The Newell Highway Road Safety Review

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Abstract

The Newell Highway is the longest highway in NSW, stretching over 1,000 kilometres from the Victorian border to the Queensland border. It is a major freight route from Melbourne to Brisbane, as well as being popular with interstate travellers and tourists.

This route was reviewed using a multi-disciplinary method developed by the NSW Centre for Road Safety based on Safe System principles.

The review examined key road safety issues, which included the large proportion of fatal crashes, which are off path crashes, or rollover crashes, fatigue in combination with high travelling speeds, the relatively high proportion of head-on fatal crashes, heavy vehicle involvement in head-on fatal crashes, heavy vehicle and interstate controllers accounting for a high proportion of fatal crash involvements.

The outcomes of the safety review of the Newell Highway varies from previous reviews due to the far greater length of road (over 1000km), environmental characteristics, a higher percentage of heavy vehicles, higher speed profiles, and lower traffic volumes. For these reasons countermeasures needed to be focused more on mass action treatments rather than precise treatments at specific locations. The mass action treatments will be centred on minor road junction upgrades, addressing horizontal curve deficiencies, and clear zone treatments, together with safety works at major junctions.

The review also highlighted the need to better separate opposing streams of traffic. To address this issue an innovative wide centre-line trail is planned on parts of the Newell Highway, which will not only separate opposing vehicles but also allow overtaking opportunities on appropriate lengths of road.

This paper illustrates how the safety review process for the Newell Highway was implemented and how it was adjusted from the previous two reviews to suit the different profile of the Newell Highway.

Keywords

Multi-Disciplinary Method, Safe Systems Principals, Mass Action Treatments, NSW Centre for Road Safety, Wide Centre-line Trial.

Introduction

The Newell Highway

The Newell Highway (State Highway 17) is the longest highway in New South Wales, stretching over 1,060km from the Victorian border at Tocumwal to the Queensland border at Goondiwindi. It is a major freight route from Melbourne to Brisbane for heavy vehicles. It is also a route for interstate travellers and tourists between Melbourne or Adelaide in the south, to Brisbane in the north. Subsequently there are high percentages of Victorian and Queensland vehicles involved in crashes along the Newell Highway.

The road environment is largely rural and runs through urban areas in major regional cities and towns such as Finley, Narrandera, West Wyalong, Forbes, Parkes, Dubbo, Gilgandra, Coonabarabran, Narrabri, and Moree. The regions adjoining the Newell Highway in NSW have a population of approximately 150,000 people.

The structure and condition of the highway between the Victorian and Queensland borders varies only slightly, and is generally a two-lane rural road with infrequent overtaking lanes. It does however have varying vertical and horizontal alignment, usage, standards, junctions, and roadside objects. The Newell Highway corridor is influenced by the generally flat terrain through which it travels. The lengths passing through the Warrumbungle Ranges, near Coonabarabran, have generally steeper grades and tighter curves than the rest of the road and are speed limited to 100km/h. The remainder of the Newell Highway is
speed zoned at 110km/h, except for those sections passing through cities, towns, and villages where the speed limit has been reduced.

The road passes through mainly agricultural land with the main uses being mixed cropping and grazing. The route is used as a major heavy vehicle transport corridor between Victoria and Queensland and subsequently the percentage of vehicles registered in other States, especially heavy vehicles is high. The road also carries a seasonally high proportion of caravan and tourist traffic travelling between Victoria and Queensland.

Highway Road Safety Reviews

Highway Road Safety Reviews are comprehensive, multi-disciplinary reviews of safety issues on key transport routes. These reviews involve extensive investigation and consultation including in-depth analyses of the Highway’s crash history, route inspections, workshops, and consultative meetings and reporting. The reviews also place emphasis on further improving the coordination and integration of road improvement projects and ensuring the best safety outcome through an integrated program.

Highway Road Safety programs are innovative holistic approaches aimed at reducing the road toll by providing low cost, effective safety engineering works and behavioural/technology programs.

Highway Road Safety Reviews have been carried out for the Pacific (in 2003/04) and Princes Highways (in 2004/05). These resulted in the implementation of a 3 year, $35M road safety program for the Pacific Highway and a 3 year, $30m program of safety improvements for the Princes Highway. The strategy resulted in substantial reductions in both fatal and injury crashes with a first year post implementation saving of 50 lives and 164 injuries on both routes(1).

Because of the success of previous highway safety reviews, it was decided to undertake a similar safety review of the Newell Highway.

The Newell Highway Road Safety Review

The Newell Highway review was established to examine and report on the circumstances surrounding the high number of fatal crashes on the Newell Highway, especially in 2006 when 19 people were killed in road crashes. The review also focussed on road conditions, facilities along the highway, signage, and the appropriateness of current speed limits. Police enforcement activities along the highway, issues associated with heavy vehicles and future priorities for the Newell Highway Upgrade Program were taken into consideration.

A range of analyses and inspections were undertaken during the review including, analysis of reports on fatal crashes and crash trends such as severity, crash type and crash factors. A desk-based review of the highway was also undertaken, which included the use of Gipsicam (a geo-referenced, drive-along-the-road imagery system used to survey the NSW State road network) to identify areas requiring closer scrutiny. Physical inspections of the entire NSW length were carried out to examine locations and circumstances of fatal crashes, a review of speed limits and to assess the road from both a behavioural and road environment perspective.

A team that included experts from the areas of road safety, traffic management, road design and psychology undertook the inspections. In addition to the inspection team, Police Officers experienced in traffic enforcement and an independent community representative with a background in psychology and road safety, participated in the review.

The review employed the safe systems partnerships approach, which while aiming to influence road user behaviour, acknowledges that people will inevitably make mistakes. As a result, this approach requires the system to anticipate and ‘forgive’ driver error. Consequently, a safe road environment is integral to managing and improving road safety outcomes.

Profile of the Newell Highway

- Traffic volumes on the Newell Highway

The Newell Highway carries between 1.1 million vehicles per year, near the Victorian border at Tocumwal, to over 1.7 million vehicles per year between Parkes and Dubbo and 2.2 million vehicles per year between Moree and Boggabilla, near the Queensland border. Traffic volumes vary considerably, ranging from around 2,000 AADT away from townships to around 6,000 in the smaller townships. Local
traffic contributes to higher traffic volumes in the cities and major towns, particularly in Dubbo and Moree, which have AADT figures in excess of 18,000.

The percentage of heavy vehicles is relatively high with 45% between Moree and Boggabilla to a low of 16% between Dubbo and Gilgandra. Road trains are permitted to use the Newell Highway on various lengths and under license.

- **Crashes on the Newell Highway**

In 2006, there were 19 fatalities on the Newell Highway, 10 more than in 2005 and the highest annual total since 1994. There were 10 fatalities on the Newell Highway in 2007, 9 fewer than 2006 (see Fig. 1). The overall trend for NSW is a decline in fatalities.

Injuries have been trending downwards since a particularly poor result in 1993. This downward trend is generally in accordance with state trends. Nevertheless, the decrease is less than is experienced statewide.

In 2006 there were 114 persons injured on the Newell Highway, 213 (65%) fewer than in 1993. However, injuries increased slightly to 138 in 2007.

In recent years, a range of engineering works such as the provision of overtaking lanes and bridge widening has contributed to positive safety outcomes despite the increase in traffic volumes, especially heavy vehicles volumes.

![Figure 1: Casualties on the Newell Highway 1990 to 2007](image)

**Key findings from the Safety Review**

Key road safety issues for the Newell Highway include:

- the largest proportion of fatal crashes are off path crashes or rollover crashes
- fatigue and high speeds were considered to be major behavioural factors in casualty crashes
- almost 30% of all fatal crashes were head-on crashes (13 out of 38), with heavy vehicles being involved in 92% of these head-on crashes
- heavy vehicle involvement in four of the five head-on fatal crashes in 2006
- heavy vehicle and interstate controllers accounting for a high proportion of fatal crash involvements, however recorded alcohol involvement in crashes was underrepresented compared to the incidence on other country highways
Several features of casualties and recorded crashes continue to be over-represented compared with NSW Country State Highways. These include the proportion of crashes involving fatalities and injuries, fatigue involvement, heavy vehicle involvement, interstate resident involvement and older driver involvement.

- **Road engineering issues**

  Generally, on rural sections, the horizontal alignment of the Newell Highway is made up of long straights joined by short arc, middle radius curves. A section of the Newell Highway to the south of Coonabarabran has a poorer horizontal and vertical alignment. However, this is an exception when compared to the total length of the highway.

  Research, undertaken by the NSW Centre for Road Safety, (2) has found that fatal and serious injury crashes on high-speed roads are over-represented on curves within the 200m to 600m radii range. The study examines existing roads in relation to run-off road crashes and the clear zone treatments that can be applied to reduce the number and severity of those crashes.

  In the Newell Highway Report, curves within the 200m to 600m radii range have been designated Priority 1 and should be effectively treated wherever they occur (2). Works on these curves will be implemented on a ranking based on risk assessment. In addition, works will be implemented to suit the conditions that exist in each case and may include shoulder widening, provision of safety barrier, improved delineation with chevron alignment markers, retro reflective pavement markers and signage. There are 104 curves along the total length of the Newell Highway that fall within the Priority 1 range with 42 of these between Gilgandra and Coonabarabran and 20 between Parkes and Dubbo.

  Over the 5 year period to the end of December 2007, there have been a total of 13 crashes, 6 injury crashes and 7 towaway crashes in high speed sections where a vehicle has attempted to overtake a right turning vehicle at a T-junction or property entrance. Trucks (5 light and 5 heavy) were involved in 10 of these crashes and most (7) occurred at junctions between Gilgandra and the Queensland border. This suggests that there is insufficient pavement area to allow vehicles to pass the turning vehicle safely on the left hand side at these junctions. As many truck drivers are unwilling to leave the road due to the higher chance of vehicle rollover, they are more likely to stay on the pavement and crash into the turning vehicle. The widening of pavement to the left of the junction is expected to reduce this crash type.

  In areas adjoining state forests such as Gillenbah State Forest south of Narrandera, and Pilliga Nature Reserve / Pilliga East State Forest north of Coonabarabran, there are substantial regrowth areas of trees and scrubs within the clear zone. These non-frangible objects form a substantial roadside hazard within the clear zone.

- **Behavioural issues**

  o **Fatigue and Alcohol**

    Fatigue was identified as the major factor amongst casualties on the Newell Highway with around 26% of casualties in 2007 involving fatigue. This figure is higher than other country highways (15% in 2007).

    Casualties with alcohol involvement are underrepresented on the Newell Highway.

  o **Speeding**

    After fatigue, speed was identified as the next major factor contributing to casualties with an average 20.6 casualties for the five-year average 2003-2007. Speeding on the Newell Highway is common. This may be due in part to the low perceived likelihood of being detected by Police for speeding. The RTA conducts annual speed surveys on the Newell Highway to monitor speeding behaviour. Speed surveys have been conducted at 12 locations, 10 within 110 km/h speed limit zones, and 2 within 100 km/h speed limit zones. The results show that from 2004 to 2006 the mean and 85th percentile speeds for both light and heavy vehicles increased. The mean speed in the 110km/h sections increased from 109km/h to 112km/h while the 85th percentile speed increased from 113km/h to 116km/h.

    Due to the isolated nature of many casualty crashes, it is difficult to always correctly identify speed as a factor in crashes. Accordingly, the number of crashes that identify speeding as a factor should be considered as a minimum.

  o **Pedestrians**

    In the cities, towns and villages along the highway there is significant interaction between arterial traffic and vulnerable road users such as pedal cyclists and pedestrians. For local residents, the highway serves as a local road in that it contains sections with development (houses and businesses) on one or both sides.
of the road and connects residents with their nearest major centre for shopping and education. Pedestrian crashes accounted for 2% of the fatalities over the 5-year period to the end of 2007.

An integrated road safety strategy needs to provide consistency in the treatment of speed zoning in locations where there is residential and/or commercial development on one or both sides of the highway and to signpost these locations at a safe and appropriate speed.

- **Enforcement issues**
  - Police enforcement
    The NSW Police Force and the RTA have worked together for many years to improve road safety in NSW. The formal partnership between the RTA and the NSW Police Force under the Enhanced Enforcement Program (EEP) has evolved and diversified since its inception in 1995. The RTA contributes many millions of dollars each financial year to fund operations targeting speeding, drink driving, fatigue, heavy vehicle safety issues, seatbelt and helmet use. In recent years, significant achievements have been made in reducing the number of fatalities and injuries during holiday periods. This has been attributed to the introduction of double demerit points, coordinated public education, and extra enforcement made possible by the Enhanced Enforcement Program.
  - Heavy vehicle enforcement

Compliance and Freight Strategy (CFS) Branch of the RTA work through Regional Inspectors Vehicle Regulations (IVR) to implement ongoing heavy vehicle enforcement programs. These are undertaken through random mobile enforcement activities supported by fixed roadside site-specific enforcement and special operations. The programs include asset protection, fatigue management, registration, and vehicle and driver licence compliance.

There are currently seven on-road enforcement sites used by IVRs to safely intercept and check heavy vehicles on the Newell Highway. These sites are located close to the city of Dubbo and the towns of Coonabarabran, Forbes, and West Wyalong.

**Strategic Plan Developed from the Safety Review**

A program of works, based on the findings of the report, is being developed integrating road safety engineering, behavioural and enforcement programs costing $30 million. The program of works will be implemented over 3 years, commencing in the 2009/10 financial year.

**Enhanced Road Safety Engineering Works**

- **Junction treatments**
  Mass action treatments will be undertaken to widen the Newell Highway at road junctions carrying significant traffic volumes and to seal the approaches of those side roads. In addition upgraded road junction warning signposting schemes will be provided on all approaches to all road junctions. A number of major State road junctions will be upgraded to provide improved delineation and better separation between turning traffic.

- **Road environment**
  Clear zones of at least 6 metres are planned along the Newell Highway with emphasis in areas adjoining state forests and on the outside of curves. Where these clear zones cannot be achieved, the installation of wire rope safety barriers will be considered.

- **Widened tactile centreline**
  A widened tactile centreline trial will be undertaken on two locations along the Newell Highway. The widened tactile centreline is designed to separate opposing traffic by approximately 1.0 metre but still allow vehicles to legally overtake at safe locations.

- **Road alignment**
  Shoulders will be widened and sealed, especially around the outsides of curves. Delineation around the outsides of curves is also planned to enhance the definition of the curve and provide better guidance to drivers at night. Where appropriate, high priority curves will be targeted for realignment and or an adjustment to the existing superelevation.
Behavioural Programs

- **Driver fatigue**

Strategically positioned public education campaigns will be targeted at key groups using the Newell Highway. The communication strategies will focus on reminding drivers to look for the early warning signs of fatigue and to plan their journeys allowing time for breaks. A communication strategy will be developed and implemented that utilises signs, print and other media encouraging drivers to know and recognise the early warning signs of fatigue and to use the available rest areas and stopping opportunities in cities and towns along the Newell Highway to take a break. A second communication strategy will be developed and implemented targeting heavy vehicle drivers reminding them to take regular breaks. Information will also be provided informing heavy vehicle drivers of rest areas suitable for heavy vehicles.

In addition Variable Message Signs (VMS) will be positioned from south of Forbes to north of Dubbo encouraging drivers to take a break. Other mass media strategies will include new television and radio campaigns to be developed in 2008/2009.

Rest opportunities are provided by the majority of cities, towns and villages along the Newell Highway as well as the 94 formal rest areas constructed and maintained by the RTA. There are also 40 blue reflector stopping opportunities for heavy vehicle drivers on the Newell Highway. The Blue Reflector Scheme involves the use of a series of blue reflectors to advise drivers of heavy vehicles they are approaching an informal heavy vehicle stopping area. Three blue reflectors are mounted on guideposts 300 metres from an informal site, two on a post 200 metres away and one on a post at the turnoff to the stopping area. As well as providing advance warning to heavy vehicle drivers of suitable informal stopping areas, they are also a way to remind them of their obligation to manage fatigue.

- **Speeding Drivers**

Mass public education campaigns addressing speeding will be implemented. The RTA ‘Pinky’ campaign has effectively challenged the relationship between speeding and social approval among young males. Outdoor advertising, radio, and print media will support the television-based campaign.

Targeted campaigns supporting speed enforcement, both on the open road as well as in towns, will be implemented. The campaigns will strategically target key identified locations, times and demographics and will utilise outdoor, print and radio media. In particular, campaigns will also target heavy vehicle enforcement programs. Heavy vehicle drivers and operators will be targeted with information relating to the enforcement of speed limiters deemed to be operating incorrectly.

In addition, Variable Message Signs (VMS) will also be employed to remind drivers of risks associated with speeding as well as current Police enforcement programs.

- **Pedestrian Safety**

The speed of vehicles is a substantial contributing factor to the level of safety in urban areas. The speed limit through the majority of cities and towns is 50 km/h. However, Grong Grong, Dubbo, West Wyalong, Alectown, Edgeroi, and Gilgandra all have higher speed limits ranging from 60km/h to 80km/h. Speed limits will be reviewed and reduced to a safe and appropriate level.

Enforcement Programs

- **Police Enforcement**

The formal partnership between the RTA and the NSW Police Force under the Enhanced Enforcement Program (EEP) has evolved and diversified since its inception in 1995. These programs will be continued along with a planned expansion of the program.

- **Heavy vehicle enforcement**

Compliance and Freight Strategy (CFS) Branch work through Regional Inspectors Vehicle Regulations (IVR) to implement ongoing heavy vehicle enforcement programs. These are undertaken through random mobile enforcement activities supported by fixed roadside, site-specific enforcement and special operations. CFS is currently developing an enforcement strategy focusing on a route basis.
**Conclusion**

The success of the Pacific and Princes Highway reviews in delivering improved road safety provides sound evidence that a similar road safety outcome on the Newell Highway can be achieved by adopting an integrated program of engineering, behavioural and enforcement programs. Substantial road safety benefits are achievable by strategically implementing carefully targeted works developed in partnership with stakeholders across disciplines. This approach is founded in Safe System principles and the need to progress to forgiving roads. This paper outlines the road safety challenges for the Newell Highway and the proposed strategic plan to address these challenges.

**References**