Department of Transport and Main Roads

Underground Bus and Train project

Initial Advice Statement

18 November 2013

Great state. Great opportunity.

Queensland Government

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Contents

Executive Summary

The Underground Bus and Train project is an innovative, world first solution to the looming bus and rail capacity constraints in Brisbane's inner city. The project will deliver rail and bus together in a single tunnel under the Brisbane River from Dutton Park to Victoria Park with new underground stations at Woolloongabba, George Street and Roma Street. The Project will double the capacity of the rail and busway network across the Brisbane River and improve frequency, travel time and access benefits for passengers whilst reducing traffic congestion.

South East Queensland is expected to grow by over 660,000 people by 2021, and by over 1.3 million by 2031. While much of this residential growth is set to occur in areas beyond Brisbane's boundaries such as the Gold Coast, Sunshine Coast and Ipswich, Brisbane's inner city is forecast to remain the primary area for jobs growth. This means an increasing commuter transport task is expected to the inner city. The longer distance trips are particularly well suited to very high capacity public transport such as heavy rail, while the bus network will have a key role in catering for demand in areas closer to the inner city and in areas where rail has less coverage.

The rail network and bus network in Brisbane are both focused on the inner city and are busiest during weekday peak periods. Capacity in and through the inner city is therefore critical to maintaining the effectiveness of the public transport network to cater for current and expected growth in demand for travel.

Current service forecasts for rail are that the inner city rail network will reach capacity by around 2020, highlighting the need for expanding capacity to cater for growth. Similarly, the popularity of the busway network has meant that some inner city locations are exceeding capacity, affecting trip times and reliability. Almost 80 per cent of forecast trips across the region will start in, finish at, or travel through the inner city where bus and rail infrastructure is reaching capacity.

The Underground Bus and Train project represents a cost effective investment in public transport infrastructure that addresses a number of major capacity challenges facing the inner city bus and rail network. It addresses issues that would otherwise have adverse long term economic, social and environmental impacts. Expanding the rail and bus systems at the core of the network will result in a high level of integration between rail, which acts as the backbone of the regional network, and buses, the lifeblood of the city network.

An Underground Bus and Train project Concept Design has been prepared. The key features of the project include:

- A single large diameter tunnel from Dutton Park in the south to Victoria Park in the north
- Two new rail tracks and two new bus lanes integrated within the tunnel in a stacked arrangement
- Three new underground combined bus and rail stations at George Street and Roma Street in the Brisbane CBD, and at Woolloongabba (all proposed on government-owned land)
- Two tunnel portals, at Dutton Park and Victoria Park (all proposed on government-owned land)
- Rail track connections from the portals to the existing northern and southern rail network
- Busway connections from the portals to existing busway infrastructure
- Ventilation requirements at station locations.

The exact alignment and size of the tunnel and portals, the configuration of the tunnel (how bus and rail are arranged), connections to the existing network, station locations and design, and any associated changes to existing infrastructure will be refined from the current Concept Design during development of a Reference Design.

While the rail component of the project has been informed by the previous *Cross River Rail* proposal, the design varies markedly from the *Cross River Rail* design as it is a multi-modal option (by including bus infrastructure) that improves engineering and constructability aspects and provides significant cost savings. By having bus and rail in one integrated infrastructure solution the project provides a wide range of benefits for the entire public transport network. It also has a shorter tunnel and runs along George Street rather than Albert Street. This project is being proposed as a new project, requiring a new Environmental Impact Statement (EIS).

It is anticipated that the tunnel will for the most part be constructed using a tunnel boring machine (TBM). Five major construction sites could be required for the project, one at each of the three stations and one at each of the tunnel portals. The exact location and size of construction worksites as well as the methods and potential impacts of the removal of spoil and transportation of materials will be determined as part of the environmental assessment.

The study corridor, containing the proposed new infrastructure, is the area that will be the primary focus of impact assessment and identification of required mitigation measures. The study corridor stretches roughly from Dutton Park south of the river to Victoria Park in the north, via Woolloongabba and the CBD. Although the Concept Design has determined a possible alignment, the study corridor is sufficiently wide to allow scope for innovative design and robust assessment of project impacts. Project impacts outside the immediate study corridor will also be identified and assessed. Benefits that may be achieved beyond the study corridor as a result of the project, including improved rail and bus services, will also be determined.

There is significant potential for construction and operation impacts that will need to be mitigated under transparent and carefully developed management measures. The Proponent will undertake extensive consultation throughout the EIS process to ensure that the community is well informed and has opportunities to make suggestions about the project.

The studies required to support and complete the EIS may include, but are not limited to assessment of:

- traffic and transport, including bus and rail operations, road network impacts and active transport
- natural environment, including geology, water quality, flooding, ecosystems, and flora & fauna
- social environment, including property impacts, air quality and noise
- indigenous and non-indigenous cultural heritage
- spoil and waste management
- urban design, landscape and visual amenity
- hazard, risk and health and safety.

An environmental management plan will be developed as part of the EIS. The environmental management plan will seek to address the full range of aspects related to the project including design, construction, operation and maintenance. The intent of the environmental management plan is to outline the measures that are proposed to be implemented to manage the impacts of the project on the environment.

It is not anticipated that the project will significantly impact on matters of national environmental significance. However, the project will be referred to the Australian Government for a decision as to whether it represents a ‘controlled action’ under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

The Queensland Government is committed to growing a four pillar economy, lowering the cost of living by cutting waste, revitalising front line services, delivering better infrastructure and planning, and restoring accountability to government. The Underground Bus and Train project forms an integral part of responding to, and more importantly, driving economic growth particularly in South East Queensland. It also has a key role in supporting the ongoing role and function of the Brisbane CBD as the state's primary centre for commerce and employment.

The project will deliver the combined benefits of the previous *Cross River Rail* proposal and Brisbane City Council's recently announced *Suburbs 2 City* bus project, together estimated at around $8 billion (P90, out-turn), at a much more affordable price. The cost of the Underground Bus and Train project is currently estimated at $5 billion (P90, out-turn).

This Initial Advice Statement has been prepared as part of the application for a declaration as a 'coordinated project' under the State Development and Public Works Organisation Act 1971 to provide information for the Coordinator-General to decide whether to declare the Underground Bus and Train project a 'coordinated project' for which an EIS is required. Project approvals for all elements of the project will be identified during the EIS process. This Initial Advice Statement identifies a range of potentially relevant planning instruments for assessment of the project, both at local and state level, and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

The Department of Transport and Main Roads is the Proponent for Underground Bus and Train project and will fund the Reference Design and EIS phase of the project. The project will include a robust governance structure to guide development and assessment of the project that includes representatives from both state and local government agencies. There will be numerous opportunities for community input into the project during the EIS phase to completion of the process.

1 Introduction

1.1 Background

South East Queensland is one of Australia's fastest growing regions. In the 20 years to 2011, the residential population of South East Queensland increased from 1.85 million to more than 3 million. By 2021 the population is predicted to reach to 3.7 million and by 2031 almost 4.4 million[1].

Brisbane is the administrative, commercial and cultural centre of Queensland, and is one of Australia's leading growth centres. Maintaining strong growth and economic competitiveness in a major city relies on an effective, safe and attractive transport system. The Queensland Government and Brisbane City Council together continue to enhance the city's transport system and in ways that also benefit the broader region.

The Brisbane CBD is the region's primary activity centre and the focus of South East Queensland's public transport system. As it is the centre of the highest employment mix and density, and it supports a large, in-centre residential population, the CBD generates and attracts a large number of transport trips. The CBD also continues to expand into surrounding areas such as Fortitude Valley, Spring Hill, Milton, Albion, Newstead, Woolloongabba, Bowen Hills, South Brisbane and West End. Significant employment growth is expected in Brisbane's inner city with an additional 130,000 jobs expected by 2031[3].

Brisbane's inner city is the hub of South East Queensland's rail network, with all services passing through the inner city. Around 2020, the rail network is expected to reach capacity. Extensions and service increases to the broader rail network will depend on alleviating the capacity constraint at the heart of the network. The limited capacity of the Merivale Bridge and existing inner Brisbane rail tunnels significantly limit the number of additional trains that can be introduced to meet passenger demand. These bottlenecks have long been known and gave rise to projects including the previous *Cross River Rail* proposal.

Like the rail network, the bus network is focused on Brisbane's inner city. Bus constraints are already evident and visible on parts of the busway network and on key streets in the CBD. Bus queues on Victoria Bridge and in Adelaide Street show that the limits are being reached. Providing capacity in and through the inner city bus network is critical to the effective operation of the wider bus network and the ability to cater for future growth in services.

The Queensland Government is addressing the region's transport challenges through targeted and cost-effective investment in transport infrastructure, services and policy measures. Unlocking rail and bus network constraints in the inner city is considered the single largest priority for the public transport system in the region. The Underground Bus and Train project will relieve current capacity constraints and provide a major long-term boost to inner city bus and rail capacity and ensure growth in South East Queensland is supported by an efficient transport system.

The Queensland Department of Transport and Main Roads (the Proponent) recognises that a considerable body of work has been undertaken to examine ways in which to address inner city transport network constraints. In response to an increasingly tight fiscal environment, the Proponent reassessed the findings of previous studies in light of the Queensland Government's new priorities. The Underground Bus and Train project is an affordable and innovative, world first solution to the looming bus and rail capacity constraints in Brisbane's inner city. The project will double the capacity of the rail and busway network and improve frequency, travel time and access benefits for passengers whilst reducing congestion.

[1] *Queensland Government population projections, 2011 edition, OESR.*

1.2 Purpose and Scope of this Document

The Proponent is seeking to have the Underground Bus and Train project declared by the Coordinator-General a 'coordinated project' under section 26(1) of the *State Development and Public Works Organisation Act 1971.* Should such a declaration be made, the Coordinator-General will evaluate the environmental effect of the project and any other related matters, including any proposed mitigation measures.

This Initial Advice Statement has been prepared as part of the application for a declaration as a coordinated project under the *State Development and Public Works Organisation Act 1971* and as required under s.27AB of the Act to provide enough information to allow the Coordinator-General to decide whether to declare the project a 'coordinated project' for which an EIS is required. The Initial Advice Statement is also prepared to inform preparation of terms of reference for an environmental impact statement and to inform advisory agencies, stakeholders and the community of the project.

In making a declaration for a 'coordinated project', the Coordinator-General will have regard to one or more of the following[2]:

a) *detailed information about the project given by the Proponent in this Initial Advice Statement*
b) *relevant planning schemes or policy frameworks of a local government, the State or the Commonwealth*
c) *relevant state policies and government priorities*
d) *a pre-feasibility assessment of the project, including how it satisfies an identified need or demand*
e) *the capacity of the Proponent to undertake and complete an Environmental Impact Statement for the project*
f) *any other matter the Coordinator-General considers relevant*

However, the Coordinator-General need not consider an application for a declaration under section 26(1) unless the Coordinator-General is satisfied that the project has at least one of the following:

a) *complex approval requirements imposed by a local government, the State or the Commonwealth*
b) *strategic significance to a locality, region or the State, including for the infrastructure, economic and social benefits, capital investment or employment opportunities it may provide*
c) *significant environmental effects*
d) *significant infrastructure requirements.*

1.3 Cross River Rail

There is a close association between the Underground Bus and Train project and the previous *Cross River Rail* proposal in terms of part of the rail infrastructure component, including the general alignment of part of the corridor and potential environmental impacts. The Proponent for the Underground Bus and Train project is also the same as that for the previous *Cross River Rail* application.

The Proponent has sought to make best use of information generated as part of the *Cross River Rail* proposal. As such, the environmental assessment phase of the project will utilise relevant information and analyses generated as part of *Cross River Rail* investigations where applicable.

For clarity, the Proponent wishes to advise that this project is being proposed as a new project, requiring a new Environmental Impact Statement.

[2] *State Development & Public Works Organisation Act 1971, section 27*

2 The Proponent

The Queensland Department of Transport and Main Roads is the Proponent for the Underground Bus and Train project. Contact details for the Proponent are:

Office address:	Postal Address:	Contact:
Level 12, Terrica Place 140 Creek Street Brisbane QLD 4000	GPO Box 213 Brisbane QLD 4001 Australia	Project Director Phone 07 3066 7298 arthur.stamatoudis@tmr.qld.gov.au

The next phase of the project includes developing a Reference Design and environmental assessment. This phase will be funded by the Proponent and involve a range of specialist advisory consultants.

For the construction phase, a range of delivery options, such as traditional delivery, Public-Private Partnership (PPP), and hybrid PPP, will be explored by the Proponent during preparation of a detailed Business Case.

The Proponent is highly experienced in the planning, delivery and operation of major transport infrastructure. In 2012-13 the Proponent administered a transport capital budget of almost $5 billion. The Proponent has an excellent track record in coordinating environmental assessments and delivering environmentally sensitive transport solutions, evidenced through recent major infrastructure projects such as the Ipswich Motorway Upgrade, Eastern Busway, Northern Busway, and Springfield and Moreton Bay rail projects. Further information about the Proponent's achievements, performance and outlook is available at www.tmr.qld.gov.au.

3 The Proposal

3.1 Scope of the Project

The Underground Bus and Train project will provide a new north-south bus and rail tunnel extending from Dutton Park in the south to Victoria Park in the north via the Brisbane CBD. A Concept Design for the project has been prepared and consists of:

- A single large diameter tunnel from Dutton Park in the south to Victoria Park in the north
- Two new rail tracks and two new bus lanes integrated within the tunnel in a stacked arrangement
- Three new underground combined bus and rail stations at George Street and Roma Street in the Brisbane CBD, and at Woolloongabba (all proposed on government-owned land)
- Two tunnel portals, at Dutton Park and Victoria Park (all proposed on government-owned land)
- Rail track connections from the portals to the existing northern and southern rail network
- Busway connections from the portals to existing busway infrastructure
- Ventilation requirements at station locations.

The Concept Design has the main underground rail tracks and bus lanes accommodated together in a single 5.4 kilometre tunnel with a diameter of around 15 metres. The tunnel will arrange bus and rail in a stacked manner and provide for one rail track and one bus lane in each direction, providing capacity for at least 24 rail services and 150 bus services per hour per direction. It will be equipped with sophisticated emergency, communication and ventilation systems as well as evacuation measures comprising the Fire & Life Safety systems of the tunnel. The vertical alignment of the tunnel will be dictated by geological conditions, topography, under river detail, performance characteristics of new trains, the location of stations and the need to connect to existing surface infrastructure.

The northern portal at Victoria Park will be located to enable effective rail and bus connections to the existing rail network and Inner Northern Busway. Both southbound and northbound tracks and bus lanes will use the one portal. The southern portal at Dutton Park will facilitate rail track and bus lane connections to the existing southern rail network and Eastern Busway. Changes to the existing bus and rail network may be required as part of the project, including changes to, or decommissioning existing stations. Both portals will use government-owned land.

The new underground combined bus and rail stations will be at varying depths and designed to meet strategic land use and planning intentions in each location. The new stations will facilitate seamless interchange between other bus and rail stations at Roma Street and Woolloongabba. Rail platforms will have an estimated length of up to 175 metres to enable train lengths to increase from six-car to seven-car trains in the future. Bus platforms will have sufficient length to cater for high bus volumes and a range of bus vehicle types. Innovative technological systems will be part of the stations and tunnel including station platform screen doors, real time passenger information and a world's best practice train signalling system, to allow greater capacity and enhanced safety.

The George Street station will be key to delivering additional passengers to the city centre. It will be integrated with the revitalised Government Precinct[3], providing better access by rail and bus to employment, recreation, parklands, and the Queensland University of Technology.

[3] *See Glossary for a definition of Government Precinct*

The Roma Street station will extend South East Queensland's primary transport interchange hub and support the continued development of commercial and mixed-use activities in this quarter of the CBD. It will also preserve long-term city expansion opportunities associated with the Transit Centre and Roma Street Station.

The station at Woolloongabba will be situated in the Woolloongabba Priority Development Area to support planned urban growth in that location. The station will have multiple roles in the rail and bus network. It will provide access to the Woolloongabba precinct, act as a major interchange and is a major event station serving "The Gabba" stadium.

The Concept Design tunnel arrangement and cross-section is illustrated in Figure's 3.1 and 3.2. However, the exact alignment and size of the tunnel, its configuration (how bus and rail are arranged within the tunnel), connections to the existing network, station locations (including entry points) and design, and any associated changes to existing infrastructure will be refined from the current Concept Design during the development of the project Reference Design. It is anticipated that the tunnel will for the most part be constructed using a tunnel boring machine (TBM). The location for launching the TBM will be determined as part of the Reference Design phase, however it is likely to be limited to the major construction sites identified in Section 3.9.

The project design has also considered the long-term requirements of the infrastructure as it relates to further expansion of the public transport network in South East Queensland. Projects to be considered within this context include (but are not limited to) future expansion of the bus network, a possible new north-west rail connection, and a potential new inner city rail connection to the Ipswich line and potential future underground 'metro'.

The Underground Bus and Train project timetable is proposed to align with the timetable for the redevelopment of the Government Precinct. This interface is an important consideration for the project as the George Street station is expected to form an integral part of the Government Precinct project. There are potentially close construction interrelationships between the two projects.

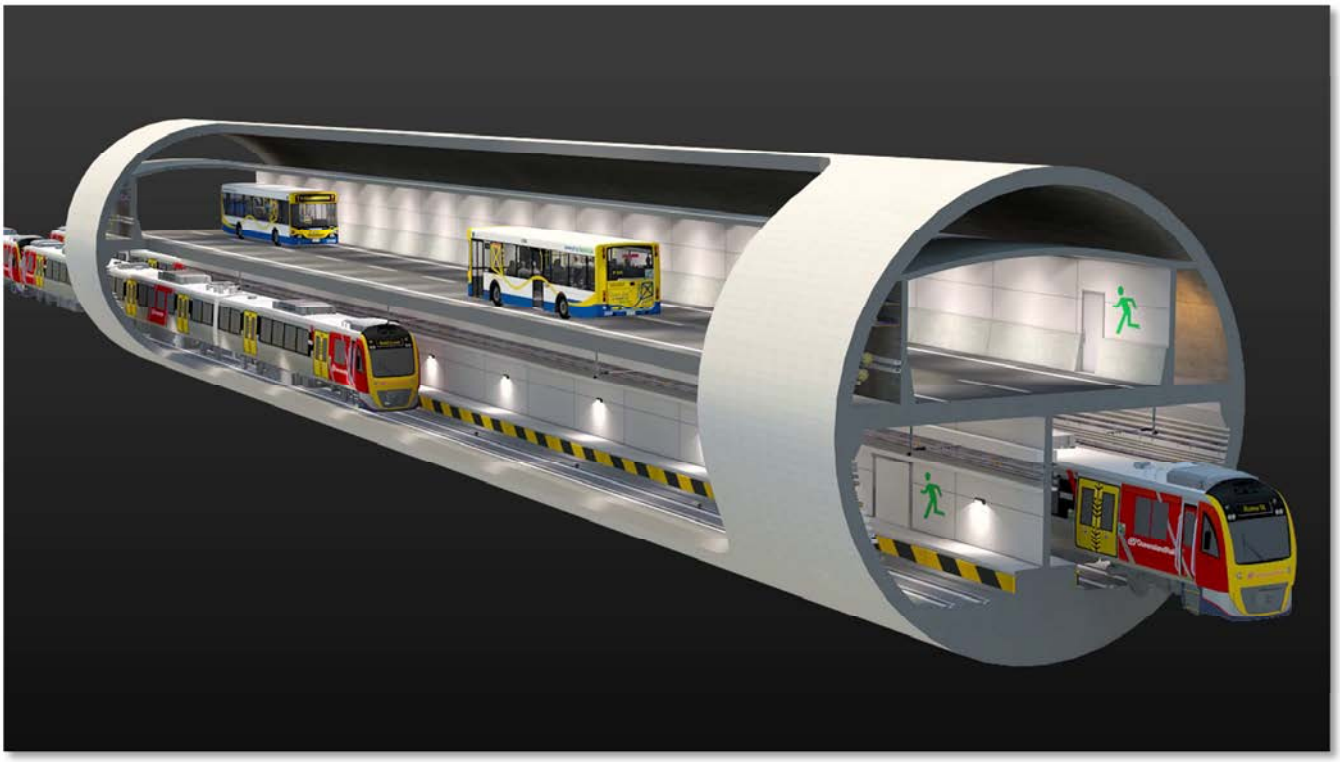

Figure 3.1 Tunnel concept as per current Concept Design, noting this will be refined through the Reference Design process

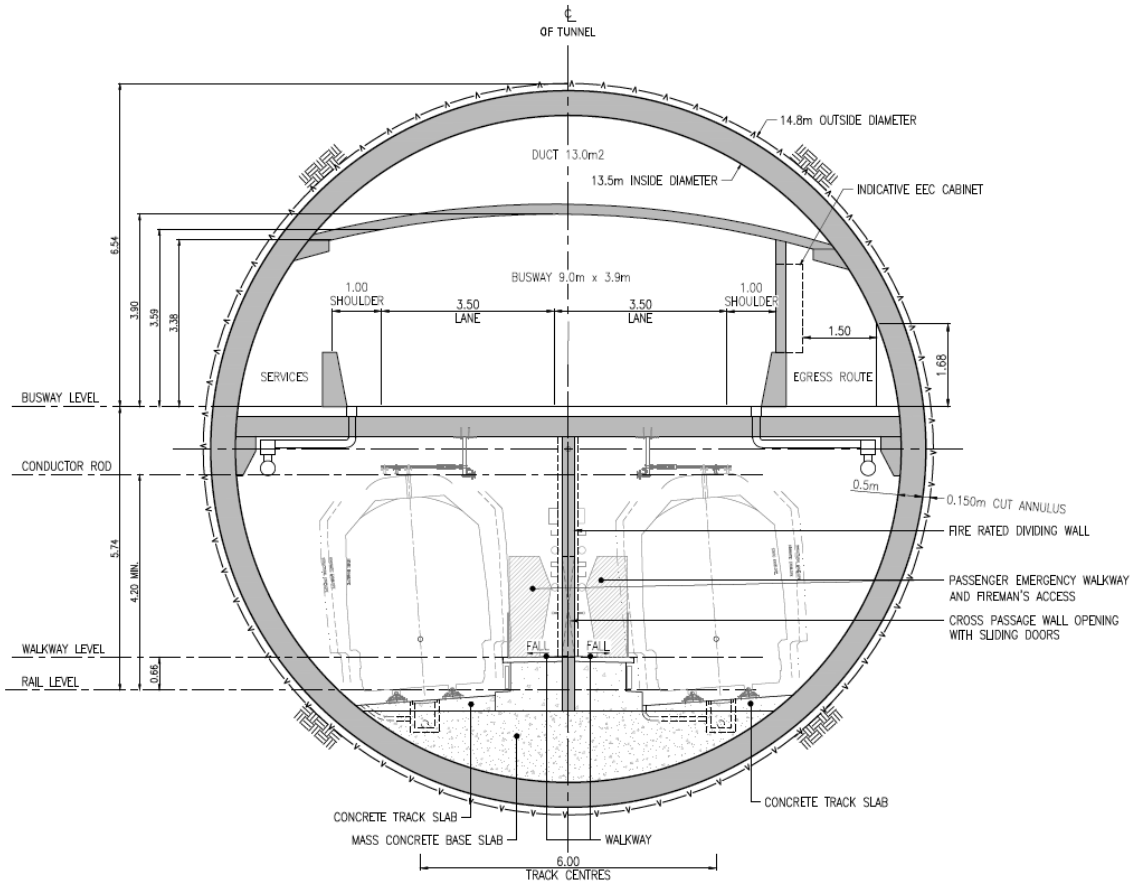

Figure 3.2 Tunnel Cross-Section as per current Concept Design, noting this will be refined through the Reference Design process

3.2 Associated Infrastructure Requirements

The Underground Bus and Train project may include (but is not limited to) the following infrastructure elements:

- establishment of work sites and access arrangements to facilitate construction works
- utility provision and relocation (including potable water, sewage, gas, telecommunications, power, and stormwater drain provision and relocation)
- rail tracks and signalling, both at the surface and in tunnel
- busway infrastructure both at the surface and in tunnel, including bus layover and hold-up areas
- tunnel and station infrastructure, including fire and life safety systems, ventilation systems and lighting and communications systems
- underground stations including access and egress provisions, vertical transport, passenger amenity facilities and safety features
- changes to surface infrastructure (e.g. footpaths) to facilitate passenger movements
- potential changes to, or decommissioning of existing stations
- rail and bus infrastructure connections to the existing rail and busway network
- provision of power for construction and operations including feeder cables and substations
- provision of telecommunications and data provision within the operating project
- rail signalling and bus Global Positioning System (GPS) headway and fleet management technologies
- bus and rail Real Time Passenger Information Systems

3.3 Complementary Projects

Government Precinct Redevelopment Project: The current Concept Design integrates a new George Street bus and rail station beneath the Government Precinct redevelopment site to realise cost savings through joint design and delivery and achieve an integrated outcome. By integrating the infrastructure components of the station and building development, efficiencies can be realised through shared excavation and construction works, and shared services and facilities. This joint design and construction however, requires a high level of integration and coordination.

The preferred design solution for the George Street station and the responsibility for station civil and structural works will be confirmed in the Reference Design phase of the project. A range of different design and delivery options exist. At the time of writing, many of the integration and interface complexities were yet to be resolved. For the purposes of this Initial Advice Statement, Table 3.1 provides an indication of possible delivery responsibilities for the two projects, noting that these might change as the design of both projects evolves.

The interface risks between the two projects are significant and will be managed by the Queensland Government to ensure that the two projects are effectively integrated. If government considers the integration risk too challenging, the two projects may be separated. The potential cumulative impacts of the two projects occurring simultaneously will also need to be assessed.

Underground Bus and Train Proponent	Government Precinct Proponent
• Structural works for the station, vertical transport and service requirements • Possible construction of a load transfer structure • Station fit-out • Essential works at station entrances • Minor public realm works	• Demolition of buildings • Station, station shaft and basement car-park excavation • New building and car-park development and construction • Major public realm works including major street works and reconfiguration

Table 3.1 Delivery responsibilities assumed for this IAS related to the George Street Station site

Rail and bus vehicles: The project assumes full integration with existing rail rollingstock and has been designed to allow for Next Generation Rollingstock being procured by the Queensland Government to cater for growth across the rail network. Reconfiguration of bus routes and services to make best use of the new capacity and accessibility provided by the project is proposed to be planned and implemented by TransLink and Brisbane City Council. New bus vehicles, if specifically required for the project, are proposed to be procured separately. Procurement of bus and rail vehicles is thus outside the scope of the Underground Bus and Train project for assessment purposes.

3.4 Project Need

Population and Employment

The population of South East Queensland is forecast to grow by over 660,000 people by 2021, and by over 1.3 million by 2031. Much of the expected population growth is set to occur in the Gold Coast, Beenleigh, Sunshine Coast and Ipswich catchments and in inner urban areas of Brisbane. At the same time, Brisbane's inner city is forecast to remain the primary area for jobs growth in South East Queensland. Of the 445,000 new jobs expected in metropolitan Brisbane by 2031, 130,000 will be located in the inner city[4].

With much of the residential growth occurring outside Brisbane but significant jobs growth occurring in Brisbane's inner city, a large commuter transport task is expected to the inner city. The land use profile of Brisbane's inner city is also planned to change. The resident and employment population will increase substantially, particularly in areas such as South Brisbane, Milton, Woolloongabba, Bowen Hills and Fortitude Valley. Travel within the inner city itself will consequently intensify, with more people living and working in the area and more interaction between existing and new areas of activity.

Another significant change in Brisbane's CBD will be the redevelopment of the Government Precinct to become a major destination not just for employment but for recreational and cultural activities. Once developed, considerable new transport demand will be generated to the area, which is currently not well serviced by rail or bus services.

For the longer distance trips from outer parts of South East Queensland to the inner city, a very high capacity public transport mode such as heavy rail is most efficient. At the same time, the bus network has a key role to play in catering for demand in areas closer to the inner city and in areas where rail has less coverage. Buses provide connections to major activity centres that are not on the rail network such as the University of Queensland, Garden City, Griffith University, Carindale, Chermside, Royal Brisbane & Women's Hospital and Mater Hospital precinct.

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.

Public transport demand

Almost 20% of commuting trips in South East Queensland are to places of employment located in the Brisbane inner city. The inner city provides a significant portion of the employment due to the economic benefits to businesses of co-locating. Every day, about 170,000 employees, visitors and students travel to or through the city centre, the majority by public transport. This number is predicted to climb to 250,000 by 2031.

The overall indicators for travel demand suggest growth will continue to put pressure on the transport system, especially in the peak periods in the inner city. Located on a peninsula, the city centre is tightly constrained by geographical features such as the Brisbane River.

[4] *Brisbane Economic Development Plan 2012 – 2031*

Rail and bus trips in the wider Brisbane region are expected to almost double by 2031. Of the more than 1.1 million public transport trips each day across the wider Brisbane region in 2031, almost 80% will start in, finish at, or travel through the inner city.

More train services from the outer regions to inner Brisbane and more bus services from the middle and inner suburbs of Brisbane and internally within the inner city will be required to cope with demand and ensure public transport remains an attractive alternative to driving.

The public transport network is already under pressure with capacity limits on both the rail and busway networks being approached. While some operational strategies can provide a level of short-term relief, a major 'step-change' in capacity will be required to keep workers, visitors, students and residents moving easily into, around and out of Brisbane, especially the inner city, Queensland's most significant employment area.

Rail network challenges

The inner city is the 'hub' of South East Queensland's rail network, and its capacity limits the number of additional train services which can be introduced on the network. The major challenge for the rail network is the looming capacity limits of the Merivale Bridge. River crossing capacity for train services from the south of the city (including the Gold Coast) is constrained by available 'slots' on the Merivale Bridge. Once these slots are utilised further growth in services cannot occur without the provision of an additional inner city rail river crossing.

Train patronage across the region as a whole continues to grow faster than population growth (3.4% vs. 2.4% for the period 2006 to 2012[5]), most notably in the Gold Coast, Ipswich, Sunshine Coast and Caboolture rail catchments where it has significantly outstripped population growth. A recent KPMG study revealed that Gold Coast commuters are the "*biggest inter-city commuters in Australia with 26,000 workers commuting each day to Brisbane…*"[6]

The current capacity of the Merivale Bridge is a maximum of 24 trains an hour in each direction. With an extra 200 services a day coming into effect in January 2014, there will be 19 trains crossing the bridge towards the city in the morning peak. The remaining slots will be used by around 2020 with the roll out of the new trains starting in 2015. Once this capacity is reached, the only non-infrastructure solutions available to address travel demand increases from the south and east will be peak spreading and overcrowding.

As maximum rail river crossing capacity is approached, reliability will be affected across the whole rail network due to the way rail operations need to be managed; trains on the Gold Coast, Beenleigh, Cleveland, Ferny Grove, Airport and Doomben lines must travel across this one bridge.

In addition to the Merivale Bridge, there are other capacity constraints on the inner city rail network. These include flat junctions at Park Road, Roma Street, Milton and South Brisbane; speed restrictions at Central Station; passenger capacity of platforms at Central Station; and older signalling technology.

A number of major inner city destinations are also not currently easily accessible by rail. Key inner city areas that are less easily accessed by rail include:

- Government Precinct – the focus of a major government redevelopment initiative
- Parliament / Queensland University of Technology

[5] *Independent Panel Review of Cross River Rail Report*

[6] *KPMG Press Release 13-08-2013*

- Financial district of CBD (Eagle Street area)
- Woolloongabba/Kangaroo Point

To improve accessibility to locations across the inner city, more rail stations are needed in more parts of inner Brisbane. This will establish new trip opportunities, attract more passengers to the rail system and contribute to a reduction in urban congestion into the future.

Overall, the number of daily and peak period rail network trips on the network is expected to more than double by 2031. Without an expansion in inner city rail infrastructure, additional rail services cannot be added in the morning peak, that is, the rail system will be at full capacity.

The Underground Bus and Train project is expected to double the capacity of the rail network through the inner city and provide the following benefits:

- free up capacity on the Merivale Bridge, enabling services from the south and Cleveland lines to grow
- enable rail services in the morning peak from the south to nearly double from 24 to 48 trains per hour
- enable an 80% increase in Gold Coast services from the south in 2021
- enable services to increase from the south beyond 2031
- enable expansion of the network to Hillcrest (new Beaudesert line) by 2031.

Bus network challenges

Brisbane's bus network, like rail, is focused on the inner city and busiest during weekday commuter peak periods. In 2012-13, 120 million trips were made by bus on South East Queensland's network, of which 76 million on Brisbane Transport buses. Capacity in and through the inner city bus network is critical to the effective operation of the wider bus network.

Bus and passenger volumes carried on parts of Brisbane's busway network are recognised as among the highest found anywhere in the developed world. The South East Busway carries over 350 buses per hour in the morning peak between Woolloongabba junction and the Allen Street exit to the Pacific Motorway. About 210 buses per hour enter the city via the bus lanes on the Victoria Bridge and nearly 230 buses per hour use the Captain Cook Bridge in the morning peak, without any form of bus priority.

Brisbane already experiences difficulties getting buses into and out of the CBD, especially from the south where the greatest increases in bus services are predicted to cater for growth areas without good access to rail. The popularity of the busway network has meant that some inner city locations on the network are exceeding capacity. Reliability issues are already present at key stations such as Cultural Centre Busway Station and on streets within the CBD such as Adelaide Street. Bus queues on Victoria Bridge are a visual illustration of limits being reached.

Buses are also increasingly competing with cars, taxis, and delivery vehicles on major roads and busy city streets, especially at major intersections. This is impacting on service quality, increasing delays and undermining reliability.

It is estimated that around 1,000 buses may need to enter the CBD during the morning peak by 2031, compared to 550 now[7]. New dedicated bus infrastructure, more station capacity, and improving operational efficiency will be key to maintaining the ability of the bus network to cater for growth and provide a fast and reliable level of service.

The Underground Bus and Train project will more than double the capacity of the busway network across the river and provide the following benefits:

[7] *Suburbs 2 City Pre-Feasibility Report*

- increases the maximum busway passenger capacity from the south into the CBD from 10,400 to 23,100 per hour
- increases the maximum busway passenger capacity from the north into the CBD from 5,200 to 17,900 per hour
- reduction of 6,400 passengers per hour, equivalent to 100 full buses, from the Captain Cook Bridge, allowing more capacity for private vehicles
- enable service growth to increase from the south beyond 2031.

Traffic congestion

Traffic congestion is a growing problem in South East Queensland, particularly in Brisbane. Congestion stifles productivity and bears a significant economic cost. If freight vehicles are consistently caught in congestion, the region will lose its ability to attract and retain industry. Road congestion also impacts buses, affecting ability to maintain reliable timetables.

It is expected that congestion will cost the Brisbane economy around $3 billion per annum by 2020[8]. If public transport capacity issues are not addressed and it becomes an unreliable and uncompetitive means of getting to the inner city, people will be forced to drive and there will be undesirable pressure on roads and related social, economic and environmental consequences.

Public transport has lower environmental and health impacts than motor vehicles, which cause almost half of all air pollutants in South East Queensland. Well-located public transport also encourages urban development in more accessible locations and supports land use integration in already established areas. This land use – transport integration reduces private vehicle use and congestion. The Underground Bus and Train project will assist in managing congestion by potentially reducing private vehicle travel by an estimated 310,000 km per day.

3.5 Project Objectives

The Underground Bus and Train project will be an innovative, world first solution to the looming bus and rail capacity constraints for inner Brisbane. It will provide fast and reliable travel times, open up new travel opportunities and provide seamless passenger interchange opportunities.

For rail, the project will unlock capacity at the heart of the network and enable more train services to operate more often across the entire South East Queensland rail network. It will also facilitate future expansion and enhancement of the rail network that relies on capacity through the inner city.

For the bus network, the project will address major existing congestion issues and provide a significant boost to inner city bus capacity and network reliability.

The Underground Bus and Train project will enhance access by both bus and rail to key inner city destinations by building new stations in areas planned for growth. It will bring high frequency public transport services to the southern part of the CBD for the first time and provide a major catalyst for the proposed redevelopment of the Government Precinct. A key project objective will be to align with the Government Precinct redevelopment in order to provide high quality public transport infrastructure and services in an integrated and timely manner.

The following strategic project objectives provide the overarching basis for the project and have been established in consideration of the project need identified in Section 3.4:

- support a more diverse and robust economy for Queensland

[8] *BITRE Working Paper 71*

- deliver a more efficient, integrated passenger transport network
- improve accessibility and provide for faster and more reliable travel times for bus and rail users
- increase utilisation of the bus and rail networks
- reduce congestion and crowding on the surface road, bus and rail networks
- support more sustainable urban development and land use patterns.

3.6 Project Alternatives Considered

Without an integrated response, the public transport system in Brisbane and South East Queensland will not cope with expected demand. As such, a 'do nothing' option would result in serious congestion, unreliable services, and an undermining of the region's liveability and economic competitiveness.

A range of significant bus and rail projects have taken place since 2008 examining possible solutions to capacity constraints in Brisbane's inner city. This is the first time that a project has sought to integrate both bus and rail projects.

In 2008, the *Inner City Rail Capacity Study* was undertaken to identify possible solutions to capacity issues in Brisbane's inner city rail network. The study found that an additional north-south river crossing for rail would be needed by 2016 to cope with the increasing demand for transport services in South East Queensland.

The process of identifying the proposed *Cross River Rail* project through the *Inner City Rail Capacity Study* involved consideration of both reform and investment solutions that were progressively refined through a number of analyses. More than 100 alternative heavy rail capacity enhancements options were identified and assessed, including Merivale Bridge duplication, rail loop for inner city Brisbane, lower cost heavy rail tunnel, longer trains and platforms, enhanced signalling, and Cross River Rail as a bridge. Short term heavy rail capacity enhancement options were also assessed and a number of viable options were identified including peak spreading, outer network and stabling upgrades and additional rollingstock, and real time passenger information systems.

The *Inner City Rail Capacity Study* recommended three potential options be investigated during the detailed feasibility phase of the project. As part of the detailed feasibility phase of the project these options, plus many other possible solutions, were considered when selecting a study corridor for the *Cross River Rail* detailed feasibility phase. This phase was completed in 2011 and included:

- selecting a study corridor
- selecting an alignment and station locations
- developing a Reference Design
- preparing an environmental impact statement
- preparing a Business Case
- consulting with stakeholders and the community.

At the conclusion of the detailed feasibility phase of the *Cross River Rail* project it was concluded that the combination of short-term rail capacity enhancement options together with the development of the *Cross River Rail* project would address short term transport capacity requirements and enable longer term operational effectiveness of the rail network.

In March 2012, a new Queensland Government was elected and an independent review of *Cross River Rail* was commissioned to assess whether the investment was the best option for the task and offered value for money. The Independent Panel Report found that the full *Cross River Rail* solution was beyond the scope required to address the immediate rail capacity problem. It recommended the 'core' of the full *Cross River Rail* solution be delivered

and that interim measures to improve capacity be implemented. Short-term capacity works are currently being delivered and together with a recent softening of demand will likely prolong the life of the rail network to around 2020.

As part of further work, with a strong focus on affordability and innovation, the project Proponent developed the Underground Bus and Train project concept. The rail component of the project has been informed by the *Cross River Rail* project for which the Proponent previously prepared an environmental assessment. The Underground Bus and Train project design varies from the *Cross River Rail* design as it is a multi-modal option (by including bus infrastructure) that improves engineering and constructability aspects and provides significant cost savings. By having bus and rail in one integrated infrastructure solution the project provides a wide range of benefits for the entire public transport network. It has a shorter tunnel and runs along George Street rather than Albert Street.

For the bus network, the 2008 *Bus Access Capacity Inner City Study* (BACICS) investigated how existing infrastructure in the inner city would meet the future expected public transport task. BACICS estimated a doubling of bus capacity across the river would be required and significantly more bus bays and layover space would be needed in the city to meet forecast bus demand to 2026, in the absence of *Cross River Rail*.

BACICS developed alternative strategies for bus operations and infrastructure to address the issues it had identified. An optimised bus strategy was formed combining successful elements of the options and included consideration of the *Cross River Rail* proposal. The optimised strategy proposed to use inner city bus network capacity more efficiently and create new bus link and bus capacity or reallocate space from general road traffic. Infrastructure solutions included new bus stations at various CBD locations and new busway connections.

Since BACICS, a range of state and local transport plans have identified the need to improve bus access and circulation in the Brisbane inner city order to support the proposed strategic bus network. The Queensland Government and Brisbane City Council (BCC) have undertaken a number of investigations of potential infrastructure, management and other measures that could be implemented over the next 10 years. In mid-2013, the *City Centre Bus Infrastructure Project* was completed and outlined a series short and medium-term initiatives to improve bus efficiency and reliability in Adelaide Street and the Government Precinct. The findings provided input to BCC's draft new *City Centre Master Plan*.

In September 2013, BCC released a pre-feasibility report for the "*Suburbs 2 City*" project, which examined options for a dedicated bus link connecting South Brisbane to Fortitude Valley using a bridge across the Brisbane River and tunnel underneath Adelaide Street. The objectives of the project were to enhance bus capacity and access in the inner city using dedicated bus infrastructure, alleviating existing issues such as those at Cultural Centre. The report states: "*economic studies show that Suburbs 2 City would not only improve bus services through the city centre but also foster the CBD's expansion, intensify inner-city retailing activity and support the commercial growth of South Brisbane and Fortitude Valley"*[9]*.* BCC presented the report's findings to the Queensland Government for its consideration in further planning.

The Underground Bus and Train project will deliver not only the rail benefits sought by the previous *Cross River Rail* proposal but bus benefits beyond those of the *Suburbs 2 City* proposal, for a significantly reduced cost.

[9] *Suburbs 2 City Pre-Feasibility Report*

3.7 Strategic Significance of the Project

The Queensland Government is committed to grow a four pillar economy, lower the cost of living by cutting waste, revitalising front line services, delivering better infrastructure and planning, and restoring accountability to government.

The Underground Bus and Train project is an important part of responding to, and more importantly, driving economic growth particularly in South East Queensland. It also has a key role in supporting the ongoing role and function of the Brisbane CBD as the state's primary centre for commerce and employment.

The Underground Bus and Train project represents a cost effective investment in public transport infrastructure that addresses a number of major capacity challenges facing the inner city bus and rail network. It addresses issues that would otherwise have adverse long term economic, social and environmental impacts.

3.8 Timeframes for the Project

Figure 3.3 highlights indicative phasing for the project with a high level breakdown of key milestones and deliverables. The timeframes align with the proposed timetable for the redevelopment of the Government Precinct with respect to key planning decisions and construction.

Timing	Phase	Project component
2013	A	• Concept Design Business Case and Decision to Proceed - **complete**
2014	B	• Reference Design • Environmental Impact Statement
2015	C	• Stage 1 Procurement Expression of Interest • Stage 2 Procurement (Appoint Preferred Proponent)
2016	D	• Commence Early Works • Commence Detailed Design • Commence Construction - *major underground construction and tunnelling* - *surface rail and bus infrastructure works* - *fit-out of stations and tunnels* - *testing and commissioning* **Construction period of approximately 4.5 years**
2021		• Commencement of operations

Figure 3.3 Indicative project phases and timeframes

Figure 3.4 provides a detailed timeline proposed for the environmental assessment phase of the project.

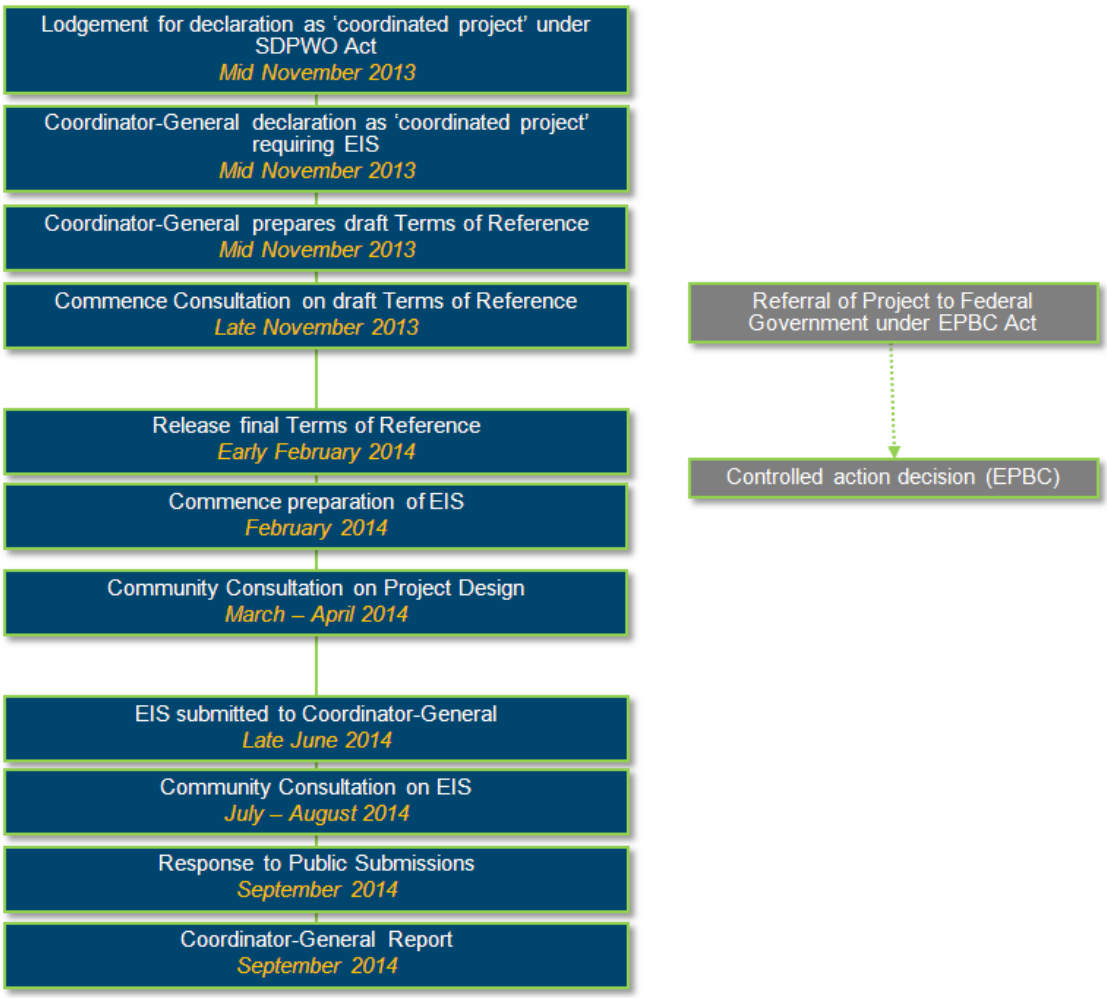

Figure 3.4 Indicative timeline for the EIS process

3.9 Construction and Operational Processes

A range of construction methods and options will be examined and may be applied to the project, to be further determined during the development of the Reference Design. These methods may include:

- tunnelling works that, subject to the ground conditions and potential surface impacts, may include construction by tunnel boring machines, mining / excavation by road headers, rock breakers and blasting
- open excavation work for both tunnelled sections (including open cuttings and cut and cover work) and station infrastructure
- station construction and access arrangements
- modifications within or adjacent to existing rail and busway corridors including the realignment of existing track / busway and the construction of new track / busway.

Construction impacts for the tunnel section are likely to be similar to those experienced with the construction of Brisbane's Clem7, Airport Link and Legacy Way road tunnels. Underground works and works carried out inside an acoustic enclosure, or distant from sensitive receivers, could be carried out 24 hours a day, 7 days a week.

Surface works may generate impacts such as noise, vibration and air quality, while underground works may generate impacts such as noise and vibration, groundwater movement and demand for energy for operating tunnelling machinery. Construction traffic impacts will include those resulting from transport of construction materials to work sites and transport of spoil to placement sites, and possibly changed road traffic flows to

accommodate surface works adjacent to stations. There may also be temporary impacts on existing rail and bus infrastructure and services including the need for temporary closures (possessions).

Broadly, five major construction sites could be required for the project, one at each of the three stations (Woolloongabba, George Street and Roma Street) and one at each of the tunnel portals. Depending on the construction methodology, some of these sites could generate large volumes of spoil. The exact location and size of construction worksites as well as the construction methods will be determined through the environmental assessment.

The quantities of construction materials and of construction spoil will also be determined through the environmental assessment, and rely as much on the proposed horizontal and vertical alignments as on the type of construction and method of delivery. Broadly, the Underground Bus and Train project Concept Design estimates approximately three million tonnes of material will be removed over the excavation period.

The means of transportation for materials and spoil will be determined through the environmental assessment. Broadly, the options for transportation include road, rail, and river. Any road haulage of spoil would be transported using approved haulage routes and would generally rely on higher order (arterial) roads. The locations for spoil placement sites will also be identified through the environmental assessment.

The operation of the project and how it is integrated into the broader South East Queensland public transport network will be considered in detail as part of the Reference Design and assessed in the EIS. For the purposes of this Initial Advice Statement, current operational arrangements are assumed whereby Queensland Rail operates and maintains railway infrastructure, TransLink sub-contracts bus operations to various bus operators (primarily Brisbane Transport) and the Department of Transport and Main Roads maintains busway infrastructure. However, the ultimate operational arrangement could change and depends on a number of factors including the project delivery model. As per current public transport operations, the timeframes for operating buses and trains could be up to 24 hours per day, 7 days per week; however the most concentrated service levels are during peak periods.

In terms of station operations, there will be considerable demand for passengers travelling to and from station locations, particularly in peak periods. Transport modelling for the Concept Design indicated total morning peak period passenger movements (boardings and alightings) of around 14,650 at George Street, 12,500 at Roma Street and 4,750 at Woolloongabba, in 2021.

The environmental effects of the operational phase of the Underground Bus and Train project are likely to be confined to specific localities such as the tunnel portals and the stations. Such effects may include noise and vibration from train and bus movements, an increased demand for energy and the movement of people to and from stations, and exhaust of air from the tunnels at station locations.

The purpose of the EIS is to identify these construction and operational impacts, and propose effective measures to mitigate and manage such impacts to the extent possible. The consultation program will keep the community informed as to the potential scale and intensity of the impacts, and enable input to the development and refinement of possible mitigation measures.

3.10 Economy and Employment

The total cost of the Underground Bus and Train project is currently estimated at $5 billion (P90, out-turn). This cost estimate will require refinement as part of the next phase when more detailed investigations take place and the Reference Design Business Case is prepared. Elements contributing to the total project cost are likely to include, but not be limited to:

- study costs (survey, Reference Design, and EIS)
- land acquisition costs and compensation
- other necessary compensatory or mitigation measures
- construction costs (earthworks, track work, busway pavement, signalling and electrification, possible substations, stations and station facility upgrades, road relocations, relocation of utilities, tunnels, bridges, culverts, noise treatments, visual treatments and landscaping).

Construction of the Underground Bus and Train project will be a major source of employment with people being employed to assess, design, construct and manage the infrastructure and through opportunities for the supply of materials and equipment to the project. The project will also alleviate the need for investment in other complex and costly areas of the busway network such as at the Allen Street, Mater Hill, South Bank, Cultural Centre and in the CBD.

While further assessment will be undertaken as part of the EIS process to determine the potential employment created by the project, a project of this nature could generate around 6.7 full-time equivalent jobs during the construction phase for every one million dollars spent[10]. The Underground Bus and Train project may generate in the order of 18,450 jobs over the life of development and construction of the project, depending on the project delivery model and the final scale of the project.

When operational, the project will generate additional employment opportunities within Brisbane, the South East Queensland region and the state of Queensland through improved transport opportunities, improved connectivity, urban renewal, and multiplier effects from the economic activity generated by the project.

As the state's capital city, Brisbane has sufficient accommodation and housing capacity to accommodate the anticipated workforce for construction and operation of the project.

A detailed assessment of job creation, skills development and training opportunities will be included within the EIS. In addition, project affordability and funding approaches (for the construction phase) will be determined through preparation of the project Business Case.

[10] *State Budget 2011-12 Capital Statement*

4 Location of the Project

4.1 Study Corridor Location

The Underground Bus and Train project comprises a bus and rail tunnel between Dutton Park in the south and Victoria Park in the north. Commencing from Dutton Park the tunnel travels north underneath Woolloongabba, crossing beneath the Brisbane River, through the Brisbane CBD to Roma Street station and extending to Victoria Park. The project will have integrated bus and rail stations at Woolloongabba, George Street and at Roma Street.

A Concept Design has been completed for the project. The next phase of the project will involve refining the design to prepare a Reference Design and undertaking an environmental assessment.

The study corridor depicted in Figure 3.5 is proposed to contain the new infrastructure and will be the focus of the Reference Design and environmental assessment phase. The study corridor is sufficiently broad to allow scope for innovative design and robust assessment of project impacts. Project impacts outside the immediate study corridor, which may include spoil haulage and placement and construction routes will also be identified and assessed. Benefits that may be achieved beyond the study corridor as a result of the project, including improved rail and bus services, will also be described.

The study corridor is located within the Commonwealth Government electorates of Griffith and Brisbane, state government electorates of South Brisbane, Brisbane Central and Yeerongpilly and the Brisbane City Council local government area including the wards of Central, Gabba, and Tennyson.

4.2 Land Use and Tenure

The study corridor has a north-south alignment that takes in the CBD and CBD Fringe locations including Woolloongabba, Dutton Park and Spring Hill.

Land uses within the study corridor reflect the high density, mixed-use urban character of inner city Brisbane. This includes residential, commercial, industrial, educational, recreational, cultural, government and open space uses.

Land tenure within the study corridor is complicated given the high density, mixed-use character. As a result land is held in a variety of tenure arrangements including freehold, community title, reserve or leasehold tenure, as well as unallocated state land.

Large areas of the study corridor are also controlled by State and Council, including:

- City Botanic Gardens, River Stage, Queens Park, Roma Street Parkland and Victoria Park;
- Council and State owned buildings like Queensland Government Precinct on George Street (CBD); and
- Road, rail and busway corridors.

Given the scale and scope of the project, the number and type of property impacts will be significantly less than would have occurred for a comparable surface rail, busway or road project. This is due to a number of practical design, engineering and key location aspects which have been considered in developing the concept design for the project. Some key factors influencing the minimising property impacts are:

- Three underground stations being positioned within existing Queensland Government-owned sites - Roma Street Station, Woolloongabba Go-Print site, and the Government Precinct on George Street.
- Northern and southern bus and rail connections (including) portals being within existing government-owned rail corridors.

- The tunnel and station caverns in the CBD being situated predominantly within existing road corridor or government owned land.
- Tunnel located at significant depth below surface level, noting that volumetric acquisition will be required to secure the underground land required for the project.

Land use zoning under the Brisbane City Plan 2000 for the study corridor generally reflects the high density mixed use character of the CBD and CBD Fringe with some inner-city suburban areas as follows:

- The CBD and CBD Fringe is generally zoned Multi-purpose Centre 1 (City Centre), Multi-purpose Centre 2 (Major Centre), Multi-purpose Centre 3 (Suburban Centre) or High Density Residential.
- Spring Hill, Woolloongabba, and Dutton Park include areas of housing in the Character Residential, Low-medium Density Residential and Medium Density Residential zone.
- Botanic Gardens, Roma Street Parklands and other parks are zoned Park Land, while Victoria Park is zoned Sport and Recreation.
- Rail corridors are zoned Community Use 7 (Railway Activities).
- PA Hospital is zoned Special Purpose 1 (Major Hospital and Medical Facility).
- Boggo Road is zoned Emerging Community, although the land uses are covered by a preliminary approval that overrides the planning scheme.

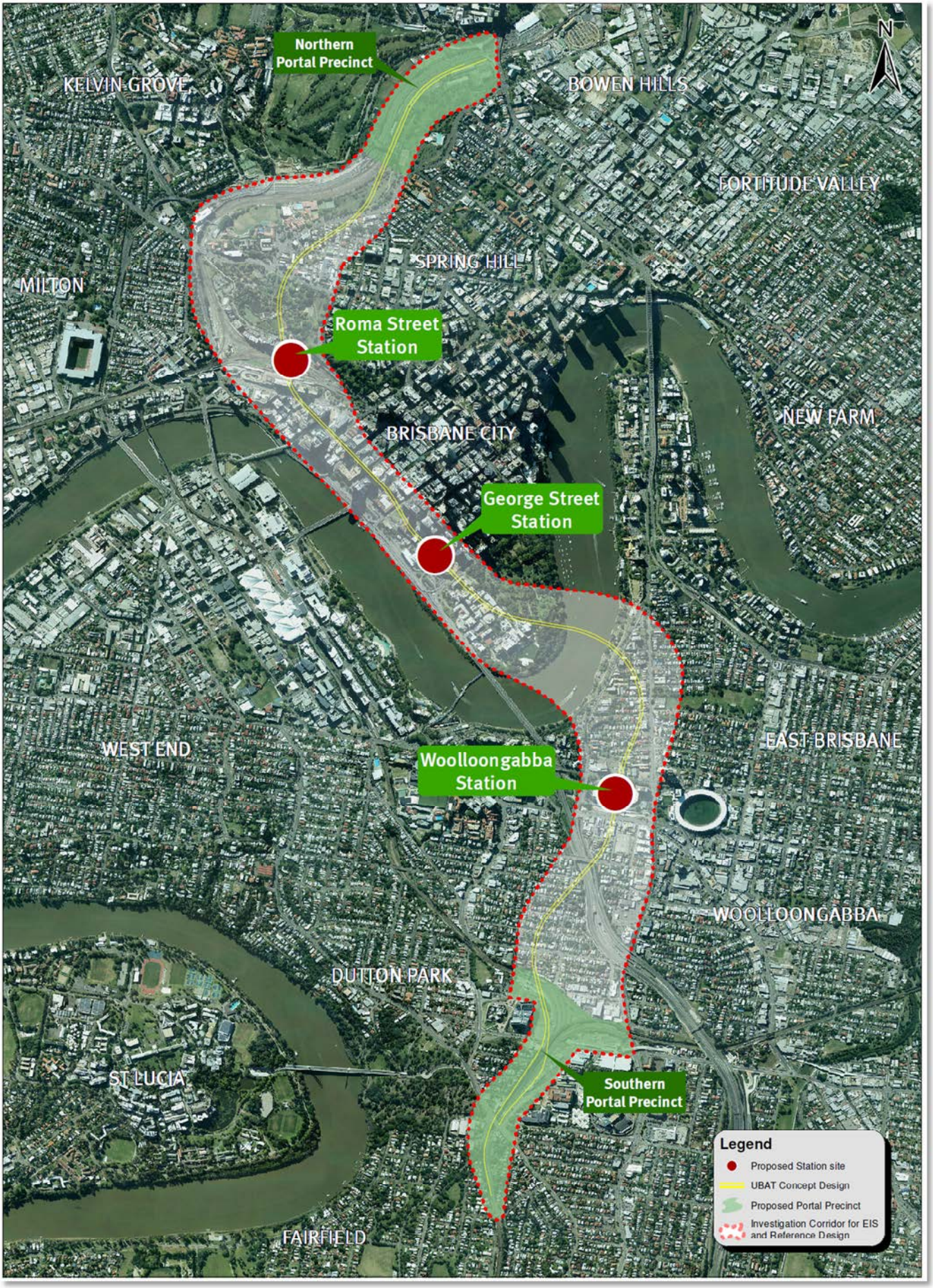

Figure 3.5 Project study corridor *(indicative only: does not necessarily reflect all areas and locations that could be impacted by the project, such as spoil haulage routes, which will be determined as part of the EIS)*

5 Existing Environment

5.1 Natural Environment

Topography

At the southern end, the study corridor commences to the east of the ridge on which Dutton Park and Boggo Road precincts lie. As the corridor heads north the topography experiences minor undulation through the suburb of Woolloongabba before gradually rising to a maximum of about 30 metres above sea level at the crest of the cliffs at Kangaroo Point. From the cliffs there is a fall to the Brisbane River, the lowest point in the corridor.

On the north side of the Brisbane River there is a rise through the City Botanic Gardens to the CBD. A low-lying flood plain occupies much of the CBD further east of George Street. A low ridgeline (maximum of about 15 metres) extends north-west from Gardens Point to the Merivale Bridge. This ridgeline lies between, and runs approximately in line with George Street and the Riverside Expressway. Continuing north there is a steep rise to Spring Hill, the highest point in the corridor with a maximum of about 55 metres above sea level. From there, the landform falls steadily to the floodplain of Enoggera Creek at Herston and Bowen Hills.

Geology

The geological characteristics of the study corridor north of the Brisbane River are dominated by Palaeozoic “Brisbane Metamorphics”, primarily consisting of Neranleigh-Fernvale Beds, some of the oldest bedrock in the Brisbane region, formed around 420 million to 350 million years ago. The Neranleigh-Fernvale Beds comprise mainly quartz arenite and phyllite with occasional quartzite and localised meta-basalt. From a hydrogeological perspective the Neranleigh-Fernvale Beds can be described as an aquifer of very low to low permeability.

In the area between the Brisbane River and Park Road Station, the Brisbane Tuff Formation dominates, comprising fine to coarse grained volcanic rocks formed as the result of pyroclastic (volcanic ash) flows. The rock is generally of very high strength (composed of a very hard welded tuff or ignimbrite). It has effectively no primary porosity and any groundwater movement will be through secondary features such as joints and fractures.

The Mesozoic Tingalpa Formation, comprising variable sandstones and shale is present at the southern end of the study corridor south of Park Road Station. It is generally of low permeability.

Quaternary alluvium comprising variable deposits of clay, silt, sand and gravel, but with clay predominating, infills topographic depressions and low-lying areas along the study corridor. The alluvium is expected to be relatively thin (<10m) and is confined to the upper catchment of Norman Creek on the southern side of the river, an area along the northern side of the Brisbane River and in the Victoria Park area at the northern end of the corridor.

The older geology has been deeply eroded by the Brisbane River system during periods of low sea level. The course of the Brisbane River has changed little since Tertiary times, and appears to have been established even earlier. As sea levels rose, the deeply dissected land surface was subsequently in-filled by alluvial and estuarine sediments to form the flat, low-lying plains of the Brisbane River.

The hydrogeological regime of the corridor within which tunnelling may take place comprises two broad aquifer types:

- a fractured rock aquifer system of either the Brisbane Tuff, Neranleigh-Fernvale Beds or Tingalpa Formation; and
- narrow and isolated Quaternary alluvial systems associated with valleys that have eroded into the older bedrock.

Overriding these aquifer systems is the impact of the Brisbane River which is incised through Brisbane Tuff and the underlying Neranleigh-Fernvale Formations.

The study corridor contains different soil types including prairie soils with some sandy alluvial surface soils, lithosols and shallow podzolic soils. Most surface soils are classed as easily erodable to erodable. Acid sulfate soils and potential acid sulfate soils are expected and known to exist in parts of the corridor.

Water

The Brisbane River is the only major waterway potentially affected by works. The original waterways in the CBD were moved into lined drains many years ago. Tunnelling will be beneath the bedrock level of the Brisbane River similar to works undertaken by the Clem7 road tunnel. Local flows may occur in overland flow paths in some areas of the corridor. Minor surface water features such as ponds and lakes are also located at the City Botanic Gardens, Roma Street Parklands and York's Hollow at Victoria Park.

The CBD is adjacent to the Brisbane River, where there has been river flooding under extreme events, most recently in 2011. A number of overland flow paths are identified within the study corridor.

Groundwater levels along the study corridor will be variable and will generally be a subdued reflection of the topography, except in areas where the water table has been impacted by existing infrastructure. Similarly groundwater quality will be variable with pH ranging from slightly acidic to slightly alkaline and the total dissolved salts ranging from fresh to saline, the brackish to saline groundwater occurring in areas close to the Brisbane River which is tidal. Previous investigations indicate that areas of groundwater contamination may be present with the potential to be mobilised by any induced groundwater flows.

The development of Brisbane over time has impacted the groundwater regime through lowering of groundwater levels due to the construction of deep drains, sewers and tunnels and a reduction of recharge as a result of tree-clearing and construction of buildings, pavements and roadways.

Air and noise

The existing environment is typical of the centre of a large city, with road, rail and air traffic the dominant air and noise influence. The air and noise characteristics are extensively monitored as part of ongoing programs and other construction projects.

The existing air quality within the study corridor is primarily influenced by regional air emissions. The existing acoustic environments in the vicinity of the project portals and connections with the surface rail and busway network are influenced by road, busway and rail traffic and other urban activities at both the northern and southern ends of the corridor.

Ecosystems, Flora and Fauna

The environment in the vicinity of the corridor has been heavily modified over many years. Modified green spaces include the City Botanic Gardens, the Roma Street Parklands, Victoria Park and the banks of the Brisbane River.

A search of the Department of Environment and Heritage Protection's *Wildlife Online* tool using the Brisbane CBD as a centre point with a 4 kilometre buffer identified four species of Bird, two Mammals, four Plants, two Insects and one species of Frog as either Vulnerable or Endangered on Queensland's *Nature Conservation Act 1992* and / or the EPBC Act. It is noted that the area selected is much larger than that covered by the study corridor.

Previous detailed environmental assessments[11] undertaken within the corridor suggest the study corridor generally has low natural habitat values and integrity. These assessments found that flora and fauna were predominantly common and widespread species of the Brisbane metropolitan area – generally being urban specialists or disturbance tolerant species. The areas in the study corridor with most significant habitat values are Victoria Park, Roma Street Parklands, City Botanic Gardens, the vegetated area at the Kangaroo Point cliffs and Dutton Park (including the South Brisbane cemetery). There is little direct connectivity between most of the habitats.

The previous environmental investigations identified one species considered vulnerable under the Commonwealth EPBC Act, namely the Grey-headed Flying Fox. It is likely to use suitable fruiting and flowering trees across the study corridor and broader Brisbane metropolitan area. No roosting sites were located as part of the investigation. Investigations also identified the presence of one flora species (*Plunkett mallee*) considered rare under Queensland *Nature Conservation Act 1992*. These were not considered to constitute wild populations as their habitat and distribution range does not occur within the study corridor.

Aquatic habitats along the Brisbane River are dominated by mangroves, with an associated range of fauna. In addition, there are heavily modified parkland environments in the City Botanic Gardens and the Roma Street Parklands that contain limited aquatic habitat supportive of a range of fauna.

5.2 Social and Economic Environment

Economic and demographic characteristics

In 2011, Brisbane's economy was valued at $114 billion (Gross Regional Product) and this is expected to increase to $217 billion by 2031. The Brisbane CBD is the economic centre of both Brisbane and Queensland. Employment in the CBD and adjacent suburbs is forecast to grow by 130,000 jobs by 2031[12]. The public transport system is key to moving a significant number of the highly skilled workforce to the Brisbane CBD and inner city.

The study corridor includes the urban areas of Dutton Park, Woolloongabba, CBD, Spring Hill and small parts of Fairfield, Kangaroo Point and Herston. These are substantial urban areas that support residential, commercial, industrial and recreational activities. A large number of people from across the broader region travel to these areas, particularly the CBD for business, employment, recreation and shopping. In recent times there has been a significant increase in the number of residents living in the inner city. There is considerable social diversity within these areas.

The following provides a demographic characterisation of key statistical areas (level 2) covered by the corridor[13].

	Estimated resident population 2012	Average annual growth rate 2007 to 2012	Projected population		Average annual growth rate 2011 to 2031
			2021	2031	
Brisbane City	9,656	2.5%	9,582	10,124	0.6%
Woolloongabba	5,330	5.3%	5,645	12,129	5.2%
Spring Hill	6,070	1.3%	6,329	6,601	0.5%
Fairfield-Dutton Park*	4,432	1.5%	4,930	4,938	0.4%
Kelvin Grove-Herston*	8,332	3.7%	8,659	8,934	0.9%
* - only very small parts of these statistical areas are covered by the study corridor					

[11] *Cross River Rail Environmental Impact Statement*

[12] *Brisbane Economic Development Plan 2012 -2031*

[13] *Areas selected are "Statistical Area Level 2" - data source: Brisbane Community Profile, Government Statistician, Queensland Treasury and Trade.*

Brisbane City records a very low proportion of children (aged under 14) at 5.5% compared to Fairfield-Dutton Park (14%) and the broader Brisbane local government area (17.5%). For the working-age population (15 to 64 years), Brisbane City has a very high proportion at almost 90% (the broader Brisbane area is 70%). Fairfield-Dutton Park has a relatively high proportion of persons aged over 65 years (10%) although this is consistent with the broader Brisbane local government area. The proportion of 'families with no children' is high in Brisbane City (66%) and relatively low in Fairfield-Dutton Park (39%).

In terms of occupied dwelling types, Brisbane City has a very high percentage of apartments at 89% of all dwellings. Spring Hill also has a high proportion of apartments (75%), while Fairfield-Dutton Park and to a lesser extent Woolloongabba have higher proportions of detached houses at 64% and 55%, respectively. The broader Brisbane local government area has 19% of dwellings represented by apartments and 71% as detached houses.

Social and recreational services

The study corridor includes many features important to both the broader Brisbane and Queensland society, and a number of facilities visited by tourists, mostly in the city centre. These features within or proximate to the study corridor include the Queensland Parliament, Brisbane City Council headquarters and the public library, the City Botanic Gardens, the Roma Street Parklands, the Queen Street Mall and surrounding retail outlets, the Queensland University of Technology, Kangaroo Point Cliffs, the Brisbane Stadium (the Gabba), historic buildings and places, and the Treasury Casino.

Cultural heritage

This area was the centre of initial European development for Brisbane and contains many features of historic interest.

Historic use by indigenous peoples of the area contained within the study corridor is known to have been extensive. There are two native title claims under the Commonwealth *Native Title Act 1993* within the study corridor. These claims have been made by the Jagera and Turrbal people over broader areas covering Brisbane.

Previous investigations have identified a number of places with Indigenous cultural heritage significance, in particular York's Hollow (Victoria Park). The views of Indigenous parties with interests in the study corridor will be important inputs to the documentation of the cultural values and significance of the area.

There are non-indigenous cultural heritage sites within the study corridor, primarily within the Brisbane CBD and Spring Hill areas. These include sites listed on the *Australian Heritage Places Inventory, Queensland Heritage Register*, *Brisbane City Plan 2000* heritage register, the *Commonwealth Heritage List* and the *National Heritage List*. Throughout the study corridor, especially in the CBD, there are older buildings with heritage value.

5.3 Built Environment

The built environment within the study corridor is dominated by urban development. Brisbane, as the capital of Queensland and its business and administration centre, has been extensively developed for commercial, institutional, cultural, educational, religious, recreational and residential uses.

The southern areas of Park Road and Dutton Park contain a mix of residential, commercial and light industrial uses and much of the residential precincts are dominated by pre-1946 timber and tin character housing, covered by a demolition control precinct under the *Brisbane City Plan 2000*.

The suburb of Woolloongabba, about one kilometre south of the Brisbane CBD, contains a mix of retail, commercial, industrial and residential uses, and residential dwellings range from character housing to modern residential towers. Woolloongabba contains the Brisbane Cricket Ground ('the Gabba'), the Mater hospital complex and the South Brisbane dental hospital. The state government owns a large site housing Go Print and the Land Centre.

The built form within the Brisbane CBD is characteristic of a city centre, with many tall buildings and deep basements. The location of building basements, together with the use of such buildings will be assessed as part of the Reference Design and impact assessment studies.

The Government Precinct area in the southern part of the CBD is proposed to undergo major redevelopment. This has already commenced with construction on the 1 William Street office tower started in 2013, due for completion in late 2015. The proposed redevelopment will revitalise this part of the CBD for commercial and recreational activities.

Spring Hill was one of the first parts of Brisbane to be settled, around the 1820s and contains some of the city's oldest buildings. The area has undergone substantial redevelopment for commercial, institutional and residential uses.

6 Potential Environmental Impacts

6.1 Environmental Assessment and Approval Process

Like all major infrastructure projects, there is potential for construction and operation impacts that will need to be mitigated through transparent and carefully developed management measures. The implementation of the Underground Bus and Train project will require a range of approvals, as set out in Section 8.

The Proponent is seeking to have the environmental assessment required for the project conducted under the requirements of Part 4 of *State Development and Public Works Organisation Act 1971 (SDPWOA)*. The *SDPWOA* contains requirements for environmental assessment and public review of an EIS, and the relationship of the environmental impact assessment process with the *Sustainable Planning Act 2009 (SPA).* Other assessment could be carried out under alternative processes, including through the guidelines process for a community infrastructure designation or non-statutory environmental assessment processes. The Proponent considers that the EIS process under the *SDPWOA* provides an effective and transparent option for a rigorous statutory assessment of the environmental effects of this significant infrastructure project.

The EIS process under the *SDPWOA* will involve an extensive process of consultation integrated with the technical environmental studies. The consultation process will include the statutory notifications for the EIS and may include statutory notifications for the draft Terms of Reference and additional information on the EIS.

Consideration also needs to be given to the potential for impacts on matters of national environmental significance identified under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999 (EPBC)*. No significant impact on matters of national environmental significance is anticipated. However, for certainty, the Proponent will refer the project to the Commonwealth Minister for the Environment for a decision as to whether the project is a 'controlled action' under the *EPBC.*

6.2 Potential Environmental Impact Studies

The Underground Bus and Train project has to date focused on investigating a concept level bus and rail infrastructure solution connecting north and south of the river with stations at Woolloongabba, the Government Precinct and Roma Street. Detailed investigation, a Reference Design, environmental assessment and community and stakeholder engagement will be undertaken as part of the EIS process. The studies required to support and complete the EIS may include, but are not limited to:

- further geotechnical and detailed surveys
- project Reference Design, including urban design and landscape design, and construction planning
- traffic and transport, including rail and busway operations, pedestrian and cycle access, road network impacts and other public transport
- land use, planning scheme provisions and urban renewal opportunities
- studies of potential bio-physical impacts (e.g. ecology, groundwater, contaminated land, surface water, noise, vibration and air quality)
- studies of potential socio-economic impacts (e.g. visual, cultural heritage, social, economic including cost-benefit analysis, construction effects)
- waste management
- cumulative impacts
- hazards and risks.

6.3 Transport System

During construction there is the potential at the local level for some adverse impacts to local and higher order roads as well as bus and rail infrastructure and services, particularly where the project interfaces with existing infrastructure at the northern and southern portal locations. As an example, construction activities such as truck movements of equipment and spoil to and from worksites could impact road network condition and traffic flows. There may also be impacts associated with any changes required to the existing bus and rail network such as changes to, or decommissioning of existing stations.

During operation, there may be impacts associated with the increased movement of passengers to and from stations. Passengers moving to and from stations such as the busy George Street Station during peak periods could impact on congested footpaths and pedestrian crossings.

A range of cumulative impacts on the transport system may also result from this project occurring at the same time as other major infrastructure or development projects.

These impacts will need to be carefully considered and mitigated against through considered design and management approaches. A more detailed assessment of these impacts will be undertaken as part of the EIS.

6.4 Natural Environment

Geology and groundwater

Construction of the Underground Bus and Train project tunnel has potential to impact the groundwater regime along the corridor.

Potential impacts that will be considered include:

- the potential to intersect open fractures and joints
- consolidation and settlement where the tunnel passes under and drains saturated alluvial sediments
- reduction of available water for groundwater dependant ecosystems due to lowering of the groundwater table
- mobilisation of contaminated groundwater to “drained” sections of the tunnel
- the potential occurrence of acid sulphate soils in low-lying alluvial areas where there is potential for tunnel construction to lower water table levels
- groundwater impacting on or ‘attacking’ concrete and steel
- disposal of inflows to the tunnels during and post construction.

Hydrogeological investigations involving drilling and testing will be undertaken during the detailed investigations and feasibility studies to inform the EIS process.

Flooding, water quality and sediment control

Tunnelling will be beneath the bed level of the Brisbane River, greatly reducing the potential for impact on the Brisbane River. The findings from this approach with the Clem7 road tunnel are that impacts on the river system are very unlikely.

Construction works near overland flow paths or smaller local waterways will need to be appropriately managed to ensure that they are protected and that no adverse impacts result in the Brisbane River. The management of construction water quality and sediment control for major building excavations is well established in the Brisbane

City area and will be appropriately assessed and documented as part of the construction planning informing the EIS.

The design of the project will need to achieve design objectives with regards flood immunity, and that any works associated with the project do not have adverse effects on existing flood regimes in any of the local catchments.

Any construction work involving excavation has the potential for water quality and sediment impacts if not appropriately managed. Recent experience on other major transport tunnel projects in Brisbane indicates that these potential impacts can be mitigated through the provision of enclosed construction portals, routine controls on surface works and water treatment if necessary before discharge to any waterways. Groundwater discharges may be required at times during underground excavation and any discharges will need to be appropriately treated, and the potential impacts of groundwater drawdown and the induced movement of any existing contamination understood. The EIS will assess these issues.

Ecosystems, Flora and Fauna

The biophysical environment of the study corridor has been heavily modified over many years, particularly since European settlement. The preparation of the EIS and selection of the final project alignment within the study corridor will allow any potential impacts to flora, fauna and aquatic habitats to be identified and assessed. Significant impacts to flora, fauna and aquatic habitats are not anticipated due to the highly urbanised environment within the study corridor and recent experience on other major transport tunnel projects in Brisbane.

Ecological studies will be undertaken to determine the presence, if any, of significant species and the current ecological conditions. Such studies will inform the scope of possible mitigation measures to ensure the existing environmental values are protected from potential adverse effects.

No adverse impacts are anticipated on the Brisbane River or the Ramsar wetlands downstream, principally because much of the Underground Bus and Train project is expected to be constructed underground, mostly in bedrock and beneath the Brisbane River.

Predicted impacts will be minimised through sensitive planning and design development. An environmental management plan will be developed to assist in mitigating impacts as part of the EIS.

Spoil and waste management

There is the potential for a significant amount of waste to be generated during construction of the project including demolition materials and construction waste.

The location for the disposal of material excavated from the tunnel and station locations has not been selected. Similarly, the method of transporting construction spoil has yet to be determined and will be the subject of feasibility studies informing the EIS. Depending on the nature of the excavated material, there may be an opportunity to exploit a proportion of the spoil as a valuable construction resource.

Studies of the nature and volume of waste materials and spoil will be undertaken as part of the design and construction planning studies informing the EIS. The proposal for spoil and waste management will be described and assessed.

Contaminated land investigations will be undertaken as part of the EIS and management procedures developed. Existing rail corridors and rail corridor land is expected to be contaminated. The removal of soil from sites

registered on the Environmental Management Register will require the approval from the Department of Environment and Heritage Protection.

Strategies will be developed, in accordance with the waste hierarchy, to avoid where possible, and then reuse, recycle and appropriately dispose of the remainder.

Air quality, noise and vibration

By increasing the use of public transport, and increasing the attractiveness of the rail and bus systems to passengers, it is expected that the Underground Bus and Train project will help reduce air emissions and road traffic noise across Brisbane into the future. This relates to a reduction in the number of motor vehicles that otherwise would use the road network with a corresponding reduction in vehicle exhaust and noise emissions.

The operation of trains and buses will require energy inputs (in the form of electricity and fossil fuels) and therefore potentially contribute to greenhouse gas emissions. However, on a per-passenger basis, travel by rail and bus is considerably lower than equivalent travel by motor vehicles. Increasing the use of public transport is a widely recognised strategy to reducing the overall contribution to greenhouse gas emissions of the transport system. The potential for greenhouse gas emission reductions will be assessed.

The existing residential amenity for individuals along the corridor will need to be understood and protected where possible. Further assessment of the current air and noise conditions will be undertaken as part of the EIS to inform requirements for mitigations during project construction.

Construction experience on other major tunnels and building excavations in Brisbane indicates that potential adverse air quality, noise and vibration impacts can be managed with appropriate and carefully managed mitigation measures. Potential air quality impacts may arise from dust generation during excavation and construction activities, dust released during spoil removal, the distribution of dust by wind, exhaust emissions from increased traffic and machinery use on site, and exhaust emissions from buses using the tunnel. Noise impacts can result from construction activities and indirectly from regenerated noise due to vibration. Vibration can affect individual amenity, buildings (especially heritage sites due to construction techniques and finishes) and sensitive equipment.

Potential impacts on properties and people near the project construction sites will be assessed as part of the EIS including the development of predictive models where necessary. Appropriate construction site management practices will be developed to mitigate predicted impacts and monitoring programs set out to ensure required outcomes are achieved. These management programs will be linked with consultation requirements to ensure businesses and residents are kept informed and problems are identified.

It is likely that underground stations and tunnels will have some ventilation requirements to provide both fresh air and to exhaust of pollutants, with the potential impact on the local ambient air quality. Potential effects of ventilation outlets on the surrounding community and changes in air quality resulting from reduced traffic volumes will be assessed as part of the EIS.

In areas where surface traffic volumes are significantly reduced, it is expected that air quality adjacent to benefited roads will be improved.

There is limited risk of long-term noise or vibration impact since most of the project will be underground. A noise and vibration assessment for the construction period will be undertaken to determine impacts and any required mitigation measures, especially in areas where the project operational works are on or close to the surface.

6.5 Social Environment

The project is expected to deliver strong social outcomes at a regional and local level, providing people with a choice of transport mode and improved lifestyles compared with the situation if the project did not proceed. Positive social outcomes expected to result from the project include:

- improved access to services and public transport
- improved amenity, especially in terms of air quality, noise, and visual effects
- greater choice and accessibility to employment opportunities
- improved economic well-being.

There are also a number of potentially adverse effects that may occur in the study corridor, during both construction and operation. These may include:

- land acquisition and potential displacement
- disruption of local access during construction
- localised air quality, noise and visual effects
- localised changes in accessibility to the transport network e.g. resulting from changes to existing stations
- adverse impacts on residential and workplace amenity.

A social impact assessment will be undertaken as part of the EIS and include consultation with the community to identify issues, both positive and negative, and the development of appropriate measures to address these.

The economic impacts, both positive and negative, will also be evaluated, and the impacts of and opportunities for the project on local businesses and urban renewal will be considered.

Property impacts and severance

Despite the current Concept Design not showing any direct surface private property requirements, subject to further detailed design and survey work, the delivery of the Underground Bus and Train project may involve the acquisition of properties in the vicinity of the portals and to a much lesser extent the stations. Some land acquired for construction may also be required to support the operation of the Underground Bus and Train project. Land will also be acquired volumetrically to support the passage of the project beneath the surface. Overall, the project will primarily involve government owned land and buildings.

The process of acquiring interests in land on the surface and in strata may be undertaken through the provisions of the *Acquisition of Land Act 1967* and the *Transport Planning and Coordination Act 1994*. Any future acts on land on which native title has not been extinguished will need to be consistent with the *Native Title Act 1993 (Commonwealth)* and the *Native Title (Queensland) Act 1993*.

Impacts on properties directly affected by construction will be assessed and will allow for redevelopment of some properties directly above station locations, or cut and cover works near tunnel portals. Properties immediately adjacent to construction areas may experience some construction impacts such as vibration and the EIS will assess these potential impacts and develop appropriate mitigation measures.

Property severance, if any, as a result of the project is expected to be minor given that most of the project will be constructed in tunnel and stations underground. Once operational the project is expected to have a net benefit for connected properties through future development opportunities. There may be impacts on future development above and immediately adjacent to the underground sections of the project. This will be assessed during the EIS

including related issues associated with the acquisition of volumetric title required for the underground sections of the works.

Changes in the tenure of affected land may occur, and the rationalisation of final tenure arrangements will be considered as the project progresses.

As a consequence of the proposed investment and benefits delivered by the Underground Bus and Train project, changes in land use are expected to occur, over time, at key locations along the project alignment.

The conversion of land use along the route may be required at surface interface locations at proposed stations and at portals, with current land usage (residential, commercial, industry, etc.) replaced by rail or bus transport infrastructure and facilities. The process of land use conversion (if required) will be developed throughout the EIS.

Cultural heritage

Consultation with local indigenous groups and the Cultural Heritage Branch of the Department of Environment and Heritage Protection will be undertaken to determine if there are any sites of indigenous significance within the study corridor. Their input will be sought as part of an indigenous cultural heritage study that will be undertaken across the study corridor as part of the EIS.

The Underground Bus and Train project is likely to pass by or beneath a number of listed heritage sites and the potential exists for direct or indirect (vibration) effects to occur during construction, particularly at stations. A detailed assessment of the potential impacts of the proposed works on all buildings along the final route will be undertaken during the EIS, especially heritage-listed structures or other buildings of historic interest.

The project is not anticipated to have any adverse impacts on cultural heritage but will enable greater access to buildings and places with cultural heritage values in inner Brisbane and throughout South East Queensland. Assessments will be undertaken as part of the EIS of all matters relevant to cultural heritage to ensure that any potential impacts are predicted and mitigation measures provided to ensure no discernible adverse impacts occur. This will include the assessment of the potential effects of construction on all adjacent structures, with particular attention to the potential effects of vibration.

Urban design, landscape and visual effects

Most of the project is anticipated to be underground and accordingly there will be relatively few impacts on the landscape during the operational phase, with any minor impacts related to portal areas, underground station access points and temporary construction sites. Above ground station components will be designed to complement and enhance the local urban design environment. The assessment of visual impacts is often subjective and consultation will be undertaken as part of the EIS to identify preferred visual approaches.

6.6 Economic Effects

Traffic congestion stifles productivity and bears a significant economic cost. By 2020, it is expected that congestion will cost the Brisbane economy around $3 billion per annum if current trends continue. The Underground Bus and Train project will provide vital public transport to cut congestion, providing access to job markets and remove cars from the roads, helping to maintain highway capacity for goods and services. High quality public transport reduces traffic congestion by attracting travellers who would otherwise drive.

Preliminary economic assessment undertaken has indicated substantial benefits available from the projected investment. Environmental impact studies will include comprehensive cost benefit assessments as part of a wider economic assessment that will include all significant economic benefits and impacts of the project.

6.7 Built Environment

The project will have a positive impact on the built environment within the study corridor through the provision of an underground public rail and bus transport facility, hence reducing the impact of motor vehicles on the city and reducing the need for surface road transport infrastructure and parking.

The impact of construction on buildings, especially from vibration, will be assessed and mitigation measures determined as part of the EIS.

The project will enable urban renewal opportunities at stations and nearby areas in the CBD and at other locations along the study corridor including Woolloongabba. High quality public transport can help reduce social disadvantage by providing opportunities for affordable housing and improving access from more remote housing areas. The project would promote sites for infill development, and activate a range of land use opportunities at locations along the corridor and in bus and rail catchments.

6.8 Hazard, Risk and Health and Safety

There are a number of potential hazards, risk and health and safety issues that may occur during the project. The project may also provide health and safety benefits including improved station facilities and accessibility, and resulting improved passenger safety.

Construction activities that may generate a hazard include:

- operation of vehicles and construction equipment in the confined tunnel and station box spaces with resulting increased risk levels from spillages, fire and poor air quality
- operation of vehicles and construction equipment, and the storage of dangerous goods in relatively compact construction sites
- construction failures and accidents including tunnel collapse or subsidence, flooding and worker injuries and death
- the use of oils, fuels and other dangerous goods including explosives, and their transport to construction areas
- increased traffic risks as a result of the transport of excavated materials to disposal areas.

Operation activities that may generate a hazard include:

- passenger safety incidents including personal safety and injury
- staff accidents and incidents in the tunnel during maintenance works
- major train or bus incidents including derailment, collision and fire
- acts of terrorism leading to major fires and explosions resulting in injury to passengers and staff
- tunnel and other structural components collapse, subsidence or failure
- flooding and inundation from both surface and groundwater sources.

Further risk studies will be undertaken during the EIS and effective mitigations developed and documented. Consultation will be undertaken with relevant government agencies on issues such as fire and life safety, disability access and personal safety through design.

6.9 Cumulative Impacts

Cumulative impacts can arise when a range of major projects interact or occur concurrently in the same area, or where the same community experiences ongoing construction activities of a number of different projects over a period of time. Impacts can include combinations of noise, dust, visual intrusion, traffic and competition for parking and / or reduced access to land uses and activities.

As Brisbane is a rapidly growing city, a number of projects could potentially occur concurrently with the Underground Bus and Train project although there are uncertainties in terms of timeframes. The predicted cumulative impacts will be assessed as part of the EIS and would be reassessed closer to the time of construction. At the time of writing, the following large scale projects / events were identified as potentially generating cumulative impacts:

- Government Precinct Redevelopment Project (Brisbane CBD)
- Development construction at RNA Showgrounds, Woolloongabba and Dutton Park / Boggo Road
- Development construction in Brisbane CBD at 300 George Street, 266 Roma Street, 151 Roma Street and various other locations
- Possible transport projects at Inner City Bypass, Kingsford Smith Drive and Alice Street – Kangaroo Point Pedestrian / Cycle Bridge
- Major events such as the annual Brisbane Festival.

6.10 Matters of National Environmental Significance under the EPBC Act

It is not anticipated that the project will significantly impact on matters of national environmental significance. To confirm this, a referral to the Australian Government will be made for a decision as to whether the project is a 'controlled action' under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. The referral will occur following the submission of this Initial Advice Statement to the Coordinator-General.

7 Environmental Management

A draft outline Environmental Management Plan (EMP) will be developed as part of the EIS. The EMP will seek to address the full range of aspects related to the project including design, construction, operation and maintenance. The intent of an EMP is to specify:

- proposed environmental management strategies, actions and procedures to be implemented to mitigate adverse and enhance beneficial environmental and social impacts
- monitoring, reporting and auditing or verification requirements
- the entity responsible for implementing proposed actions
- proposed timing
- corrective actions if monitoring indicates that performance requirements have not been met.

Throughout the project the EMP including any sub-plans shall be reviewed and updated periodically to reflect the knowledge gained and experiences encountered. The EMP will address design requirements, pre-construction activities, construction / commissioning and operational phases of the project.

The EMP including any sub-plans will address matter such as those outlined below:

Design and Construction	Operations
• natural environment e.g. soil erosion, sedimentation, flooding, water quality • built environment • social impact including air quality, noise and vibration • cultural heritage (indigenous and non-indigenous) • waste management • hazard and risk, health and safety	• wastewater management • landscape management and maintenance • emergency and risk procedures • flooding and groundwater management • greenhouse gas management

Table 7.1 Example of matters to be addressed in the project EMP

8 Policies and Approvals

8.1 Government Plans

State level

The Underground Bus and Train project aligns closely with the Queensland Government's overarching key priorities and policies outlined in its five point action plan:

1. *Growing a four pillar economy (including tourism, agriculture, resources and construction)*
2. *Investing in better infrastructure and better planning*
3. *Revitalising front-line services*
4. *Lowering the cost of living*
5. *Restoring accountability in government*

This project is relevant to the 'Growing a four pillar economy' and 'Investing in better infrastructure and better planning' priorities.

The Queensland Government is preparing the *Queensland Plan* that will outline a shared vision for the next 30 years and identify local and state-wide priorities. It will harness the collective wisdom of Queenslanders and guide future activities delivered by all levels of government, business and the community. Public consultation to gather insight on the State's future needs was completed in August 2013. From the various inputs, five focus areas, which will form goals for the vision, have been developed. These are:

1. *Grow and strengthen our regions*
2. *Strengthen Queensland's economic direction*
3. *Foster community health and wellbeing*
4. *Balance economic prosperity and natural environment*
5. *Community cohesion*

The Underground Bus and Train project will positively contribute to these overarching goals, particularly to the growth and strength of the South East Queensland region and strengthening Queensland's economic direction. The project will keep Brisbane, Queensland's economic engine room, moving by ensuring its public transport infrastructure keeps pace with growth. It is an important step in realising the Queensland Government's blueprint for infrastructure reform, *Infrastructure for Economic Development.* It also directly contributes to the *Governing for Growth,* in particular the priority policy area of "enabling infrastructure for economic growth".

Local level

Brisbane Vision 2031: Brisbane City Council's long-term community plan for the city, Brisbane Vision 2013 details the aspirations for the city's future and outlines ideas for achieving the vision. The Brisbane underground project will support the vision, by creating an accessible and connected city, by improving accessibility through increased cross river capacity for public transport, providing relief for the major bottlenecks in the rail and busway system and providing safe and efficient movement of people to and from the inner city.

Brisbane City Plan 2000: The City Plan is a planning scheme under the Sustainable Planning Act 2009 that regulates all new development in the city. It includes a number of neighbourhood plans relevant to the project such as the City Centre Neighbourhood Plan. The vision for the city centre included in the plan, and supported by the Underground Bus and Train project includes:

- the further development of the city centre in its role as Queensland's principal centre for business and administration
- a reduced dependence on private vehicle usage and increased reliance on public transport, cycling and walking.

Brisbane City Council is currently reviewing the *Brisbane City Plan 2000* and it is anticipated that the new city plan will be adopted and effective in 2014.

Draft Brisbane City Centre Master Plan: The Draft Brisbane City Centre Master Plan 2013, currently under development, provides a vision for development of Brisbane's city centre. A high quality public transport system is recognised as a key enabler to this vision. The draft master plan includes transport strategies to service the busiest parts of the city centre and identifies the need to improve public transport provision to and within the inner city. The Underground Bus and Train project is consistent with and will be a major contributor to achieving the vision outlined in the new City Centre Master Plan.

Brisbane Long Term Infrastructure Plan 2012 – 2031: The Underground Bus and Train project supports the objectives for transport infrastructure in the long-term infrastructure plan to "Grow the economy" and "Build the community". It directly supports the following actions in the plan:

- Introduce a rapid transit service in the CBD - Implement high frequency services linking major commercial precincts of the greater CBD.
- Increase the capacity of the bus network - Increase inner city bus capacity through further river crossings for buses and providing inner city layover.
- Increase the capacity of the rail network – Implement the proposed *Cross River Rail* project [replaced by the rail component of the Underground Bus and Train project] to provide capacity to cater for anticipated demand for rail services.
- Improve the public transport network servicing the Greater CBD – support the implementation of *Cross River Rail* [replaced by the rail component of the Underground Bus and Train project] to link key areas of the Greater CBD and provide additional river crossing and stations.

Brisbane Economic Development Plan 2012 – 2031: The Brisbane Economic Development Plan 2012 – 2031 outlines Council's policy and priorities for supporting Brisbane's successful development. The plan identifies the following priority actions for infrastructure and planning:

- Council and TransLink to continue to improve public transport connectivity between economic precincts.
- Special attention to ensuring the inner city/CBD maintains competitiveness and provides economic growth.

The Underground Bus and Train project supports the economic development plan as it will provide better public transport connections between the areas where people will live and the places where they will work. The project will provide relief for the major bottlenecks in the rail and busway system.

8.2 Legislation and Approvals

The approvals that will be required will depend on a number of factors, including physical location, site characteristics and construction methodology. Commonwealth, Queensland and local government legislation that may be relevant to the project, including related permits and approvals, are identified in the Tables below:

It is noted that the Sustainable Planning Regulation 2009, Schedule 4 prescribes development that cannot be declared to be development of a particular type – Act, section 232(2). This list includes in Table 5 - All aspects of development for the Gold Coast Rapid Transit, Moreton Bay Rail Link, Northern Busway and Airport Link. Consideration may be given to amending the Regulation to include the Underground Bus and Train project to clarify that it is exempt from assessment against the local planning scheme.

Table 8.1 - IDAS approvals and permits potentially required for the project

Legislation	Administering authority	Permit/approval/ requirement	Trigger/relevant aspect of project	Relevance to project
Building Act 1975 Sustainable Planning Act 2009	Department of Housing and Public Works	Development Permit (Building Works)	Building works that assessable against the Building Regulation 2006	Building works
Sustainable Planning Act 2009	Department of State Development, Infrastructure and Planning	Development Permit for an MCU of Premises on contaminated land	Making an MCU on a property identified on the Environmental Management Register (EMR) or Contaminated Land Register (CLR)	All land on the EMR/CLR that would be subject to Project works.
Sustainable Planning Act 2009 Environmental Protection Act 1994	Department of Environment and Heritage Protection	Development Permit for an MCU of Premises for an Environmentally Relevant Activity	Undertaking an activity that is identified as 'environmentally relevant' (ERA) under Chapter 4 of the *Environmental Protection Act 1994*. ERAs could include: - 8 Chemical Storage - 38 Surface Coating - 43 Concrete Batching - 58 Regulated Waste Treatment - 63 Sewage Treatment - 64 Water Treatment Registration Certificate for the ERAs would be required prior to their commencement.	Possible at large construction sites, such as Woolloongabba and some smaller construction sites.
Sustainable Planning Act 2009 and City Plan 2000 (see note 1)	Brisbane City Council (BCC)	Development Permit for an MCU	Buildings	Construction sites
Sustainable Planning Act 2009 and City Plan 2000 (see note 1)	BCC	Development Permit for an MCU	Ancillary works	Whole of project
Sustainable Planning Act 2009 and Coastal Protection and Management Act 1995 (see note 1)	BCC	Development Permit for Operational Works for Prescribed Tidal Works	Undertaking works below the high water mark within a tidal waterway	Brisbane River
Sustainable Planning Act 2009 and City Plan 2000 (see note 1)	BCC	Development Permit for Operational Works – Filling and Excavation	Filling or excavation greater than 1m	Whole of project
Sustainable Planning Act 2009 and City Plan 2000 (see note 1)	BCC	Development permit for reconfiguring a lot	Where not exempt development	Whole of project
Sustainable Planning Act 2009 and Building Act 1975	Private certifier	Development permit for Building works	Assessment under the Building Act	Whole of project
Sustainable Planning Act 2009 and City Plan 2000 (see note 1)	BCC	Development permit for Building work, operational work or reconfiguring a lot on the site of a Heritage Place or within a Heritage Precinct	Planning approval for development onsite or within a heritage precinct	Whole of project
Temporary Local Planning Instrument 01/13 Protection of Buildings Constructed Prior to 1911 (see note 1)	BCC	Assessment approval	Activity within Demolition Control Precinct and Demolition Control Precinct (Local Character Significance)	Whole of project
Sustainable Planning Act 2009 Relevant Local Government Planning Schemes	The relevant local government area	Development permit for MCU	Landfill	Location to be determined

Sustainable Planning Act 2009 *Relevant Local Government Planning Schemes*	The relevant local government area	Development Permit for Operational Works – Filling and Excavation	Filling or excavation	Location to be determined
Note 1 - exempt development under the city Plan provided it is covered in the EIS				

Table 8.2 - Non-IDAS approvals potentially required for the project

Legislation	Administering authority	Permit/approval/ requirement	Trigger/relevant aspect of project	Relevance
Construction				
Commonwealth				
Environment Protection and Biodiversity Conservation Act 2000	Commonwealth Department of Environment	Approval from the Commonwealth Minister for Environment is required if activity is likely to have a significant impact on a matter of national environmental significance.	Development that has a significant impact on: - World Heritage places - National heritage places - Ramsar wetlands - Great Barrier Reef marine park - listed threatened species and - ecological communities - listed migratory species - development involving a Commonwealth marine area - nuclear actions - the environment on Commonwealth land	Activity likely to have a significant impact on matters of national environmental significance are unlikely
Native Title Act 1993	National Native Title Tribunal	If native title is not extinguished, notification procedures or an Indigenous Land Use Agreement required	Native title	Whole of project
Radiocommunications Act 1992	Application made to the Australian Communications & Media Authority	Licence for an Apparatus or Spectrum (s99 and Chapter 3, Part 3.2)	Radiocommunications devices must be licensed	Devices may be used on construction sites
State Government				
Aboriginal Cultural Heritage Act 2003	Department of Environment and Heritage Protection (DEHP)	Cultural heritage management plan (CHMP) (s. 87)	An approved CHMP is required for projects requiring an EIS	Whole of project
Environmental Protection Act 1994	DEHP	Registration Certificate for an Environmentally Relevant Activity (s. 73D)	Registration certificate must be obtained prior to the commencement of an Environmentally Relevant Activity	At all locations that require a development permit for an ERA
Queensland Heritage Act 1992	Heritage Council (DEHP)	Development by the State on a Queensland Heritage Place (s. 104)	Undertaking works on, or adjacent to a property listed on the Queensland Heritage Register. Approval would not be required if works are undertaken by the State or an exemption notice is issued.	To be determined, likely CBD locations
Environmental Protection Act 1994	DEHP	Disposal Permit (s. 424)	Required for the removal and treatment or disposal of contaminated soil removed from a property listed on the EMR or CLR	To be determined
Transport Infrastructure Act 1994	Department of Transport and Main Roads (TMR)	Agreement of the chief executive to carry out road works on, or to interfere with the operation of, State-Controlled Roads (s. 33)	Any works that would impact on the road structure or the intended operation of the State controlled road. Would be required for any works undertaken to the Pacific Motorway and associated on and off ramps.	To be determined

Transport Infrastructure Act 1994	TMR	Road corridor permit	Advertisement exhibited on a state controlled road	Any state controlled roads
Transport Infrastructure Act 1994	Railway manager	Approval of railway manager to interfere with a railway (s. 255)	Any works that would impact on the railway or the intended operation of the railway	Locations where works interfere with the existing network
Transport Infrastructure Act 1994	TMR	Rail Feasibility Investigators Authority (s. 114(2))	Allows investigator entry and re-entry onto land to investigate potential and suitability as a rail corridor	Locations that require further investigation
Transport Infrastructure Act 1994	TMR	Approval from chief executive for Ancillary Works and Encroachments	Required to construct, maintain, operate or conduct ancillary works and encroachments on a State-controlled road	Works encroaching on Pacific Motorway
Forestry Act 1959	Department of Natural Resources and Mines	Sales permit or authorisation	Administration and sale of state owned quarry material	To be determined
Explosives Act 1999	Department of Natural Resources and Mines	Approval for use	Possession, storage and use of explosives	Construction activities, if required
Land Act 1994	Department of Natural Resources and Mines	Permanent road closure (s. 99) or short term occupation and construction within road reserves (excluding state roads)	Permanent closure or short term occupation	Locations to be determined, if required
Nature Conservation Act 1992	DEHP	Taking, using, keeping or interfering with cultural or natural resource of a protected area.	License or Permit required (s62)	To be determined, if required
Transport Planning and Coordination Act 1994 and Acquisition of Land Act 1967	TMR	Resumption of land.	Purposes for which land may be resumed and the resumption process.	To be determined, if required
Vegetation Management Act 1999 and Sustainable Planning Act 2009	DEHP	Clearing of native vegetation	Permit required	To be determined, if required
ULDA Vegetation Management By-Law	Urban Land Development Authority or BCC	Removal of controlled vegetation within declared urban development areas	Permit to interfere with controlled vegetation	Woolloongabba, if required
Work Health and Safety Act 2011 / Work Health and Safety Regulation 2011	Workplace Health and Safety Queensland	Approval for the Storage of Flammable and Combustible Substances	Required for the storage of flammable or combustible substances	Construction sites
Local Government				
Sustainable Planning Act 2009	BCC	Plumbing and Drainage	Seal off/repair/ reconnect existing services along the study corridor and new services at construction sites	Whole of project
Transport operations (Road Use Management) Act	BCC/ Queensland Police Service	Temporary road closure permits (s. 96)	Certificate of assessment	Whole of project
Operation				
Commonwealth				
National Greenhouse and Energy Reporting Act 2007	Department of the Environment	Reporting of GHG emissions, abatement and energy consumption and production activities by corporations	Where project exceeds 50kilotonnes in CO2 equivalent of GHG emitted or consumes/ produces 200 terajoules of energy	Whole of project

Energy Efficiency Opportunities Act 2006	Department of Industry	Reporting of energy efficiencies	Corporations that use more than 0.5 petajoules of energy annually undertake an assessment of their energy efficiency opportunities and report publicly	Whole of project
State Government				
Transport (Rail Safety) Act 2010	TMR	Accreditation of Rail Transport Operator	Required for the management of rail infrastructure and rolling stock	N/A
Transport (Rail Safety) Act 2010	TMR	Implementation of Safety Management Systems	The Safety Management Systems must be established for works managed by the Rail Transport Operator	N/A
Operation Transport Security (Counter-Terrorism) Act 2008	TMR	Risk Management Plan for a Security-Identified Surface Transport	A risk management plan must be prepared if the project is declared a Security-Identified Surface Transport Operation	N/A
Local Government				
Plumbing and Drainage Act 2002	BCC	Compliance Permit for Plumbing and Drainage Work (s. 78)	Required for the installation of any permanent facilities, such as toilets, showers, etc	Stations
City of Brisbane Act 2010 *Local Government Act 2009*	BCC	Local Law Permits	Approvals from the BCC under relevant local laws or provisions of the *Local Government Act 2009* may be required prior to the commencement of such activities. Local Law no 1 - control of advertisements Natural Assets Local Law Health Safety and amenity local law 2009	Various locations

8.3 Local Planning Instruments and Laws

Under *Chapter 3 Section 2.3* of the Brisbane City Council, *Brisbane City Plan 2000,* exempt development includes the following: "*Development involving the construction, maintenance or operation of roads and busways, and things associated with roads and busways by or on behalf of or under contract with Brisbane City Council or the Queensland Government. Things associated with roads and busways includes but is not limited to:*

- *Activities undertaken for road construction*
- *Traffic signs and controls*
- *Depots*
- *Road access works*
- *Road construction site buildings*
- *Drainage works*
- *Ventilation facilities, including exhaust fans and outlets*
- *Rest area facilities and landscaping*
- *Parking areas*
- *Public transport infrastructure*
- *Control buildings*
- *Toll plazas.*

This means a combined rail and bus tunnel, stations and associated infrastructure works and ancillary activities would be defined generally as exempt. Where development is defined as exempt it requires no applications and need not comply with the Codes and other requirements of the *Brisbane City Plan 2000*.

It is noted that at the time of writing the new *draft Brisbane City Plan 2014* was under development; the public notification version of the new plan includes the same provision for exempt development, under Section 5.3.4.

The following local codes, policies and laws may be relevant to the project and should inform the scope of the EIS.

Codes

- *Acid Sulfate Soil Code*
- *Biodiversity Code*
- *Demolition Code*
- *Filling and Excavation Code*
- *Heritage Place Code*
- *Industrial Amenity and Performance Code*
- *Industrial Areas – Adjacent Development Code*
- *Industrial Design Code*
- *Landscaping Code*
- *Non-discriminatory Access and Use Code*
- *Operational Works Code*
- *Services, Works and Infrastructure Code*
- *Stormwater Management Code*
- *Subdivision Code*
- *Transport, Access, Parking and Servicing Code*
- *Waterway Code*
- *Wetland Code*
- *Light Nuisance Code.*

Policies

- *Acid Sulfate Soil Planning Scheme Policy*
- *Air Quality Planning Scheme Policy*
- *Brisbane River Corridor Planning Scheme Policy*
- *Community Impact Assessment Planning Scheme Policy*
- *Consultation Planning Scheme Policy*
- *Crime Prevention Through Environmental Design (CPTED) Planning Scheme Policy*
- *Environmental Impact Assessment Planning Scheme Policy*
- *Hazard and Risk Assessment Planning Scheme Policy*
- *Heritage Register Planning Scheme Policy*
- *Impact Assessable Uses Planning Scheme Policy*
- *Management of Urban Stormwater Planning Scheme Policy*
- *Natural Assets Planning Scheme Policy*
- *Noise Impact Assessment Planning Scheme Policy*
- *Planting Species Planning Scheme Policy*
- *Transport, Access, Parking and Servicing Planning Scheme Policy*
- *Transport and Traffic Facilities Planning Scheme Policy*

Laws

- *The 'Gabba Traffic Area Local Law 2000*
- *Heavy and Long Vehicle Parking Local Law 1999*
- *Natural Assets Local Law 2003*
- *Streets, Bridges, Culverts Etc 2003*
- *Public Health, Safety and Convenience, 2003*
- *Parking and Control of Traffic, 2007.*

9 Costs and Benefits Summary

9.1 Local, State and National economies

The total estimated cost for the Underground Bus and Train project is $5 billion (P90, out-turn). This cost estimate for the project will require refinement as part of the next phase when more detailed investigations take place and the Reference Design is prepared.

The project will therefore deliver the combined benefits of the previous *Cross River Rail* proposal and Brisbane City Council's recently announced *Suburbs 2 City* bus project, together estimated at about $8 billion (P90, out-turn) at a much more affordable price.

The project is a major transport infrastructure project that will deliver substantial, long-term benefits to Brisbane, South East Queensland and Queensland. It will provide extensive benefits to the South East Queensland's rail and bus network. It will result in significant long-term benefits to the region's road network, and provide opportunities for future integration of land use and public transport at locations such as the Government Precinct. It will also provide benefits to communities, environmental amenity, enhanced accessibility and liveability.

Enabling infrastructure for economic growth sits at the heart of the Queensland Government's plan for boosting economic development over the next decade, *Governing for Growth*. The project will unlock major rail and busway bottlenecks and generate network wide benefits by providing the inner city bus and rail infrastructure necessary to transform the network and promote future productivity, prosperity and sustainable development.

The Underground Bus and Train project will provide key infrastructure that supports the nationally significant economic growth area of Brisbane's inner city. It addresses the Australian Government policy priorities of better planning for infrastructure and delivering priority infrastructure for the nation. It also supports the Coalition's Policy to Deliver the Infrastructure for the 21st Century policy areas of delivering infrastructure to cut traffic congestion and better infrastructure planning.

As the capital of business, government and culture, Brisbane drives economic prosperity and underpins the Queensland Government's four pillar economy of tourism, agriculture, resources and construction. Brisbane's growing reputation as a new world city is attracting global investment and multiplying job opportunities, drawing workers from across the region.

The Underground Bus and Train project will keep Brisbane, Queensland's economic engine room, moving by ensuring its public transport infrastructure keeps pace with growth. The project is an important step in realising the Queensland Government's blueprint for infrastructure reform, *Infrastructure for Economic Development*. The project will provide a clear stimulus to the Queensland economy during construction.

The Underground Bus and Train project contributes to the strategic objectives of the Queensland Government, Brisbane City Council and the Australian Government. The project will deliver wide ranging benefits in terms of transport outcomes and economic benefits for the city and region. The following strategic objectives provide the overarching basis for the project:

- support a more diverse and robust economy for Queensland
- deliver a more efficient, integrated passenger transport network
- improve accessibility and provide for faster and more reliable travel times for bus and rail users
- increase utilisation of the bus and rail networks
- reduce congestion and crowding on the surface road, bus and rail networks

- support more sustainable urban development and land use patterns.

9.2 Natural and Social Environments

Table 9.1 summaries the expected positive and negative impacts of the project on the natural environment and the impacts of the project on the social environment.

	Positive impacts	Potential negative impacts
Natural Environment		
Geology and Groundwater	-	Potential changes to groundwater regime along corridor
Flooding, water quality and sediment control	-	No significant impacts anticipated
Ecosystems, flora and fauna	-	Potential minor local disturbance during construction and operation
Spoil and waste management	Possible valuable construction resources generated	Potential for significant amount of spoil / waste to be generated during construction
Air quality	Reduced regional air emissions (pollutants and greenhouse gas emissions) Local air quality improvement where vehicle traffic volumes are reduced	Potential local air quality impacts during construction (e.g. dust) and operation (e.g. bus exhaust)
Social Environment		
Property and severance	Redevelopment opportunities and potential value uplift due to increased accessibility	Potential property acquisition due to surface and / or volumetric impacts Changes in accessibility to transport infrastructure e.g. stations
Cultural heritage	-	No significant impacts anticipated
Urban design, landscape and visual effects	Enhanced public realm around stations and opportunities for urban design outcomes	Potential local impacts at portal areas, station locations and temporary construction sites
Noise and vibration	Reduced noise where vehicle traffic volumes are reduced	Local noise and vibration impacts during construction and local noise during operation at specific sites

Table 9.1

10 Community and Stakeholder Consultation

The Proponent is committed to extensive engagement with the community and stakeholders throughout the project, especially as an integral part of the EIS process. This will include engagement with a broad and diverse range of stakeholders involving the community, local government, state government, federal government, interest groups and industry. This will allow all interested parties the opportunity to be well informed about the project, to have input into its development and to ensure that all concerns are addressed during the environmental impact assessment processes.

The project governance structure will include a steering committee that provides guidance and comment on the project development and assessment. The steering committee membership includes representatives of government agencies, including senior representation from Brisbane City Council.

Brisbane City Council is seen as a key partner in the determination of the final configuration of the project and the development of the required measures that will guide its construction and how the project fits into the city fabric during operation.

There will be numerous opportunities for community input into the EIS from mid-2014 to completion of the process including:

- commenting on the draft terms of reference which sets the scope of the EIS
- giving input into community values and which issues and opportunities need to be explored in the preparation of an initial design and completion of the EIS
- reviewing and giving feedback on the alignment, station and construction options
- a complaints mechanism
- commenting on the EIS.

Throughout the EIS period, information about the project will be available on a project website and the project team will be available to answer queries.

Community engagement is an essential part of the Department of Transport and Main Roads' strategic priorities and an integral part of the planning and implementation of the Underground Bus and Train project. During construction and implementation, the community will have an opportunity to provide feedback on the impacts of the project, including practical matters about amenity, dust, noise and vibration through a dedicated communication portal.

Engagement activities are planned to maximise the opportunity for members of the public to have a say about the project. These activities will be varied, offering many different ways to give feedback including public displays, information sessions, online forums, and one-on-one meetings.

References and Data Sources

BITRE Working Paper 71, 2007

Brisbane Community Profile, Government Statistician, Queensland Treasury and Trade.

Brisbane Economic Development Plan 2012 - 2031

City Centre Master Plan 2006

City Centre Neighbourhood Plan

City Plan 2000

Cross River Rail Initial Advice Statement

Cross River Rail Environmental Impact Statement Report

Cross River Rail - Coordinator General's Report

Cross River Rail – Independent Panel Review (available at www.tmr.qld.gov.au)

Draft Brisbane City Centre Master Plan 2013

Inner City Rail Capacity Study (2008)

Infrastructure for Economic Development, Queensland Government – October 2013

Governing for Growth – Enabling a Stronger Queensland Economy July 2013

KPMG Press Release 13-08-2013: The Gold Coast's Seductive Lifestyle Underpins Rise of Extreme Commuting

National Institute of Economic and Industry Research

Northern Link Environmental Impact Statement Technical Paper 1 (Traffic and Transport) Sept 2008

State Budget 2011-12 Capital Statement Budget Paper No. 3

State Development & Public Works Organisation Act 1971

Suburbs 2 City: Pre-Feasibility Report September 2013

Transport Plan for Brisbane 2008–2026

Queensland Plan (under development)

Glossary

Active transport	Walking and cycling
BCC	Brisbane City Council
CBD	Central Business District (Brisbane), roughly bounded by the Brisbane River to the east and south, Boundary Street to the north and Hale Street to the west. This definition is based on the Brisbane City Council "Brisbane City" Statistical Area Level 2.
***Cross River Rail* proposal**	A previously proposed new 18 kilometre north-south rail line in Brisbane's inner city. The project included a detailed feasibility phase including a full Environmental Impact Statement.
Underground Bus and Train Concept Design	Concept design for Underground Bus and Train included tunnel design, surface track design, station design, fire and life safety design and systems, proposed construction methodology and property requirements
EPBC Act	Environment Protection and Biodiversity Protection Act 1999 (Commonwealth)
EMP	Environmental Management Plan
Government Precinct	The Government Precinct area describes the area generally located between the Brisbane River and George Street and between Alice and Queen Streets.
Government Precinct Redevelopment Project	The Queensland Government is working to renew the Government Precinct. The redevelopment area is the state-owned land generally located between the Brisbane River and George Street and between Alice and Queen Streets. The government will seek private sector investment to revitalise the area through a mix of new uses which may include retail, quality hotels, cultural activities, entertainment and convention facilities.
EIS	Environmental Impact Statement
IAS	Initial Advice Statement
IDAS	Integrated Development Assessment System
LGA	Local Government Area
Reference Design	The design that incorporates all elements of the project and meets current design standards and engineering principles. A Reference Design is not for construction.
SDPWOA	State Development and Public Works Organisation Act 1971 (Queensland)
SPA	Sustainable Planning Act 2009
The Proponent	Department of Transport and Main Roads
The Project	The Underground Bus and Train project
PPP project	Public Private Partnership – a project which is funded / operated through a partnership of government and one or more private sector companies
Hybrid-PPP	Public Private Partnership where Government provides significant levels of support, for example by reducing the private sector funding component