on the Pacific Highway in Kempsey is approximately 50% greater than traffic on the highway outside the town centre. This confirms that the town centre generates a substantial proportion of traffic on the Macleay River bridge. Other roads in and around the town centre generally carry less than 4,000 vehicles per day on typical weekdays.

**Daily variations**

The daily variations in traffic volume were assessed at four locations in and around Kempsey in December 2004. The survey locations were on the existing Pacific Highway at South Kempsey, the Macleay River bridge north of Frederickton, and at Eungai Rail.

Generally, weekday traffic volumes on the Pacific Highway in and around Kempsey are higher than weekend volumes, indicating that the highway predominantly serves work and business-related travel at the four locations surveyed.

The peak day is Friday for all four locations, with Wednesday having the lowest daily volumes, which (in some cases) are lower than weekend daily volumes.

There is no obvious peak day for truck movements, with higher volumes tending to spread across Tuesday, Wednesday and Thursday. Truck movements decline to approximately half of the peak day traffic on the weekend.

Long-term daily traffic variations (sourced from RTA long-term traffic counts near Macksville and Port Macquarie) show that traffic on the Pacific Highway reaches its peak volume during major public holiday periods, such as Christmas and Easter, and during school holidays. During the Christmas/New Year period, the highest recorded traffic volume was approximately 25,000 to 30,000 axle pairs per day, nearly double the AADT level. This is consistent with traffic volumes recorded on other highways affected by holiday traffic loadings.

During peak holiday periods, considerable delay and congestion occurs on the Macleay River bridge at Kempsey when through-traffic on the highway is slowed by local traffic, and the operation of traffic signals at the intersection of Belgrave Street and Smith Street (Pacific Highway).

### Heavy vehicles

The Pacific Highway at Kempsey has relatively high numbers of heavy vehicles, with heavy vehicles outside of the town centre around 21–24% of the average weekday daily traffic. Heavy vehicles comprise around 12% of traffic in the town centre. However, in terms of absolute values, heavy vehicle volumes are higher in town than elsewhere. For example, 2,749 heavy vehicles per day pass through the town centre, compared to 1,949 heavy vehicles per day at Eungai Rail. During the night-time period, heavy vehicles comprise approximately 50–60% of all traffic outside of the town centre, and 38% in the town centre.

### Through-traffic distribution

Traffic on the Pacific Highway at Kempsey is a mixture of through and local traffic. Both types of traffic must be quantified and current travel times for through-trip makers understood, for the potential vehicle use of the proposed upgrade to be estimated. Origin-destination (OD) surveys (conducted by PB in 2004) were used to quantify through-traffic versus local traffic patterns.

The results of the OD surveys demonstrated that for the 12-hour period from 7am to 7pm, about 20.5% of the total two-way volumes on the Pacific Highway at South Kempsey was through-traffic travelling regionally. Similarly, for the 12-hour period, the percentage of through-traffic was balanced in both the northbound and southbound directions, at about 20%. Heavy vehicles were slightly less likely to be through-traffic than light vehicles, at about 17%. Furthermore, the directional flow was unbalanced for heavy vehicles, with 22% of heavy vehicles making through-trips northbound, but only 13% southbound. It is possible that collection of data over a full week may have demonstrated a better directional balance for heavy vehicles.

For the morning peak hour, from 8am to 9am, the two-way through-traffic was approximately 20% of the morning peak hour traffic on the Pacific Highway. This demonstrates that the majority of traffic within the town centre is local traffic.

#### What is a heavy vehicle?

A heavy vehicle is classified as a Class 3 vehicle (a two axle truck) or larger in accordance with the Austroads Vehicle Classification System.



### Stopping traffic

The estimated through-traffic would include a small proportion of stopping traffic, that is, long distance trips where the end destination is not in Kempsey, but the driver stopped at Kempsey for refreshment.

For the 12-hour period assessed, the proportion of stopping traffic as a percentage of the total traffic observed was 20.4% (two-way traffic). This 12-hour proportion of stopping traffic can be reasonably assumed to represent the entire 24-hour period.

### 14.2.3 Current network capacity

#### Pacific Highway level of service

The Pacific Highway currently operates at LoS D or better. The sections of the Pacific Highway approaching the Kempsey town centre from either side currently operate at LoS D. Under LoS D traffic conditions, vehicle manoeuvrability is severely restricted due to traffic congestion, travel speed decreases with a further increase in volume, and only minor disruptions can be absorbed without further deterioration in LoS.

The section of the Pacific Highway near Eungai Rail operates at LoS C. Under LoS C, the influence of traffic density on operations becomes apparent and vehicle manoeuvrability within the traffic stream is clearly affected by other vehicles.

Anecdotal evidence suggests that during the holiday peak periods, the reported LoS deteriorates significantly. This deterioration in LoS would apply to the entire length of the Pacific Highway in and around Kempsey town centre.

#### Town centre intersections LoS

In an urban environment such as the Kempsey town centre, the capacity and performance of the intersections, in particular signalised intersections, govern the operating conditions of the road network. Assessment of the existing performance of intersections provides a good indication of the level of congestion and existing capacity on the road network within the Kempsey town centre.

The most critical of the key intersections analysed is the signalised intersection of Smith Street and Belgrave Street. This intersection operates at LoS D, where the operating condition is at or near capacity. Anecdotal evidence suggests that traffic congestion is a regular occurrence at this intersection and that the situation worsens during holiday periods with long queues and excessive delays.

### 14.2.4 Safety

Accident records for the Pacific Highway between Maria River and Eungai Rail overbridge show that there have been 414 accidents, based on 1996-2005 data (NSW Roads and Traffic Authority 2006a). The location and type of accidents (as a proportion of the total accidents in each location) are shown on Figure 14-2 in 2 kilometre sections. Figure 14-2 indicates that the majority of accidents occur in urban areas. The section of the Pacific Highway near Kempsey had the highest total number of accidents over the 10 year analysis period, with a total of 124 accidents, including three fatal accidents, 59 resulting in injuries and the remaining 62 accidents requiring towing. The section with the second highest total number of accidents was at South Kempsey, where a total of 40 accidents were recorded, including one resulting in a fatality. The proposed upgrade would bypass these areas.

#### What is level of service?

Level of service (LoS) is a performance measure used in the planning design and operation of roads. It provides the basis for determining the number of lanes to be provided in the road network. The following level categories apply:

- A Good
- B Good with minimal delays and spare capacity
- C Satisfactory with spare capacity
- D Satisfactory but operating at capacity
- E At capacity and incidents will cause excessive delays
- F Unsatisfactory and requires additional capacity

Source: AustRoads (1988)



Photo: Heavy vehicle traffic at the intersection of Belgrave and Smith Streets in Kempsey town centre.

Figure 14-2 Accident numbers and severity (1996-2005)

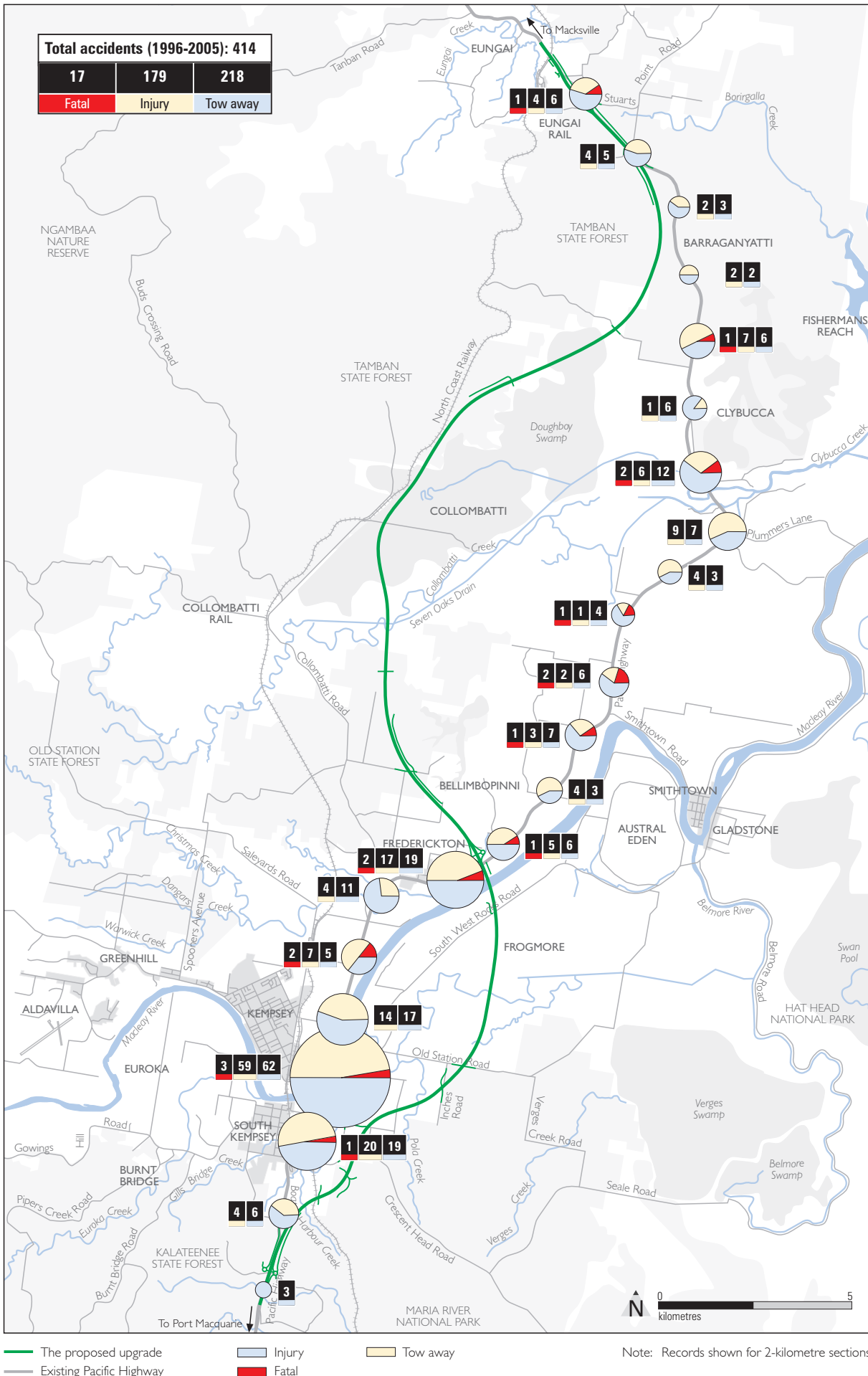
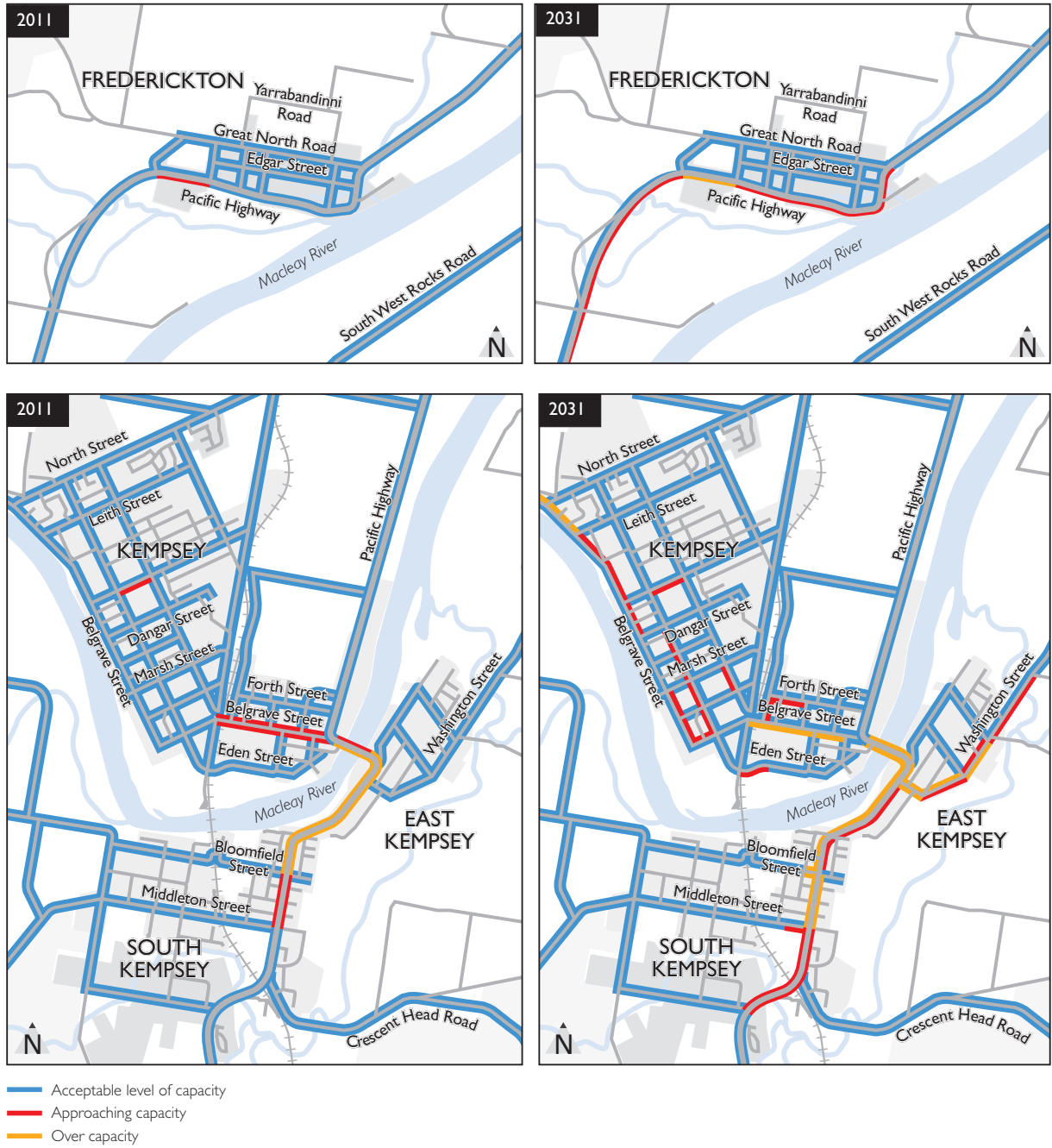


Figure 14-3 Existing road network capacity – 2011 and 2031





### 14.3 Changes to traffic conditions during construction

The majority of the proposed upgrade would be constructed away from the existing Pacific Highway. Therefore, most of the route would be constructed without affecting traffic on the existing highway. The main impacts of construction traffic would be at the northern end, where the proposed upgrade joins with the existing Pacific Highway. Traffic on the existing highway and on local and arterial roads crossed by the proposed upgrade would experience short-term delays at various times during construction.

The proposed upgrade would be constructed either in its entirety or potentially in two stages, with Stage 1 comprising the southern section from south of Kempsey to the existing highway north-east of Frederickton, and Stage 2 comprising the northern section from the existing highway east of Frederickton to the dual carriageways north of Eungai Rail. The potential staging and corresponding traffic arrangements are discussed in detail in Section 7.3.2.

The sections of highway and surrounding road that would be affected by the different staging scenarios would remain the same, with only the timing of the changes/impacts differing.

A Construction Traffic Management Plan would be prepared and implemented by the construction contractor prior to the commencement of construction. This Plan would ensure the safe and efficient movement of local and highway traffic and would reduce inconvenience to local residents. The local community would be kept informed of these measures through notices placed in the local media.

### 14.4 Impact of future traffic growth on the existing network

The forecast increase in traffic to 2011 and 2031 would place increasing demand on the existing highway network in and around Kempsey. This predicted increase in demand is illustrated using volume to capacity ratios on Figures 14-3. The volume to capacity ratio provides an indication of the level of congestion experienced on a road.

The level of congestion (volume to capacity ratio) is presented in three categories as follows:

- 0.00 to 0.25 indicates an acceptable level of capacity.
- 0.75 to 1.00 indicates the road is approaching capacity.
- >1.0 indicates that the road is over capacity.

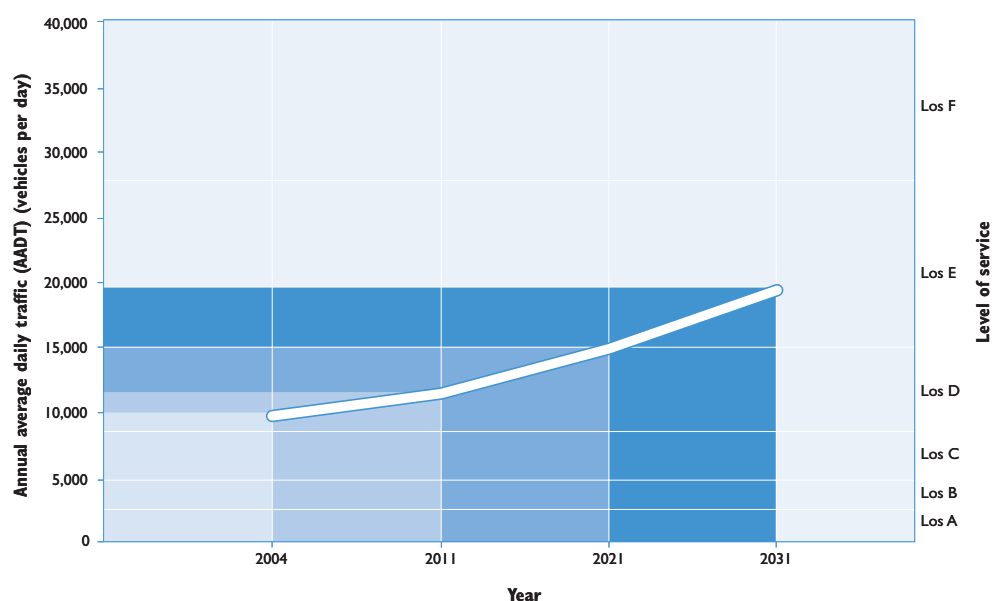
Road improvements are generally not considered necessary on roads at an acceptable level of capacity and at the lower end of the approaching capacity category (up to 0.8). Improvements would be justified on most roads that are approaching capacity, and are almost certain to be justified on roads that are over capacity.

As indicated on Figures 14-3, by 2011 (and 2031), the Pacific Highway, Belgrave Street and Smith Street are predicted to be highly congested, without the proposed upgrade, with volume to capacity ratios greater than 1.0. This would be likely to lead to motorists seeking alternative routes to avoid severe congestion on parts of the Pacific Highway. Under this scenario, it would be expected that turning and crossing movements at key intersections would be more than double existing levels, and that road safety would be compromised as drivers become impatient in seeking access to, or across, the highway.

By 2011, the Pacific Highway between South and Belgrave streets would operate at LoS F. Under such conditions, economic development in the region could be impeded. The forecast rate of increase in local and through-traffic would not be sustainable without a significant upgrade of the Pacific Highway.

The Pacific Highway between Frederickton and Eungai currently operates at LoS D or better. However, by 2016, without the proposed upgrade, the operation of parts of this section of the highway would deteriorate to LoS E, with the entire section of the highway operating at LoS E or worse by 2026. This is illustrated in Figure 14-4. The operation of the existing two-lane, two-way facility would be at or near capacity by 2016. At this time, average travel speed would drop below 60 kilometres per hour and passing of vehicles within the traffic stream would become difficult. These conditions would reduce road safety, increasing the risk of motor vehicle accidents.

**Figure 14-4 Projected traffic volumes and level of service on the Pacific Highway (north of Frederickton)**



Note: AADT and level of service - Pacific Highway, north of Frederickton (no build scenario)  
 Los - Level of service, for definition see text

Source: NSW Roads and Traffic Authority (2006b)

## 14.5 Changes to the road network with the proposed upgrade

### 14.5.1 Road hierarchy

The proposed upgrade would cause the existing Pacific Highway to become the principal local arterial road to connect Kempsey and Frederickton with smaller villages to the north, including Clybucca, Smithtown and Gladstone. Armidale Road and Crescent Head Road would complete the local arterial road network connecting rural areas to the west and east respectively.

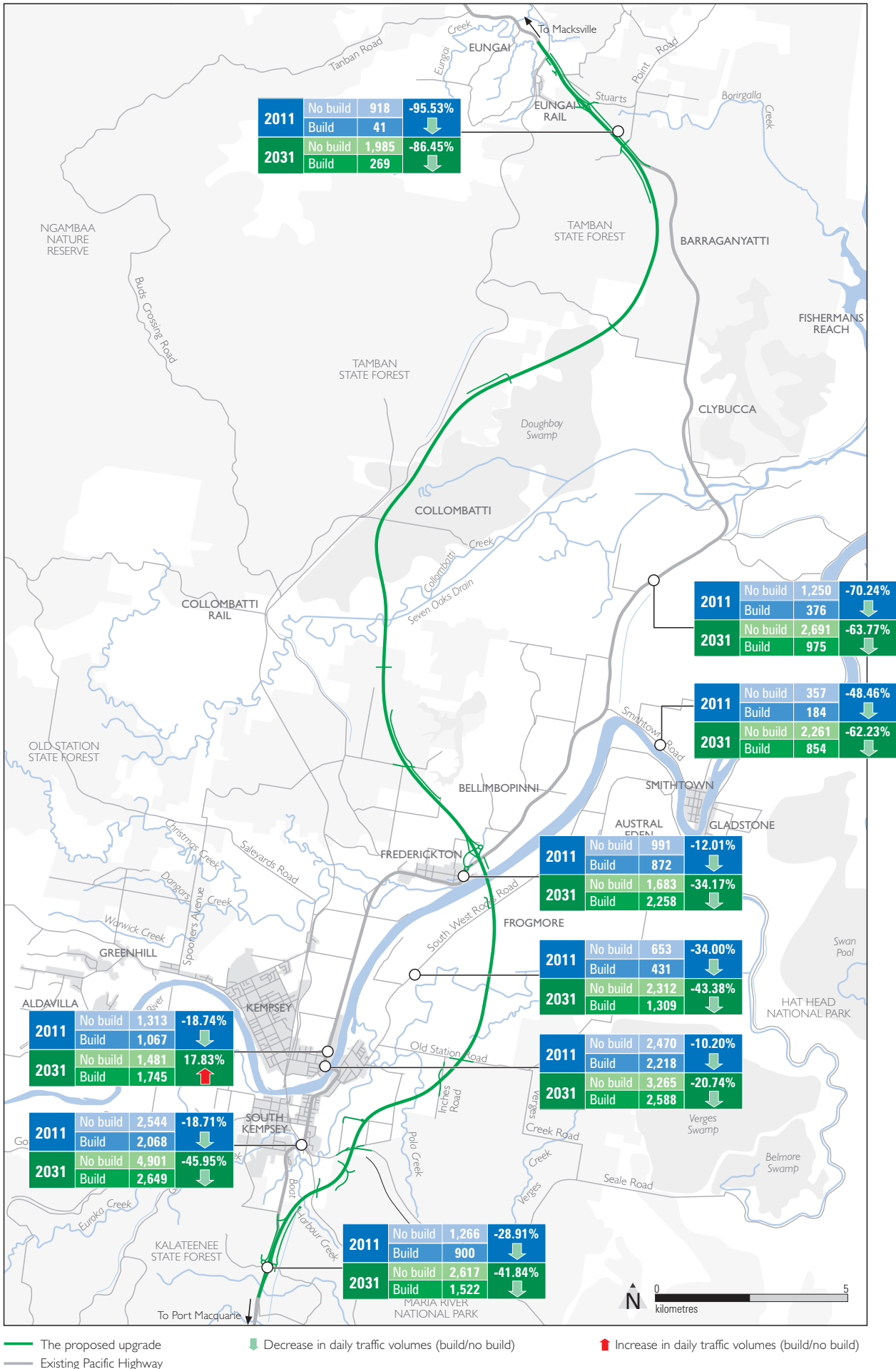
Other key local roads carrying light traffic volumes, such as Collombatti Road and South West Rocks Road, would retain their current road hierarchy classifications. Permanent changes to the local road network resulting from the proposed upgrade are shown on Figures 6-1a to s.

### 14.5.2 Impact on operational performance

#### Daily traffic

The proposed upgrade would provide new road infrastructure that would change future traffic volumes on the existing Pacific Highway and key roads in and around Kempsey. The future daily traffic volumes (in 2011 and 2031 under the 'no build' and 'full project' scenarios), on key roads are shown in Figure 14-5.

Figure 14-5 Daily traffic volumes – 2011 and 2031 (with or without the proposed upgrade)



— The proposed upgrade     
 ↓ Decrease in daily traffic volumes (build/no build)     
 ↑ Increase in daily traffic volumes (build/no build)

— Existing Pacific Highway

As shown in Figure 14-4, AADT volumes on the existing highway would generally be lower with the proposed upgrade than without. The exception to this would be the section between Kempsey and Frederickton. The reason for the predicted increase in traffic in this section under the full project scenario is that traffic travelling to northern sections of Kempsey from the south is likely to continue travelling along the proposed upgrade through the Kempsey interchange, exiting the highway at the Frederickton interchange and entering Kempsey from the north to avoid traffic congestion on the Macleay River bridge.

**What is average weekday one hour morning peak?**

Average weekday 1 hour morning peak traffic is the average volume of traffic (number of vehicles) travelling on the relevant section of road during the morning weekday peak hour.



**Morning peak hour traffic**

The predicted changes in morning peak hour traffic volumes and their impacts under a full project scenario include:

- A reduction of up to 70% in peak hour traffic would occur on the existing Pacific Highway, with the greatest reduction at the northern end between Frederickton and Eungai.
- The Pacific Highway at the Macleay River bridge would experience a reduction in traffic of approximately 10% in 2011 and 21% in 2031 (under the full project scenario in comparison to the no build scenario).
- Traffic on the existing Pacific Highway through the Kempsey town centre would be reduced, although the level of reduction would be less than that experienced on other parts of the highway.
- The existing Pacific Highway between Kempsey and Frederickton would see an increase in peak hour traffic in 2031 by up to 33%, attributable to traffic using the Frederickton interchange to access northern sections of the town and the Kempsey town centre.
- Smithtown Road east of the Pacific Highway and South West Rocks Road would experience substantial increases in traffic in 2031 if the proposed upgrade was not constructed. The construction of the proposed upgrade would see a reduction of up to 63% and 43%, respectively for Smithtown Road and South West Rocks Road compared to no-build volumes predicted in 2031.

**Travel time**

The proposed upgrade would significantly relieve traffic congestion on the Pacific Highway associated with existing peak holiday traffic and predicted future traffic growth. The proposed upgrade would also improve traffic flows and travel times at other times of the year. The expected travel time savings from the proposed upgrade in the morning peak period are summarised in Table 14-2.

**Table 14-2 Travel time savings in 2011 and 2031 (weekday morning peak)**

Scenario	Travel time (in minutes)		Travel time saving (in minutes)	
	2011	2031	2011	2031
No build <sup>1</sup>	46.3	58.4	–	–
Full project <sup>2</sup>	23.8	23.8	22.5	34.6

**Notes:**

1. denotes travel time along existing Pacific Highway between South Kempsey and Eungai Rail Crossing
  2. denotes travel time along the proposed upgrade between South Kempsey and Eungai Rail
- Source: NSW Roads and Traffic Authority (2006b)

**LoS**

### *On the proposed upgrade*

At the time of writing an opening date of 2011 was adopted for the proposed upgrade. This opening date is no longer accurate, however, for the purposes of this assessment it demonstrates a base case for predicted traffic volumes on the proposed upgrade at opening, if it is approved.

Design specifications require the proposed upgrade to operate at LoS C or better 20 years after opening. Therefore, the years 2011 and 2031 are critical for the LoS analysis. LoS analyses were undertaken for three representative sections of the proposed upgrade: north of the southern interchange, north of the Frederickton interchange, and north of the Stuarts Point Road interchange.

The results of the LoS analyses indicated that, in 2011, the proposed upgrade would be expected to operate at LoS A under the conditions of the 100<sup>th</sup> highest hourly volume (the hourly traffic volume that is expected to be exceeded for only 100 hours of the year). In 2031, the proposed upgrade would be expected to operate at LoS B. The analyses also indicated that most sections of the proposed upgrade would continue to operate at LoS B through to 2051, albeit at the upper end of this LoS. The exception would be the section north of the South Kempsey interchange, which would operate at the lower end of LoS C in 2041 and would further deteriorate by 2051, but still retain LoS C.

A sensitivity analysis indicated that a 20% increase in the forecast traffic volumes would not result in noticeable deterioration of the predicted LoS, except for the section to the north of the South Kempsey interchange. However, a decrease in the forecast traffic volume by 20% would result in an improvement in the predicted LoS in all sections. Therefore, a four-lane dual carriageway freeway type road with a 110 kilometre per hour design capacity would satisfy the design criterion of LoS C operation 20 years after opening.

### *On the existing Pacific Highway*

Traffic volumes on three representative rural sections on the existing Pacific Highway were predicted under the full project scenario for 2011 and 2031. These are shown in Table 14-3.

**Table 14-3 Future Pacific Highway two-way peak hour and AADT traffic volumes**

	2011			2031		
	1-hour morning peak	100th highest hourly volume	AADT	1-hour morning peak	100th highest hourly volume	AADT
South Kempsey	730	938	9,445	1,166	1,513	15,239
North of Frederickton	754	1,005	10,117	1,927	2,557	25,753
Eungai Rail	260	348	3,503	537	711	7,156

Source: NSW Roads and Traffic Authority (2006b)

LoS analyses for the three representative rural sections of the existing Pacific Highway were made based on these predicted traffic volumes. Generally, the existing Pacific Highway would operate at LoS D or better under forecast 2011 traffic conditions. The most critical section would be north of Frederickton. The section near Eungai would have the most favourable LoS. Under 2031 conditions, all three sections would experience a reduced LoS, with the section

near South Kempsey at LoS E, the section near Eungai Rail at LoS D and the section north of Frederickton at LoS F.

The poor LoS predicted between the Frederickton interchange and Kempsey is due to traffic using the proposed upgrade to access Kempsey from the north via the Frederickton interchange, to avoid congestion on local roads south of Kempsey and the Macleay River bridge. Under these conditions it is anticipated that consideration would need to be given to the duplication of this section of the existing Pacific Highway by 2031. Alternatively, consideration could be given to the duplication of the section of the existing highway between the South Kempsey interchange and Kempsey to help reduce traffic congestion on the Kempsey to Frederickton section. The consideration of the duplication of these sections of the existing highway would need to be addressed separately at a later time and do not form part of the proposed upgrade.

*In the Kempsey town centre*

The predicted traffic performance at six key intersections in the Kempsey town centre in 2011 and 2031 under the no build and full project scenarios is summarised in Table 14-4.

**Table 14-4 Intersection performance**

Intersection	Traffic control	No build		Full project	
		Delays <sup>1</sup>	LoS	Delays <sup>1</sup>	LoS
<b>2011</b>					
Smith St/Stuart St	Roundabout <sup>2</sup>	7	A	8	A
Smith St/Forth St	Fixed signals	14	A	16	B
Stuart St/Belgrave St	Fixed signals	21	B	22	B
Smith St/Belgrave St	Fixed signals	53	D	46	D
Rudder St/Lord St	Giveway	>70	F	>70	F
Lachlan St/Middleton St	Giveway	>70	F	>70	F
<b>2031</b>					
Smith St/Stuart St	Roundabout <sup>2</sup>	9	A	9	A
Smith St/Forth St	Fixed signals	18	B	19	B
Stuart St/Belgrave St	Fixed signals	37	C	29	C
Smith St/Belgrave St	Fixed signals	>70	F	>70	F
Rudder St/Lord St	Giveway	>70	F	>70	F
Lachlan St/Middleton St	Giveway	>70	F	>70	F

**Notes:**

1. Delays in seconds per vehicle

2. This intersection is now signalised, but at the time the model was run, a roundabout was in place.

Source: NSW Roads and Traffic Authority (2006b)

As indicated in Table 14-4, the proposed upgrade would have limited impact on the future operation of the intersections of Smith Street with Stuart Street and Forth Street. These intersections would operate at LoS C or better with or without the proposed upgrade.

The intersection of Smith and Belgrave Streets would operate at LoS D under the 2011 no build scenario. In 2031, this intersection would deteriorate to LoS F under both the no build and full project scenarios. In both 2011 and 2031, the proposed upgrade would improve the operation of this intersection, but not to an acceptable level.

As a result of traffic from side streets having insufficient gaps to enter the traffic stream along Lord Street/Lachlan Street, these intersections would operate at LoS F in all cases. The proposed upgrade would reduce traffic along Lord Street/Lachlan Street; however, the reduction would not provide sufficient gaps to enter the traffic stream.

Consideration would need to be given in the future to improvement measures for the intersections operating at LoS F. However, any such upgrades would be addressed separately and do not form part of the proposed upgrade.

With regard to the change of intersection type at the Smith Street/Stuart Street intersection, under the 2031 predicted traffic demand, the right turn on the northern approach would carry in excess of 600 vehicles per hour. Intersection analysis assuming traffic signal control has not been undertaken, however, under such heavy demand, this right turn would require two lanes. For this reason, it is difficult to judge the level of performance for this intersection. It is anticipated that this intersection may operate at near capacity – LoS D, or better.

The poor level of service at these intersections may be addressed at some point in the future. However, for the purposes of this Environmental Assessment, no improvements to local roads have been assumed as the timing and extent of any such works are unknown and beyond the scope of this project.

### 14.5.3 Changes to local road and private property access

The proposed upgrade would affect access arrangements in 94 locations, including the existing highway, local roads and private property access. The proposed arrangements at key local roads are described in Table 14-5. Changes to all local roads are illustrated in Figure 14-6a to f.

**Table 14-5 Changes to existing access arrangements**

Road name	Proposed works/change
<b>Service road (between South Kempsey interchange and the Pacific Highway)</b>	Constructed between the western roundabout of the South Kempsey interchange north to the existing Pacific Highway to provide a connection between the proposed upgrade, the existing highway and Kempsey.
<b>Shannon Close</b>	Closed at the proposed upgrade. Access to the properties road east of the proposed upgrade would be provided via a service road from the eastern roundabout of the South Kempsey interchange.
<b>Crescent Head Road / Bruces Lane</b>	Raise the alignment over the proposed upgrade and increase the horizontal curve radius to provide greater sight distance for vehicles entering Crescent Head Road from properties on the southern side of the road.  Intersection with Bruces Lane would also be upgraded to provide adequate sight distances to the intersection.
<b>Bingis Lane</b>	Bingis Lane would remain open, passing under the proposed upgrade. Access to nursery would be reinstated.
<b>Patersons Lane</b>	Patersons Lane would pass under the proposed upgrade providing access to the timber recycling business.
<b>Inches Road</b>	Construct a new bridge over the proposed upgrade to maintain access along this road. Works would be in a deep cutting (approximately 16 metres), intersecting the road at an acute angle. To minimise the length of bridging, the road would be realigned to intersect the proposed upgrade at a less acute angle.

Road name	Proposed works/change
Old Station Road	A new bridge over the proposed upgrade would be constructed to maintain access along this road. In the vicinity of the proposed upgrade, Old Station Road would be raised to pass over the proposed upgrade on a bridge structure.
Raymonds Lane	Closed at the proposed upgrade. Access to the eastern side of Raymonds Lane is proposed via a service road from Mill Lane.
Mill Lane	New bridge over the proposed upgrade to maintain access along this road. Mill Lane would be raised to pass over the upgrade on a bridge structure.
Seashore Lane	Closed at the proposed upgrade. Access to the eastern side of Seashore Lane is proposed via a service road from Mill Lane.
Kemps Access	New bridge over the proposed upgrade to maintain access along this road. Kemps Access would be raised to pass over the upgrade on a bridge structure.
Cooks Lane	New bridge over the proposed upgrade to maintain access along this road. Cooks Lane would be raised to pass over the upgrade on a bridge structure.
Hill Lane	Closed at the proposed upgrade. The timber bridge on Hill Lane between the upgrade and the Pacific Highway is proposed to be upgraded as it is at a very low level and in poor condition.
Nirvana Way	Closed at the proposed upgrade. Access to Nirvana Way would be provided via a service road from Barraganyatti Hut Road.
Barraganyatti Hut Road/Thurgood Lane	New bridge over the proposed upgrade to maintain access along this road. Barraganyatti Hut Road/Thurgood Lane would be raised to pass over the upgrade on a bridge structure.
Stuarts Point Road	New bridge over the proposed upgrade would be constructed to maintain access along this road. This would form part of the Stuarts Point Road interchange. Stuarts Point Road would be raised to pass over the proposed upgrade on a bridge structure.
Pacific Highway at Barraganyatti	<p>The proposed upgrade at Barraganyatti would run parallel to the existing highway corridor from Station 35700 to the northern end of the project at Eungai Rail. Through this section, a service road would be constructed east of the proposed upgrade to provide access between the existing Pacific Highway and Stuarts Point Road.</p> <p>This service road would provide a connection between the Stuarts Point Road interchange and South West Rocks and Frederickton. It would also provide for vehicles from Stuarts Point to travel to Frederickton and Kempsey via the existing highway.</p>

### New local roads

New local roads would also be constructed in addition to the above. These would comprise:

- A service road between Nirvana Way and Barraganyatti Hut Road west of the proposed upgrade.
- An upgrade of Lyall Lane west of the proposed upgrade.
- A service road between the Pacific Highway at Barraganyatti and Stuarts Point Road, east of the proposed upgrade.
- A service road between Stuarts Point Road and the North Coast Railway, east of the proposed upgrade.
- A service road between Raymonds Lane and Mill Lane, east of the proposed upgrade.
- A service road between Seashore Lane and Mill Lane, east of the proposed upgrade.

All local roads and accesses to be reinstated would be reinstated to a suitable standard in consultation with Kempsey Shire Council and affected landholders.



Figure 14-6a Changes to the local road network and property access



Figure 14-6b Changes to the local road network and property access

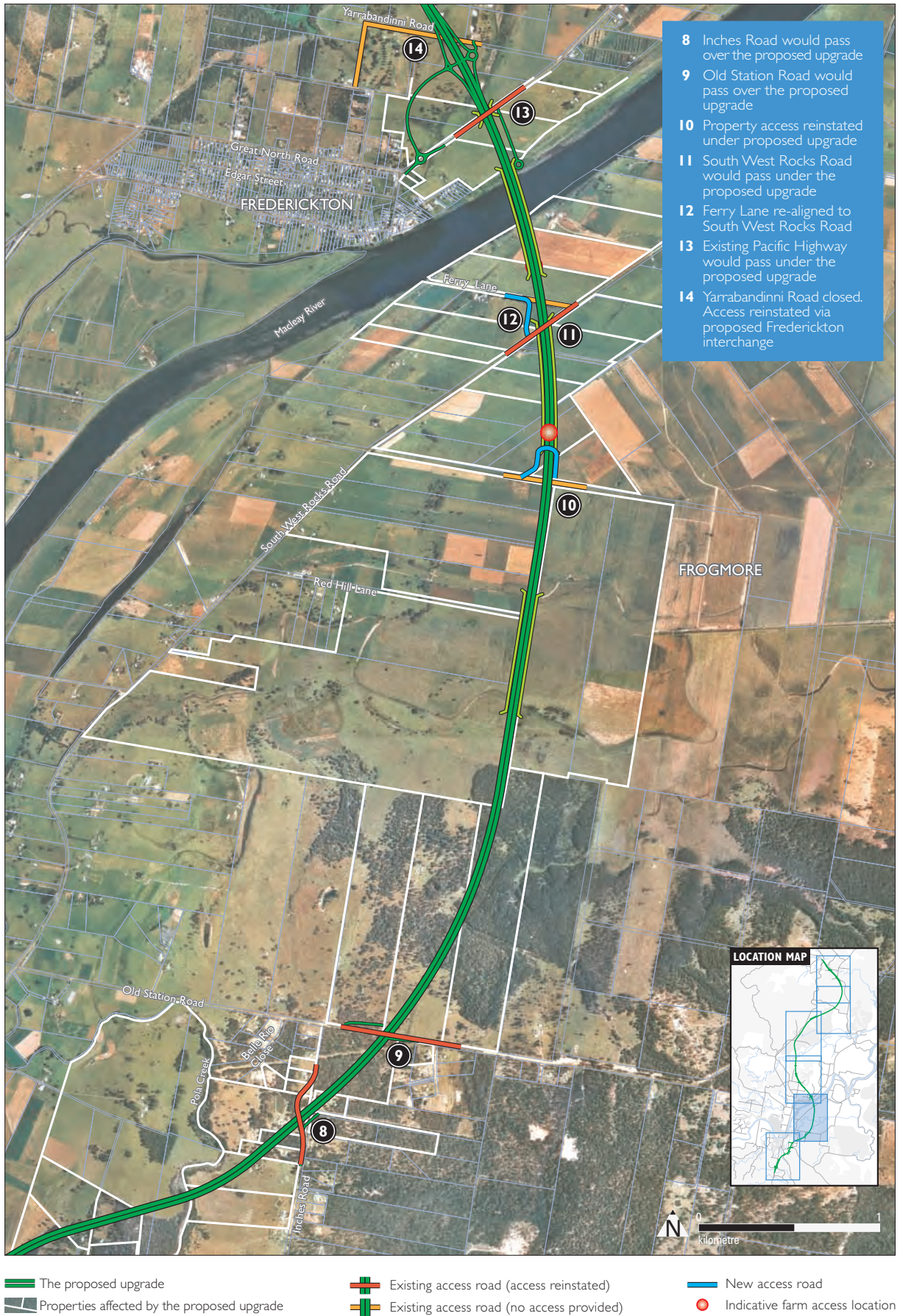
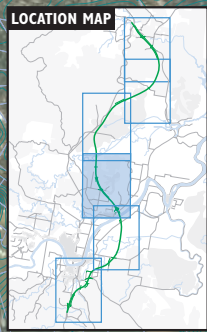


Figure 14-6c Changes to the local road network and property access



- 13 Existing Pacific Highway would pass under the proposed upgrade
- 14 Yarrabandinni Road closed. Access reinstated via proposed Frederickton interchange
- 15 Raymonds Lane closed. Access reinstated via service road to Mill Lane
- 16 Mill Lane would pass over the proposed upgrade
- 17 Seashore Lane closed. Access reinstated via service road to Mill Lane
- 18 Kemps Access would pass over the proposed upgrade



- The proposed upgrade
- Existing access road (access reinstated)
- New access road
- Properties affected by the proposed upgrade
- Existing access road (no access provided)
- Indicative farm access location

Figure 14-6d Changes to the local road network and property access

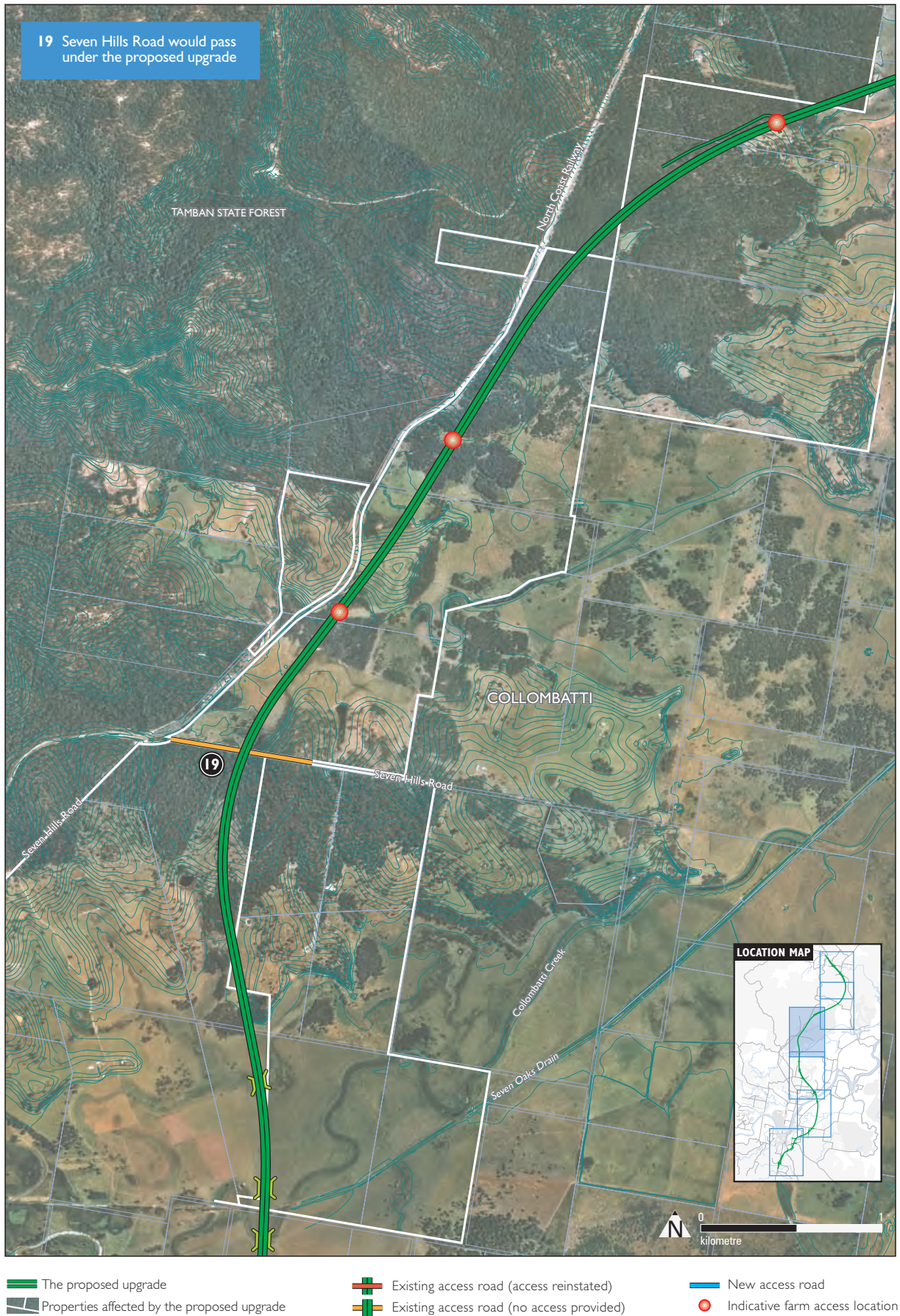
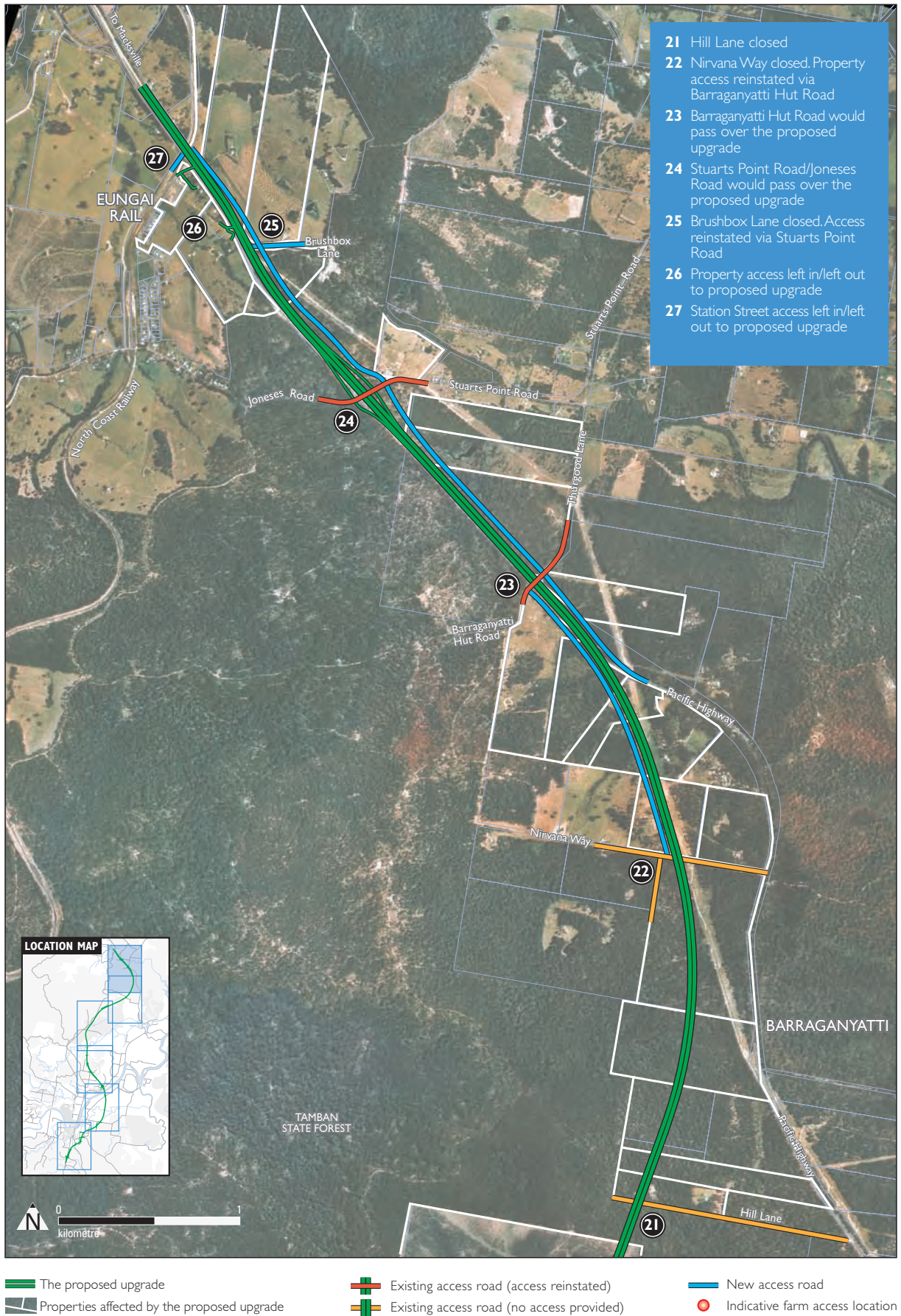


Figure 14-6e Changes to the local road network and property access



- The proposed upgrade
- Properties affected by the proposed upgrade
- Existing access road (access reinstated)
- Existing access road (no access provided)
- New access road
- Indicative farm access location

Figure 14-6f Changes to the local road network and property access



## 14.6 Improvements to freight efficiency

The completion of the proposed upgrade would result in significant benefits to the freight efficiency of this section of the Pacific Highway, and of the entire Pacific Highway as a major corridor for freight between Sydney and Brisbane.

The proposed upgrade would increase the predicted average travel speed of both freight vehicles and general traffic, marginally reduce vehicle kilometres travelled, improve the LoS along the upgraded section, and improve safety, particularly for local traffic, cyclists and pedestrians within Kempsey, through the diversion of freight and heavy vehicles from the Kempsey town centre. The proposed upgrade would reduce travel times between Kempsey and Eungai by 23 minutes in 2011 and by 35 minutes in 2031. This would lead to improved fuel efficiency for heavy vehicles due to flatter grades and improved horizontal alignment.

## 14.7 Provision for cyclist and pedestrian access

Suitable provision would be made for cyclists under both the staged and unstaged construction options for the proposed upgrade, to allow continued cyclist use of the local road network and cycle ways. Cycle access may be provided on the shoulders of the new highway, but pedestrian access would not be provided on the new highway. Bicycle connections would be provided across the proposed upgrade at all overbridges. Pedestrian access would be limited to the following locations:

- Crescent Head Road bridge.
- Inches Road bridge.
- Old Station Road bridge.
- Stuarts Point Road interchange bridge.

As discussed in Section 14.2.1, Kempsey Shire Council maintains an extensive network of footpaths and cycleways in and around the Kempsey town centre. The reduction in through-traffic travelling in the Kempsey and Frederickton town centres, including heavy vehicles, arising from the proposed upgrade would provide opportunities for more on-road cycle facilities to be considered. In particular, the diversion of heavy vehicles from the town centres would improve safety for pedestrians and cyclists using existing footpaths and cycleways.

## 14.8 Provision for public transport

The existing public transport services in and around Kempsey mainly comprise buses. In addition to the local bus network, intra- and inter-state links are provided by bus and rail to key destinations including Sydney and Brisbane. Considering the area's population and residential density, the existing public transport services are considered adequate to meet needs.

Reductions in travel time and improved safety along the entire Pacific Highway and the proposed upgrade section, as a result of the proposed upgrade, would improve the efficiency, reliability and safe operation of bus services within the local area and those that pass through the area along the Pacific Highway or pick up/set down passengers in Kempsey.

## 14.9 Management of impacts

### 14.9.1 Summary of management measures

Construction traffic impacts would be managed through the implementation of Traffic Management Plans. Other mitigation measures are detailed in the draft Statement of Commitments for the proposed upgrade in Appendix D and summarised below.

- Prepare pre-construction road dilapidation reports for all roads likely to be used by construction traffic.
- Prepare post-construction road dilapidation reports for the roads assessed prior to construction following the completion of construction. Any damage resulting from construction, except for normal wear and tear, will be repaired at the RTA's cost.
- Provide copies of road dilapidation reports to the relevant roads authority, where required.
- Prepare and implement a Construction Traffic Management Sub Plan, which will include:
  - Identification of all public roads to be used by construction traffic.
  - Management 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.
  - 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.
- Ensure that access to properties is maintained during construction and, where necessary and feasible, provide temporary alternative access.
- Ensure that where any legal access is permanently affected, alternative access to an equivalent standard to and from a public road is provided where a property has no other legal means of access and where such alternative access is feasible and practical. Where alternative access arrangements are not feasible or practical and a property is left with no access to a public road, negotiations will be undertaken with the relevant property owner for acquisition of the property in accordance with the provisions of the *Land Acquisition (Just Terms Compensation) Act 1991*.