Bruce Highway Action Plan

“Out of the Crisis”

October 2012

Road safety is everyone's responsibility. With the support of the Australian Government, local governments and industry, the Queensland Government is committed to making our roads safer for all Queenslanders.

2011-2020 is also the Decade of Action for Road Safety, an initiative of the United Nations which aims to reduce road deaths and injuries across the world. This Road Safety Tag is the global symbol of the movement to improve safety on the roads. Nearly 1.3 million people die every year on the world's roads, and up to 50 million are injured. To learn more about the international community's response visit the official site for the Decade of Action at http://www.who.int/roadsafety/en/

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Version 26b

Foreword

The Bruce Highway Technical Advisory Group was tasked in May 2012 to deliver "a proper engineering based 10 year Crisis Action Plan" to upgrade the Bruce Highway, giving priority to safety and flood immunity initiatives.

Over a six month period, the Technical Advisory Group has worked with a dedicated team of professionals from the Department of Transport and Main Roads to rigorously assess the upgrading needs of the Bruce Highway and to produce an engineering-based Plan that optimises the return on investments.

Whilst up-to-date engineering standards underpin the proposals, new and innovative solutions have been devised to maximise the use of existing infrastructure while significantly lifting the safety performance of the highway. The 10 year Plan also identifies on-going economic and social benefits through vastly improved flood immunity and extended highway capacity to match growing traffic demand.

In setting priorities for the upgrading works, the Plan allows a balanced delivery program over the 10 year period by scheduling early start safety improvement works that have short pre-construction timelines. This ensures a smooth roll-out of the work once funding arrangements are in place.

A step change in funding is required to fix the Bruce and to achieve the objectives of the Plan over the 10 year period.

Members of the Technical Advisory Group and the Project Team commend this Crisis Action Plan to Government for implementation.

Alan McLennan, Chair of the Technical Advisory Group.

Acknowledgements

The Bruce Highway Action Plan "Out of the Crisis" is a Queensland Government Publication. It has been prepared by the Technical Advisory Group in consultation with various stakeholders. The document will enable the Bruce Highway Crisis Management Group to effectively lobby the Federal Government for additional funding above and beyond the base funding that is currently provided for the Bruce Highway.

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Associations and Industry

The Royal Automobile Club of Queensland (RACQ) as a member of the Australian Road Assessment Program (AusRAP) - a program run by the Australian Automobile Association (AAA) and State and Territory motoring clubs, dedicated to saving lives through advocating for safer road infrastructure.

International Road Assessment Programme (iRAP) - a registered charity dedicated to preventing more than 3500 road deaths that occur every day worldwide.

Contributions from motoring and industry groups, surveyed stakeholders and the many community members who have provided comments are appreciated.

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Abbreviations

AAA	Australian Automobile Association
AusRAP	Australian Road Assessment Program
BHAP	Bruce Highway Action Plan
NBP1	Nation Building Program 1 (2009-10 to 2013-14) – Federal Government program for Australia's land transport infrastructure
NB2	Nation Building 2 (2014-15 to 2018-19) – Federal Government program for Australia's land transport infrastructure
NPC	Net Present Cost - the cost of the project in ^{2012}\$ (a cost plan using macro rates has been used and this has been updated for projects where the business case has been completed with a P90 estimate)
RACQ	Royal Automobile Club of Queensland
TMR	Department of Transport and Main Roads
vpd	Number of vehicles per day, a measure of traffic volume
^{2012}\$	Cost of work if completed in 2012, simplifies the understanding of cost in terms of today's prices

1. The Crisis is undeniable

The Bruce Highway Technical Advisory Group was tasked by the Queensland Government to compile a proper engineering based 10-year 'Crisis Action Plan' to address the Bruce Highway crisis.

The Bruce Highway Action Plan is designed to implement a generational upgrade in the condition of the Bruce Highway and bring it "Out of the Crisis" to meet acceptable Australian standards commensurate with such a strategic piece of public infrastructure. Deterioration on this part of the National Highway has compounded over many years and has led to the need for a significant investment to fix the Bruce; thereby saving lives, addressing many areas of preventable flooding and creating improved capacity and travel time reliability for road users.

Sadly, deaths are disproportionate on the Bruce Highway, accounting for 17% of fatalities on only 7.5% of the National Highway. Investment in safety, flooding and capacity improvements will all contribute to reducing the road toll (currently around 50 fatalities and 400 serious injuries per year) by about 35% on completion of the plan. It is expected that this plan will deliver estimated savings of approximately $3b over the 30 year assessment timeframe. Time savings between both domestic and industry travel are estimated to create a further dividend to the economy of up to $30b.

The current state of the Bruce Highway was accurately articulated by the Royal Automobile Club of Queensland (RACQ) in their recent report *Regional Road Inspection Tour: Bruce Highway – Cairns to Caboolture 2012* which found:

> "…a general lack of capital investment on the Bruce Highway over many years means that there is a backlog of safety, flood immunity and capacity projects needed to raise the standard of the highway".

2. The Bruce Highway in Crisis

The Queensland Government has responded to community alarm over the condition and operation of the Bruce Highway by commissioning this project with an objective to 'Fix the Bruce Highway'. The project focuses on the three priority areas:

- Safety;
- Flooding;
- Capacity.

Safety

In a recent safety assessment conducted by Australian Roads Assessment Program (AusRAP), the Bruce Highway was identified as **one of the most dangerous roads in Australia**, accounting for more than 17% of deaths on the entire national network. Yet comparatively by distance it represents only 7.5% of the national network. Also, of the top 15 'persistently higher risk' sections of highway in Australia, the Bruce Highway is mentioned five times.

This is reinforced by a review of Killed and Serious Injury (KSI) accident data from 2008 to 2011 where there were 170 deaths and 1620 hospitalisations due to road crashes on the Bruce Highway.

Flooding

Significant flooding is an annual reality along the coastal plain traversed by the Bruce Highway between Brisbane and Cairns. Flooding of the highway occurs at a large number of creek and river crossings.

On average, there are nine locations which close annually for greater than 48 hours and six locations which close for greater than five days.

In addition, highway flooding causes destruction of road pavements and structures, resulting in poor and unsafe driving conditions on damaged surfaces. Reconstruction then results in further delays to traffic. A massive program of reconstruction has been undertaken since January 2011 and is still underway.

Capacity

Traffic volumes along the whole length of the highway continue to increase rapidly as a result of the economic activity associated with the resources boom throughout the state. This traffic growth is manifest in both rural and urban areas:

- As well as the extension of congestion from the Brisbane region north to Maryborough, severe congestion is occurring on roads within and approaching regional cities for example south of Rockhampton, Sarina to Mackay, the northern beach suburbs of Townsville and Gordonvale to Cairns. This is due to rapidly expanding outlying residential estates, development of new industrial parks in outer suburbs and traffic associated with major industrial development such as ports (Gladstone, Hay Point, and Townsville).
- Dramatic increases in queuing on rural sections of the roads resulting from growth in freight transport (including heavy vehicles and wide loads carrying mining and industrial equipment) and tourism traffic (motor homes, caravans). This, coupled with overall growth, results in reduced overtaking opportunities causing driver frustration and risky overtaking.
- Long delays associated with the large number and frequency of road rehabilitation and upgrading projects, mainly resulting from the flood and cyclone damage in 2011. A major contributing factor to this damage is the poor condition of road pavements, narrow seals and unsealed shoulders, and flood prone creek and river crossings.

3. Fixing the Bruce Highway

This Bruce Highway Action Plan details the projects that will fix the Bruce Highway and bring it up to an acceptable engineering standard over the next 10 years by employing:

- standards which are realistic in terms of community and industry needs and expectations
- solutions which address the most critical deficiencies and adopt cost-effective and innovative techniques

These are addressed within each of the following three improvement areas of:

1. **Safety improvements** – implementing appropriate safety standards and specific treatments of sections with poor safety ratings and undertaking critical maintenance.
2. **Flooding improvements** – reducing flood impacts for highway sections and connections to cities.
3. **Capacity improvements** – enhancing or making better use of infrastructure to overcome persistent congestion problems.

Safety improvements

Overview

To meet the rapidly increasing traffic demands on the Bruce Highway, it is desirable to have a sealed road width of 11m to 12.5m. While the capacity and flooding projects under this plan will make some progress towards this, long lengths of the highway with deficient width and high crash rates would require many times the investment this program recommends to meet the desirable design standard.

So that this plan addresses the critical crash history of this national highway, proven and innovative traffic engineering treatments will be rolled out over the full length of the highway (some at 10m to 11m seal widths). Some of these are low cost treatments and can be delivered through mass action (bulk delivery) arrangements.

The wide centre line treatment is a new generational change to engineering standards aimed specifically at reducing the cross centreline crashes. This treatment simply splits the existing line format (for example an existing dashed line is replaced by 2 dashed lines 1 metre apart, which continue to allow overtaking with caution).

Objective

A standard of treatment has been set for the Bruce Highway which includes:

- a wide centreline treatment (with a 10m minimum seal width) including Audio Tactile Line Marking (ATLM) to mitigate cross centreline crashes
- clear zone by clearing of roadside verges and safety barriers on a priority / crash history basis and sealed shoulders to mitigate run-off-the-road crashes
- safety barriers on 4 lane sections (left and median sides) on a priority / crash history basis
- specific improvements at intersections and skid problem areas
- overtaking lanes at spacing of 5km (>6000 vpd), 10km (>4000 vpd) and 20km (>2000 vpd) and
- critical maintenance involving pavement, bridge and culvert rehabilitation; pavement resurfacing; fixing deficient guardrail terminals; stopping place and rest area rehabilitation; and addressing slope stability issues.

Wide Centreline Trial (double barrier line format)

This trial was carried out on the Cooroy to Curra section of the Bruce Highway, which led to a 58% reduction in crashes. This kind of treatment has been effective in warning drivers and reducing head-on crashes.

Flood improvements

Overview

Queensland's monsoonal weather patterns, including extreme cyclones and storms, require a highway that is resilient to these annual events. Given the current standard of bridges and culverts, the Bruce Highway requires a significant number of improvement projects to fix this problem.

Flood improvements are designed to allow vehicles to cross flood plains, rivers and creeks for a specified level of flood event with a predicted duration of when vehicles are unable to pass. In critical areas, this delay may be set at zero for the typical peak flood event (once in 50 years). Also, these projects provide safety improvements by reducing the risk of vehicles being washed away and allowing the resupply of vital food and other emergency supplies to communities during times of flood.

Objectives

The goal for these projects is to improve flood immunity for each section of the highway to be above a specified minimum standard, as indicated in the table below. While it may not be feasible at this time to provide a flood free route, the proposed improvements ensure that a consistent level of flood

improvement is provided across each network link. Standards have been adopted depending on traffic demands, flooding severity and extent, and community consultation through previous projects.

Capacity improvements

Overview

The capacity improvement projects generally provide extra lanes either as overtaking sections in rural areas where only intermittent relief is required, or upgrading from 2 lanes to 4 or 6 lanes in more populous areas. Other improvements involve making the best use of existing infrastructure using the managed motorway intelligent systems.

Objective

While every project type cannot be represented, the table below shows the primary treatments addressed in this Plan.

Table 7 Bruce Highway Vision Standards - Capacity

Section	Traffic	No. of lanes	Focused Treatment
Pine River to Cooroy	Up to 120,000	4-8 lanes	Managed motorway and enhancement
Cooroy to Gympie	>12,000	4 lanes	Extending 4 lanes (>12,000vpd)
Gympie	>12,000	4 lanes	Bypass and flood immunity
Gympie to Rockhampton	5 -10,000	Wider seals and Overtaking - see Safety	
Rockhampton	10-20,000	4 lanes	Extending 4 lanes (>12,00vpd)
Rockhampton to Mackay	3 - 6,000	Wider seals and Overtaking – see Safety	
Mackay	10-20,000	4 lanes	Extending 4 lanes (>12,000vpd)
Mackay to Townsville	3 - 6,000	Wider seals and Overtaking – see Safety	
Townsville	10-30,000	4/6 lanes	Extending 4 lanes (>12,000vpd)
Townsville to Cairns	3 - 8,000	Wider seals and Overtaking – see Safety	
Cairns	10-30,000	4/6 lanes	Extending 4 lanes (>12,000vpd)

4. The Program of Work

Priorities

Due to the significance and number of deficiencies, the program of work has been considered in terms of three broad timeframes for delivery over the next 10 years:

- High Priority 1 (years 1 to 4)
- High Priority 2 (years 5 to 7)
- High Priority 3 (years 8 to 10)

While each improvement category has had projects allocated across all three of the timeframes, the plan places a greater focus on safety improvements ahead of flooding and capacity improvements. This is in response to the currently accelerating trend in severe crashes. In addition, the safety improvements will fix long lengths of the highway at a relatively low cost. Generally, the three improvement categories have been prioritised in the order shown below, and using the following principles within each area to rank the projects.

Table 8 Prioritised Projects[1]

		Bruce Highway Action Plan - 10 year Project Priorities								
		BHAP No.	Safety Improvements	Cost (2012$) ($m)	BHAP No.	Flooding improvements	Cost (2012$) ($m)	BHAP No.	Capacity Improvements	Cost (2012$) ($m)
High Priority 1	Base Case - $6b over 10 years (matched on historic basis)	S1a	Wide Centreline and Audible Edge Lines	174	F2	Dallachy Road Flood Immunity Upgrade	7	C1	Cairns Southern Access Corridor Stage 3	80
		S1b	S1a above plus sealed shoulders	188	F4a	Ingham to Cardwell Range Dev - Plan & Preserve	30	C3	Cairns Southern Access Corridor Stage 2	42
		S1c	S1b above plus formation widening	810	F5	Cattle and Frances Creeks Upgrade	105	C4	Edmonton to Gordonvale Duplication	300
		S2	Audible Edge lines other than S1a,S1b & S1c.	48	F6	Haughton River & Pink Lily Lagoon Upgrade	352	C6	Babinda Intersection Upgrade	2
		S3	Clearzone clearing	26	F8a	Burdekin Deviation - Plan & Preserve Corridor	30	C7	Innisfail Bypass - Plan and Preserve Corridor	5
		S4	Safety barrier	200	F9	Yellow Gin Creek Upgrade	35	C8	Ash & Pine Streets Intersections Upgrade	4
		S5	Intersections	70	F10	Sandy Gully Bridge Upgrade	58	C11	Townsville Nth Access Intersections Upgrade	47
		S6	Rest areas and stopping places	18	F11a	Goorganga Plains Upgrade - Plan & Preserve	10	C13	MacArthur & Melton Black Intersection Upgrade	19
		S7	Pedestrian / cyclist upgrades	6	F12	Jumper Creek Upgrade	15	C19	Knobels Rd Intersection Upgrade	5
		S8	Overtaking lanes	334	F13	Yeppen Floodplain South Upgrade	214	C21	Mackay Northern Access Upgrade	58
		S9	Curve Widening	2				C23	Mackay Intersection Upgrades - Stage 2	7
		S10	Deliniation for Narrow Structures	2				C24a	Mackay Ring Road - Plan and Preserve	18
		S11	Road-rail crossings	7				C27	Hay Point Road Intersection Upgrade	23
		M1	Resurfacing	98				C29	Sarina Northern Access Upgrade	8
		M2	Pavement rehabilitation	500				C31	Rockhampton Nth Access Upgrade - Stage 1	79
		M3	Culvert rehabilitation - Major (Concrete)	20				C33	Rockhampton Bypass - Plan and Preserve	40
			Culvert rehabilitation - Major (Steel)	38				C41	Childers Bypass - Plan / Preserve Corridor	5
			Culvert rehabilitation - Minor	40				C42	Tinana Interchange	25
		M4	Bridge rehabilitation	92				C47	Cooroy to Curra Upgrade - Section C	600
		M5	Misc - Guardrail deficiencies	8				C49	Cooroy to Curra Upgrade - Section A	570
			Misc - Truck/ motorist rest/ stop areas	12				C50a	Maroochydore Rd Interchange Upgrade - Stage 1	109
			Misc - Slope stability	9				C51a	Caloundra Rd to Sunshine M/way - Stage 1	280
								C54	M/ged M/ways - Gateway M/way to Caboolture	76
								C55a	Pine River to Caloundra Rd Interchanges - Planning	5
								C56	Road operations improvement projects	35
High Priority 2	Crisis Action Plan 50:50	S1c	S1b above plus formation widening	350	F4b	Ingham to Cardwell Range Deviation - Construction	780	C24b	Mackay Ring Road Stage 1 Construction	450
		S4	Safety barrier	40						
		S8	Overtaking lanes	140						
		M2	Pavement rehabilitation	200						
		M3	Culvert Rehabilitation	30						
		M4	Bridge Rehabilitation	10						
	Crisis Action Plan 80:20	S1c	S1b above plus formation widening	200	F3	Meunga, Sunbeam and Lily Cks Deviation	80	C9	Liverpool Creek to Cowley Beach Rd Realign	30
		S4	Safety barrier	35	F8b	Burdekin Deviation - Construction	1400	C17	Collingvale Road Intersection Upgrade	3
		S5	Intersections	20	F15	Saltwater Creek Bridge Upgrade	65	C18	Prosepine - Shute Harbour Rd Intersection	20
		S8	Overtaking lanes	120				C32	Rockhampton Intersection upgrades	30
		M2	Pavement rehabilitation	30				C38	Curve Re-alignment North of Miriam Vale	21
		M3	Culvet Rehabilitation	12				C44	Gympie Nth Approach Intersection Upgrades	44
								C51b	Caloundra Rd to Sunshine M/way - Stage 2	610
								C55b	Pine River to Caloundra Rd Interchanges - Construction	150
								C53	Boundary Road Interchange Upgrade	130
	Beyond 10 year Plan	S4	Safety barrier	125	F16	Tiaro Flood Immunity Upgrades	64	C16	Bowen Intersection Upgrade	20
		S5	Intersections	45				C44	Gympie Nth Approach Intersection Upgrades	66
		S6	Rest areas and stopping places	10				C46	Cooroy to Curra Section D Stage 1	405
		S7	Pedestrian / cyclist upgrades	7				C51c	Caloundra Rd to Sunshine M/way - Stage 3	455
		S8	Overtaking lanes	140						
		M2	Pavement rehabilitation	143						
		M3	Culvert rehabilitation	120						
		M4	Bridge rehabilitation	12						
High Priority 3	Beyond 10 year Plan	S4	Safety barrier	133	F11b	Goorganga Plains - Construction	330	C20	Mackay Northern Access Upgrade - Stage 2	45
		S5	Intersections	65	F14	Currajong Creek Bridge Upgrade	59	C26	Hay Point Road to Mackay Duplication	390
		S7	Pedestrian / cyclist upgrades	7				C28	Sarina to Hay Point Road Duplication	290
		S8	Overtaking lanes	400				C30	Rockhampton Nth Access Upgrade - Stage 2	95
		M3	Culvert rehabilitation	112				C43	Wide Bay Highway Intersection	50
								C45	Cooroy to Curra Upgrade - Section D, Stage 2	1600
								C50b	Maroochydore Road Interchange Upgrade - Stage 2	100
								C51d	Caloundra Rd to Sunshine M/way - Stage 4	300
								C51e	Caloundra Rd to Sunshine M/way - Stage 5	230

[1]The project costs identified are indicative only. Funding envelopes are in $2012.

5. Making it happen

Investment for the 10 year Action Plan

The level of investment recommended by this Action Plan will bring about a long overdue, significant and welcome step change in the condition of the Bruce Highway. The plan requires significant investment over the next 10 years and beyond. The Queensland Government, alone, is unable to fund these urgently needed works. The Australian Government needs to contribute additional funding over and above base funding, in order to take Queensland's lifeline of life support.

Risks of inaction

Because of the importance of the Bruce Highway in the state and national economy and its vital role in serving Queensland's coastal communities, there are considerable and quantifiable risks which would result from not addressing the deficiencies detailed in this plan. These are:

- continued deterioration of the road assets
- loss of reputation by governments deemed responsible for highway maintenance and upgrading
- adverse community reaction to continuing road trauma, flooding delays and congestion
- cost increases in major projects and loss of economies of scale on bulked-up projects where funding is delayed
- impacts on state and local economies resulting from traffic delays, poor reliability of travel and perceived "danger" of travel for tourists
- impacts on health and safety for communities subject to long duration wet season road closures, and especially where critical urban infrastructure (water supply, sewerage, electricity and hospitals) may be damaged by storms or flooding

The crisis is undeniable.

The benefit is demonstrated with clear objectives.

The plan includes "shovel ready" projects.

The Bruce Highway must be fixed.

The investment must be provided.