



RACQ SUBMISSION TO INFRASTRUCTURE AUSTRALIA

This submission covers:

**Issues Paper 1 - Australia's Future Infrastructure Requirements; and
Issues Paper 2 – Public Private Partnerships.**

The Royal Automobile Club of Queensland Limited

October 2008

Summary

The RACQ congratulates the Australian Government on the initiative to establish Infrastructure Australia and the undertaking to develop a long-range plan that prioritises infrastructure requirements based on transparent and objective criteria. The intention to establish nationally consistent Public Private Partnership (PPP) guidelines will also reduce bidding costs and encourage competition in the market.

With the high cost of infrastructure, congestion, safety and environmental impacts, it is important that sound policy and project decisions are made. These need to move beyond the current electoral cycle and the debate between roads and public transport, toward a long term vision of a sustainable, integrated and resilient transport system that meets all future needs.

This submission provides comments on policy issues associated with the funding of roads and details the five priority projects that RACQ believes should be implemented by Infrastructure Australia. These include:

1. Cooroy to Curra Bruce Highway deviation
2. Toowoomba Bypass
3. North West Motorway
4. Brisbane Rail Upgrade
5. Four-star National Network in Queensland

Introduction

Representing almost 1.2 million Queensland motorists, the RACQ congratulates the Australian Government on the initiative to establish Infrastructure Australia and the undertaking to develop a long-range plan that prioritises infrastructure requirements based on transparent and objective criteria. The intention to establish nationally consistent Public Private Partnership (PPP) guidelines will also reduce bidding costs and encourage competition in the market.

With the high cost of infrastructure, congestion, safety and environmental impacts, it is important that sound policy and project decisions are made. There is a need to move beyond the political constraints of electoral cycles and the debate between roads and public transport, toward a long term vision of a sustainable, integrated and resilient transport system that meets all future needs.

This submission details the RACQ's priority list of projects for Australian Government contribution and the methodology utilised to derive this list. It also raises a number of policy, planning and funding issues that RACQ believes should be considered during the prioritisation process and establishment of PPP guidelines.

The RACQ welcomes further discussion of strategic transport infrastructure priorities with government, stakeholders and the community and looks forward to the outcomes from Infrastructure Australia's prioritisation process.

Audit Framework and Policy Comments

Goal definition

The transport system should be designed and built to provide the highest level of service feasible for all modes (walking, cycling, public transport, cars, freight and commercial vehicles) so that people have real choices that provide safe, convenient and affordable access.

Funding options

The \$20 billion Building Australia Fund is a welcome Australian Government initiative to enable delivery of a range of infrastructure projects that have not been supported through other constrained funding mechanisms such as AusLink.

The current global financial crisis places greater urgency on the Building Australia Fund for two reasons. Firstly, it can facilitate early construction of projects to stimulate the economy in a time of declining global demand. Secondly, it can add public equity to projects to replace some of the high debt leveraging that previous toll road projects have utilised, but is unlikely to be feasible with near term credit constraints.

The equity contributions could be further supported and leveraged by Infrastructure Australia through a move to replace toll revenue from new urban roads with a form of congestion charging targeted at inner city areas where bypasses and public transport alternatives are available and significant congestion reduction benefits can be realised. The RACQ would seek to be involved in the design process of such a scheme to ensure it achieves maximum benefits and is more equitable for motorists than toll roads.

The RACQ believes that PPPs can have a valuable role in infrastructure provision and agrees that nationally consistent guidelines are a step forward. However, we do have strong concerns over the inefficiency of placing tolls on our newest and best urban roads and thereby diverting potential users back onto the congested surrounding road network. Nor does the RACQ consider the practice of allocating all traffic projection risk to private proponents as optimal. This effectively places an additional burden on motorists as private proponents have little control over traffic volumes and hence must factor in a risk premium to their toll levels.

The experience of toll roads in Sydney and Melbourne has demonstrated that traffic projections are subject to wide ranges of uncertainty and volumes are significantly impacted by the existence and level of tolls. This is clear evidence that many urban toll roads are not effective in reducing congestion compared with the provision of free roads supported through other revenue streams.

Problem identification

Mobility and accessibility are important components of our society and contribute substantially to overall economic, social and environmental outcomes. Infrastructure improvements are aimed at achieving the mobility and accessibility goals in the most productive and efficient manner possible while also minimising negative externalities.

The main challenges are to reduce congestion in our urban areas and to minimise crash costs over the whole network. Other economic, social and environmental factors that need to be considered include greenhouse emissions, air and noise pollution, equity, distance between traffic generators and destinations, and quality of life.

Problem assessment and analysis

The productivity and economic contribution of transport infrastructure is best measured using a Net Present Value or Benefit Cost Ratio that compares all the benefits of the infrastructure – primarily through travel time, vehicle operating cost and crash cost reductions – against total construction and maintenance costs.

The nature of transport outcomes is complex, providing rationale for the valuing and inclusion of all recognised externalities into a consistent evaluation framework. This should include social and environmental costs and benefits such as air and noise pollution, amenity, community severance and greenhouse emissions. Without a consistent framework, perverse outcomes may well arise through the prioritisation process. For example, initiatives that increase public transport mode share may decrease the amount of motor vehicle travel and reduce some emissions, but if this results in increased congestion compared with alternative proposals, then the greenhouse impact is likely to be worse as the increases from congestion will swamp the decreases from mode change.

Major infrastructure projects can also open up new geographic areas for industry and residential development. Where these complete missing links in a strategic network, they can support regional land use strategies and provide a more robust or resilient transport network that is more able to adapt to incidents and long term scenario changes.

The RACQ is concerned that some valuable infrastructure proposals are not being properly considered at present due to the expediency of supporting specific proposals that are further advanced in terms of planning processes or political preferences. The quantitative and transparent long-range planning and prioritising approach adopted by Infrastructure Australia is a welcome development.

Option generation

The RACQ does not generally have access to the modelling data and expertise available to governments and proponents of specific projects. The RACQ does, however, engage in extensive consultation with government, stakeholders and our members to inform our position and priorities.

The five projects proposed by the RACQ for contribution from the Building Australia Fund are based on this broad and informed position. They are in addition to existing commitments and represent the urban and regional projects that RACQ believes are high priorities with regional scale impacts. All projects have also been checked against the following qualitative criteria to ensure their appropriateness for Australian Government contribution:

- Improves safety of the national road network;
- Adds capacity to reduce congestion;
- Completes a logical and strategic missing link in the national road network;
- Reduces the need for other road upgrades; and
- Improves vehicle travel for trips (eg. cross-city and interregional) that do not compete with public transport systems.

All major new urban roads and upgrades should include high quality bicycle and shared paths to ensure that pedestrian and cycle networks are enhanced. Transport corridors are important public spaces, so local amenity improvements (shade tree plantings, noise amelioration, quality urban design and public spaces) should be incorporated in all upgrades.

The priority projects are not based narrowly on the benefits to private motor vehicle travel; rather they consider road and rail capacity, including public transport and freight impacts.

The RACQ is confident that the proposed projects will perform well in both strategic and economic evaluation and should be supported by the Australian Government.

RACQ Priority Queensland Projects for Infrastructure Australia

- 1. Cooroy to Curra Bruce Highway deviation**
- 2. Toowoomba Bypass**
- 3. North West Motorway**
- 4. Brisbane Rail Upgrade**
- 5. Four-star National Network in Queensland**

Project Details

Project 1: Cooroy to Curra Bruce Highway deviation

Description

The Cooroy to Curra Bruce Highway deviation would be a four-lane duplicated road in a new corridor south of Gympie. It would extend the existing four-lane duplicated road north from the Sunshine Coast and replace a manifestly inadequate two-lane road that caters for about 16,000 vehicles per day.

Total project costs are estimated at \$4 billion with feasible completion by 2015.

Immediate Action

Infrastructure Australia to allocate funding, with construction to commence within the year.

Dependencies

Queensland Government to finalise alignment dependent on decisions related to the proposed Traveston Dam.

Details

The Cooroy to Curra section of the Bruce Highway has received one of the lowest ratings of all sections of the AusLink network in Australia. It is a single lane in each direction with regular bends within rolling terrain, limited opportunities for overtaking and many intersections with poor sight distance. Despite the constrained road environment, it caters for an average annual daily traffic volume of about 16,000 vehicles.

Table 3 in Project 5 below, shows that there were 27 deaths and 181 casualty crashes in the link of the Bruce Highway from Cooroy to Gympie between 2001 and 2005. This has resulted in it receiving a high individual and collective risk rating under the Australian Road Assessment program (AusRAP).

Many investigations and much planning have been undertaken in response to the numerous serious crashes and the overwhelming and oft-repeated community cries for a solution. As a result, the existing road is subject to many on-going management measures and restrictions that are anticipated to remain until a deviation is completed.

The proposed Traveston Dam is an issue that requires resolution as it impacts the possible corridors. The RACQ expects that the Queensland Government will make a decision on the final alignment of the deviation when the Australian Government allocates funding. The Queensland Government will presumably fund any additional costs associated with preserving the possibility of constructing the dam.

The RACQ understands that the full deviation cost is in the order of \$4 billion and design is sufficiently advanced for construction to start in the next year and be completed by 2015. The RACQ supports this timetable based on early notification from the Australian Government of funding availability. The continuing economic

and population growth both north and south of this national highway link will ensure that the human tragedy and economic cost builds rapidly with each year's delay.

Project 2: Toowoomba Bypass

Description

The Toowoomba bypass would be a four-lane duplicated road and tunnel in a new corridor that links Helidon to the east with Charlton to the west. It would provide a much improved alignment and gradient, particularly for the freight vehicles negotiating the Great Dividing Range crossing, and it would bypass the urban area of Toowoomba.

Total project costs are estimated at \$2 billion.

Immediate Action

Infrastructure Australia to allocate funding, with construction to commence within the year.

Dependencies

Australian and Queensland Governments to agree on Charlton as an appropriate intermodal terminal site for the Melbourne to Brisbane inland rail link.

Queensland Government to prioritise the 'Southern Missing Link' rail line linking Toowoomba with Gladstone as the preferred bulk commodity port, rather than an additional rail crossing of the Toowoomba range.

Details

About 25,000 vehicles a day drive the Toowoomba range road, including about 5,000 B-doubles and semi-trailers. The existing road through Toowoomba includes at least 16 sets of traffic lights. This is expected to rise to some 25 traffic lights in the near future. The urban area in Toowoomba thus experiences substantial negative safety, amenity and air and noise pollution impacts from a very large number of heavy vehicle movements 24 hours a day. Capacity constraints in the rail alignment up the range are adding to the problem by forcing more freight onto the road. The RACQ understands that QR is carrying only about 35 per cent of the coal from Ackland to Swanbank and the Brisbane port on the rail line. This is a very unfortunate situation, which requires priority resolution.

Table 3 in the Project 5 section, shows that there were 6 deaths and 95 casualty crashes in the short link of the Warrego Highway from Helidon to Toowoomba between 2001 and 2005. This has resulted in it receiving a high individual and collective risk rating under AusRAP.

There has been much planning into improvements in rail capacity and speed along the Melbourne to Brisbane or Gladstone corridor. Clearly a decision is required on how to increase transport capacity between Toowoomba and Brisbane. Another range crossing is required. Both rail and road options have been put forward, yet the volumes are unlikely to support both. The Australian and Queensland Governments

need to make a decision on which will go forward and move to implement it as soon as possible.

The RACQ believes the proposed road range crossing should be supported as it is the cheaper alternative and delivers many benefits. It also complements the current work on the 'Southern Missing Link' rail line that would link Toowoomba with Gladstone, which is a more appropriate port for bulk commodity exports.

The planning for the second road range crossing is complete and land purchases have commenced. Also, a 600-metre pilot tunnel has been drilled through the range to test the geology at the location of the proposed tunnel. It is now time to begin the infrastructure construction task in earnest.

This project has overwhelming community support and strategic benefits by improving linkages between Brisbane, Toowoomba, west of the range and all areas to the south. The extent of travel time saving justifies the imposition of a toll on heavy vehicles to partly fund the crossing. Industrial land estates with good access to the second range crossing and any intermodal rail terminal would experience substantial beneficial impacts to land values. A portion of this should also be captured to contribute funding to the project.

Project 3: Brisbane North West Motorway

Description

As envisaged by the RACQ, the North West Motorway would be a limited access and grade-separated facility linking the Western Freeway with the Gympie Arterial Road and Airport Link tunnel in Brisbane. This would provide the full bypass and ring road solution sought for the west of Brisbane for many decades.

Total project costs have not been estimated but are expected to be in the vicinity of \$10 billion.

Immediate Action

Infrastructure Australia to urgently commission a feasibility study into the North West Motorway in order to compare benefits and costs with the proposed Northern Link tunnel and Northern Busway extensions.

Dependencies

This proposal is the preferred alternative to the Northern Link tunnel and extension of the Northern Busway north of Kedron for delivery in the short term.

Details

The recent Western Brisbane Transport Network Investigation (WBTNI), undertaken by the Queensland Government, identified a number of projects that, when delivered together, offers a major strategic solution that establishes a well functioning road hierarchy for the Brisbane region.

The projects are identified in WBTNI as Options 3, 6 and 15 – named here as the *North West Motorway*. WBTNI Option 3 is a tunnel from the Western Freeway to

Stafford Road, providing north-south transport capacity through this densely settled hilly terrain that is lacking adequate surface corridors. WBTNI Option 6 is the upgrade of Stafford Road to form a strong east-west spine that links the major north-south spines of North West Motorway, Gympie/Lutwyche Road and Gateway Motorway. WBTNI Option 15 is a grade separated motorway link from Stafford Road to Gympie Arterial Road at Carseldine, utilising the preserved North West Transport Corridor adjacent to Trouts Road.

The North West Motorway would provide a limited access and grade-separated facility linking the Western Freeway with the Gympie Arterial Road and Airport Link tunnel. This combination of projects provides the full bypass and ring road solution sought for the west of Brisbane for many decades. By utilising a tunnel, a preserved corridor and an existing arterial road, this major investment in the region's future could be built with minimal disruption to existing communities and roads relative to the scale of the civil construction task.

Utilising Stafford Road and Airport Link, the North West Motorway also serves an inner orbital function that connects the north and west of Brisbane with the International Airport. An upgraded Stafford Road provides a high order east-west link about seven kilometres north of the CBD to take maximum advantage of the Airport Link east-west connection and associated upgrade of the Airport roundabout.

Subject to construction of the North West Motorway, the RACQ considers that no other western bypass, such as the proposed *Brisbane Valley Bypass* or *West of Mt Coot-tha Bypass*, is required in the short term or the long term.

Maps of Freight Priority Routes in South East Queensland highlight the absence of any adequate road hierarchy through the north-west of Brisbane, linking the limited access and grade separated Western Freeway with Gympie Arterial Road.

The additional north-south capacity and east-west link provided by the North West Motorway will take pressure off the Inner City Bypass and allow it to function effectively with the added pressure of the North South Bypass Tunnel (NSBT), Airport Link and Hale Street Link feeding into it. This will also take through traffic off most roads in the north-west of Brisbane, reducing congestion and allowing the lower-order road network to function as originally intended.

The major advantages to freight and the linking of much of Brisbane to the airport, as well as the congestion relief, public transport opportunities and completion of a genuine bypass, combine to provide ample rationale for the Federal Government to devote funding toward the North West Motorway.

Why the North West Motorway is a priority over Northern Link

The Northern Link is a potential solution that could act as an inner west orbital and provide radial capacity to relieve congestion on Milton Road and Coronation Drive. It should be assessed for priority against the North West Motorway. The RACQ believes the North West Motorway with Stafford Road upgrade would emerge as the preferred more immediate solution.

The Northern Link acts primarily as a duplication of Milton Road with improved connections to the Inner City Bypass rather than a western bypass of the urban area. As such, it will not relieve congestion on any roads to its north and will funnel additional traffic onto the Inner City Bypass and Lutwyche Road – both already struggling with their major roles in the road hierarchy.

Further information on the extent of congestion growth on Brisbane's roads is available at racq.com in the *'Travel Time Survey 2007'* document.

These shortcomings of Northern Link are demonstrated in the *Northern Link Preliminary Assessment Report* of August 2007, which reports a range of most likely net project costs of \$672 million to \$861 million. These large costs demonstrate that a large public subsidy is required to fund the project, even though motorists would be forced to pay a toll. The figures above include the report's assumption of traffic funnelling by declaring existing general use lanes as T3 lanes (three or more people/car only) on both Milton Road and Coronation Drive.

The existing Federal government election commitment of \$500 million for Northern Link could be diverted to the North West Motorway as the preferred strategic solution deserving of Federal funding support and AusLink national corridor status. Further Australian Government funding would however be required, commensurate with the broader scope and long-term benefits available. Further information is available at racq.com in the *'RACQ Submission to WBTNI Aug 2008'* document.

Project 4: Brisbane Rail Upgrade

Description

The Brisbane Rail Upgrade would be a combination of Phase 1 of the Inner City Rail Upgrade proposed by the Queensland Government to alleviate inner city capacity constraints, with modifications to the northern alignment to link with the Ferny Grove rail line and a new North West rail line along the proposed North West Motorway, providing an alternative corridor north to Bald Hills station.

Total project costs have not been estimated but are expected to be in the vicinity of \$10 billion.

Immediate Action

Infrastructure Australia to commission a feasibility study for the project as an additional option for consideration in the Queensland Government Inner City Rail Upgrade project.

Dependencies

This proposal is dependent on decisions regarding the North West Motorway and the Inner City Rail Upgrade project.

Details

The RACQ considers there is a need to improve public transport so that more people have a reasonable alternative to using their cars.

The Inner City Rail Upgrade proposed by the Queensland Government is recognition of the constrained capacity of the existing rail alignments through the inner city, and the need for additional capacity to cater for a strong Central Business District with growing employment and greater residential densities planned for the inner city.

The RACQ understands that the key inner city rail capacity constraint is the northern end of the Merivale Bridge where the Ipswich rail line intersects with the Beenleigh, Gold Coast and Cleveland rail lines. In addition, the existing network of four lines between Roma Street and Bowen Hills stations does not allow for a significant increase in the number of services, so any long term solution for cross-river capacity should provide additional capacity through the CBD. A separate corridor with several north, south and intermediate links would also add resilience to the rail network and provide flexibility to divert trains following incidents or delays.

Upon initial inspection, the RACQ supports a version of the Phase 1 alignment proposed by the Inner City Rail Capacity Study. However, the RACQ does not support the Phase 2 alignment, as this is not considered necessary once the additional cross-river capacity is provided for Beenleigh and Gold Coast trains.

The RACQ believes several modifications to the Phase 1 corridors should be tested for feasibility.

On the southern end, a link should be provided to the Cleveland line if feasible. This would allow Cleveland passenger trains to access the CBD via the new corridor and would allow freight trains between the port and the north to be directed under the city to reduce noise and other impacts, particularly at night.

An intermediate link to the main line, probably between Central and Brunswick Street stations, would add flexibility and resilience to the rail network and minimise disruptions from any delays or incidents. This would be particularly beneficial if the RACQ's proposal for the northern alignment were adopted.

The northern end of the new alignment could connect to the Ferny Grove line between Wilston and Enoggera Stations, rather than to the main line north of Bowen Hills. This connection would reduce travel times from the Ferny Grove line and relieve some capacity around Bowen Hills where the northern lines intersect. The major benefit, however, would be to link to the North West rail line, detailed below.

This North West rail line would utilise space between the northbound and southbound lanes of the North West Motorway, similar to the existing rail line from Perth CBD to Joondalup. This new rail line could provide a valuable alternative north-south corridor between Bald Hills and the Ferny Grove rail line with several new train stations to intercept inbound car traffic at 'Park and Ride' nodes, adding capacity, resilience and catchment to the rail network.

This proposal represents a major rail upgrade that delivers a strong central hub to ensure the future role of the rail network for Brisbane and surrounds, given the government targets to increase patronage and construct several suburban and outer-urban rail extensions. This option should be considered against other more narrowly focussed upgrades of inner city rail capacity and distribution.

Busways

The Inner City and North West rail lines provide a major public transport radial capacity expansion and inner city upgrade that would allow the CBD to grow in the long term.

This rail capacity provides the opportunity and rationale to refocus bus spending toward supporting the rail upgrade rather than expanding competing radial capacity. The RACQ supports a range of bus-rail interchange and Park and Ride upgrades in preference to any further expansion of the busway network.

The preferred solution is to have a well functioning road network and rail network. Many of the benefits of busways are available for corridors distant from rail, through upgrades to the existing road network and the provision of bus priority as required in the specific circumstances. The RACQ believes that road upgrades would generally provide greater economic and social returns than busways through cost savings, greater opportunities to stage construction according to need, and additional benefits to motorists, who usually constitute a large proportion of the total passenger movement through a corridor.

For example, the proposed North West Motorway would reduce traffic levels substantially along Gympie Road north of Stafford Road, as much of the through traffic would prefer the new faster corridor. This would allow space in the existing Gympie Road corridor for bus priority to achieve much of the potential benefits of the extended Northern Busway proposal at a small fraction of the price.

Project 5: Four-star National Network in Queensland

Description

The national network links in Queensland need to be upgraded to four-star AusRAP status to improve the standard and the safety of rural and regional roads. This process could be planned and implemented over the next 10 years with approximately \$5.5 billion in additional funding.

Immediate Action

Infrastructure Australia to establish a 10-year funding program for safety countermeasures on National Network links. Construction can commence within months in numerous locations across Queensland.

Dependencies

To maximise cost-effectiveness, safety countermeasures are to be implemented during road maintenance treatments.

Details

The RACQ supports the Australian Automobile Association submission to Infrastructure Australia and believes that the National Network links in Queensland need to be upgraded to four-star AusRAP status. Details on how AusRAP Star

Ratings are determined are contained in reports available for download at www.ausrap.org.

The Queensland component of the AusLink National Network requires substantial funding support for maintenance and upgrading to cater for population and economic growth. The RACQ believes that planned AusLink funding is insufficient to prevent further deterioration of the road asset and does not cater for many urgently needed improvements to safety and capacity. The upgrade could be planned and implemented over the next 10 years with approximately \$5.5 billion in additional funding from the Australian Government. The Queensland Government should implement a similar upgrade program for other state-controlled roads to achieve a minimum three star rating.

This submission has put forward two specific regional projects that address existing priority problems through the provision of totally new road corridors with higher capacity near Gympie and Toowoomba. The majority of the National Network in Queensland will not attract this level of investment, yet traffic levels continue to increase.

The \$5 billion estimated cost is based on using a range of cost-effective road safety countermeasures. The guiding principles are:

- The most cost-effective road safety countermeasures should be given priority in the cost estimate model.
- Since AusRAP is designed primarily as a high-level awareness-raising tool, the cost estimate model should not attempt to provide a project-by-project level of detail — that is the role of road authorities. The finest level of detail should be for whole highways in each State and Territory.
- The AusRAP star ratings reports and software provide the necessary guidance to AAA and state and territory motoring organisations on locations where road safety countermeasures might be implemented.
- While the ideal rating is five stars, the focus of this research is to determine the cost of making an intermediate step of lifting a significant proportion of the network to four stars.

This submission complements an AusRAP report, *Comparing Risk Maps and Star Ratings*, which was published in April 2008 and found that the crash cost on a four-star road is about half that of a three-star road; and the crash cost on a three-star road is about half that of a two-star road.

The cost estimates used in the model are listed below in Table 1. These countermeasures were prioritised according to cost effectiveness, and no further measures were implemented once the four-star threshold was reached. Duplication was considered only where traffic volumes exceeded 10,000 vehicles per day. Given these constraints, some roads were not able to achieve four-star status.

The changes in star ratings for National Network links in Queensland, based on the proposed countermeasures, are shown below in Table 2. The traffic and crash details of the existing AusLink National Network in Queensland are included for reference on the following page in Table 3, taken from the *'How safe are Queensland roads?'* December 2007 AusRAP report.

The improvement in star ratings results in a 13% reduction in crash costs across the Queensland component of the National Network. This provides a substantial benefit stream to weigh against the costs of the proposal. Other benefits in reduced congestion and future maintenance needs will add to the crash cost savings. All of these benefit streams are expected to grow exponentially rather than linearly as they relate more to the number of potential traffic conflicts than the rate of economic and population growth.

The implementation cost to upgrade each of the Queensland links of the National Network to four stars where feasible is shown below in Table 4. The total cost for Queensland is approximately \$5.5 billion over the 10-year cycle. This is in addition to the cost for the Cooroy to Curra and Toowoomba Range deviations.

Table 1 Countermeasures and cost estimates

Countermeasures	Unit	Cost
Duplication	per km	\$25,000,000
Overtaking lane (both directions)	per km	\$2,000,000
Formation and pavement widening (both sides)	per km (0.4m lane widening, 0.8m for both directions)	\$200,000
Sealed shoulder width (both sides)	per km (0.6m shoulder widening, 1.2m for both directions)	\$300,000
Delineation: (3 of edgelines, centrelines, RRPM, guide post)	per km	\$6,000
Wire rope barriers	per linear km	\$250,000
Intersection realignment	per site	\$450,000
Intersection sight distance (clear and grub)	per site	\$20,000
Protected right turn provision at intersection	per site	\$500,000
Left turn provision at intersection	per site	\$300,000
Rail crossing type	per site	\$1,000,000

Table 2 Changes in Star Ratings on National Network due to countermeasures

State	Star Rating	Length (km)		Percentage	
		Before	After	Before	After
QLD	1	0	0	0%	0%
	2	29	0	1%	0%
	3	3061	1921	59%	37%
	4	2078	3248	40%	63%
	5	0	0	0%	0%
QLD Total		5169	5169	100%	100%

Table 3 Traffic and crash details of National Network links in Queensland

From - to	Type	Length km	Traffic Vehicles per day	Casualty crashes 2001-05	Deaths 2001-05	Collective Risk Rating		Individual Risk Rating	
						Annual average casualty crashes per km	Annual average casualty crashes per 100m veh-km		
Bruce Highway (AusLink national network)									
Bald Hills to Caloundra	Dual	61	52300	614	15	2.00	High	10.50	Medium
Caloundra to Cooroy	Dual	41	24500	226	12	1.11	High	12.45	Medium-high
Cooroy to Gympie	Single	40	12700	181	27	0.91	High	19.57	High
Gympie to Childers	Single	138	6700	232	26	0.34	High	13.73	Medium-high
Childers to Miriam Vale	Single	152	2900	177	8	0.23	Medium-high	21.84	High
Miriam Vale to Rockhampton	Single	164	4000	163	12	0.20	Medium-high	13.62	Medium-high
Rockhampton to St Lawrence	Single	165	2300	120	9	0.15	Medium	17.63	High
St Lawrence to Sarina	Single	118	2500	80	8	0.14	Medium	15.05	Medium-high
Sarina to Mackay	Single	25	8100	58	6	0.46	High	15.36	Medium-high
Mackay to Proserpine	Single	118	3700	127	17	0.22	Medium-high	15.92	Medium-high
Proserpine to Ayr	Single	160	2800	130	19	0.16	Medium	16.07	Medium-high
Ayr to Townsville	Single	74	5200	88	9	0.24	Medium-high	12.68	Medium-high
Townsville to Ingham	Single	100	5800	153	6	0.31	High	14.34	Medium-high
Ingham to Innisfail	Single	137	3500	134	16	0.20	Medium-high	15.24	Medium-high
Innisfail to Cairns	Single	60	4800	102	5	0.34	High	19.45	High
Flinders Highway (AusLink national network)									
Townsville to Charters Towers	Single	122	1800	64	4	0.10	Medium	15.78	Medium-high
Charters Towers to Hughenden	Single	245	600	40	1	0.03	Low-medium	15.06	Medium-high
Hughenden to Richmond	Single	117	300	12	0	0.02	Low	16.57	High
Richmond to Julia Creek	Single	148	300	22	1	0.03	Low	23.89	High
Julia Creek to Barkly Hwy	Single	123	300	21	3	0.03	Low-medium	29.84	High
Gore / Leichhardt Highway (AusLink national network)									
Toowoomba to Yandilla	Single	64	2700	48	6	0.15	Medium	14.99	Medium-high
Yandilla to NSW border	Single	155	1400	82	1	0.11	Medium	21.22	High
New England / Cunningham Highway (AusLink national network)									
Ipswich to Willowbank	Dual	18	17000	58	2	0.65	High	10.40	Medium
Willowbank to Kalbar	Single	37	4900	39	6	0.21	Medium-high	11.66	Medium
Kalbar to Warwick	Single	68	4200	93	10	0.27	Medium-high	17.85	High
Warwick to Stanthorpe	Single	57	3300	47	8	0.16	Medium	13.50	Medium-high
Stanthorpe to NSW border	Single	36	2500	36	5	0.20	Medium-high	22.22	High
Pacific Motorway (AusLink national network)									
Gateway Motorway to Logan Motorway	Dual	15	102200	365	5	4.94	High	13.25	Medium-high
Logan Motorway to Smith Street Fwy	Dual	35	99500	364	7	2.07	High	5.71	Low
Smith Street Fwy to Gold Coast	Dual	29	66900	443	10	3.10	High	12.72	Medium-high
Warrego / Landsborough / Barkly Highway (AusLink national network)									
Cunningham Hwy to Gatton	Dual	55	19200	279	16	1.01	High	14.43	Medium-high
Gatton to Helidon	Single	20	10700	41	4	0.41	High	10.44	Medium
Helidon to Toowoomba	Dual	16	16400	95	6	1.16	High	19.39	High
Toowoomba to Dalby	Single	74	5400	66	7	0.18	Medium-high	9.16	Low-medium
Dalby to Roma	Single	262	1600	87	7	0.07	Low-medium	11.71	Medium
Roma to Morven	Single	175	600	33	5	0.04	Low-medium	16.83	High
Morven to Barcaldine	Single	413	300	34	2	0.02	Low	14.04	Medium-high
Barcaldine to Winton	Single	285	400	24	0	0.02	Low	10.42	Medium
Winton to Flinders Hwy	Single	334	300	28	1	0.02	Low	17.19	High
Flinders Hwy to Mt Isa	Single	131	1000	39	1	0.06	Low-medium	15.75	Medium-high
Mt Isa to NT border	Single	195	200	38	2	0.04	Low-medium	44.51	High

Table 4 Estimated cost to upgrade Queensland National Network links to 4 star AusRAP

State	Road Name	Sum of Length (km)	Lane Widening	Shoulder widening	Improve Delineation	Improve Overtaking	Duplication	Install Roadside Barrier	Intersection Realignment	Increase Sight Distance	Protected Right Turn	Protected Left Turn	Install Boom Gate & Light	Total
QLD	Barkly Highway	305	\$45	\$27	\$1	\$36	\$0	\$4	\$0	\$0	\$4	\$2	\$0	\$119
	Bruce Highway	1,695	\$3	\$202	\$0	\$83	\$3,383	\$93	\$16	\$2	\$262	\$165	\$0	\$4,209
	Cunningham Highway	155	\$2	\$14	\$0	\$1	\$417	\$6	\$0	\$0	\$8	\$5	\$0	\$453
	Flinders Highway	762	\$50	\$126	\$1	\$18	\$0	\$12	\$0	\$0	\$1	\$3	\$1	\$212
	Gateway Arterial Road	76	\$0	\$0	\$0	\$0	\$0	\$13	\$0	\$0	\$0	\$0	\$0	\$13
	Gore Highway	197	\$7	\$27	\$0	\$7	\$0	\$4	\$0	\$0	\$24	\$14	\$3	\$86
	Ipswich Motorway	23	\$0	\$0	\$0	\$0	\$0	\$10	\$0	\$0	\$0	\$0	\$0	\$10
	Landsborough Highway	1,018	\$32	\$61	\$1	\$25	\$0	\$6	\$0	\$0	\$14	\$8	\$0	\$148
	Leichhardt Highway	14	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	New England Highway	94	\$6	\$12	\$0	\$0	\$0	\$6	\$0	\$0	\$15	\$7	\$1	\$47
	Pacific Highway	156	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	Warrego Highway	674	\$4	\$23	\$0	\$6	\$182	\$11	\$0	\$0	\$15	\$7	\$2	\$251
QLD Total		5,169	\$149	\$492	\$2	\$176	\$3,982	\$165	\$16	\$2	\$343	\$212	\$7	\$5,548