3 Strategic justification and project need

This chapter describes the strategic landuse and transport policies which underpin the need and justification for the project. It also identifies objectives and actions from these policies which need to be considered in the assessment of options and the preferred option in subsequent chapters. The Director General's requirements relating to this chapter are presented below.

Director General's requirements	Where addressed
A statement of the objectives of the project, including a description of the strategic need, justification, objectives and outcomes for the project, the aims and objectives of relevant strategic planning and transport policies, including NSW 2021, the Metropolitan Plan for Sydney 2036 and the draft North West Subregional Strategy.	This chapter and Chapter 11.
Identification of how relevant planning, land use and development matters (including relevant strategic and statutory matters) have been considered in the impact assessment (direct, indirect and cumulative impacts) and/or in developing management / mitigation measures.	This chapter and Chapters 5, 7, 8 and 10.

3.1 Strategic planning and policy framework

The following sections describe the compatibility of the project with key strategic planning and policy documents.

3.1.1 NSW 2021

NSW 2021 A Plan to Make NSW No 1 (Department of Premier and Cabinet, 2011) is the NSW Government's 10-year strategic plan setting priorities for action and guiding resource allocation within the NSW budget. The plan includes strategies for returning quality services and renovating infrastructure, with goals and targets for improving transport and road safety. Presented in **Table 3-1** is an assessment of the project objectives against relevant NSW 2021 goals, targets and actions.

The project is consistent with the NSW 2021 plan as it aims to replace an existing road crossing of the Hawkesbury River that is deteriorating with age and cannot be maintained effectively through standard maintenance programs. The project is needed to improve the safety and efficiency of the bridge and maintain the road linkage between the southern and northern sides of the Hawkesbury River at Windsor. The bridge is important for both the local community and regional road networks, including traffic routes between Sydney, the Blue Mountains and the Hunter region.

Table 3-1 Assessment of the project against the relevant goals, targets and plans of NSW 2021 A Plan to Make NSW No 1

Goals and targets	Actions	Relevance to the project
Improve the efficiency of the road network during peak times on Sydney's road corridors		
Improve AM and PM peak hour travel speeds on 100 major road corridors	Deliver road infrastructure to: • Relieve congestion. • Improve safety. • Enhance and expand capacity on road corridors.	Key project objectives of the project are to improve traffic and transport efficiency and to improve safety for motorists, pedestrians and cyclists – which assists in meeting this goal and target. The delivery of a replacement bridge (ie road infrastructure) would be a complying action with the plan that assists the target and goal to be achieved.
Improve road safety		
Reduce fatalities to 4.3 per 100,000 population by 2016	• Improve the safety of roads by carrying out road development, upgrading, maintenance and safety works, such as safety barriers and works on local roads to address crash risks • Cut congestion and introduce safe, simpler speed zones to save lives.	One of the key project objectives is to improve safety for motorists, pedestrians and cyclists – which assist in meeting this goal and target. The replacement bridge would be designed to meet current safety standards – whereas the existing bridge does not. The project would also reduce congestion. These would be complying actions with the plan that enables the target and goal to be achieved.
Increase expenditure on critical NSW infrastructure		
Increase investment in regional infrastructure	Prepare a 20 year State Infrastructure Strategy, detailed five year Infrastructure Plans and Sectoral State Infrastructure Strategy Statements	The project has been allocated funding as part of the most recent five year Infrastructure Plan. Freemans Reach Road and Wilberforce Road provide connections from regional areas to Windsor and the Sydney metropolitan area.
Improve the quality of urban and rural State roads		
93% of state roads meet national road smoothness standards by 2016	Conduct road resurfacing and reconstruction programs to improve road quality in areas not currently meeting the national road smoothness standards	The project would meet national road smoothness standards and consequently a complying action that enables the target and goal to be achieved.

3.1.2 Metropolitan Plan for Sydney 2036

The *Metropolitan Plan for Sydney 2036* (NSW Government, 2010a) is a strategic policy document to guide Sydney's growth and development over the next 25 years with the aim of improving sustainability, affordability and lifestyles. It builds on the *Metropolitan Strategy: A City of Cities* (Department of Planning, 2005), identifying a range of strategic directions and policy settings to meet Sydney's future needs in transport, housing and employment while protecting the environment and community. The plan integrates land use and transport planning, addressing the need to be able to move around the city efficiently for work, recreation and other activities.

One of the aims of the plan is to ensure that infrastructure development is guided by the need to reduce car travel and traffic congestion, improve air quality and reduce greenhouse gas emissions. This means focusing on both developing new infrastructure and improving existing infrastructure to support established urban centres.

The project is compatible with the *Metropolitan Plan for Sydney 2036* as it aims to maintain an existing, long established road crossing of the Hawkesbury River at Windsor, which is important to both the local community and wider regional transport network. Without this road crossing of the Hawkesbury River, a 20 kilometre road detour via the Richmond Bridge would be required to gain access between the southern and northern sides of the Hawkesbury River in the Windsor locality. A river crossing at this location assists in reducing car travel and traffic congestion, improving air quality and reducing greenhouse gas emissions (which are aims of the *Metropolitan Plan for Sydney 2036*). The project is compatible with maintaining existing transport networks that support an established urban centre, as well as protecting the environment and lifestyle of the Windsor community.

3.1.3 Draft NSW Long Term Transport Master Plan

The draft *NSW Long Term Transport Master Plan* (Transport for NSW, 2012) sets the direction for transport planning for the next 20 years, providing a framework for transport policy and investment decisions. The draft Master Plan integrates transport with wider economic, infrastructure, social, housing and land use planning including the *Metropolitan Strategy for Sydney 2036*, and the *State Infrastructure Strategy* to provide a coherent overall approach.

The plan does not specifically mention a replacement bridge at Windsor, however the overall objectives of the plan are important to consider in relation to the project (see **Table 3-2**).

Table 3-2 Assessment of the project against the relevant objectives of the Draft NSW Long Term Transport Master Plan

Objective from plan	Relevance to the project
Improve quality of service – by putting the customer at the centre of transport planning and service delivery, improving the quality of travel experiences, offering more travel choices and providing integrated services that directly meet our travel requirements.	The project would result in an improved quality of travel experiences by reducing congestion and providing a safer less stressful driving experience in comparison to the existing situation.
Improve liveability – by shaping our cities and major centres, improving connectivity and customer service, and facilitating ease of movement in our major cities and activity centres.	The project would increase the ease of movement and connectivity between the southern and northern sides of the Hawkesbury River for vehicles, cyclists and pedestrians..
Support economic growth and productivity – by providing a transport system that responds directly to customer needs, is more efficient, increases freight efficiency and improves the connectivity and accessibility of people to other people, opportunities, goods and services.	The project would provide a more efficient and safer link between the agricultural and horticultural businesses north of the Hawkesbury River and the markets, employees and suppliers on the southern side of the Hawkesbury River.
Support regional development – by improving accessibility to jobs, services and people, improving freight connections to markets and providing better links between clusters of business activity.	As the project is located in the Greater Sydney region, there would no direct benefits from the project to regional communities.
Improve safety and security – by placing a high priority on addressing the causes and risks of transport accidents and security incidents.	The project would result in improved safety for pedestrians, cyclists and motorists as the project would be designed to meet modern safety standards and would provide additional facilities to enable pedestrians to safety cross the alignment of the project.
Reduce social disadvantage – by improving access to goods, services and employment and education opportunities for people across all parts of the State.	The project would increase the ease of movement and access to the goods, services and employment for residents north of the Hawkesbury River.
Improve sustainability – by maintaining and optimising the use of the transport network, easing congestion, growing the proportion of travel by sustainable modes such as public transport, walking and cycling, and becoming more energy efficient.	The project would use existing roads and other infrastructure where possible. It would ease traffic congestion during peak periods. The project would also include new pedestrian and cyclist facilities.
Strengthen transport planning processes – by improving integrated transport planning processes, including with land use planning, identifying areas where evidence should be collected for future decision making and continually improving governance and administration of the transport system.	A high growth rate of traffic using the project has been used to account for potential urban development north of the Hawkesbury River.

3.1.4 First things first – A 20 year State Infrastructure Strategy

In October 2012, Infrastructure NSW released *First things first – A 20 year State Infrastructure Strategy* (the Strategy) (Infrastructure NSW, 2012). The Strategy assesses the current state of infrastructure in NSW and the need and strategic priorities for infrastructure for the next 20 years. The Strategy does not specifically mention a replacement bridge at Windsor, however, the Strategy is not required to produce a detailed capital works budget for NSW.

Three guidance principles were defined in the Strategy and the project is assessed against these principles in the table below. Overall the project would meet the guidance principles of the Strategy.

Table 3-3 Assessment of the project against the guidance principles of the State Infrastructure Strategy

Guidance principles	Relevance to project
Incremental improvement Incremental improvement can address infrastructure problems more quickly and cost effectively than one-off major and mega projects, and should be thoroughly considered first to resolve problems. Major projects, if shown to be necessary and cost effective, should be the second option considered. Incremental improvements include operational and economic reforms that increase the utilisation of existing assets.	The project comprises the replacement of an existing asset due to deterioration. The project fits within the existing road network and requires minimal changes, however it is not considered to be an incremental improvement or a major project.
Investing in NSW's strengths The priority is those regions of NSW and sectors of the economy with the highest growth potential, which are constrained by inadequate infrastructure capacity. Speculative infrastructure investment on the promise of creating growth has often led to waste, not regeneration, and should be avoided.	The project is an investment in an important river crossing which is currently constrained by poor capacity. The region north of the Hawkesbury River provides important agricultural and horticultural products to Sydney metropolitan area.
Affordability and fiscal sustainability To be capable of being delivered the Strategy must be affordable and realistic. Rigorous prioritisation of infrastructure investment ensures that the projects and reforms recommended deliver strong positive economic returns to NSW.	The project has a high benefit to cost ratio and is affordable especially in comparison to other river crossing options.

3.1.5 Draft North West Subregional Strategy

The *draft North West Subregional Strategy* (Department of Planning, 2007) is being developed by the NSW Government in consultation with local councils to guide land use planning until 2031 in the Baulkham Hills, Blacktown, Blue Mountains, Hawkesbury and Penrith local government areas. The aims of the strategy include strengthening existing areas with improved accessibility and services, and creation of vibrant and liveable centres where people can live, work and access services.

A draft document has been prepared and was placed on public exhibition for comment from 24 December 2007 to 28 March 2008. Submissions on the draft document have been made by the community, government agencies, the development industry and local councils, and are currently being reviewed. When finalised, the North West Subregional Strategy will be a key planning tool for local councils.

The draft *North West Subregional Strategy* classifies Windsor as a town centre, with a rural outlook and rich colonial heritage. It identifies that the potential for further growth of Windsor is limited due to flooding constraints, however, there remains the opportunity to renew and improve the physical, economic and cultural environment of the centre. It also identifies that there are limited public transport services and links, and the town relies heavily on car and pedestrian activity. There are no specific actions or goals relating to Windsor or to the project, however the goal D1.1.1 - The Roads and Traffic Authority to continue to coordinate road upgrades in existing and growth areas – would be applicable.

The project supports the draft *North West Subregional Strategy* as it aims to maintain an existing, long established road crossing of the Hawkesbury River at Windsor, which is important to both the local Windsor community and wider regional transport network. The township of Windsor is one of the main urban centres in the Hawkesbury local government area (LGA) and supports valuable rural industries in the region. Maintaining the existing road network at Windsor, including providing a safe and efficient road crossing of the Hawkesbury River, is essential to maintaining established transport routes that are important to community lifestyle and the local and regional economy.

3.1.6 The Hawkesbury Residential Land Strategy

The *Hawkesbury Residential Land Strategy* (Hassell, 2011) was developed to guide future residential development within the Hawkesbury LGA over the next 30 years and ensure future residential development is sustainable and meets the needs of the Hawkesbury population. The *Hawkesbury Residential Land Strategy* seeks to:

- Accommodate between 5000 and 6000 additional dwellings by 2031, mainly within the existing urban areas as prescribed in the draft *North West Subregional Strategy* (Department of Planning, 2007).
- Preserve the unique and high quality natural environment of the LGA.
- Accommodate the changing population, which presents new demands in terms of housing, services and access.
- Identify on-going development pressures to expand into natural and rural areas, as well as new development both in and around existing centres.
- Identify physical constraints of flood, native vegetation and bushfire risk.

The *Hawkesbury Residential Land Strategy* nominated areas within the LGA that were suitable for future urban development based on a number of environmental, economic, land use and other criteria.

While the specific development targets of the *Hawkesbury Residential Land Strategy* were not expressly included in traffic growth estimates, the traffic growth due to changes in land use and residential development have been considered on a regional scale using growth rates derived from the Sydney Strategic Transport Model (SSTM). This is the accepted model used for such projections and is supplied by the Bureau of Transport Statistics. The traffic impact assessment for the project indicates that with a 25 per cent growth in traffic using the river crossing at Windsor (see **Section 7.3**), the project would operate at an acceptable level of service.

Also the key directions established in the *Hawkesbury Community Strategic Plan 2010-2030* (Hawkesbury City Council, 2010) guided the development of the Residential Land Strategy including:

- **Looking after people and place** - A community in which the area's character is preserved and lifestyle choices are provided with sustainable, planned, well serviced development, within strongly connected, safe and friendly neighbourhoods.
- **Caring for our environment** - A community dedicated to minimising its environmental footprint, enjoying a clean river and an environment that is nurtured, healthy, protected and provides opportunities for its sustainable use.
- **Linking the Hawkesbury** - A community which is provided with facilities and services efficiently linked by well maintained roads and accessible and integrated transport and communication systems which also connect surrounding regions.
- **Supporting Business and Local Jobs** - New and existing industries, which provide opportunities for a range of local employment and training options, complemented by thriving town centres.
- **Shaping our future together** - An independent, strong and engaged community, with a respected leadership, which provides for the future needs of its people in a sustainable and financially responsible manner.

The project would directly achieve at least two of the key directions, namely Linking the Hawkesbury and Supporting Business and Local Jobs. The design, construction and operation of the project would be undertaken in a manner to achieve the other key directions.

3.1.7 Jacaranda Ponds development – Glossodia

Hawkesbury City Council has given support in July 2012 for the submission of a detailed planning proposal for the rezoning of about 186 hectares of rural land for up to 580 large lot residential and low density residential allotments adjacent to the village of Glossodia. Glossodia is Hawkesbury's second largest urban settlement north of the Hawkesbury River, behind North Richmond and currently has a total of 840 dwellings.

Final planning approval and rezoning of the land is subject to a number of additional studies being undertaken by the proponent and approval from the Department of Planning and Infrastructure. Hawkesbury City Council have also identified a number of conditions relating to traffic that would need to be satisfied before it gave its final support for rezoning. One of these conditions is that there has been satisfactory progress to the replacement of the existing Windsor bridge.

The approval and construction of the project would satisfy one of the conditions that need to be met to allow the Jacaranda Ponds development to proceed with support from the Hawkesbury City Council. The increase in traffic generated by Jacaranda Ponds development while not explicitly included in traffic growth estimates for the project could easily be accommodated by the increased capacity of the replacement bridge.

3.1.8 Plan of Management for the Windsor Foreshore Parks Incorporating the Great River Walk

Plan of Management for the Windsor Foreshore Parks Incorporating the Great River Walk (Hawkesbury City Council, 2009) applies to a series of foreshore open spaces including: Governor Phillip Reserve, Deerubbin Park, Macquarie Park, Howe Park, Holland's Paddock, Thompson Square reserve and Windsor Wharf Reserve located in Windsor within the Hawkesbury City LGA. The parks and reserves covered in this Plan of Management are currently classified as community and operational land under the *Local Government Act 1993* or are Crown Lands under the care, control and management of council for the purpose of public recreation and wharfage.

The lands covered by this plan form part of the route of the Great River Walk. The Great River Walk project is an undertaking to expand the network of regional recreational trails serving the Sydney basin. Ultimately the walk would extend for 570 kilometres along the length of the Hawkesbury Nepean River, from the estuary at Broken Bay to its source in the Southern Highlands and beyond to Canberra.

The incorporation and enhancement of foreshore open spaces within Windsor to provide a linked river trail is the main focus of this plan. The process of linking public open spaces will provide further opportunities for the enhancement of recreation in Windsor both in terms of the overall open space system and of specific parks. The project would directly support this main focus of the plan through the revitalisation of Thompson Square, thereby enhancing this foreshore open space.

The plan identifies key issues which impact the future development of the Great River Walk. A number of these key issues are directly relevant to the project including:

- Bridge Street/George Street intersection – This is a difficult and potentially dangerous road crossing currently preventing safe and fluid pedestrian movements from the Windsor town centre along George Street to Governor Phillip Reserve.
- Access to Macquarie Park from Howe Park path requires two difficult and potentially dangerous road crossings (ie crossing the southern approach road and northern approach road of the existing bridge). The existing timber stair underpass (of existing bridge) is often not used as it is a longer alternative route adding more time to the trip as pedestrians must go down the stairs and then climb another set of stairs.
- Macquarie Park – The foreshore path terminates abruptly here and there is a lack of pedestrian crossing to Windsor bridge.

The project would directly address all of these key issues including:

- Providing traffic signals at the Bridge Street/George Street intersection which would provide safe pedestrian movements from the Windsor town centre along George Street to Governor Phillip Reserve.
- New pedestrian paths and stairs would eliminate the two difficult and potentially dangerous road crossings (southern and northern bridge approach roads) between Macquarie Park and Howe Park.
- A provision would be made to connect the foreshore path from Macquarie Park to the new shared path on the replacement bridge.

The plan also contains management objectives and actions to facilitate the further development of the Great River Walk. There are a number of specific objectives and actions relating to the project and these are presented and assessed in **Table 3-4**.

The plan also presents concept designs for the Thompson Square parkland and other foreshore parks adjacent to the project. Where possible these concept designs would inform any urban and landscape design measures that would be developed as part of the project. Achieving all the objectives and outcomes of these concept designs is beyond the scope of the project, however RMS would continue to work with Hawkesbury City Council, the community and heritage agencies to develop and implement urban design and landscaping outcomes that consider the heritage values and long term uses of Thompson Square.

3.1.9 Hawkesbury Mobility Plan 2010

The Hawkesbury Mobility Plan 2010 consists of a Pedestrian Access Management Plan (PAMP) and a Bike Plan which have a combined objective to "*identify a cohesive strategy for linking residents, particularly residents living in localities with high proportions of vulnerable road users, to the major commercial centres of the city by means of safe and accessible pathways and cycleways"* (GTA Consultants, 2010).

The Bike Plan identifies regional and subregional cycle routes in the LGA and includes a subregional cycleway route from Windsor to Wilberforce which crosses the existing Windsor bridge. The existing Windsor bridge was identified in the plan as a section of on-road cycleway as having inadequate lane and shoulder width for cyclists. It was also identified as a major constraint in improving the safety and continuity of the cycleways to the north of the Hawkesbury River.

The PAMP specifically identified Bridge Street and its intersection with George Street as a major barrier to east-west pedestrian movements and an area with poor pedestrian facilities. One the PAMP's recommendations is to "*investigate redesign of the intersection of Bridge Street and Georges Street (eg. traffic signals) to accommodate greater pedestrian movement. Note the potential future realignment of Windsor Bridge would open up Thompson Square and allow opportunities for improved east-west connection"* (GTA Consultants, 2010).

The project through its improved pedestrian and cyclist facilities around Thompson Square, at the George Street and Bridge Street intersection and across the river would enable a number of the recommendations of the Mobility Plan to be achieved.

Table 3-4 Assessment of the project against directly relevant management objectives and actions from Plan of Management for the Windsor Foreshore Parks Incorporating the Great River Walk

Management objective	Action from Plan of Management	Relevance to the project
The proposed RMS (formerly RTA) Windsor Bridge Replacement project allows for a reinstatement of historic connection between the Hawkesbury water front and Thompson Square	Reinstatement of connection between the Hawkesbury water front and Thompson Square is pursued through Landscape design and sensitivity to the historical role of Thompson Square is carried through any landscape modifications to the area	The project would allow for a reinstatement of the historic connection between the Hawkesbury water front and Thompson Square. Hawkesbury City Council (HCC), heritage agencies and specialists, the community and other stakeholder groups would continue to be consulted on the landscape design for Thompson Square. Refer to **Section 7.4** for details about visual amenity, urban design and landscaping.
Planning and management strategies promote both cohesion and diversity through the overall open space entity	Prepare landscape / improvement plan for Windsor Wharf Reserve to consider: • Improved pedestrian access to The Terrace facilitated through RMS (formerly RTA) bridge replacement project. • Activating use of foreshore spaces for fishing and other activities through reduction of spatial impacts of parking and access. • Integration of RMS (formerly RTA) bridge replacement to Windsor Road. • Optimisation of slope as design feature - eg viewing areas.	HCC and the community would continue to be consulted on landscape and urban design measures for The Terrace, foreshore areas and any areas of Windsor Wharf Reserve impacted by the project to ensure that HCC objectives/actions can be accommodated.
	Prepare landscape / improvement plan for Macquarie Park to consider: • Improved pedestrian access to the town centre facilitated through RMS (formerly RTA) bridge replacement project. • Improved linkage from park to bridge for pedestrians and cyclist. • Extension of park area to east.	HCC and the community would continue to be consulted on landscaping and urban design measures for northern foreshore areas and the pedestrian/cyclist paths to ensure that HCC objectives/actions can be accommodated. With the removal and rehabilitation of the northern approach road to the existing bridge, Macquarie Park would be able to be extended east.
Safe connection of foreshore open spaces for pedestrians/ cyclists	Liaise with RMS (formerly RTA) to establish a signalled crossing at the intersection of Bridge Street and George Street	A signalled crossing at the intersection of Bridge Street and George Street is part of the project.

3.1.10 NSW BikePlan

The *NSW BikePlan* (NSW Government, 2010b) aims to make NSW one of the world's best places to ride a bike. Following the *Metropolitan Transport Plan's* $158 million commitment to improve urban cycle networks, the *NSW BikePlan* details the State's largest cycle program to date. The *NSW BikePlan* outlines how the NSW Government will work in partnership with local councils, communities and businesses to grow bike-riding over ten years.

Through the *NSW BikePlan*, the NSW Government will encourage more and safer cycling, to:

- Increase the share of short trips by bike in Greater Sydney for all travel purposes to five per cent by 2016.
- Double the use of cycling to get to work, across all of NSW, between 2006 and 2016.

While there is no mention specifically of Windsor in the *NSW BikePlan*, the project would meet the objectives of encouraging cycling by:

- Providing an appropriately designed and safe shared three metre wide cyclist/pedestrian path across the Hawkesbury River, at Windsor. The cyclist/pedestrian path across the existing bridge is only one metre wide and is not suitable for cyclists.
- Providing an appropriately designed and safe shared three metre wide cyclist/pedestrian path linking the bridge to Macquarie Park – and provision would be made for Hawkesbury City Council to connect to a future possible northern river bank path.
- Providing cyclist and pedestrian access underneath the replacement bridge along The Terrace – and provision would be made for Hawkesbury City Council to connect to a future possible southern river bank path.

3.1.11 NSW Greenhouse Plan

The *NSW Greenhouse Plan* (The NSW Greenhouse Office, The Cabinet Office of the Government of New South Wales, 2005) was developed to set out actions for the NSW Government to reduce the emissions of its own activities and to work with other stakeholders to reduce the emissions from their activities. The main objectives of this plan are to:

- Increase awareness among those expected to be most affected by the impacts of climate change.
- Begin to develop adaptation strategies to those climate change impacts we cannot avoid.
- Put NSW on track to meeting its targets of limiting 2025 emissions to 2000 levels; and reducing emissions by 60 per cent by 2050.

During the design and construction of the project, opportunities to minimise greenhouse gas emissions would be identified and implemented where practical and cost effective. These are discussed in **Section 8.2**.

The design of the project and this EIS would identify potential climate change impacts and include mitigation strategies to minimise any impacts on the operation and life span of the bridge.

3.1.12 Action for Air

Action for Air 2009 (DECCW, 2010) is an air quality management plan for the Greater Metropolitan Region covering Sydney, the Lower Hunter and the Illawarra. Action for Air focuses on regional air pollution. The strategies address the two pollutants of primary concern: photochemical smog (ground-level ozone); and fine particle pollution. The main sources of air pollution from human activities in the region are emissions from motor vehicles, industry, and commercial and domestic sources.

The project does not directly address any of the actions proposed to improve air quality in the Greater Metropolitan Region. However the project would indirectly meet some of the actions by:

- Providing improved cycling paths in the local area.
- Increasing the efficiency of traffic movements in comparison to the existing bridge. This would result in lower fuel usage and lower vehicle emissions.

3.2 Need for the project

Windsor bridge provides an important link for communities on each side of the Hawkesbury River in the Windsor locality, as well as an important regional link between western Sydney, the Blue Mountains and the Hunter region. Around 19,000 vehicles use the bridge each day, with around seven per cent of these being heavy vehicles. The nearest alternative bridge crossing of the Hawkesbury is located around 10 kilometres away at Richmond, requiring a road detour of around 20 kilometres to drive between the southern and northern sides of the river at Windsor.

There are a number of reasons why a replacement river crossing at Windsor is required including:

- Deterioration in the condition of the existing bridge.
- The existing bridge and approach roads do not meet current engineering and safety standards.
- The existing bridge has a lower flood immunity than the surrounding roads.
- The poor current traffic performance and capacity of the existing bridge and intersections – and the predicted growth in traffic numbers using this river crossing in the future.

These are further discussed below.

3.2.1 Condition of existing bridge

Parts of the existing Windsor bridge are over 130 years old and are deteriorating due to age and heavy use. The bridge is regularly inspected to identify maintenance requirements and ensure safety for use, revealing ongoing and escalating maintenance issues. Technical inspection reports about the condition of the existing bridge are provided in **Appendix C.** Inspections have shown that while the bridge is suitable for current vehicle and pedestrian use:

- Sections of the bridge below the water line are heavily corroded and substantial graphitisation of the cast iron has occurred on some piers. This has resulted in variable pier wall thickness but in places the piers have corroded so much that the wall thickness is very low (less than five millimetres). The average wall thickness from the underwater cores taken to date is about 15 millimetres (CTI, 2011). The original wall thickness was estimated to be about 30 millimetres.
- Horizontal cracking is present in the pier columns, including both columns of the fifth pier from the southern bank. There is also a short vertical crack on the upstream column of the fifth pier from the southern bank, and there are vertical cracks in the brackets securing the upper end of the diagonal bracing to most piers. Such cracks would be expected to have a serious impact on the overall serviceability of the bridge (CDS, May 2011).
- There has been a 16 per cent deterioration in the stiffness of at least one of the bridge spans since 2003. The stiffness of a span determines the load it is able to support – and with deteriorating stiffness – load limits on the bridge may need to be implemented (Access: UTS, 2007).
- Bracing between the older cast iron column sections on three piers are undergoing considerable corrosion at the water-line and may require replacement or repair.
- The bridge deck has a number of issues including:
    - Extensive spalling, leaching, wide cracks and exposed and corroded steel reinforcement at the ends of the deck slab.
    - External beams – have severe spalling and carbonation of concrete, suspect quality of concrete, exposed and corroded steel reinforcement and loss of 50 per cent of beams seating area at the headstocks.
    - Internal beams – have minor spalling and carbonation of concrete, suspect quality of concrete, and loss of 20 per cent of beams seating area at the headstocks.
    - Deck joints – are old and do not allow expansion, have no compression seals and the sealed surfaces at the joints are cracked and bulged.
    - Headstocks - have severe spalling and carbonation of concrete, suspect quality of concrete and cracking.

Overall the condition of the existing bridge is rated as poor and, while the bridge is suitable for current use, would need extensive rehabilitation works if it was to be used and maintained into the future (RTA, 2003 and 2005). Subsequent inspections (including underwater inspections) in 2012 that followed the March 2012 floods have not identified any further significant deterioration of the structure. Also if a new bridge was to be constructed downstream of the existing bridge, retaining the existing bridge would not be possible due to the risks of its failure during a flood event. Debris from the failed bridge may cause physical damage to the piers of a new downstream bridge or may become caught in the new bridge, damming floodwaters and putting unacceptable stresses on the structure of the new bridge.

3.2.2 Engineering and safety standards

In addition to the deterioration of the existing bridge with age, the existing bridge does not meet current engineering and road safety standards including:

- The bridge deck at 6.1 metres wide is less than the recommended width for a two lane bridge. This restricts the movement of heavy vehicles with some drivers electing to wait on one side of the bridge while an oncoming heavy vehicle passes, resulting in traffic delays.
- The standard and condition of the existing bridge also necessitates that heavy vehicle speeds are limited to 40 kilometres per hour. With ongoing deterioration of the bridge, a vehicle load limit would ultimately need to be introduced, which would further restrict commercial traffic and impact travel times and the local economy.
- The pedestrian path on the existing bridge is only one metre wide and is unsuitable for cyclists.
- The traffic and pedestrian safety barriers on the existing bridge do not meet current design standards.

There are also a number of safety issues with the approach roads and intersections including:

- There are no safe crossing locations for pedestrians at the George Street/ Bridge Street intersection and across the northern approach road from the existing bridge pedestrian path to Macquarie Park.
- The sight distances for vehicles at the George Street/ Bridge Street intersection and the Freemans Reach Road and Wilberforce Road intersection do not comply with current safety standards.

3.2.3 Flood immunity

A further limitation of the existing bridge is that it is below the 1 in 2 year flood event level while the surrounding approach roads have a higher level of flood immunity. Over the past 100 years, the existing bridge is thought to have been flooded on 59 occasions, while the approach roads have still been accessible in many of these events.

A new bridge with a flood immunity similar to surrounding roads would provide improved flood evacuation opportunities for floodplain areas north of Windsor and would provide access across the Hawkesbury River for a wider range of flood events.

3.2.4 Traffic capacity

The traffic and transport assessment undertaken for this EIS (see **Section 7.3**) found that:

- The existing intersection of Freemans Reach Road and Wilberforce Road has an unacceptable level of service in the morning peak resulting in substantial queues along both roads.
- While the level of service of the existing roundabout at the George Street/Bridge Street intersection currently has an acceptable level of service, by 2016 the level of service is predicted to be unacceptable due to growth in traffic.

- Traffic numbers are estimated to grow by 25 per cent by 2026, and this would result in even poorer traffic performance of the existing bridge and intersections.

Based upon these outcomes, improved intersections and a higher capacity bridge would be required to provide acceptable traffic performance now and into the future. The traffic and transport assessment also found that a new two lane bridge and improved intersections would initially be able to convey traffic with an acceptable level of service. However, in the future when traffic numbers have increased, a three lane bridge (two lanes southbound and one lane northbound) would be required to convey traffic with an acceptable level of service.

3.3 Economic analysis

Economic analysis assists decision-makers to understand the economic worth of a project in monetary terms. It helps determine what is 'value for money' and allows the economic worth of a particular initiative to be considered in the context of other potential benefits and impacts. A favourable economic analysis often forms a key element of the project justification.

An economic analysis was undertaken for the project (SKM, 2012d). The analysis quantified the costs and benefits of the project in dollar terms and provided a benefit-cost ratio (BCR) as an indicator of its economic performance. The following economic costs and benefits were considered:

- Capital expenditure.
- Incremental operating costs.
- Travel time savings.
- Vehicle operating costs.
- Safety impacts.
- Externalities.

The economic analysis returned a high BCR of 14.6 and concluded that the project would create benefits that would be realised by the general community and would outweigh the initial upfront construction and ongoing operational costs. Key findings included:

- Travel time benefits accrued from improved travel speeds due to the removal of speed restrictions and proposed improvements to the existing curvature, grade.
- Reduced vehicle operating costs due to improved road conditions and the increase in average vehicle speed compared the base case.
- Annual crash savings due to proposed safety measures and the change in vehicle kilometres travelled.
- Decreases in externality costs compared to the base case.

Economic analysis undertaken as part of the options evaluation for the project (RMS, 2011) yielded a BCR lower than the current value (SKM, 2012d). This difference is due to the adoption of different base case assumptions around traffic flow and the inclusion of a number of additional economic factors in the recent analysis, such as vehicle operating costs, externalities and safety impacts.

This resulted in BCR values for different options increasing proportionally (approximately) but still providing a consistent comparison between those options. The BCR values calculated in 2012 for options 1 and 6 are outlined in Section 4.2.2.

A summary of the economic analysis for the project is provided in **Table 3-5** below.

Table 3-5 Economic analysis results

Attribute	Present Value [#]
Costs	
Capital costs	$ 46.36 million[##]
Maintenance costs	-$ 0.26 million
Total costs	$ 46.10 million
Benefits	
Travel time savings	$ 548.80 million
Vehicle operating cost savings	$ 118.95 million
External savings	$ 0.58 million
Safety savings	$ 3.70 million
Total benefits	$ 672.03 million
Benefit cost ratio (BCR)	**14.6**
Net present value (NPV)	**$ 625.93 million**

Using seven per cent real discount rate
Based on a total nominal capital cost of $50.4 million

3.4 Project objectives

The primary aim of the project is to provide a safe and reliable crossing of the Hawkesbury River at Windsor. Specific objectives for the project are:

- To improve safety for motorists, pedestrians and cyclists.
- To improve traffic and transport efficiency.
- To improve the level of flood immunity.
- To meet long term community needs.
- To minimise the impact on heritage and the character of the local area.
- To be a cost effective and an affordable outcome.

These project objectives have been expanded to include specific criteria for each objective. Options considered and the preferred option are assessed against the project objectives and criteria in **Chapter 4**.

3.5 Statement of strategic need and justification

If the existing bridge is not replaced, its structural condition would continue to deteriorate with age. This would lead to increasing maintenance costs and imposing a load limit in the short term and ultimately closure of the bridge in the long term when ongoing maintenance can no longer provide an adequate level of traffic safety. This would result in the loss of an important bridge crossing of the Hawkesbury River, with impacts on local and regional connectivity. Existing bridge users would need to use alternative river crossing points, resulting in increased travel times and adverse effects on the local economy of Windsor.

Also the existing bridge and intersections would not be able the cope with the predicted growth in traffic numbers using this river crossing. Currently the intersection of Freemans Reach Road and Wilberforce Road has an unacceptable level of service in the morning peak and the intersection at George Street and Bridge Street is predicted to operate at an unacceptable level of service by 2016.

In addition to its poor and deteriorating condition, the existing bridge has a number of other issues that support the need for a new bridge including:

- The bridge design and approach roads do not meet current road design and safety standards.
- The condition and design of the existing bridge places limits on heavy vehicle use, with a 40 kilometre per hour speed limit and restrictions in use due to the narrow lane widths.
- The existing bridge has a lower flood immunity than the surrounding approach roads.

A new bridge across the Hawkesbury River at Windsor is an important and essential project for the local and regional community. This option would comply with the strategic development plans and policies for the State, region and LGA as it would:

- Maintain important infrastructure while improving transport and safety.
- Provide a continuing essential regional and local road link across the Hawkesbury River at Windsor for commercial, tourist and residential traffic.
- Support predicted growth in traffic numbers using the river crossing.
- Address many of the key constraints to the development of the Great River Walk in Windsor and meet recommendation of the Hawkesbury Mobility Plan 2010 (GTA Consultants, 2010).

In providing a new bridge, the deficiencies of the existing bridge crossing of the Hawkesbury River at Windsor would be addressed and additional strategic objectives such as those detailed in **Section 3.4** would be achieved. The options for providing a new bridge at Windsor are discussed in the following chapter.

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