BaT project

Chapter 2
Project rationale

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2. Project rationale

This chapter describes the rationale for the Project, including the strategic policy context and the likely future transport, population, employment and land use outcomes for South East Queensland without the Project. It also describes the investigations undertaken into alternative projects to this Project. Alternative designs considered during the development of the reference design are described in **Chapter 3 – Project description**.

This chapter addresses part of section 9.1 of the Terms of Reference (ToR).

2.1 Introduction

The population of South East Queensland doubled between 1981 and 2011 with similar employment growth over the same period. This trend is expected to continue to 2031 and beyond. The Brisbane Central Business District (CBD) and inner city will remain the region's primary activity centre and area of jobs growth, while much of the residential growth will occur in areas beyond Brisbane's boundaries such as the Sunshine Coast, Gold Coast and Ipswich.

Longer distance trips to work are well suited to high capacity public transport such as heavy rail, while the bus network has a key role in catering for demand in areas closer to the inner city and the wider metropolitan area where there are gaps in rail coverage. Bus transport also has an important role in servicing growth areas and provide essential cross-town and feeder connections to the rail network.

A combination of direct high capacity public transport connections and interchange opportunities will be required to serve the expected demands for travel to, within and through Brisbane's inner city as South East Queensland continues to grow. Recent projects to include, Springfield Line and Moreton Bay Rail Link.

2.2 Strategic policy context

This section provides a description of the strategic policy framework, including both transport and land use planning, relevant to the Project. It provides an overview of how the Project aligns with the national, regional and local policies and strategic planning process along with a summary of current and future issues and constraints within South East Queensland's transport network.

2.2.1 National policy context

The Australian Government has developed a number of policies and strategic plans that provide guidance on the national delivery of infrastructure and the allocation of infrastructure funding. The policies and plans of relevance to the Project are outlined in the following sections.

Australian Government policy

The Australian Government has policies to guide the planning for and provision of infrastructure. These include:

- the Australian Government's Policy to Create Jobs by Boosting Productivity 2013
- the Australian Government's Policy to Deliver the Infrastructure for the 21st Century 2013.

Key goals under these policies are:

- boosting productivity – through boosting productivity and competitiveness for investment and job creation, better planning of infrastructure to underpin lower cost services and delivering priority infrastructure for the nation
- deliver infrastructure to cut traffic congestion
- better infrastructure planning.

National Infrastructure Plan 2013

The National Infrastructure Plan 2013, delivered by Infrastructure Australia, outlines the major infrastructure reforms that are needed to lay the foundations for a more productive Australia over the next 50 years.

The National Infrastructure Plan recognises that Australia is currently experiencing challenges in delivering infrastructure efficiently across the country. The National Infrastructure Plan identified the need for reform consistent with the views of the Productivity Commission, the Business Council of Australia, and the Council of Australian Governments' Reform Council.

The National Infrastructure Plan spells out actions to be delivered over the next 50 years. The Project aligns with the following actions:

- Action 1: Better use of urban networks – the Project would provide a more efficient public transport network with improved access into the Brisbane CBD.
- Action 2: Provide incentives to build higher residential densities and dense commercial centres in our cities – improved public transport accessibility from the Project would encourage the intensification of residential and commercial development around the Project's stations (Woolloongabba, George Street and Roma Street), such as Queen's Wharf Brisbane project and the wider Brisbane CBD.
- Action 5: Invest in public transport and high value vehicle links – the Project is a direct investment in public transport.

Infrastructure Australia: Urban Transport Strategy 2013

The purpose of the Infrastructure Australia: Urban Transport Strategy (the Strategy) is to provide clear direction about economic, social and environmental criteria that need to be addressed by urban transport projects seeking the Australian Government's support. It recognises the importance of the integration of transport systems as well as land use and transport planning.

The Strategy identifies other key infrastructure issues as being:

- the impact of urban transport systems on productivity
- the importance of urban access and equity
- coherent and consistent funding and financing
- consistent measurement and reporting of results.

The Project supports the objectives of the Strategy to provide a more efficient, resilient and integrated transport network and improves public transport connections between the areas where people will live and the places where they will work. The Project would help drive economic growth by providing additional cross river bus and rail capacity into the Brisbane CBD. The Project would improve connectivity in South East Queensland to deliver faster trips and more reliable trip times for bus and rail users from across the region. Furthermore, the Project would remove a large number of bus

movements from the surface road network on Victoria Bridge, Captain Cook Bridge and on Brisbane CBD streets. There will also be a reduction in train movements across the Merivale Bridge and the rail junction west of Roma Street. These are the major congestion points for public transport in the inner city.

2.2.2 State policy context

The Queensland Government has developed a number of overarching strategies and plans to manage growth and guide future development across Queensland and in South East Queensland.

The Queensland Plan 2013

The Queensland Plan: a 30-year vision for Queensland (Queensland Plan) outlines aspirations for the future development of Queensland and sets the direction for the preparation of supporting plans.

The Queensland Plan outlines nine foundation areas of importance to the development of Queensland. Of the nine foundation areas, the Project is relevant to the Infrastructure foundation area.

The Queensland Plan identified that success for the Infrastructure foundation area would result in infrastructure being delivered efficiently and effectively with a focus on taking a long-term approach to realise economic, social and community benefits. Due to the broad nature of the Queensland Plan, no specific infrastructure projects are identified.

The Project would result in significant improvements to public transport capacity, to bus and rail travel times and to regional accessibility. This would result in economic, social and community benefits for South East Queensland. Project delivery would contribute towards achieving the success parameters outlined in the Queensland Plan.

Governing for Growth 2014

Governing for Growth (2014) sets out the Queensland Government's direction and priorities for economic growth in Queensland. The strategy is intended to engender confidence in the private sector necessary to make informed investment decisions. The Queensland Government is targeting the following priority areas to help investment, innovation, growth and job creation:

- simplifying business regulations
- minimising impediment to business growth
- fostering economic growth and resilience
- enabling infrastructure for economic growth
- driving productivity growth in the public sector
- communicate the importance of economic development.

The Project would contribute directly to the priority areas of fostering economic growth and enabling infrastructure for economic growth, by addressing key congestion bottlenecks in the urban transport network supporting accessibility to employment and labour. It would provide a more efficient, resilient and integrated passenger transport network that provides for the growing travel demand in the region.

The Project would support a more robust economy by facilitating economic and social growth particularly in the Brisbane CBD and at Woolloongabba, the Princess Alexandra Hospital (PA Hospital) and the Boggo Road Urban Village.

Infrastructure for Economic Development 2013

Infrastructure for Economic Development (2013) is the Queensland Government's blueprint for infrastructure reform. Reforms to economic infrastructure planning, prioritisation, funding, financing and lifecycle management are crucial to the future competitiveness of the Queensland economy.

The Queensland Government is committed to delivering economic infrastructure to:

- drive development of a four pillar economy
- increase productivity
- reduce unemployment to 4 per cent by 2018.

The Project is part of an integrated approach by State and local governments to help drive economic growth by improving connectivity in the region and addressing capacity constraints on the existing rail and bus networks. The Project would contribute to a more robust economy for South East Queensland by facilitating economic and population growth particularly in the Brisbane CBD, at Woolloongabba, the PA Hospital campus and Boggo Road Urban Village. The Project would support the delivery of Queensland's four pillar economy by improving labour mobility, shifting to more efficient modes of transport, improving the reliability of the transport system and supporting economic productivity.

The constrained nature of the Brisbane CBD limits significant augmentation of existing public transport infrastructure required to achieve resilience or improvements in the network. The Project would allow for the existing networks to deliver services more efficiently through increased network capacity.

South East Queensland Regional Plan 2009-2031

The South East Queensland Regional Plan 2009-2031 (SEQ Regional Plan) is the Queensland Government's long-term plan for managing growth in South East Queensland. The SEQ Regional Plan is currently under review with a new plan proposed to be completed by the end of 2014. The Project has been considered against the existing SEQ Regional Plan.

The SEQ Regional Plan outlines a regional vision for South East Queensland that is supported by nine strategic directions to achieve the preferred pattern of development for the region. The strategic directions relevant to the Project include:

- creating a more sustainable future
- accommodating future residential and employment growth
- regional accessibility
- building a series of strong, identifiable communities
- providing infrastructure and services
- supporting strong, healthy communities.

Supporting the regional vision, the SEQ Regional Plan promotes a regional land use pattern, which provides a spatial context for both the strategic direction and the regulatory provisions of the Plan. The study corridor is located within the urban footprint area. The Project is consistent with the intent of the urban footprint designation to identify land to be developed in step with demand in the region to 2031.

The SEQ Regional Plan establishes a number of Desired Regional Outcomes. The Desired Regional Outcomes articulate the preferred direction for development and land use outcomes for the region.

Generally, the Project would support the Desired Regional Outcomes by addressing capacity constraints in Brisbane's inner city rail and bus networks, improving public transport capacity and accessibility to identified high growth areas. In particular, the Project would:

- relieve the existing public transport congestion points at the Merivale Bridge (rail), Victoria Bridge and Captain Cook Bridge (bus) by providing an alternative, underground route and high capacity, multi-modal stations
- support the sustainable growth of South East Queensland by providing further alternatives to private vehicle use
- integrate land use and transport, support high growth areas and areas of increased urban density along the study corridor, including in the Brisbane CBD, Queen's Wharf Brisbane and Woolloongabba, through the provision of frequent and efficient public transport connections
- provide opportunities for economic development through improved public transport access for communities to regionally significant employment areas, such as the Brisbane CBD, and to tertiary services such as the PA Hospital, Mater Hospital, Royal Brisbane and Women's Hospital (RBWH), Queensland University of Technology (QUT), the Ecosciences Precinct and indirectly the University of Queensland (UQ)
- provides access to other tertiary services in administration, finance and personal service; entertainment, cultural and recreation facilities; education and research facilities
- provide integration with existing public transport services such as busway and rail networks as well as active transport networks.

Other State policies

The Project would support a range of other State government policies and strategies, including:

- the Transport Coordination Plan for Queensland 2008-2018, by ensuring the transport system performs efficiently and accommodates the changing travel patterns and requirements of society and industry
- the Rail Network Strategy 2009, by connecting the community, enhancing economic performance and contributing to the preservation of the environment, community amenity and safety.

2.2.3 Local policy context

While the Project would be situated entirely within the Brisbane local government area (LGA), its benefits and influence would extend well beyond those boundaries.

Brisbane City Council has developed a number of overarching strategies and plans to manage growth and guide future development across the Brisbane LGA. The following provides a summary of those strategies and plans relevant to the Project.

Brisbane Vision 2031

The Brisbane Vision 2031 was released in 2013. It is a long-term community plan for the city and sets out the aspirations for the city's future and ideas for achieving the vision. The Project would contribute to the objectives and goals of the Brisbane Vision 2031, particularly the first theme – 'Our accessible, connected city' being:

- Brisbane is an accessible city for everyone. Residents, workers, students, visitors and business people can move easily throughout the city. The Project would increase public transport capacity in the inner city to relieve congestion, benefitting the regional public transport network. The Project would also improve public transport equity through the provision of access to new parts of Brisbane's inner city and opportunities for transfers.

- Road, public transport and active transport networks provide safe, efficient, fast and reliable travel options throughout the city. These networks help deliver economic benefits to Brisbane and support our growing community and changing economy. Through increasing public transport capacity, the Project would allow the public transport network to accommodate the anticipated growth in commuters and accessibility to the major inner city economic activity centres.
- There is equitable access to high-quality, inter-connected public transport services that move throughout Brisbane. These services are affordable, offer good customer service and are frequent, reliable and safe. The extra public transport capacity provided by the Project would alleviate congestion points in the inner city and overcome further deterioration of travel times and reliability.
- Brisbane has a modern, efficient and connected bus network with reliable services to work, schools and community activity centres. The Project provides an additional river crossing into the Brisbane CBD which significantly increases capacity in the bus network as well as improvements to accessibility, travel times and reliability.
- A range of local services, businesses, community hubs and development will be located near public and active transport networks. The Project stations are located within or adjoining key inner city economic activity centres (eg PA Hospital campus and development areas such as the Boggo Road Urban Village and Queen's Wharf Brisbane).

The Project supports the Brisbane Vision 2031 as it would provide improved accessibility through increased cross river capacity for public transport and relieve the major bottlenecks in the rail and busway systems. The Project would also provide safe and efficient movement of people to and from the Brisbane CBD and Woolloongabba.

Brisbane Economic Development Plan 2012-2031

The Brisbane Economic Development Plan 2012-2031 (Economic Development Plan) anticipates that Brisbane's economic output will increase from approximately $55,000 per person in 2011 to over $75,000 (in 2011 dollars) per person by 2031, raising today's $114 billion economy to an expected $217 billion by 2031.

The Economic Development Plan indicates that an additional 343,000 workers would be required in metropolitan Brisbane by 2021 to support the anticipated growth. There would be a commensurate strong demand for office accommodation in the inner city. Residential population growth is expected to occur in step with economic growth. Significant capacity building will be required across all sectors to meet these growth opportunities, including expanding transport infrastructure and improving public transport services.

The Brisbane CBD is expected to expand into adjacent fringe areas such as Milton, South Brisbane, Fortitude Valley and Bowen Hills, requiring connection through high frequency and rapid public transport corridors. The Economic Development Plan identifies that the Brisbane CBD and adjacent suburbs will need to accommodate an additional 130,000 jobs by 2031 and that the following priority actions for infrastructure and planning would be required:

- Brisbane City Council and TransLink to continue to improve public transport services and connectivity between economic precincts
- Special attention to ensuring the Brisbane CBD maintains its competitive advantage and provides for economic growth.

Public transport networks across the inner city area need to provide efficient connections between business precincts to achieve the potential agglomeration benefits.

The Project directly supports the Economic Development Plan by increasing the public transport capacity in the inner city which benefits commuters and inner city residents, and linking with key economic activity areas such as the Brisbane CBD, the PA Hospital campus and Boggo Road Urban Village. It will provide improved accessibility, utilisation and service quality of the bus and rail networks (faster, more reliable trip times for users) supporting economic and population growth and a more robust economy for the region.

Transport Plan for Brisbane 2008-2026

The Transport Plan for Brisbane 2008-2026 (Transport Plan for Brisbane) sets out actions to ensure that Brisbane can retain its unique lifestyle while providing the necessary transport infrastructure and services to encourage sustainable travel choices and accommodate expected growth.

The Transport Plan was developed as an Integrated Local Transport Plan (ILTP) for Brisbane to be consistent with the objectives of the SEQ Regional Plan. The Transport Plan for Brisbane was developed in consultation with the Queensland Government. It identifies the need for 'a second Brisbane CBD river crossing to increase cross-river capacity and rail catchment in the inner city beyond 2016'.

The Transport Plan for Brisbane aims for a public transport mode share target of 13 per cent on weekdays in an earlier timeframe than 2026. The plan identifies a number of conditions necessary to achieve this target, including:

- a significant increase in rail capacity, making full use of railway corridors to move more than 30,000 passengers per hour, including consideration of an inner Brisbane metro system
- an extensive segregated regional busway network
- a major expansion of bus capacity including quicker loading times, enhanced busway operations and bus priority measures such as signal integrations.

The Project supports the achievement of these conditions as it increases rail and bus capacity in the inner city through the provision of an extra river crossing. In particular, a new busway connection is provided from Dutton Park through the Brisbane CBD to link the Eastern Busway with the Northern Busway enhancing the regional busway network.

Brisbane City Centre Master Plan 2014

The Brisbane City Centre Master Plan 2014 (CCMP) was released by Brisbane City Council in March 2014. The CCMP sets the vision and strategic framework to guide growth within the Brisbane CBD and surrounds. The vision for the Brisbane CBD is of an 'open city' that supports new businesses (big and small), new ideas about development and activities, and buildings that interact with the streetscape and outdoor spaces.

In delivering this vision, the CCMP has identified five strategies, focussing on:

- economic development
- public realm
- built form
- social and culture
- transport.

The CCMP identifies the need for the Brisbane CBD to be well-connected with safe and efficient access between the various transport hubs and the health, knowledge, cultural and government hubs.

The Project addresses this need through connecting the PA Hospital, Ecosciences Precinct, Mater Hospital, the Brisbane Cricket Ground (Gabba Stadium), the Brisbane CBD, Roma Street Station and the RBWH.

The CCMP identifies the Project as one of six priority projects that are intended to commence within the next five years. Other priority projects include:

- Queen's Wharf Brisbane and One William Street
- Howard Smith Wharves
- Kangaroo Point Bridge
- Edward Street redevelopment
- Albert Street redevelopment.

The Project would support the successful implementation of a number of these other priority projects through the improved access to high quality public transport within the Brisbane CBD.

The CCMP also identifies the need to deliver improvements to the inner city bus network (ie 'unlock the bus networks') to improve bus access to the city centre. This objective is to be achieved by improving the bus connection from the South East Busway to the Brisbane CBD via the Cultural Centre Busway Station and Captain Cook Bridge, and increasing underground bus capacity. The Project would support this need by:

- reducing capacity constraints at the Cultural Centre Busway Station and on the Captain Cook Bridge through the provision of an additional cross river route and a new underground station at George Street
- augmenting existing busway station capacity by adding underground busway facilities at Woolloongabba Station and Roma Street Station.

2.2.4 Strategic policy context summary

The Commonwealth, State and local policy frameworks indicate that transport networks within South East Queensland and Brisbane require continued development to cater for the growth forecast for the region. Generally, a range of transport responses would be required to ensure that the region is able to operate efficiently and accommodate anticipated growth and economic activity. The Project would assist in improving regional and local passenger movements and support these Commonwealth, State, and local policy frameworks.

The Project's integration with existing and planned public transport and land use in key locations, such as Woolloongabba, George Street and around the Roma Street Station precinct, improves accessibility and encourages public transport usage supporting Commonwealth, State and local planning intents.

2.3 Existing transport and land use context

This section provides a summary of the existing transport and land use context within South East Queensland. It includes an overview of current operations and constraints on the transport network. Further information on the existing transport context is provided in **Chapter 4 – Traffic and transport**.

2.3.1 Existing public transport use and growth

Public transport use to the Brisbane CBD for commuters grew by 4.1 per cent per year on average over the 10 years to 2011. Between 2006 and 2011 public transport demand increased by over 20 per cent.

Bus patronage increased (5 per cent per annum) greater than rail at 3.3 per cent per annum between 2001 and 2011. The public transport mode share for journeys to work in the Brisbane CBD increased from 55 per cent in 2001 to 64 per cent in 2011.

Private vehicle use was the dominant method of travelling within the Brisbane metropolitan area in 2012 with around 82 per cent of all daily trips (over 5.8 million trips). In comparison, public transport trips were around 7 per cent of daily trips (over 0.5 million trips). Rail passenger trips made up 43 per cent of the public transport trips with 53 per cent being bus and ferry passenger trips.

Around 44 per cent of the daily public transport trips occur in the morning and afternoon peak periods (four hours). About three in five people (62 per cent) who work in the Brisbane CBD commute by public transport in the morning peak, placing a high demand on the public transport network for work related travel to this destination. Rail generally carries slightly more passengers than buses (113,800 passengers compared to 107,500 passengers) in the peak periods though buses have a higher daily use (248,700 passengers compared to 214,500 passengers for rail). Bus trips are generally of a shorter distance and shorter duration compared to rail.

Peak period bus and rail travel in the inner city is nearing or at capacity which is affecting service quality. Ongoing growth in population and use of public transport is forecast to result in further deterioration of public transport service quality, which is discussed in **section 2.4**.

2.3.2 Current rail network operations and constraints

The existing rail network links with the Brisbane CBD (Roma Street Station and Central Station) from the north, west and south. The lines from the west (Ipswich line) and the south (Gold Coast line) join north of the Brisbane River between the Merivale Bridge and Roma Street Station. The Cleveland line joins the Gold Coast Line just south of Park Road Station.

The merging of rail lines close to the Brisbane CBD imposes capacity constraints on the rail network. The inner city rail network inbound from these merge points is close to capacity over much of the peak commuter periods of travel. The current capacity of the rail system in the inner city is 24 trains per hour.

Figure 2-1 provides an overview of the key rail capacity constraints relevant to the study corridor. These include:

- the capacity of the Merivale Bridge (two tracks)
- merging of rail lines at Park Road, South Brisbane and Roma Street
- speed restrictions and limited platform and passenger capacity at Central Station
- old signalling technology.

Capacity across the Brisbane River for the long-distance, commuter trains from the Gold Coast and southern suburbs is limited to a single inbound line across the Merivale Bridge, which is shared with the shorter suburban services from the Beenleigh and Cleveland lines. Based on current rail passenger growth rates and train operating regimes, the Gold Coast Line would reach capacity by about 2021 due to this constraint.

The rail line merge points south of Park Road Station, at South Bank and west of Roma Street all require trains from two rail lines to merge onto single tracks to travel through the Brisbane CBD. The surrounding development and infrastructure at these locations restrict solutions to these constraints.

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FIGURE 2-1

Rail network constraints

The operation of Central Station is limited by available space on platforms and concourse areas, low train speeds to maintain safety for the narrow and crowded platforms, and signalling technology. Central Station is currently the principal destination for rail passengers to and from the Brisbane CBD with around 27,400 passengers boarding and alighting during the two hour morning peak. Future operations (2021) are likely to exceed estimated station capacity of 43,000 passenger movements per a two hour period based on the capacity of its platforms and vertical transport.

Limited inner city passenger rail coverage

The existing rail network does not provide coverage to the whole Brisbane CBD and inner city in terms of acceptable walking distances to stations. The existing Brisbane CBD rail stations at Central Station and Roma Street Station are located on the northern periphery of the city, which is relatively remote from key destination precincts, such as the George Street precinct and QUT. Other major inner city areas that are less accessible by rail, being outside a walkable catchment of 800m, include:

- financial district of the Brisbane CBD (Eagle Street area)
- Woolloongabba/ Kangaroo Point
- Newstead/ New Farm
- RBWH
- City Botanic Gardens.

Reduced reliability of passenger rail services

For current train services, Queensland Rail achieves between 90-94 per cent of trains arriving on-time (within four minutes of schedule) at Central Station in the peak period. As the services on the network increase over time and approach capacity, reliability can be expected to deteriorate across the whole network. For example the increased boarding and alighting times required in overcrowded conditions can compound and create significant impacts. For crowded stations like Central Station, delays may be exacerbated.

Overcrowding on trains

Passenger numbers on trains are most concentrated within the peak periods (the morning peak is greater than the afternoon peak) with the key destinations being the inner city stations of Roma Street Station, Central Station and Fortitude Valley Station. Central Station is the key destination for Brisbane CBD passengers, with 24,800 alighting there in the morning peak period in 2012. This is 72 per cent of the total number of alighting passengers in the Brisbane CBD.

Passenger overcrowding is currently experienced on services in the morning peak period, particularly on the longer distance Gold Coast line. In 2012, Gold Coast Line morning peak services reached 118 per cent of passenger capacity.

2.3.3 Current bus network operations and constraints

The bus network serves a distributor function across the Brisbane CBD and fringe. It also serves areas not well serviced by rail such Brisbane's middle and outer suburbs and inter-city destinations. The busway network provides almost fully grade separated access on a generally south to north alignment from Eight Mile Plains through Woolloongabba, South Brisbane, and the Brisbane CBD to Kelvin Grove and Herston in the north.

The Brisbane CBD is the destination of greatest demand for commuting trips in South East Queensland. Buses not on the busway, must travel on the road with general traffic. The key routes into the CBD for buses from the south are constrained by their river crossings (bridges).

These crossings are the Captain Cook Bridge (three general purpose lanes in both directions) and Victoria Bridge (two general purpose lanes and two bus-only lanes configured as a busway).

Bus congestion at the Cultural Centre Busway Station and on Victoria Bridge and related passenger congestion at the Cultural Centre Busway Station impacts on passenger journey times and reliability. The Captain Cook Bridge is predominantly used by peak period 'rocket' services. Since the Cultural Centre Busway Station and Victoria Bridge connection reached capacity around 2008, much of the bus service growth has been accommodated by the Captain Cook Bridge, which is also heavily congested with private vehicle traffic.

The Brisbane CBD has limited on-road bus priority facilities in the CBD. They are mostly short sections of bus lanes and queue jump lanes. There is limited kerb space for extra bus stops, and limited capacity for CBD layover space (holding for later services). Buses are also required to mix and compete with general traffic and high pedestrian activity. These factors already affect bus travel time, reliability and service efficiency.

For bus services not using the underground busway system through the Brisbane CBD, there are precincts of concentrated bus activity in the CBD. Bus stops in the CBD are concentrated in Adelaide Street, Elizabeth Street, Queen Street, Edward Street and Creek Street. While the concentration of services on key roads provides benefits in terms of interchange opportunities and destination grouping, it also concentrates bus movements on some streets, which can contribute to delays.

The key constraints to bus capacity for the inner city are shown on **Figure 2-2**. These include:

- the connections to Victoria Bridge
- the Cultural Centre Busway Station and the connection between the Melbourne Street busway portal and the Queen Street Bus Station
- Captain Cook Bridge
- general traffic within the inner city
- CBD traffic arrangements, eg limited space for extra bus stops, congestion through intersections during peak periods and the one-way street system.

The Victoria Bridge and the Cultural Centre Busway Station are at capacity in both the morning and afternoon peak periods. Over 220 buses per hour enter the Brisbane CBD in the morning peak via the Victoria Bridge, which is estimated to be 25 per cent over capacity. The key capacity constraints for the Victoria Bridge are the intersections at each end of the bridge (North Quay and Grey Street), the Melbourne Street portal and the capacity of the Cultural Centre Busway Station.

The Cultural Centre Busway Station is the third busiest public transport station after Central Station and Roma Street Station. It is also the most intensive interchange location on the busway network, with more morning peak boardings and afternoon peak alightings (indicating passenger transfer) than any other rail or busway station.

The Captain Cook Bridge carries significant general traffic volumes at around 150,000 vehicles per day. It suffers from congestion due to the volume of traffic, traffic accidents and vehicle breakdowns, and constraints at on-ramps and in the Brisbane CBD road network. The bridge carries over 220 buses per hour in peak periods which is similar to the Victoria Bridge. It also has capacity constraints for the bus routes at the exit ramps and associated intersections into the CBD. Bus travel time and reliability (affecting passengers, operational performance and cost) is impacted by general traffic congestion.

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FIGURE 2-2

Bus network constraints

Inner city bus service coverage

Bus services cover more of the Brisbane CBD than existing rail services. In particular, the lack of rail coverage in the southern part of the CBD creates a high demand for bus services. The CBD and inner city is subject to ongoing development which also increases the demand for bus services.

However, bus services are limited in parts of the inner city, such as the southern part of the Brisbane CBD, outside of the peak periods. Also the regularity of services reduces after hours and on weekends requiring significant walking to access off-peak services or rail.

Reliability of bus services

Bus movements, not on the busway network, are impacted by general traffic movements and particularly road congestion and traffic incidents. This results in longer and more variable travel times affecting travel time reliability and service efficiency.

From those suburbs where buses are required to use the road network, traffic conditions and congestion can affect buses. This can result in buses bunching (catching up to each other where one bus can be overcrowded and others empty) and being late for the start of their next service.

Bus overcrowding

In January to March 2012, 45 per cent of bus routes that terminated in the Brisbane CBD in the morning peak had boardings that exceeded seated capacity. This level of crowding along with the regular congestion, affects the passenger travelling experience.

2.3.4 Current road network operations and constraints

The Brisbane regional road network is broadly characterised by a pattern of radial routes focused on travel to and through the inner city and orbital arterial and motorway routes for cross-city and inter-regional trips.

In peak periods, many roads experience poor levels of service for traffic, including:

- the Riverside Expressway (both directions)
- the Pacific Motorway (Captain Cook Bridge) inbound
- the Story Bridge (inbound/ northbound)
- Coronation Drive (inbound)
- Kedron Park Road/ Bridge Street/ Hudson Road
- Sandgate Road/ Abbotsford Road (north of the Inner City Bypass (ICB))
- Lutwyche Road/ Bowen Bridge Road.

On sections of these roads, more than 90 per cent of available road capacity is occupied in peak periods resulting in unstable flows, congestion and delays.

Buses compete with general traffic on many of the key radial routes and are affected by congestion reflected in these poor levels of service.

Recent large road infrastructure projects have significantly improved the orbital network which provides alternatives for traffic to travel through the inner city areas. These include the Clem Jones Tunnel (CLEM7), the Gateway Motorway Bridge duplication, Airport Link and the soon to be completed Legacy Way.

However, this new road infrastructure would not completely alleviate congestion currently experienced on the road network servicing the inner city and the Brisbane CBD. In addition, strong forecast population and employment growth would continue to place further strain on the network.

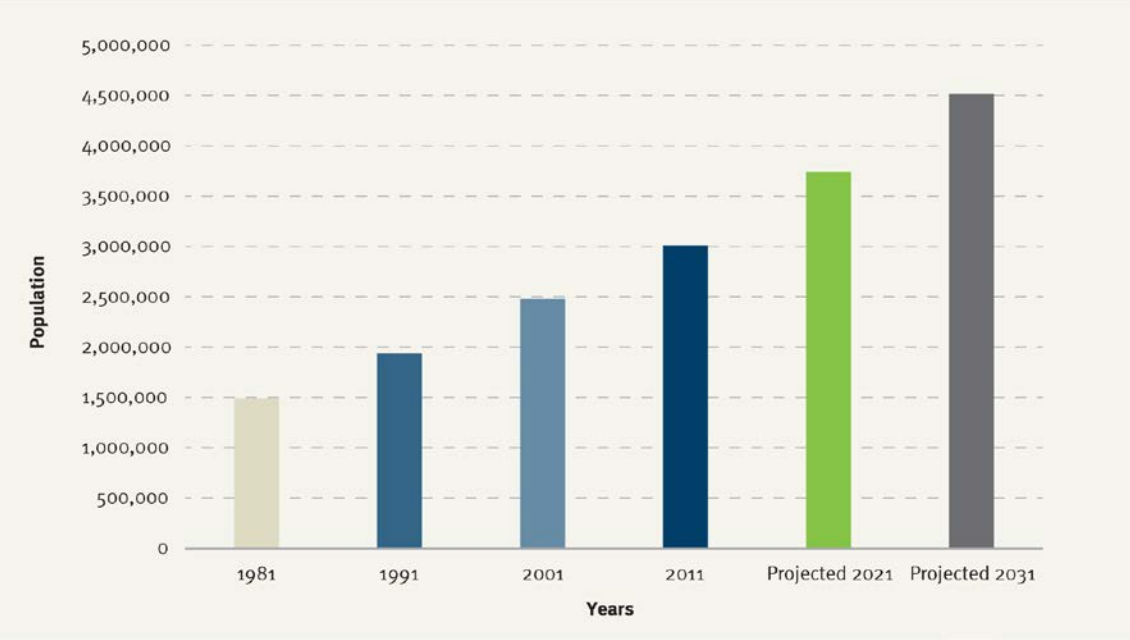
2.3.5 Employment and population growth

In general, the scale and spatial distribution of travel demand across the region is primarily influenced by population and employment growth and location. The demographic and economic profile forecast for South East Queensland identifies that strong growth would continue to drive demand for travel.

Population growth

South East Queensland continues to experience significant population growth. In 1981 the regional population was estimated to be 1.5 million people which doubled to over 3 million people by 2011. This trend is expected to continue with the regional population growing to 3.7 million people in 2021 and 4.5 million people in 2031 (refer to **Figure 2-3**).

Figure 2-3 South East Queensland population growth



Source: Queensland Government population projections, 2013 edition

Around 80 per cent of the region's population growth is expected to be in areas outside of the Brisbane LGA in the Gold Coast, Ipswich, the Sunshine Coast, Moreton Bay and Logan LGAs. However, approximately 290,000 additional people are also expected to settle within the Brisbane LGA by 2031 to bring the total population to around 1.4 million.

The residential population of the inner city is also expected to double in the next 20 years. Particular growth areas are expected include the inner city areas of the Brisbane CBD, South Brisbane, Spring Hill, Milton, Woolloongabba, Bowen Hills and Fortitude Valley. Current planning intentions anticipate growth around the Brisbane CBD with taller buildings in South Brisbane and increased intensity of development in the Woolloongabba, Roma Street and Fortitude Valley areas.

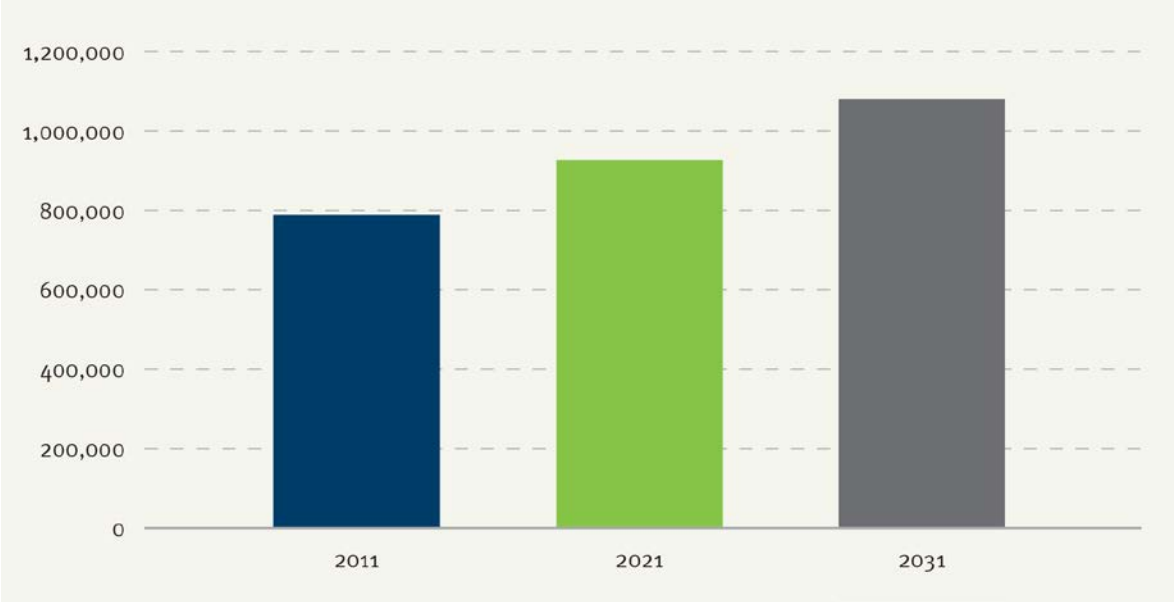
The growth in population in surrounding LGAs would place pressure on the regional transport network with a focus on peak period travel to the Brisbane CBD (as a major employment destination), particularly by road and rail. The growth in inner city residents would also place pressure on inner Brisbane travel, which includes rail and bus.

Employment growth

With the forecast increase in population in South East Queensland, employment would also grow. Brisbane will remain the primary centre for employment and employment growth in South East Queensland and Queensland as a whole. It is anticipated that about 44 per cent of the regional jobs growth would occur in Brisbane whereas population growth is mostly in outlying LGAs.

Figure 2-4 shows the projected employment growth in Brisbane LGA with an extra 140,000 jobs by 2021 and a further 150,000 jobs by 2031. The Brisbane LGA is forecast to reach a total employment of almost 1.1 million jobs by 2031 from just under 800,000 jobs in 2011.

Figure 2-4 Brisbane LGA employment growth



Source: Queensland Treasury and Trade. Long-run Economic and Employment Projections for Regional Planning (High Series), 2013 (unpublished)

Much of the growth in jobs in Brisbane will be focussed in the Brisbane CBD and adjacent fringe areas of Milton, South Brisbane, Fortitude Valley and Bowen Hills. Approximately 100,000 of the future jobs in Brisbane will be created in these locations. Overall, the Brisbane CBD and fringe will host around 20 per cent of all jobs in South East Queensland through to 2031. This is largely consistent with Brisbane City Council's Economic Development Plan.

The growth in office-based professional, technical and business administrative jobs that concentrate in the Brisbane CBD and adjoining areas will result in significant increases in both commuting and business trips into Brisbane from surrounding areas.

2.3.6 Summary of existing transport context

The current transport network servicing the Brisbane CBD and inner city is generally operating at or close to capacity during peak periods in a number of key areas resulting in congestion. This is particularly apparent in a number of locations on the bus and rail networks in the inner city. Due to the radial nature of the public transport network, these capacity constraints can affect overall network efficiency and reliability. While private vehicle use dominates in the region, public transport has greater significance for the Brisbane CBD in the peak periods as the majority of trips occur during this time.

The rail network is constrained by the merging of rail lines particularly from the south and west as well as having only one river crossing within the inner city (Merivale Bridge). Rail stations are located in the northern parts of the Brisbane CBD and do not service the whole Brisbane CBD. The bus network is constrained by the capacity of the Victoria Bridge and Captain Cook Bridge as well the congested nature of the Brisbane CBD road network.

As the region continues to experience strong population and employment growth, pressure on the transport network will continue to grow, increasing congestion and affecting travel times. Currently, public transport infrastructure does not have capacity in the Brisbane CBD and inner city to service this growth.

2.4 Future transport network without the Project

This section provides an overview of the future operations of the South East Queensland transport network without the implementation of the Project. Further information on the future transport network is provided in **Chapter 4 – Traffic and transport**.

2.4.1 Future rail network operations without the Project

Without the Project, the reliance of the rail network on Roma Street and Central Station for access to the Brisbane CBD would continue to place pressure on these stations in peak periods. Congestion at these stations would increase with resulting impacts on reliability and passenger comfort. Southern parts of the CBD would continue to be serviced inadequately by rail. This situation will be exacerbated by the commencement of planned major development such as Queen's Wharf Brisbane.

Forecast growth in rail patronage

Daily passenger numbers on rail services are expected to grow by 84 per cent between 2012 and 2021 and by 160 per cent by 2031 (refer to **Table 2-1**). Rail patronage growth in the peak periods is likely to be similar to daily growth between 2012 and 2031 placing additional pressure on the periods of greatest demand. Demand for other services, outside of peak period would also be strong across the rail network.

Table 2-1 Peak and daily forecast growth in rail patronage (Brisbane Statistical Division)

Period	2012	2021		2031	
		Users	Growth (%)	Users	Growth (%)
AM 2hr peak	59,500	104,900	76	148,600	150
PM 2hr peak	54,300	98,800	82	143,600	165
Daily	214,500	395,500	84	558,000	160

Capacity constraints

Demand for peak period rail services in 2021 from the south and east would be greater than the 24 trains per hour that can be accommodated on the Merivale Bridge. Modelling predicts demand for up to 28 trains per hours in peak periods which is four trains per hour above current capacity. Without actions to increase capacity, the rail network would not be able to cater for additional growth on these lines.

At 2021 the operation of the network in peak periods would be highly sensitive to station boarding/ alighting times and reliability of on-time operations through the key junctions. The likely implications of this include:

- overcrowding
- higher numbers of boarding and alighting passengers, increasing congestion around train doorways due to people standing and increased passenger congestion on platforms
- increased boarding and alighting times
- decrease in on-time reliability of services and ability of the network to operate at capacity.

These factors individually and in combination would impact on network performance and service reliability.

Passenger crowding

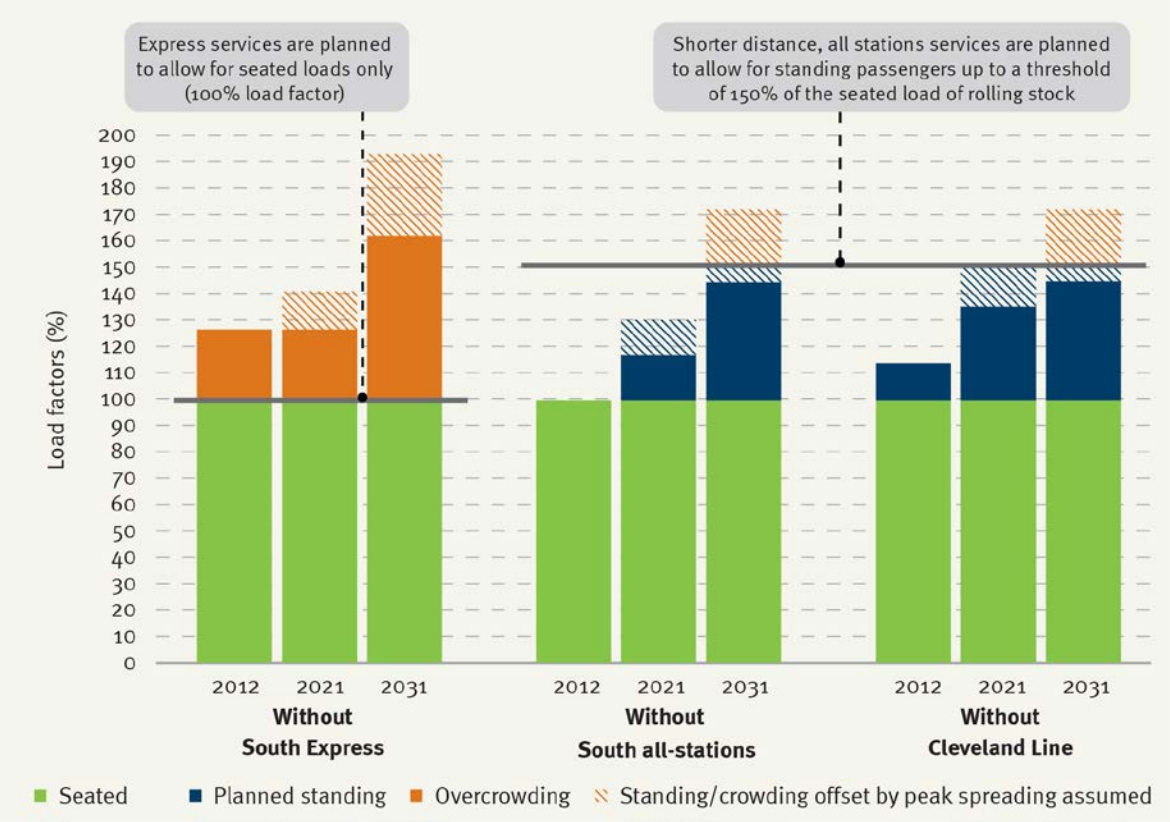
As the rail network reaches capacity at key locations such as the Merivale Bridge (southern and eastern services), new services would not be able to be provided to meet increasing demand. This would result in an increase in passenger crowding on the available services particularly in peak periods.

In 2012 southern services were approaching passenger capacity (refer to **Figure 2-5**). This situation would deteriorate in the future with passenger capacity predicted to be reached south of Salisbury in 2021. Passengers will be standing for more than 20 minutes in increasingly crowded conditions.

In 2031, trains travelling from Beenleigh to the Brisbane CBD in the morning peak would be carrying around 660 passengers. This exceeds the adopted carrying capacity for this type of service and is around 200 more people than the fully seated capacity.

These crowded conditions would be uncomfortable for all rail passengers on affected services. This would effect on-time reliability of the whole network and potentially deter passengers from using rail.

Figure 2-5 Morning peak load factors for the southern and eastern corridors



2.4.2 Future bus network operations without the Project

The two main connections for bus services from the south, Captain Cook Bridge and Victoria Bridge are already at capacity in peak periods. There is limited ability to add new services on these corridors from the south-east, without compromising network performance.

Forecast growth in bus patronage without the Project

Growth in demand for bus services is forecast to be strong between 2012 and 2021, with continued growth at a slower rate between 2021 and 2031 (refer to **Figure 2-6**). From 2012 to 2021, bus boardings would increase from just under 300,000 per day to over 450,000 per day. At 2031 the boardings would be just under 600,000 per day, or about double 2012 figures. Peak period growth rates are expected to exceed daily growth across the day between 2021 and 2031.

Approximately 550 buses per hour are currently entering the CBD in the morning peak period. Forecast patronage growth would require significantly more buses to enter the CBD by 2031.

Figure 2-6 Forecast growth in bus patronage (boarding) and demand for total weekday services without the Project

Future bus congestion within the inner city

Existing bus operations in the Brisbane CBD are already congested in peak periods. The South East Busway and, to a lesser extent, Inner Northern Busway connections to the Brisbane CBD would continue to experience capacity constraints as demand grows into the future. These constraints would place a limit on the potential to provide new bus services into and through the Brisbane CBD to meet this demand.

The congestion on the South East Busway from the south, as well as through Woolloongabba, South Brisbane, the Cultural Centre precinct and across the Victoria Bridge, will result in more buses being diverted to the inner city road network and be delayed due to mixing with congested general traffic. These congested routes would result in increased travel time, impacting service quality and on-time reliability.

Future reliability of bus services

Without the Project, reliability of the network would continue to diminish in the inner city and on approaching busways and roads due to the congested conditions.

There is only a limited amount of available kerb space in the Brisbane CBD. This creates a limit on the amount of additional bus stops that can be provided within the Brisbane CBD in the future to meet forecast demand and buses would have to queue to access the existing bus stops and experience longer times to load and unload passengers. This issue already occurs on key city streets, such as Adelaide Street during the afternoon peak period.

While some efficiency in on-street and busway operations may be able to be achieved to improve inner city capacity, it would not of sufficient scale to manage future demand.

All of these conditions in the future would result in increased travel times and reduced on-time arrivals for inner city bus travel.

2.4.3 Future road network operations without the Project

Total trips on the regional transport network are forecast to increase by over 44 per cent from 2012 to 2031 to a total of almost 10.3 million trips per day in 2031. Public transport trips are forecast to make up 1.1 million trips per day leaving the regional road network to cater for most of the remaining 9.2 million trips per day.

This translates to a predicted 60 per cent increase in total private vehicle kilometres to be travelled on Brisbane's road network between 2012 and 2031. The opportunity for further development of the road network in the inner city is constrained by the existing land use pattern, topography and capacity, similar to the rail and bus networks. As a consequence congestion would increase, travel time reliability will decrease and travel time will increase at a cost to society and the economy.

2.4.4 Summary of transport network without the Project

Without the Project, the transport network in the inner city would not be able to accommodate the expected increase in commuter and personal travel demand to, from and through the Brisbane CBD and inner city. The network would become further congested resulting in increased travel time and decreasing reliability and consequential impacts on the region's economy and liveability.

In particular, the rail and bus networks would not have the capacity to cater for the projected increase in demand for public transport travel in the future. The existing constraints in the transport network are pronounced at the Merivale Bridge for rail traffic, the Victoria Bridge for bus traffic and the Captain Cook Bridge for both bus and private car traffic. Each of these congestion points or constraints reduces the ability to service commuter trips from the south (between the Gold Coast and Park Road Station) and east (including bayside suburbs).

The current bus network into the CBD from the south is congested at peak periods and the rail crossing at Merivale Bridge is forecast to reach capacity by 2021. The public transport network, which converges at the inner city and through the Brisbane CBD, would not be able to meet future needs as forecast.

2.5 Benefits of the Project

This section provides an overview of the transport, land use and economic benefits of the Project.

By providing an additional river crossing for both rail and bus and new inner city stations, the Project would provide a significant increase in public transport capacity, predominantly from the south. It addresses the following transport issues which were discussed in **section 2.3** and **section 2.4**:

- Travel demand from the projected population and employment growth in the inner city and region would increase public transport demand into the inner city beyond the existing capacity of the public transport network infrastructure.
- Constraints on increasing rail services from the south and east due to the capacity of the Merivale Bridge.
- Constraints on increasing bus services from the south due to the capacity constraints of Victoria Bridge and Captain Cook Bridge.
- Lack of rail coverage of the southern part of the Brisbane CBD and reliance on existing stations in the northern part of the Brisbane CBD.

- Lack of capacity to meet demand for additional bus services and facilities in the CBD and inner city more broadly.
- The decrease in rail and bus reliability and increase in overcrowding and travel times.

The Project would strengthen the commercial role of the Brisbane CBD in South East Queensland and Queensland and contribute to the key transport policies and outcomes sought by the Australian, State and local governments (refer to **section 2.2**).

The critical benefits relate to the provision of greater public transport capacity, improved travel times, better accessibility to public transport and reduction of congestion and overcrowding. These benefits are discussed in the following sections and further details are provided in **Chapter 4 – Traffic and transport**.

2.5.1 Improvements to rail network operations and performance in general

Passenger rail use is forecast to increase with the Project. The rail network with the Project would have increased capacity for southern and eastern rail services and is predicted to experience higher patronage growth compared to growth without the Project. Average rail trip lengths would increase due to increased capacity in the inter-city lines (more people travelling on the Gold Coast and Sunshine Coast lines) but the average trip times would be maintained or improved through efficiencies and greater rail connectivity provided by the Project.

2.5.2 Improvements to bus network operations and performance in general

The Project would encourage the use of buses for short trips in the inner areas of Brisbane, resulting in increased bus patronage and overall kilometres travelled, but lower average trip lengths and less time spent on buses by passengers. Overarching improvements include:

- a reduction of bus crowding on routes to the Brisbane CBD as passengers are able to use the additional services provided by the Project
- a significant improvement in the level of service on the South East Busway and the Victoria Bridge approach to the Brisbane CBD
- improved level of service for bus services on the Captain Cook Bridge
- improved level of service for bus services using the Northern Busway and Inner Northern Busway and travelling through the Brisbane CBD using the Project
- improved accessibility to destinations in the inner city such as QUT, Woolloongabba and indirectly, UQ
- greater network resilience with less reliance on a single grade separated bus connection across the river
- improved network operational efficiency and reduce running costs.

2.5.3 Benefits to bus and train passengers

Passengers would benefit from the Project providing more bus and train services at higher frequencies to the Brisbane CBD, particularly from the south and east, travel time savings, reduced crowding, reduced Brisbane CBD station interchange delays and station access times, improved Brisbane CBD service reliability and reduced public transport costs.

Public transport travel time savings

Across the regional rail network, there would be an average travel time reduction of half a minute for every trip in 2021, and a 0.7 minute saving for every trip in 2031. Trip times by buses would fall on average by over one minute over the entire network. There would be a greater reduction in average trip time on public transport services to the Brisbane CBD particularly services using the Project.

In terms of total trip time (in-vehicle time, wait time, boarding time and access time), it is forecast that the Project would generate significant travel time savings in 2021 to locations that are not currently well served by public transport of up to 15 minutes. For example the QUT Gardens Point campus would be much closer to the rail and busway station located at George Street than the existing alternatives at Roma Street, Central Station and South Bank. Suburbs such as Beenleigh and Windsor that are located on public transport corridors (rail and bus respectively) and would be directly serviced by the Project, would also benefit from substantial travel time savings.

Crowding relief

The Project would generate significant benefits of about 9 per cent less crowding in 2021 and 14 per cent less crowding in 2031, compared to without the Project. This benefit would be greatest for passengers travelling in peak periods on the longer commuter bus and train services from the south, such as the Gold Coast rail services.

Wait time savings

The average 2012 wait time per passenger trip across the regional public transport network was about 7.4 minutes. The additional bus and rail services provided by the Project into the Brisbane CBD would reduce average wait times to 6.4 minutes in 2021 (13.5 per cent improvement) and to just over 6.2 minutes in 2031 (16.2 per cent improvement). Significant wait time savings would be experienced by evening peak period bus and train passengers waiting at stations within the Brisbane CBD.

The Project would reduce total regional network-wide wait times by about 2 per cent (2021 and 2031), compared with the without Project case. These savings are achieved even while overall travel demand increases significantly over the same period.

Benefits from changed public transport access time and interchange arrangements

Integration of public transport modes in the Brisbane CBD and the inner city would be improved by the Project as currently most rail activity within Brisbane CBD is centred on Central Station which has limited interface with bus services. The Project provides greater rail and bus interchanging opportunity and greater coverage of the Brisbane CBD and inner city through Woolloongabba Station, George Street Station and Roma Street Station. This improves travel time reliability for passengers travelling within the Brisbane CBD and inner city.

Compared with access times using the existing stations, the proposed changes to Brisbane CBD station arrangements, including the improved access for the southern areas of the Brisbane CBD to the George Street Station, would provide access time benefits for passengers using these stations.

Overall, there would be decreases in forecast average access time into the future with the Project, and improved public transport connectivity and coverage of the Brisbane CBD and inner city. This demonstrates the enhanced flexibility and connectivity available with the Project.

2.5.4 Benefits to public transport operators

The Project would provide a range of benefits to public transport operators, such as Queensland Rail (rail) and Brisbane Transport (buses), including:

- greater Brisbane CBD and inner city capacity (passenger rail and bus) to operate improved services and timetables to match passenger demand
- reduced vehicle crowding and the delivery of more comfortable journeys for an enhanced customer experience
- opportunities for the development of greater rail/ bus integration at key public transport nodes provided by the Project
- opportunities to rationalise operations, improve service reliability and improve the effectiveness and efficient use of existing rail assets
- higher fare revenues from higher patronage with the new, improved Brisbane CBD and inner city services.

2.5.5 Benefits contributing to wider transport objectives

The key transport objective being addressed by the Project is enhancing cross river public transport capacity to meet peak demand. The Project would also contribute to wider government transport objectives of improved regional accessibility, increased public transport mode share, reduced dependence on private transport, reduced crowding on buses and trains, reduced crowding within existing stations, and reducing the carbon footprint in the South East Queensland region.

Improved public transport accessibility to Brisbane CBD

The Project would provide the ability to add public transport services (rail and bus) to meet the demand to the Brisbane CBD and inner city between 2021 and 2031 and beyond. This would increase the accessibility to the Brisbane CBD by public transport. For example the Project would provide southern capacity for 24 trains in the peak hour, comfortably meeting south and eastern corridor demand projected for 2031, compared to the without Project case. Also the Project is projected to carry 172 bus services per day by 2031.

Improved mode share to public transport

Improved public transport services to the CBD attract more public transport users and reduce car use to the CBD. This is consistent with the key government sustainable transport objective to achieve higher public transport mode share.

The Project would result in an increase in public transport mode share on the regional network with a greater increase in public transport mode share for CBD and inner city trips to and from areas serviced by the Project. In 2021, the regional public transport mode share would increase from 7 per cent at present (2012) to 9.4 per cent and in 2031 to 10.8 per cent. In 2031 the Project would result in a higher public transport mode share (an increase of over 22,000 trips on public transport per day in 2031) than the without Project case by 0.2 per cent.

Reduced dependence on private transport

Reducing car dependency leads to environmental benefits including reducing carbon-based fuel use and reducing car engine emissions. Specifically, the Project would result in 80 million private vehicle kilometres in 2031 being taken by public transport instead of by private vehicle resulting in a reduction of weekday vehicles of 0.3 per cent.

Investigations presented in **Chapter 7 – Climate** found that in 2031, the Project would reduce trips by private motor vehicles and commercial vehicles by the equivalent of 252,000km for an average weekday.

Reducing growth in road congestion

The Project would attract passengers currently using private transport to both bus and rail services which would create a small regional benefit. This benefit would increase within local areas directly serviced by the Project. Within the Brisbane CBD, the Project would remove buses from the Brisbane CBD road network, freeing space for general traffic use.

At the regional scale, the Project would relieve general road traffic and reduce private vehicle kilometres travelled compared to without the Project (reduction of 0.2 per cent in 2021 and 0.3 per cent in 2031). Average network speeds in 2031 would be higher by around 0.4km per hour compared to the without the Project scenario. Average private vehicle travel times across the regional network would ease or decrease by 0.3 minutes in 2031 with the Project. This equates to around 36,000 less hours spent on private vehicle trips across the regional network in 2031 compared to without the Project.

Reducing fuel use and carbon footprint

The Project would result in reduced growth in fuel use and carbon footprint. This would be achieved through increased rail and bus use and resultant reduction in expected oil-based fuel use (tonnes of fuel) of private motoring and future carbon (CO_2) emissions on the network.

Investigations presented in **Chapter 7 – Climate** found that over the 100 year life of the Project, greenhouse gas emissions would be reduced by approximately 2,500,000t CO_2-e as a consequence of its operation.

Improving modal integration

Improved public transport accessibility, including new Brisbane CBD and inner city stations and improved use of existing stations, would result in improved modal integration between rail and bus. The number of passengers interchanging at key bus and rail stations would increase and use of Brisbane CBD stations would increase due to improved access and reduced walk times, particularly for the George Street Station.

This increase in connectivity between public transport modes allows interchanging between modes which improves choice of travel and greater accessibility for public transport users within the inner city.

2.5.6 Land use benefits

The Project would support the future growth and development of South East Queensland proposed under the SEQ Regional Plan, by providing improved public transport access to and between areas of future population and employment growth.

Regional population and employment growth

The SEQ Regional Plan identifies a preferred settlement pattern for South East Queensland. The preferred settlement pattern seeks to support growth in established urban areas and redevelopment in and around existing urban centres and along high frequency transport corridors.

The SEQ Regional Plan identifies the Brisbane CBD as the primary activity centre, supported by a number of principal regional activity centres that provide a focus for business, employment and residential development. The Project supports the development of the principal regional activity centres by providing the capacity to allow the regional rail network to link the regional activity centres with the Brisbane CBD, so these centres can act as vital nodes in the rail network. Without the Project, the ability to connect the principal regional activity centres to the Brisbane CBD by high quality, rapid transit links would be compromised. This would inevitably lead to the inability of these centres to reach a critical mass, resulting in more dispersed regional activities and a more car dependent region.

The SEQ Regional Plan also promotes the development of a number of strategic regional development areas, including Flagstone Coomera and Yarrabilba. Each of these locations lie within the southern catchments of the regional rail network supported by the capacity provided by the Project.

The efficient and sustainable development of these communities is dependent on additional rail capacity provided by the Project. The regional rail network capacity provided by the Project, would connect these regional development areas to activity centres by high quality transport.

Inner city population and employment growth

Inner Brisbane is identified by the SEQ Regional Plan as a focus for future employment growth. The Project would enhance the existing rail and bus networks in the inner city and in doing so would support the preferred land use patterns and efficient and sustainable development activity. Without the Project, the transport networks would remain congested, limiting the capacity to support the urban development densities envisaged for parts of inner Brisbane in the SEQ Regional Plan.

The location of the Project stations would also provide rapid, high frequency connections between primary destinations and activity areas in inner Brisbane. Dutton Park Station and Boggo Road Busway Station would continue to support the development of the Boggo Road Urban Village and the PA Hospital campus. Woolloongabba Station would support the planned renewal of Woolloongabba Central, Kangaroo Point South and the Woolloongabba PDA. The Project would also provide an indirect regional link to UQ at St Lucia, through intermodal connectivity at Woolloongabba Station.

George Street Station would support the ongoing development of the Brisbane CBD, the Queen's Wharf Brisbane project and the vibrant mixed use residential, employment and retail precinct adjoining the City Botanic Gardens. It also provides direct access to the financial district, the government precinct at lower George Street and QUT Gardens Point. Roma Street Station would support continued development of commercial and mixed use activities in adjoining areas and preserve long-term city expansion. It would also support an indirect connection, via the Kurilpa Bridge to the planned Brisbane CBD expansion areas at the northern extent of the West End peninsula.

2.5.7 Economic benefit of the Project

An economic assessment of the Project has been carried out and is described in **Chapter 14 – Socio-economic assessment**. A detailed cost benefit analysis and an economic impact assessment were completed as part of the economic assessment. The Project economic benefits and the wider economic benefits are described as follows.

Project economic benefits

The economic assessment included a broad assessment of the likely impacts of the Project on public transport passengers as well as private and commercial vehicle road users. The benefits of the Project are significant amounting to $4.73 billion in present value terms (2014).

The largest components of these benefits are time savings, crowding and reliability improvements (as described in **section 2.5.3**) to public transport users which amount to $1.66 billion or 35 per cent of total economic benefits. There are also significant benefits for road users with $1.23 billion or 26 per cent of the total economic benefits from travel time savings for road users who remain on the road network.

The estimated present value of capital costs of the Project is $3.53 billion and $563 million for whole of life costs giving a total cost of $4.09 billion, which includes the cost of additional rollingstock.

Based on the above costs and benefits, the Project generates a solid economic return with a net present value of $641 million and a benefit-cost ratio of 1.16 (7 per cent discount rate) based on transport system benefits.

Wider economic benefits

Transport improvements have the potential to impact the economy through a number of different mechanisms, including changes in process, economic output, labour supply, imports and exports. Changes to the Brisbane economy may result in wider economic impacts attributable to the Project. These changes could include:

- agglomeration effects of improved public transport bringing activities and people closer together and effectively raising the density of economic activity. The Project would effectively lower the cost for workers accessing locations of employment along the route thereby increasing productivity and the available pool of workers that firms can find suitable workers from
- additional labour supply, as the result of improved time and reduced cost in getting to a place of work, as an incentive to work. By reducing the cost of accessing jobs, improved accessibility provided by the Project can encourage non-participants, typical potential second-earners or family members with child care responsibilities, to take up employment.

Imperfect competition effects were also considered, and these are where companies that benefit from transport improvements would experience lower costs, which in turn can be converted to increased turnover. However, since a very small proportion of journey savings from the Project accrue to businesses, the resulting wider economic impacts are likely to be insignificant.

2.6 Alternatives to the Project

This section provides an overview of the strategic network, corridor and project planning undertaken in recent years regarding the inner-city public transport challenges in Brisbane. The Commonwealth, State and local strategic planning frameworks identified the need for the development of public transport infrastructure within inner Brisbane. A range of studies have been carried out by various levels of government to identify suitable public transport solutions.

These studies have led to the identification of the Project, a combined railway and busway in a single double-decked tunnel, as the preferred public transport outcome for the Brisbane area. The Project provides an affordable bus and rail solution that would address public transport capacity constraints at key inner city destinations, including across the Merivale Bridge for rail and at the Cultural Centre Busway Station for bus. As such, the Project would boost the capacity of the public transport network and reshape it to meet Brisbane's growing and changing travel demands.

2.6.1 Strategic public transport analyses to identify preferred strategy

A number of rail and bus studies have been carried out by various State and local government agencies to identify future capacity and network constraints. These studies outlined potential future public transport demand scenarios and identified opportunities for addressing network capacity issues.

Studies carried out of relevance to the Project include:

- Inner City Rail Capacity Study (ICRCS), 2008
- The Rail Assessment of Capacity Alternatives Study (RACAS), 2008
- Bus Access Capacity Inner City Study (BACICS), 2008
- Busway Conversion Report, 2009.

From the studies considered, it was generally identified that bus and rail networks are already experiencing capacity constraints that would continue to worsen as demand increases. Each study identified a range of options that would assist in alleviating future capacity constraints on the bus and rail networks. These studies provided direction for the investigations into the proposed projects described in **section 2.6.2**.

Heavy rail options – new infrastructure and capacity management measures

The ICRCS study identified that the rail capacity needed to be doubled by 2026 to support the forecast passenger demand and the consequential required increase in train services. The ICRCS identified that two new heavy rail links would be required to double the inner city's rail capacity, the first by 2016 and the second by 2026. A new public transport river crossing was sought to provide additional north-south corridor capacity through the inner city by 2016. A future north-west corridor, to be delivered by 2026, was proposed to further expand inner city capacity.

The RACAS study was carried out to identify alternative, short-term capacity measures to assist in alleviating capacity constraints while major rail infrastructure upgrades are implemented. The RACAS recommended a prioritised program of alternative capacity measures for possible implementation over five to seven years that sought to preserve current capacity, change passenger travel demand patterns and ultimately enhance network capacity. This package of initiatives included utilising higher capacity trains, peak spreading, eliminating Mayne stabling conflict movements, active management of passenger loading and unloading, rescheduling the inter-state XPT service and fine tuning inner city headways.

Bus options – new infrastructure and capacity management measures

The BACICS study identified that the demand for 529 buses per hour entering the Brisbane CBD in the morning peak in 2008 could increase to over 1,200 buses per hour by 2026, an increase of 127 per cent. This would result in on-street and bus/ busway infrastructure having insufficient capacity to meet demand and a requirement for the doubling of bus capacity across the Brisbane River to provide significantly more bus bays and layover space in the city.

After identifying where the network is most heavily loaded, BACICS then assessed which initiatives had the greatest potential for improving travel times and reliability. It assessed options to provide additional capacity within the inner city, including policy intervention, operational improvements to improve efficiency and infrastructure solutions such as:

- providing a strategic mix of bus services that either terminated on the fringe of the Brisbane CBD or ran through the Brisbane CBD
- developing feeder and distributor bus services from stations on major spine routes
- expanding the bus priority network to link with more inner city destinations
- improving inner city pedestrian and cycle connections to and from public transport stations
- investigating an additional inner city bus distribution network.

BACICS recommended more efficient use of the inner city bus network to create new bus capacity and reallocate space from general road traffic for more bus bays and layover space. Also proposed were new bus stations within the Brisbane CBD and new busway connections.

Light rail and metro vehicle options

The Busway Conversion Report included a technical assessment of the potential to co-locate buses and light rail transit vehicles within the existing Brisbane busway network or to fully convert the existing busway into a dedicated metro rail operation utilising either light rail transit or metro vehicles.

The report found that it was not feasible to co-locate buses and light rail transit vehicles within the existing busway infrastructure. This was due to the considerable cost and significant disruption that the works would cause to the existing network versus the marginal increase in passenger capacity that would result from the conversion works.

Integrated transport and land use considerations

In 2009, the Queensland Government examined how the transport network overlaps and how gaps in the transport networks could be addressed in a coordinated way and aligned with preferred land use development patterns and current or committed investments. Some of the key findings of this assessment were:

- inner city Brisbane is expected to experience significant intensification of land use activity development in areas adjacent to the Brisbane CBD and along the major mass transit corridors
- with coordinated land use planning and provision of adequate public and active transport infrastructure, inner Brisbane has the capacity to accommodate a significant proportion of the necessary dwelling and employment targets outlined in the South East Queensland Regional Plan
- accessibility between nodes within the inner city will be a key determinant of the future success of the Brisbane CBD. Inner city employment forecasts would only be realised if travel to and within the inner city remains convenient and reliable.

This study reiterated the conclusions from BACICS that bus and rail infrastructure alone would not meet the capacity issues facing inner Brisbane, particularly the inner city passenger distribution task.

This work supported the findings of the ICRCS, proposing a new south to north link via Park Road, Woolloongabba, Brisbane CBD and initially via the Exhibition Line and ultimately extending to the north-west. This strategy was considered the most complementary to the preferred land use strategy by serving the areas most in need of additional capacity and most likely to grow first.

2.6.2 Investigation of identified heavy rail and bus solutions

Following the earlier studies described in **section 2.6.1**, separate preferred options were identified for heavy rail and buses ie Cross River Rail and Suburbs 2 City. Both sought to provide additional river crossing capacity as well as new infrastructure in the inner city.

Heavy rail – Cross River Rail detailed feasibility study

The Queensland Government undertook a comprehensive assessment of the impacts of the proposed Cross River Rail project through a business case, supported by a reference design and an Environmental Impact Statement (EIS). The process involved extensive consultation with key stakeholders including the broader community.

The proposed Cross River Rail consisted of a 9.8km twin heavy rail tunnels between Yeerongpilly in the south and Victoria Park in the north. Four new underground stations were proposed along the route at Woolloongabba, Boggo Road, Albert Street and Roma Street. At the southern end a new surface station at Yeerongpilly and minor upgrades at Moorooka and Rocklea stations were proposed.

The proposed Cross River Rail project also included 5km of additional surface tracks to the south of Salisbury (including 4km of additional dual gauge track, 3km of two additional passenger tracks and various track realignments and access tracks). At the northern end, a new surface station at the existing Exhibition Station was planned. From the northern portal at Victoria Park the proposed project also had 2.7km of two additional surface tracks on the Exhibition Line plus additional track construction and realignment to maintain capacity and functionality through Mayne Yard.

The then Coordinator-General approved the EIS in December 2012, and indicated that, subject to the conditions of the EIS being met, project impacts can be avoided or minimised to an acceptable degree.

In September 2011, a business case for the proposed Cross River Rail project was completed and forwarded to Infrastructure Australia for consideration. Infrastructure Australia's assessment process afforded the proposed project 'ready to proceed' status in mid-2012.

The investigations demonstrated that a new cross river heavy rail option was technically feasible, environmental impacts were manageable and along with the business case, identified the significant economic and transport benefits of improving rail infrastructure serving the inner city.

Due to the cost of the proposed project ($6.4 billion), the Cross River Rail project was put on hold while further investigations were undertaken.

Bus – Suburbs 2 City

In 2013, Brisbane City Council developed the Suburbs 2 City buslink initiative to investigate options to improve the performance of Brisbane's bus services through the busiest parts of the inner-city at the Cultural Centre precinct and the Brisbane CBD.

Stage 1 of Suburbs 2 City proposed to improve connections between Brisbane's northern and southern busways across the Brisbane River and through the CBD via a dedicated busway link to:

- increase bus capacity across the river into the city centre
- further develop Brisbane's busway network by giving buses a congestion-free run through the Brisbane CBD between the northern and southern busways
- alleviate bus capacity issues along Adelaide Street and free up city streets for people
- improve development opportunities along Adelaide Street.

Stage 1 proposed a segregated busway connecting the South East Busway to the Inner Northern Busway at King George Square comprising tunnels and a new busway bridge shared with pedestrians and cyclists. Stage 1 of Suburbs 2 City was part of a broader long-term busway concept consisting of Stage 1 – South East Busway to Inner Northern Busway, Stage 2 – Inner Northern Busway to Centenary Place, Fortitude Valley and Stage 3 – Centenary Place, Fortitude Valley to the Northern Busway at the RBWH.

This study identified the benefits of improving busway capacity across the river and providing improved busway infrastructure in the Brisbane CBD. The pre-feasibility study was provided to the Queensland Government for consideration as part of its investigations into the rail and bus networks.

2.6.3 Refinement of the preferred public transport strategies

A number of studies have been carried out following the completion of the Cross River Rail and Suburbs 2 City studies. These studies aimed to identify further opportunities based on the studies completed particularly in regard to affordability and integration of public transport outcomes. These studies included:

- Independent Panel Review – Cross River Rail, 2012
- Cross River Rail Business Case Addendum, 2013
- Brisbane Inner Rail Solution (BIRS), 2012-2014.

Heavy rail – Independent panel review of the proposed Cross River Rail project

In May 2012, the Queensland Government commissioned an Independent Panel (the Panel) to review the proposed Cross River Rail project. The Panel recommended consideration of progressing with the core Cross River Rail project as part of a staged delivery. The Panel also recommended the implementation of priority short to medium term initiatives to increase rail capacity and optimise the use of existing infrastructure and services.

The Panel recommended staging the Cross River Rail with an initial focus on the north-south core to enhance affordability. The Panel also recommended the development of more accurate capital costings, confirmation of the extent of capacity enhancement by initiative and the development of a detailed implementation plan including funding arrangements.

Heavy rail – Cross River Rail business case addendum

In March 2013, the Department of Transport and Main Roads (TMR) developed an addendum to the Cross River Rail Business Case (the Addendum). The Addendum confirmed that the proposed core Cross River Rail project provided significant transport benefits and could be delivered largely within the conditions of the EIS approval for Cross River Rail. However, the affordability of the proposed core project was considered to be prohibitive in light of the State's fiscal position.

Heavy rail – Brisbane Inner Rail Solution

The BIRS is a program of works and initiatives to accommodate growth and address inner city capacity constraints in the existing rail system and was initiated in light of the findings of the 2012 Cross River Rail Independent Panel Review. The BIRS includes:

- delivery of an early capacity works program – a package of value-for-money, short to medium-term solutions which includes capital works such as seat reconfiguration and routine operational improvements such as revisions to timetabling – to defer the need for Cross River Rail from 2016 to 2021
- delivery of the core Cross River Rail project between Yeerongpilly and Victoria Park.

The early capacity works program is currently in delivery with timetabling changes having taken effect from Monday, 20 January 2014.

Integrated heavy rail and bus infrastructure outcome

Both the Queensland Government and Brisbane City Council recognised the need to improve rail and bus capacity into and within the inner city. Constructing separate heavy rail and bus projects had significant costs and construction impacts that made separate projects unfeasible.

It was recognised that significant savings could be realised by combining new inner city bus and train infrastructure into one project, while maintaining the significant benefits of both. This provided the direction for the development of the concept design and reference design for the Project (refer to **Chapter 3 – Project description**).

2.7 Conclusion

The Project addresses the growing need to increase the capacity of public transport infrastructure within the inner city areas of Brisbane, particularly across the river and through the Brisbane CBD. Parts of the current train and bus networks are operating close to or above capacity during peak periods resulting in congestion, increases in travel times, reduction in on-time reliability and overcrowding. Key public transport challenges for the inner city are:

- population growth across the region, particularly outside the Brisbane LGA
- employment growth, with a strong focus on Brisbane's CBD and inner city
- public transport patronage growth
- transport network capacity constraints on the rail and bus networks such as Merivale Bridge (rail) and Victoria Bridge (bus)
- public transport service coverage requirements to meet the changing structure of the inner city Brisbane such as improving access for the CBD south
- increased transport network congestion and public transport overcrowding.

This situation will deteriorate in the future without investment in public transport infrastructure.

Commonwealth, State and local strategic policy frameworks recognise the need to augment the current public transport network to accommodate the future growth forecast for the region. The Project would address many of the strategic transport outcomes being sought by these policy frameworks.

The Project would provide additional river crossings to the bus and train networks resulting in substantial improvements to network capacity. This allows for growth in train and bus services resulting in increased public transport passenger movements. Other benefits that would be experienced include:

- travel time savings on public transport, including reduced likelihood of delays to passengers
- crowding relief on public transport
- improved public transport wait time savings
- improved access to public transport within the Brisbane CBD
- improved mode share to public transport
- reduction in private vehicle demand, thereby reducing road congestion and fuel demand
- support for the development intents of the regional and local planning frameworks
- improved economic activity through lower transport costs and improving accessibility to employment opportunities.