



Australian Government  
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Transport  
Roads & Maritime  
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# Richmond Bridge and approaches congestion study

Long-term options report

SEPTEMBER 2012

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## Executive summary

### Project overview

Richmond is a town about 65 kilometres north west of the Sydney CBD and located in the Hawkesbury City Council local government area. Richmond Bridge spans the Hawkesbury River connecting the towns of Richmond to the east and North Richmond to the west.

The corridor comprising March Street, Kurrajong Road, and Bells Line of Road (Bells Line of Road) between East Market Street, Richmond and Grose Vale Road, North Richmond experiences traffic congestion eastbound in the morning (AM) peak period and westbound in the afternoon/evening (PM) peak period.

The Australian Government has provided funding to Roads and Maritime Services (RMS) to undertake a study to investigate the traffic congestion issue in the short and long terms. The purpose of the study is to develop suitable options to address the traffic congestion issue in the short (2016-2021) term (Stage 1) and the long (2021-2036) term (Stage 2).

The focus of this options report is on 'Richmond Bridge and Approaches Congestion Study' Stage 2 to investigate a long term solution to the traffic congestion along the corridor for the purpose of reserving a corridor for future improvements. Consideration has also been given to options that improve the current level of flood immunity along the corridor.

This report presents the investigations undertaken to develop four strategic concept options in consultation with the Federal Department of Infrastructure and Transport (DoIT), Transport for New South Wales (TfNSW), Hawkesbury City Council (HCC) and other key stakeholders. Information collected from the public consultation phase in September / October 2012 will be considered in the refinement of the strategic concept options and will assist in identifying a preferred option.

Identifying a preferred option that will address the traffic congestion issue, and potentially improve the level of flood immunity, will allow for a road corridor to be identified and reserved.

### Project objectives

The objectives of the study are to improve travel conditions and road safety along the corridor between Richmond and North Richmond. To support these objectives, the following additional objectives also need to be satisfied by the study:

- Ensure the operation of Richmond Bridge and its approaches can be maintained during construction.
- Maintain/improve the accessibility of Richmond Bridge.
- Minimise the impacts on the built and natural environment along the route.
- Minimise the project whole of life cost.



Downstream side of Richmond Bridge

## Community consultation

The objectives of the community consultation process for the project are to enable proactive community engagement, provide clear information about the scope of the upgrade investigations, ensure accurate documentation of feedback and capture and resolve issues where practicable.

In July 2012 a community update was issued by RMS identifying the Australian Government's allocation of \$2 million to investigate short term (Stage 1) and long term (Stage 2) traffic congestion mitigation measures for Richmond Bridge and its approaches between East Market Street, Richmond and Grose Vale Road, North Richmond.

This announcement also referred to the Stage 1 report titled Richmond Bridge and Approaches Congestion Study- Stage 1 Summary Report. The community was provided with the opportunity to comment on the contents of the report and also raise ideas for long term congestion mitigation proposals as part of the Stage 2 study. The closing date for providing comments to RMS was 31 July 2012.

A community workshop was held 24 July 2012 and the issues raised by the community with regard to the long term (Stage 2) strategies for the corridor fall into the following broad categories:

- Traffic management and access arrangements at intersections along the corridor.
- Town bypasses and alternate river crossings.
- Alternate traffic arrangements and routes.
- Public transport improvements (locally and more broadly).
- Land use and development (locally and more broadly).

During consultation, community members suggested completely bypassing Richmond, North Richmond, Windsor or a combination of all three. These suggestions are outside the scope of the current investigations. Bypass options would be considered as part of overall transport planning for the north-west region of Sydney.

## Technical investigations and multi criteria analysis (MCA)

A series of technical studies (listed below) provide the basis for the assessment of the route options. These studies aim to inform the project objectives and allow assessment of the route options against the criteria. The key outcomes in the form of issues and opportunities associated with each route option are presented in this report. The technical studies commissioned to inform the Stage 2 study include:

- Traffic modelling and transport assessment.
- Flood modelling.
- Environmental studies (including biodiversity and heritage).
- Urban and landscape design study including visual assessment.
- Constraints mapping (based on outputs from the Environmental studies).
- Review of utility services.
- Strategic concept designs (road and bridge).
- Preliminary geotechnical investigations.

## Development of corridor options

Using the information collected when identifying constraints, a number of road and bridge alignment options were considered. These include:

- Contra flow traffic management options.
- Widening the existing carriageway and the existing bridge by two lanes.
- New bridges at higher elevations to improve flood immunity.
- Additional lanes on the eastbound carriageway and/or additional lanes on the westbound carriageway.

The options were assessed against the constraints and, due to conflicts or impacts, many of these options could not progress further. This process of short listing led to the four options being progressed for more detailed investigation.

**Option A** - Three lane contra flow traffic management option to provide two lanes in the peak direction. This would involve:

- Widening of the existing bridge downstream to accommodate three travel lanes across the bridge.
- An additional two lanes for the Kurrajong Road eastbound carriageway between Chapel Street and Old Kurrajong Road/Yarramundi Lane to provide four lanes (two lanes in each direction).
- Contra flow traffic management from approximately 50 metres west of Old Kurrajong Road/Yarramundi Lane to approximately 120 metres east of Pitt Lane including across the bridge.
- No change to the current level of flood immunity.

**Option B** - Provide a total of four lanes, two in each direction, with no change to the current level of flood immunity. This would involve:

- A new two lane bridge five metres downstream from the existing bridge constructed at the same level as the existing bridge.
- Retaining the existing bridge.
- An additional two lanes for the Kurrajong Road eastbound carriageway between Chapel Street and Old Kurrajong Road/Yarramundi Lane which will provide four lanes (two lanes in each direction).

**Option C** - Provide a total of four lanes, two in each direction, with the bridge and additional eastbound carriageway constructed at a level to provide 1:5 year ARI flood immunity. This would involve:

- A new two lane bridge provided 25-50 metres downstream from the existing bridge.
- Retaining the existing bridge.
- An additional two lanes for the Kurrajong Road eastbound carriageway between Chapel Street and Old Kurrajong Road/Yarramundi Lane which will provide four lanes (two lanes in each direction).

**Option D** - Provide a total of four lanes, two in each direction, with the bridge and additional eastbound carriageway constructed at a level to provide 1:20 year ARI flood immunity. This would involve:

- A new two lane bridge provided 25-50 metres downstream from the existing bridge.
- Retaining the existing bridge.
- An additional two lanes for the Kurrajong Road eastbound carriageway between Chapel Street and Old Kurrajong Road/Yarramundi Lane which will provide four lanes (two lanes in each direction).
- Removal of some turning movements at Old Kurrajong Road / Yarramundi Lane.

In all the four options, parking along the corridor would be restricted to off peak hours in Richmond and North Richmond, to provide for four lanes during the morning and afternoon peaks.

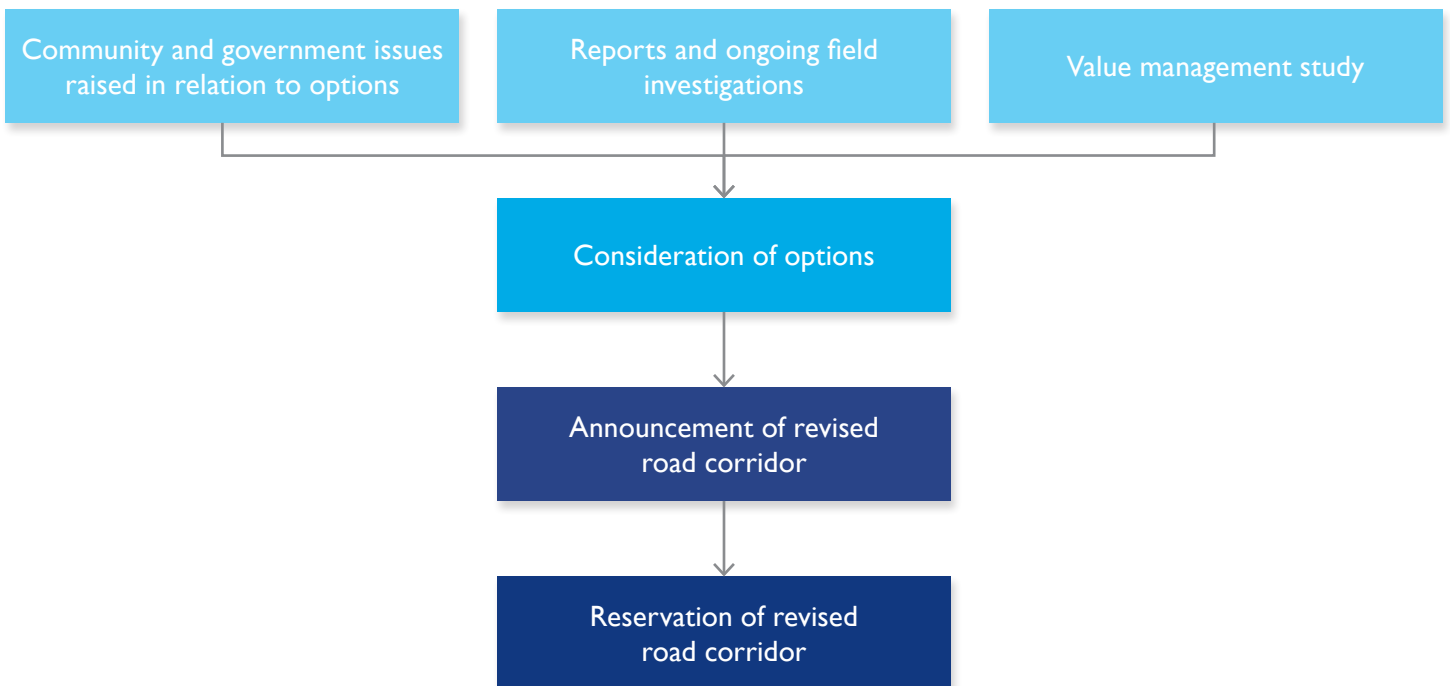
### Consideration of a new four lane bridge

A sub-option of Option C and D consisting of a new four lane bridge on the downstream side of the existing bridge and with the same level of flood immunity as Options C and D has also been considered. This alternative bridge option would provide two lanes in each direction across a single bridge and could allow the existing bridge to be used for recreational purposes such as a green link pedestrian and cycle route across the river.

This four lane bridge could be accommodated within the proposed corridor. Due to the height difference in the approach alignment, the new four lane bridge option would have impacts on turning movements at Old Kurrajong Road / Yarramundi Lane that would require adjustments to be made at Bosworth Street to cater for the additional traffic.

### Assessment process and next steps

The September-October 2012 community consultation process will review the options and refine them. These refined options will then be assessed and compared as part of a value management process, and then reviewed by RMS and key stakeholders prior to recommending the preferred option.



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## Glossary of terms and abbreviations

<i>Term</i>	<i>Description</i>
<b>5, 10, 20, 100 year ARI flood level</b>	Refers to the flood which occurs, on average, once every 5, 10, 20 or 100 years. Also known as the 1:5, 1:10, 1:20, 1:100 year flood level. These events are of a random nature. For example, it is possible for there to be two 100 year floods in successive years; similarly the 100 year flood may not occur for 200 years and the 100 year flood may not be the largest flood in the last 100 years.
<b>Afflux</b>	The rise in water level (above normal) on the upstream side of a bridge or obstruction caused when the effective flow area at the obstruction is less than the natural width of the water way (river, stream, floodplain) immediately upstream of the obstruction.
<b>AHD</b>	Australian Height Datum
<b>AHIMS</b>	Aboriginal Heritage Information Management System
<b>Annual Average Daily Traffic (AADT)</b>	Annual Average Daily Traffic is the yearly two-way traffic volume divided by 365, expressed as vehicles per day
<b>ARI</b>	Average Recurrence Interval
<b>BTS</b>	Bureau of Transport Statistics (formally Transport Data Centre)
<b>Biodiversity</b>	The biological diversity of life is commonly regarded as being made up of the following three components: <ul style="list-style-type: none"> <li>• Genetic diversity – the variety of genes (or units of heredity) in any population</li> <li>• Species diversity – the variety of species</li> <li>• Ecosystem diversity – the variety of communities or ecosystems</li> </ul>
<b>Catchment</b>	An area of land draining to the same low point
<b>EPBC Act.</b>	Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)
<b>DBYD</b>	Dial Before You Dig
<b>DECCW (Environment &amp; Heritage)</b>	The Department of Environment, Climate Change and Water (DECCW) was established effective 1 July 2009. The Department is one of the agencies that form the new Environment, Climate Change and Water super agency cluster, and includes Sydney Catchment Authority, Zoological Parks Board, Royal Botanic Gardens, Jenolan Caves Reserve Trust & Lord Howe Island Board and the Catchment Management Authorities which are separate statutory authorities.
<b>EEC</b>	Endangered Ecological Community
<b>ESD</b>	Ecological Sustainable Development
<b>Feasible</b>	Relates to the engineering considerations and what can practically be built
<b>Flood</b>	Relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or coastal inundation resulting from super-elevated sea levels and/or waves overtopping coastline defences
<b>Floodplain</b>	Area of land which is subject to inundation by floods up to the probable maximum flood event (i.e. flood prone land)

<i>Term</i>	<i>Description</i>
<b>HCC</b>	Hawkesbury City Council
<b>HW</b>	Highway
<b>LGA</b>	Local Government Area
<b>LEP</b>	Local Environmental Plan
<b>Level of Service (LoS)</b>	Level of Service is a fundamental performance measure, used in the planning, design and operation of roads, providing the basis for determining the design capacity requirements of a road network, including the performance of intersections. The LoS of a road is classified between A and F (A reflecting excellent performance, F representing very poor performance)
<b>MCA</b>	Multi Criteria Assessment
<b>MR</b>	Main Road
<b>PAD</b>	Potential Archaeological Deposit
<b>Paramics</b>	Microsimulation traffic modelling program used to assess the network performance and efficiency of potential route options
<b>PMF</b>	Probable Maximum Flood
<b>Reasonable</b>	Is to be judged in terms of noise mitigation benefits and costs, community views, aesthetic impacts, existing and future noise levels at the affected sites and the benefits arising from the development
<b>RR</b>	Regional Road
<b>RMS</b>	Roads and Maritime Services of New South Wales
<b>RUBICON</b>	RUBICON is a dynamic 1-dimensional hydraulic model used to simulate flood behaviour in rivers and floodplains and is able to model branched flow and the effect of hydraulic structures including weirs, bridges and culverts.
<b>State Environmental Planning Policy Number 14 (SEPP 14)</b>	Policy prepared under the Environmental Planning and Assessment Act 1979 for the protection of identified coastal wetlands in NSW
<b>SHR</b>	State Heritage Register
<b>SIDRA</b>	Empirical traffic modelling software used to assess the intersection performance
<b>TCS</b>	Traffic Control Signal
<b>TSC Act</b>	NSW Threatened Species Conservation Act 1995
<b>WHS</b>	Workplace Health and Safety