CrossRiver*Rail*

1. Introduction

Cross River Rail

CHAPTER 5
TRANSPORT

JULY 2011

Contents

5. Transport

5.1. Introduction

This chapter addresses Section 3.1 of the ToR for the EIS. It presents a summary of the main transport impacts of Cross River Rail, including future transport considerations for both rail passengers and freight operation with and without the Project.

The chapter also presents the impact of the Project on bus, ferry and road networks at the local and regional level, as well as the impacts on rail maintenance and the transport impacts during construction. A more detailed description of the transport impacts of Cross River Rail is presented in *Technical Report No. 1 – Transport*.

Cross River Rail would provide additional rail and station infrastructure through the Brisbane central business district (CBD) and relieve capacity constraints on the inner city rail network. This increase in capacity would benefit both passenger and freight rail services, which would support the growth and economic development of the city and the wider South East Queensland region.

The additional rail capacity would change the way rail operates in the future with the Project enabling the sectorisation of passenger services for enhanced operating efficiency and reliability. By allowing passenger trains from the south to bypass key sections of the surface rail network, the Project also allows the dual gauge tracks used by freight trains accessing the Port of Brisbane to carry more freight.

By providing an additional underground station at Albert Street in the CBD, Cross River Rail would spread passenger movements more evenly across all three CBD stations. This would relieve passenger congestion at Central Station, which is the busiest station in the rail network.

The benefit of Cross River Rail in the busy morning peak period would also be felt on the road transport system, with both bus and private vehicle modes benefiting from some congestion relief.

Cross River Rail would have both costs and benefits as described elsewhere in this EIS. However, the transport benefits have been assessed as outweighing the infrastructure costs.

5.1.1. Assessment carried out by others

This chapter has been informed by information provided by other organisations, including:

- **AECOM** in relation to traffic engineering assessment of the reference design and for the assessment of impacts on the rail network during construction
- **Saha International Limited** in relation to Cross River Rail freight demand review
- **Systemwide Pty Ltd** in relation to rail operations assessment.

The information provided by these organisations has not been independently verified or audited by the SKM-Aurecon CRR Joint Venture. The SKM-Aurecon CRR Joint Venture acknowledges the contribution made by these organisations to the development of this chapter.

5.1.2. Study area

The transport assessment is focussed on the study corridor identified for the EIS ToR (shown in **Figure 5-1**), which extends from Wooloowin in the north to Salisbury in the south.

In addition, transport impacts were assessed and reported for the Brisbane CBD and the Brisbane metropolitan area:

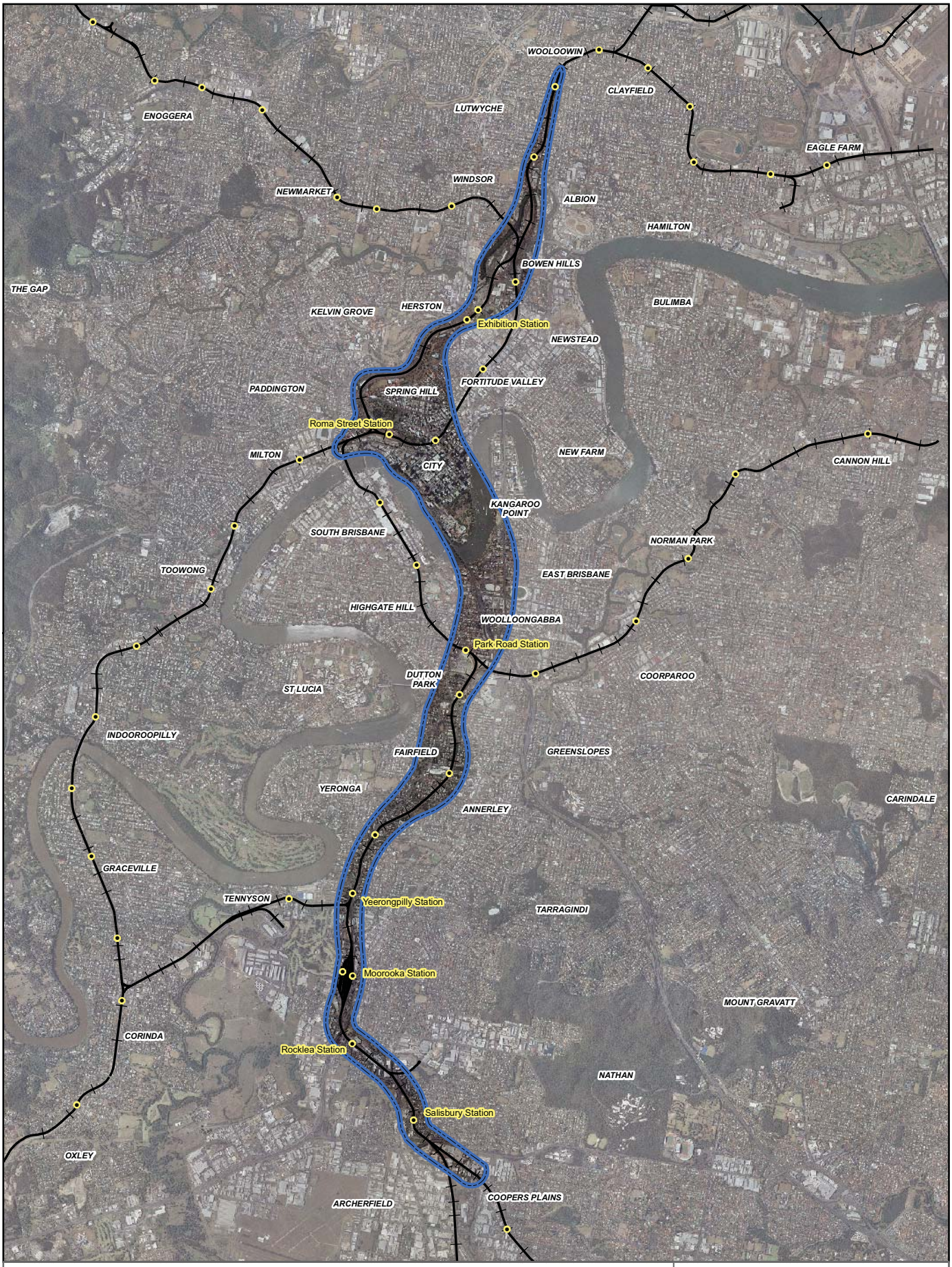
- The Brisbane CBD, which comprises the area of commercial, retail, finance and government uses located within the area extending from Eagle Terrace (near the William Jolly Bridge) to Kemp Place (near the Story Bridge), including all land to the south and east of Ann and Turbot streets.
- The Brisbane metropolitan area, which covers an area of approximately 4,700km^2 and comprises the Brisbane local government area (LGA) and the surrounding area extending to Caboolture in the north, Beenleigh in the south, Ipswich in the west and Redlands in the east. The metropolitan area is the same area defined by the 2001 Brisbane Statistical Division (BSD) and also represents the area covered by the Brisbane Strategic Transport Model (BSTM) and the Cross River Rail Project Model.

5.1.3. Basis of the transport impact assessment

The public transport patronage forecasts and user benefits of Cross River Rail were derived from a land use and transport network model specifically developed for the Project (the Cross River Rail Project Model). The transport model provides average weekday travel demand forecasts for the Brisbane metropolitan area up to and including the year 2031, for both public transport and road traffic trips. This patronage forecasting model is based on the BSTM and is described in *Technical Report No. 1 – Transport.*

Most of the analyses that form the basis of the Project assessment, including the assessment of patronage, station passenger use, road network congestion and user benefit forecasts, were derived from the Cross River Rail Project Model. Other supplementary transport models and analysis tools developed and applied to assess the Project included:

- A benchmark forecasting tool was used to prepare preliminary patronage forecasts for initial input to design tasks while the Cross River Rail Project Model was being developed.
- A dynamic rail operations simulation model (RailSys) was used to assist in rail network service plan development, analysis and the derivation of performance measures, including train reliability.
- A train load predictor tool (TLP) was applied to assess the passenger and operational impacts of rail network timetables, developed using RailSys, and provide performance measures such as load factors.
- A station simulation model (ClicSim) was used to assist in station design and sizing, the assessment of pedestrian movements and level of service (LOS) at rail stations.
- Detailed assessment of impacts at intersections and on affected sections of the road network was undertaken using traffic modelling software, namely SIDRA and Transyt.
- The overall method to assess the transport effects of the Project used a comparative analysis of effects with and without the Project. Sensitivity scenario testing was used to determine the degree of influence of key factors on demand and transport performance, such as population and employment forecasts, public transport fares and station features, as reported in *Technical Report No. 1 – Transport.*



Study Corridor
Station
Track

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-1

The Rail Network

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1:75,000 at A4

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CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G0119_CRR_Transport_Study_Corridor_A4.mxd 06/07/2011 14:45

5.2. Existing transport networks and services

This section provides an overview of the existing transport networks and services, including for passenger rail, freight rail, bus, and regional, arterial and local roads. Information is also presented on the existing pedestrian and cycle network in the study area.

5.2.1. Regional rail network (passenger)

The Queensland Rail passenger network in South East Queensland is a large suburban railway network comprising approximately 740 km of railway tracks. It extends from Nambour (Sunshine Coast) in the north, Varsity Lakes (Gold Coast) in the south, Moreton Bay in the east and Rosewood in the west. In 2011, the network included 144 stations, as shown in **Figure 5-2**.

Inner city stations are located at Bowen Hills, Fortitude Valley, Roma Street, Central, South Brisbane and South Bank. Roma Street and Central stations are both located in the Brisbane CBD.

Queensland Rail, in partnership with the TransLink Transit Authority (TransLink), provides 57 train services each weekday peak hour through the CBD. These rail services operate on the main (or inter-urban) sector and the suburban sector, which comprise:

- Main sector, including the Nambour, Caboolture, Ipswich and Rosewood lines
- Suburban sector, including the Shorncliffe, Airport, Doomben, Ferny Grove, Cleveland, Beenleigh and Gold Coast lines.

Generally, passenger rail services in Brisbane are medium to long-distance commuter services, receiving heavy patronage during the morning and evening peak travel times.

The existing (2009) timetable provides 57 trains during the morning one hour peak period arriving at Central Station between 7.30 am and 8.30 am weekdays (refer **Figure 5-3)**. These services include:

- 15 services operating on the Main lines from the north, including two express services from Nambour (Sunshine Coast), four semi-express services from Caboolture, six services from Petrie and three services from Shorncliffe.
- 12 services operating on the Suburban lines from the north, including three services from the Airport, two services from Doomben, five services from Ferny Grove and two services from Mitchelton.
- 12 services operating on the Main lines from the west, including two express services from Rosewood, five services from Ipswich, three services from Corinda, one service from Redbank and one service from Darra.
- 18 services operating on the Suburban lines from Beenleigh, the Gold Coast and Cleveland, including four express services from the Gold Coast, five services from Beenleigh, two services from Kuraby, four services from Cleveland, one service from Thorneside and two services from Lota. These services all use the Merivale Bridge to cross the Brisbane River.

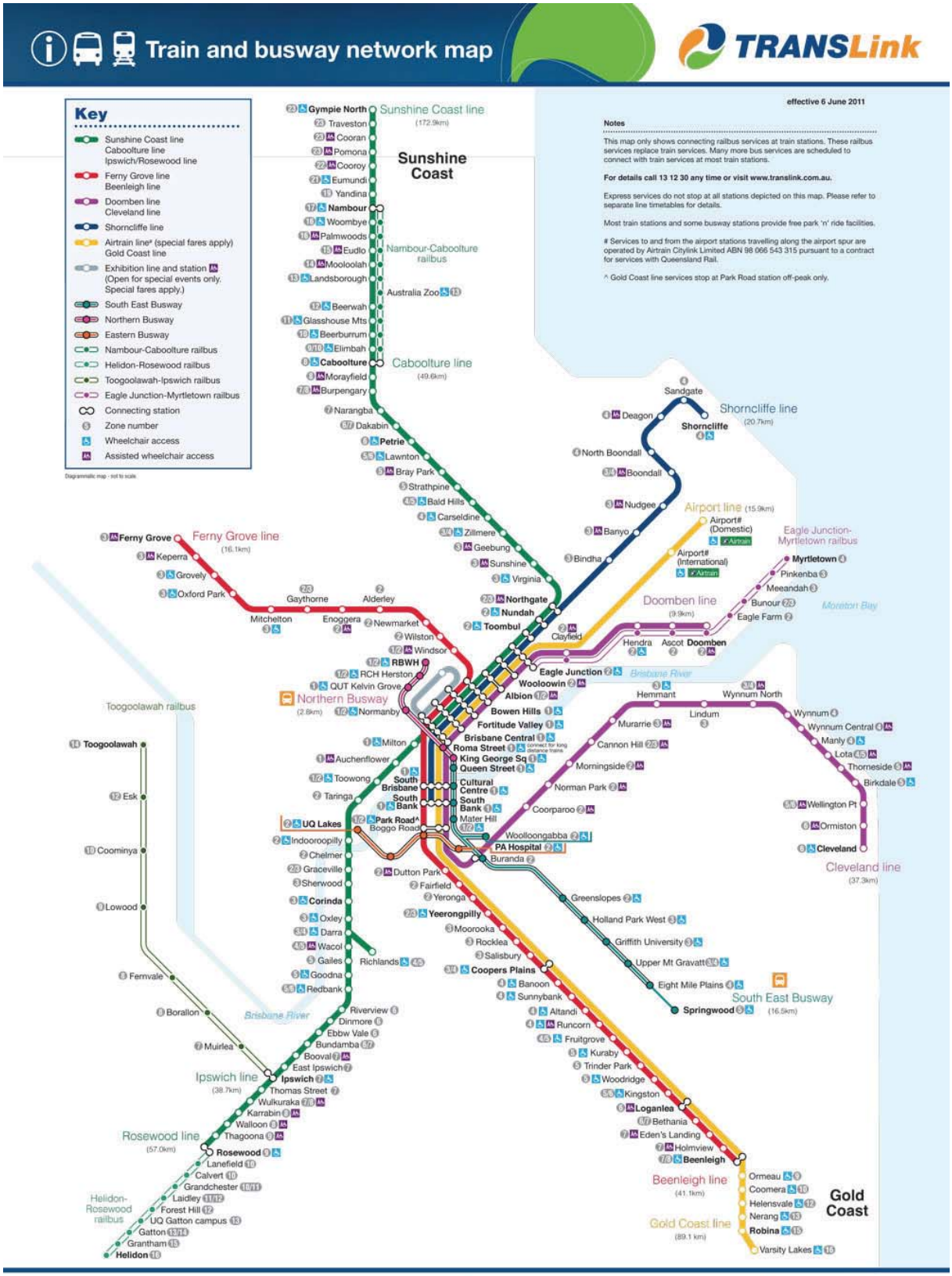


Figure 5-2 South East Queensland rail network

Source: www.translink.com.au, 2011

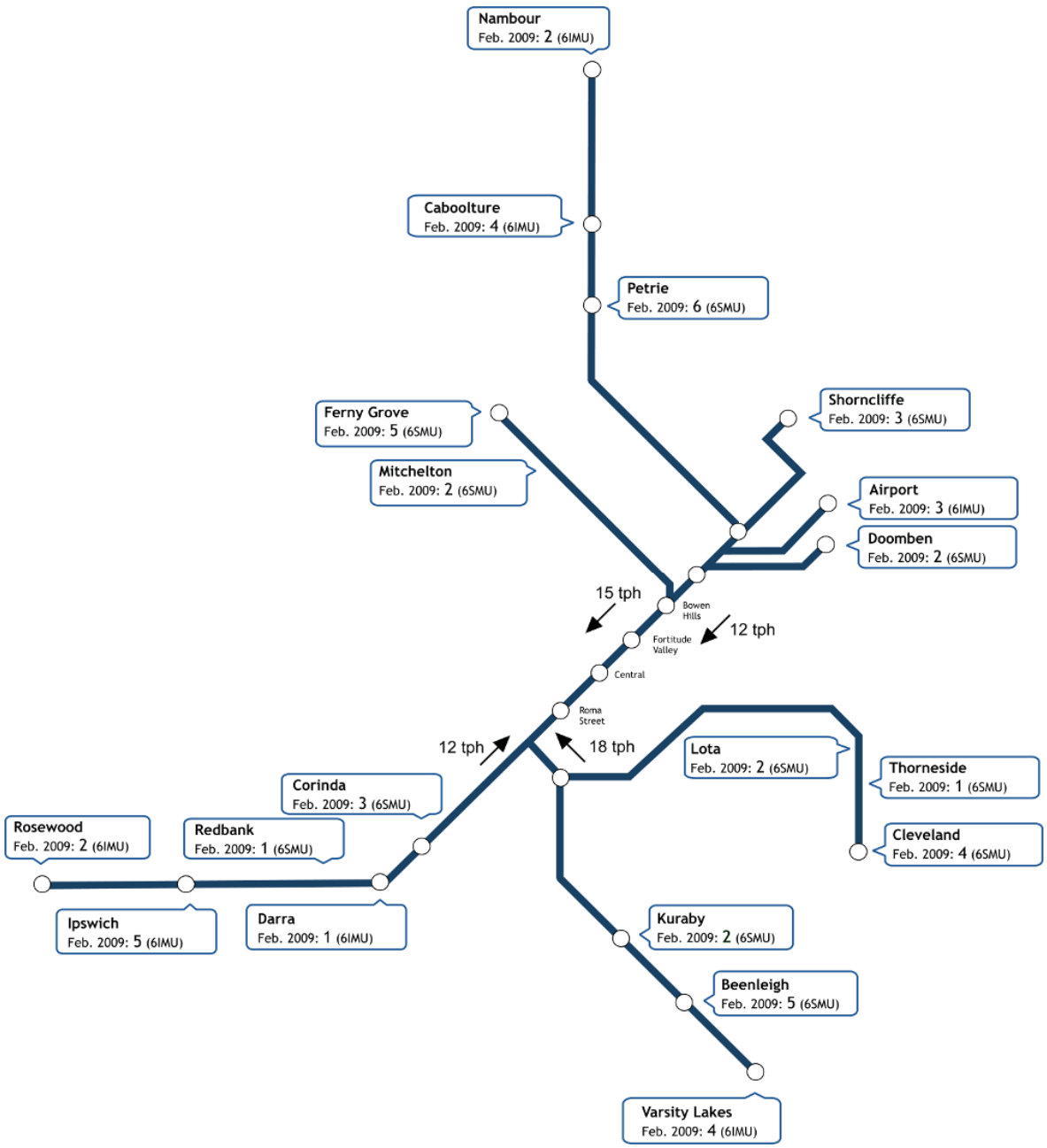


Figure 5-3 Brisbane 2009 morning peak hour rail in-bound services towards Brisbane CBD

Source: Systemwide, December 2010

Passenger fares

Public transport in South East Queensland is managed and coordinated by TransLink. TransLink has developed a consistent region-wide zone and fare structure for all public transport travel, which covers 23 zones. The Brisbane CBD is at the centre of the network and is within zone 1. The network extends as far north as Gympie, south to Coolangatta and west to Helidon (west of Ipswich).

Fares are calculated at either an adult or concession rate and based on the number of zones travelled through during your journey. Fares also vary between paper and electronic (*go card*) payment methods, with an off-peak discount applied for *go card* transactions only. The current (2011) adult paper fare within one zone is $3.90, while the equivalent peak fare on *go card* is $2.65 and off-peak is $2.26. The current (2011) adult *go card* fares within five zones (ie Strathpine, Moggill or Kuraby to the Brisbane CBD) are $4.72 (peak) and $4.02 (off-peak). Concession fares are half the equivalent adult fare.

Rail patronage

At present, approximately 243,200 passengers use the rail system on an average weekday. Just over 50% of use occurs during the morning and evening peak periods, which cover four hours of the typical weekday. The morning peak is busier than the evening peak, as shown in **Table 5-1**, as commuter work and education trips combine during this period, whereas later in the day education trips tend to occur from mid-afternoon.

Table 5-1 Existing (2009) rail travel in Brisbane metropolitan area

Period	Rail users
AM peak (7.00 am-9.00 am)	67,000
PM peak (4.00 pm-6.00 pm)	58,400
Average weekday (24 hours)	243,200

There were approximately 56,500 boarding and alighting movements at inner city rail stations (Bowen Hills, Fortitude Valley, Central, Roma Street, South Brisbane and South Bank) in the 2009 two hour morning peak period, of which 43,800 boarding and alighting movements (including transfers) occurred at a CBD station (ie Central or Roma Street stations).

Central Station is the busiest station in the network, accounting for almost 80% of CBD passenger activity during the peaks.

In the morning peak, about 29,800 passengers board trains to the north of the inner city and 35,800 passengers board trains to the south of the CBD (including the Ipswich line). The majority of passengers (greater than 90%) board trains outside the inner city.

Rail services

During the peak hour, there are 27 rail services that operate in the northern section of the study corridor including:

- services to and from the Sunshine Coast and Caboolture and (some) Shorncliffe trains operating on the Main lines
- services to and from the Airport, Doomben, Ferny Grove and (some) Shorncliffe trains operating on the Suburban lines.

There are a minimum of two trains per hour from each destination with services coming together to create higher frequencies at many inner city stations. Less frequent services (approximately every two hours) operate from the Sunshine Coast (Nambour).

In the southern section of the study corridor, a total of 30 services operate, including:

- services to and from the Gold Coast and Beenleigh lines and Cleveland line operating on the Suburban lines
- services to and from Ipswich and Rosewood line operating on the Main lines.

Services from the north and south merge in the central study corridor, stopping at each of the four stations from Bowen Hills to Roma Street (inclusive) during the morning peak hour.

Stations in the study corridor and their patronage

Table 5-2 provides a summary of existing average weekday and morning peak period patronage for stations in the study corridor.

Table 5-2 Existing (2009) daily and morning peak period movements at stations

Station	Time Period	Boarding*	Alighting*	Total
Wooloowin	Daily	1,100	1,300	2,400
	AM (7.00-9.00 am)	500	100	600
Albion	Daily	2,500	2,500	5,000
	AM (7.00-9.00 am)	1,000	300	1,300
Bowen Hills	Daily	5,900	6,800	12,700
	AM (7.00-9.00 am)	800	2,800	3,600
Fortitude Valley	Daily	7,900	9,000	16,900
	AM (7.00-9.00 am)	500	4,200	4,700
Central	Daily	54,000	50,300	104,300
	AM (7.00-9.00 am)	4,400	30,100	34,500
Roma Street	Daily	17,800	18,700	36,500
	AM (7.00-9.00 am)	1,700	7,600	9,300
Park Road	Daily	2,100	1,800	3,900
	AM (7.00-9.00 am)	600	600	1,200
Dutton Park	Daily	500	500	1,000
	AM (7.00-9.00 am)	300	100	400
Fairfield	Daily	600	500	1,100
	AM (7.00-9.00 am)	500	100	600
Yeronga	Daily	1,000	900	2,000
	AM (7.00-9.00 am)	500	200	700
Yeerongpilly	Daily	600	900	1,500
	AM (7.00-9.00 am)	400	300	700
Moorooka	Daily	800	600	1,400
	AM (7.00-9.00 am)	300	100	400
Rocklea	Daily	600	500	1,100
	AM (7.00-9.00 am)	100	200	300
Salisbury	Daily	600	500	1,100
	AM (7.00-9.00 am)	100	200	300

** Note: Passenger boardings and alightings include transfers between all modes, including rail to rail (rounded to the nearest 100).*

The following provides a description of each station and its function.

Wooloowin Station

Wooloowin Station is situated between Bridge Street and Hudson Road, in the predominantly low density residential area of Wooloowin, approximately 5.6 km north of Central Station. The station is located on the main north coast railway line and is served by the Caboolture, Shorncliffe and Doomben lines. Peak hour express trains from Caboolture do not stop at the station. Trains from the Airport and Sunshine Coast (Nambour) lines pass through, but do not stop at Wooloowin Station.

The station has four railway tracks and four platforms connected by a pedestrian bridge and concourse at the southern side of the station. The station ticket office is located on the concourse bridge above platforms two and three and includes other facilities such as bike racks and toilets. All four platforms are approximately 150 m in length, with tactile indicators present only on Platform 4.

Overall boardings and alightings are relatively low with around 600 passenger movements in the morning peak period. The station operates a typical residential movement pattern with a large proportion of station activity relating to boardings in the morning peak and alightings in the evening peak, with the majority of trips related to journey to work travel to the CBD.

Observations of platform activity indicate that passengers are generally able to board southbound trains at Wooloowin in the morning peak period, with trains not at 'crush capacity'.

Walk access is the dominant mode of access in the morning peak representing around 70% of station boardings, with park 'n' ride accounting for much of the remaining 30% of passenger boardings.

Albion Station

Albion Station is located approximately 700 m east of Lutwyche Road in the suburb of Albion, approximately 4.5 km north of Central Station. It includes four platforms and four railway tracks. All platforms are approximately 150 m in length and arranged as an island and two side platforms. Platform 2 and Platform 3 (island platforms) are accessed by two pedestrian bridges connecting to all other platforms and the surrounding streets. Platform 1 and Platform 4 are side platforms with direct access to adjacent streets. The station office is located on Platform 1.

Albion Station is served by the Caboolture, Shorncliffe and Doomben lines. In the morning peak period southbound trains carry 114% of their seated capacity. This suggests that there are standing passengers for a large part of the morning peak, although there is some spare capacity particularly in the end carriages. Observations of platform activity show that passengers are able to board southbound trains at Albion in the morning peak period and that trains are not at 'crush capacity'.

Walk access is the dominant mode of access in the morning peak representing 63% of station boardings. Park 'n' ride is the other key access mode, used by 36% of boarding patrons. Bus access is negligible.

Bowen Hills Station

Bowen Hills Station is located approximately 2.7 km north of Central Station. The station is located within 250 m of Queensland Rail's Mayne Rail Yard, which is a significant facility used for rail activities such as maintenance, stabling, cleaning and staff facilities. There is direct staff access from Mayne Rail Yard to Bowen Hills Station to facilitate staff changeovers.

Bowen Hills Station comprises two island platforms with four platform faces serving four railway tracks. The station is accessible by two pedestrian overpasses – one to the south, which includes lift access, and one to the north, which includes stairs only.

The station is one of only four stations in Brisbane which are served by all suburban passenger lines, with others being Fortitude Valley, Brisbane Central, and Roma Street stations. During the morning peak hour, 57 trains in total stop at Bowen Hills.

Bowen Hills is one of the busiest stations in the rail network (after Central, Roma Street, Fortitude Valley, South Bank and South Brisbane) with over 12,000 daily passengers. In the morning peak period the majority of station activity is alighting movements while in the evening peak the station has significant boarding passengers. Walk is the dominant means of station access, although, the station is also an important rail to rail interchange. A key operational issue at the station is the narrow width of the western island platform (Platforms 3 and 4) being less than 4 m wide at its northern end, which is less than the Queensland Rail desirable minimum of 8 m. This platform is often overcrowded during peak times.

Exhibition Station

Exhibition Station, is approximately 3.4 km north-east of Central Station. It is located in the RNA Showgrounds, which are bordered by Bowen Bridge Road, O'Connell Terrace, St Paul's Terrace and Gregory Terrace at Bowen Hills.

Exhibition Station is located on the Exhibition railway line and is currently used for passenger services twice a year during the Royal Queensland Show (the Ekka) and the Caravan and Camping Show.

During normal operations, trains travelling on the Exhibition line and through Exhibition Station include:

- empty trains to and from the stabling facilities at Mayne Rail Yard
- freight trains bypassing the heavily used passenger lines between Bowen Hills and Roma Street stations or accessing the Normanby marshalling yard
- long-distance passenger services to and from Roma Street Station.

Central Station

Central Station is located in the northern area of the Brisbane CBD. The Central Station precinct includes offices and hotels and is surrounded by major roads within the CBD network, namely Ann Street, Turbot Street, Creek Street and Edward Street.

Central Station serves all suburban and interurban railway lines. The station has six platforms arranged as three double-sided islands. Each island has escalators, stairs and lift access to the main station concourse as well as stair access to a pedestrian subway link under Ann Street. The concourse area accommodates a range of convenience retail facilities.

During the morning peak hour, 57 trains stop at Central Station. It is the busiest station on the network in terms of passenger activity, with around three times the number of daily passenger movements of Roma Street Station, the next busiest station on the network.

Central Station has over 104,000 passenger movements (boardings, alightings and transfers) on a typical weekday. The morning and evening peak periods account for almost 60% of the daily passenger activity. Station activity in the morning peak period is busier than the evening peak period.

There is a strong 'tidal flow' nature of passenger movements at Central Station with very heavy alightings in the morning peak and few boardings, whereas in the evening peak there are large numbers of boardings and few alightings. The station experiences relatively short, peak flows and congestion on platforms and at access stairs is a noticeable occurrence during the peak periods. The subway under Central Station currently operates within its capacity. Pedestrian congestion occurs on the footpaths surrounding the station during the peak periods and pedestrians cross busy roads.

Walk access is by far the dominant mode of access to Central Station accounting for over 80% of patrons. Only small proportions of bus to rail (5%) and rail to rail (13%) interchanging are estimated.

Roma Street Station

Roma Street Station is part of the Roma Street Transit Centre, a multi-modal transport hub comprised of the railway, busway and intercity coach stations as well as a range of retail and commercial uses. The transit centre is located in the north-western area of the Brisbane CBD and serves a growing inner city precinct.

Roma Street Station serves all suburban and interurban passenger railway services, a total of 57 services per hour in the morning peak. It includes six in-service platforms (Platforms 4 to 9). Each platform is accessible by stairs, lifts and escalators from a central pedestrian subway.

Roma Street Station also caters for interstate and long distance passenger rail services including:

- Daily railway services to Sydney provided by CountryLink NSW. Services arrive daily at 6:30 am (5.30 am during Eastern Daylight Time) and depart at 7.30 am (6.30 am during Eastern Daylight Time) from Platform 2.
- Long distance services to Queensland destinations, provided by Queensland Rail TravelTrain, which depart from Platform 10 and include daily Tilt Train services to Rockhampton, as well as weekly services to Cairns, Longreach and Roma.

Roma Street Station is the second busiest station on the rail network with 36,500 passenger movements (boardings, alightings and transfers) on a typical weekday. Around 50% of the daily activity occurs during the peak four hours. The morning peak period is marginally busier than the evening peak period, with alighting passengers dominant in the morning peak and the evening peak activity characterised by boarding commuters.

In the morning peak alighting passengers are mainly pedestrian-orientated with around 75% of alighting passengers walking from the station to the surrounding precinct, 14% transferring to bus and 12% transferring to other rail services.

The station experiences crowding at the main ticket gate line within the subway. The station exits for pedestrians approaching Roma Street are also constrained with the most direct exit leading onto a narrow footpath with a lack of formal pedestrian crossing facilities, as shown in **Figure 5-4**.

Figure 5-4 Roma Street Station entrance, looking towards the intersection of Roma and George streets

Park Road Station

Park Road Station is located in the inner suburb of Dutton Park approximately 5 km south of Central Station. It serves a wide range of suburban and interurban railway lines. It has four platforms of which, three are used for passenger services. Each platform has stairs and lift access to a pedestrian overbridge, which links the road and footpath networks on the northern and southern sides of the station. The station is adjacent to the Boggo Road busway station.

The Beenleigh and Cleveland lines stop at Park Road Station along with off-peak Gold Coast services. The Beenleigh and Cleveland lines both have regular 'all stops' services, approximately every half hour, all day every day, with more regular services (including some semi-express) during peak hours. In the morning peak period (7.00 am to 8.00 am), seven trains arrive from the Cleveland corridor and seven trains from the Beenleigh corridor. In total, 14 trains stop during the morning peak period inbound to the CBD (with a further four not stopping). In the off-peak, two trains per hour from each of Cleveland, Beenleigh and the Gold Coast stop at Park Road Station, giving a combined total of six trains per hour in each direction.

Park Road Station has almost 4,000 boardings and alightings on a typical weekday. The morning peak period is slightly busier than the evening peak period. Boardings and alightings are closely matched in the morning peak, indicative of the range of attractors and destinations within the surrounding catchment as well as the various interchange opportunities (rail-rail and rail-bus) available at Park Road. This pattern is not evident in the commuter evening peak where alightings are lower, due to trips spreading into other afternoon/evening time periods.

A high proportion of rail passengers access the station by walking (51%). There is some limited park 'n' ride and kiss 'n' ride access to the station (17%), while bus access to the station in the morning peak is low at around 4%. In the morning peak approximately 30% of alighting passengers transfer to bus, 25% transfer to another rail service and 43% walk to surrounding trip attractors, including the Princess Alexandra Hospital (PA Hospital) (1.1 km), the University of Queensland (1.5 km) and local businesses.

No crowding issues on the platforms or access walkways are typically evident on a weekday morning peak.

Dutton Park Station

Dutton Park Station is located on the Beenleigh line, approximately 5.9 km south of Central Station. The station consists of two side platforms, one for northbound and one for southbound travel. The northbound platform is 160 m long and is accessed by an elevated ramp and stair structure from the eastern side of Annerley Road. The southbound platform is 150 m long and is accessed by a ramp from Kent Street. Station facilities (ticket office and amenities) are located on the northbound platform. To the west of the northbound platform is a third, dual gauge railway track used by express passenger trains (travelling to/from the Gold Coast and Sydney) as well as freight trains (travelling to/from the Port of Brisbane).

There are up to five inbound services to the CBD in the peak hour. During the off-peak, two services per hour are provided in each direction. Dutton Park Station has a relatively low level of passenger use, with around 1,000 passengers per day. Activity is highest in the morning peak, due to commuter boardings. The main mode of access and egress for the station is walking, with some travel by car also evident.

Fairfield Station

Fairfield Station is located approximately 7.1 km south of Central Station and located close to the Fairfield Gardens Shopping Centre. The station consists of two platforms and three tracks. Platform 1 is located parallel to Equity Street and has a direct access from the street as well a pedestrian bridge. Platform 2 is located parallel to Midmay Street and accessed via a pedestrian bridge. The station office is located on Platform 2.

In the one hour peak period there are up to five inbound services to the CBD, while two services per hour are provided in each direction during the off-peak period.

Fairfield Station has relatively low levels of passenger use, with around 1,100 passengers daily. Morning peak commuters mainly walk to the station, with around 14% arriving by car.

Yeronga Station

Yeronga Station is located between Fairfield Road and Lake Street. The station consists of two side platforms with three tracks. The third track is a dual gauge express/ freight track running parallel to Fairfield Road bypassing the station. Platform 1 can be accessed by a ramp or stairs, while Platform 2 is accessed by a footbridge linking the station to the east and over Fairfield Road to the west. Both platforms are approximately 150 m in length with the station ticket office located on Platform 2.

Yeronga Station is served by the Beenleigh line. Five inbound services stop at Yeronga Station during the morning peak, including three Beenleigh and two Kuraby services. During the off-peak period, two services per hour are provided in each direction.

Yeronga Station has around 2,000 boardings and alightings on a typical weekday. The majority of morning peak activity is associated with boarding passengers, with the majority arriving on foot (57%) although a significant proportion (43%) access the station by car.

Yeerongpilly Station

Yeerongpilly Station is located between Fairfield Road and Wilkie Street. It is located approximately 9.3 km south of Central Station. The station comprises two platforms arranged in an island configuration with two main tracks for passenger trains and four additional tracks for freight and express trains. The station ticket office is located on the island platform.

Yeerongpilly Station is served by the Beenleigh line. There are currently seven inbound services stopping at Yeerongpilly Station during the morning peak, including two Beenleigh express, three Beenleigh ‘all stations’ and two Kuraby ‘all stations’ services. During the off-peak period, two services per hour are provided in each direction.

The station has relatively low levels of passenger use, with around 1,500 daily boardings and alightings on a typical weekday. The majority of morning peak boarding patrons (80%) arrive on foot with most of the remainder by car.

Moorooka Station

Moorooka Station is located between Ipswich Road and Fairfield Road, approximately 10.5 km from Central Station. The station comprises two platforms in an island configuration with an approximate length of 150 m. The station office is located on the island platform that is served by two passenger rail tracks, with additional rail tracks to the west and through the adjacent Clapham Rail Yard served by express and freight trains. Clapham Rail Yard is currently used for intermodal freight wagon storage and shunting of freight trains.

Moorooka Station is served by the Beenleigh line. There are currently five inbound services stopping at Moorooka Station during the morning peak, three Beenleigh ‘all stations’ and two Kuraby ‘all stations’ services. During the off-peak period, two services per hour are provided in each direction.

The station caters for around 1,400 passengers on a typical weekday. The key access modes to the station in the morning peak for boarding passengers are walk (48%), bus (31%) and 17% by car.

Rocklea Station

Rocklea Station is located approximately 11.6 km from Central Station, in close proximity to the Ipswich Motorway and Beaudesert Road.

The railway is a three-track configuration within the vicinity of the station, with a pair of suburban lines and a single dual gauge track for freight and express passenger trains. The station comprises two side platforms, with ticket facilities, toilets, etc located on the northbound platform. Pedestrian overbridges link the platforms to each other and the surrounding catchment.

Rocklea Station is served by the Beenleigh line. There are currently five inbound services stopping at Rocklea Station during the morning peak, three Beenleigh 'all stations' and two Kuraby 'all stations' services. During the off-peak period, two services per hour are provided in each direction.

The station has relatively low levels of passenger use, with around 1,100 passengers on a typical weekday. Over 70% of boarding passengers in the morning peak walk to the station, with the remainder mainly using a car as their access mode.

Salisbury Station

Salisbury Station is located 13 km from Central Station on the Beenleigh line, just east of Beaudesert Road. The railway within the vicinity of the station is a three-track configuration, with a pair of suburban lines and a single dual gauge express track for freight, express trains and/or standard gauge (interstate) trains. The station consists of two platforms in an island configuration with ticketing and facilities all located within the island.

The station is served by the Beenleigh line and there are currently five inbound services stopping at Salisbury Station during the morning peak, three Beenleigh 'all stations' and two Kuraby 'all stations' services. Off-peak, only two services per hour in each direction are provided.

Salisbury Station has relatively low levels of passenger use, with around 1,100 boardings and alightings on a typical weekday. Unlike other stations, most morning peak activity consists of alighting movements, with the reverse applicable in the evening peak. In the morning peak most alighting passengers walk to their destination (58%), with a further 38% continuing by bus.

5.2.2. Freight rail

Currently, there are limited sections of dedicated rail freight lines in South East Queensland. This has resulted in the need for passenger and freight rail services to share a common network and track capacity, with passenger services prioritised over freight. Freight trains are restricted from using the network in the passenger peak periods where possible, with freight traffic using train paths on the passenger network during the off-peak period.

There are approximately 344 freight services per week (54 freight services per day) travelling through the Brisbane rail network along narrow gauge or dual gauge lines. Transit freight, which is predominantly long haul rail operations in South East Queensland, generally flows in an east-west direction through Brisbane to and from the Port of Brisbane. Currently, freight transiting through Brisbane is dominated by coal and agricultural products moved to the Port of Brisbane for export and the movement of import/export containers. Smaller volumes of petroleum products are transported west from the oil refineries at the Port.

The following describes the rail freight movements by freight line.

North Coast line freight

The North Coast line consists mainly of non-bulk (intermodal or containerised) freight transported between Acacia Ridge (and to a lesser extent the Brisbane multi-modal terminal) and various destinations in North Queensland.

North Coast line freight movements are important in the context of inner city rail capacity as virtually all of this freight is transported through the inner city via the Exhibition Loop. The large majority of North Coast line freight is transported to and from Acacia Ridge (intermodal freight) and the Australia TradeCoast (fuel and bitumen) via Corinda, Yeerongpilly and Park Road. Movement of freight directly across the Merivale Bridge is limited due to the importance of this route to passenger trains throughout the day.

An estimated 2.8 million tonnes of freight is transported along the North Coast rail line annually (GHD 2005).

Western line freight

The Western line extends from Corinda through Rosewood to Toowoomba and regions further west. Significant amounts of bulk freight are transported along this line from locations west of Toowoomba to the Port of Brisbane for export. In particular, coal freight has increased significantly in recent years as a result of strong export demand and new/expanded mining activities in the Surat Basin. Coal exports through the Port of Brisbane are currently estimated at 6.3 million tonnes per annum and each week there are 120 coal train movements to and from the Port via the Western line.

Given the non-time sensitive nature of coal transport, much of the rail throughput is transported in the passenger off-peak periods when rail capacity is more readily available.

Grain freight movements west of Toowoomba are much lower compared to coal (approximately one million tonnes per annum) and are highly seasonal.

Coal and grain trains operating on the Western line use the Tennyson loop and the southern lines between Yeerongpilly and Park Road to access the Port of Brisbane.

Interstate freight

Interstate freight consists of intermodal freight transported between South East Queensland and other states via Acacia Ridge and the Brisbane multi-modal terminal. At present, interstate freight train operations are confined to the network south of Park Road, with 59 train services per week travelling on the line between the Acacia Ridge inter-modal terminal and Melbourne or Sydney.

Acacia Ridge plays a key role in the Queensland freight network and supports the movement of interstate and intra-regional freight. The terminal has dual gauge rail lines servicing the interstate corridor and the Brisbane multi-modal terminal. Current terminal throughput is understood to be in the range of 380,000 twenty-foot equivalent units per annum. The terminal has a total capacity of 500,000 twenty-foot equivalent units per annum. However, as a result of infrastructure and operational enhancements, it is expected that this could be increased to around 850,000 twenty-foot equivalent units per annum in the future.

Intra-urban freight

Intra-urban freight currently represents a small segment of the freight market with a very small amount of intra-urban freight transported by rail within South East Queensland. Freight trains operate between Acacia Ridge and the Brisbane multi-modal terminal, but almost all of this freight arrives from, or is destined for, locations outside of South East Queensland (ie interstate and intrastate). Rail currently caters for around 13% of import-export (IMEX) container movements through the Port of Brisbane. Freight trains operating between Acacia Ridge and BMT move through the inner city corridor between Yeerongpilly and Park Road.

The large majority of freight movements between Acacia Ridge and the Brisbane multi-modal terminal relate to exports from outside South East Queensland. At present, virtually all intra-urban IMEX movements are transported by road.

Summary of existing rail freight traffic

The number of freight services currently passing through the Brisbane rail network to destinations including Fisherman Islands (Port of Brisbane), Acacia Ridge freight terminal, and to regions serviced by the North Coast line are shown in **Figure 5-5**.

There are around 344 freight services per week travelling through the Brisbane rail network along the narrow gauge lines, including:

- 120 coal services travelling along the Western corridor, between Rosewood and the Port of Brisbane (Fisherman Islands) via Corinda and Yeerongpilly
- 16 grain services travelling along the Western corridor, between Rosewood and the Port of Brisbane (Fisherman Islands) via Corinda and Yeerongpilly
- 146 intermodal freight services travelling along the North Coast line, between Nambour and intermodal freight terminals, such as Acacia Ridge and the Port of Brisbane
- 62 intermodal freight services travelling along the Western corridor, between Rosewood and the Port of Brisbane or Acacia Ridge terminal.

In addition to the freight services travelling along the narrow gauge lines, there are up to 177 freight services (either standard gauge or narrow gauge) operating along the existing dual gauge lines between Acacia Ridge and Port of Brisbane per week. In addition, 59 standard gauge freight trains travel along the standard gauge-only line south of Acacia Ridge between Brisbane and Melbourne.

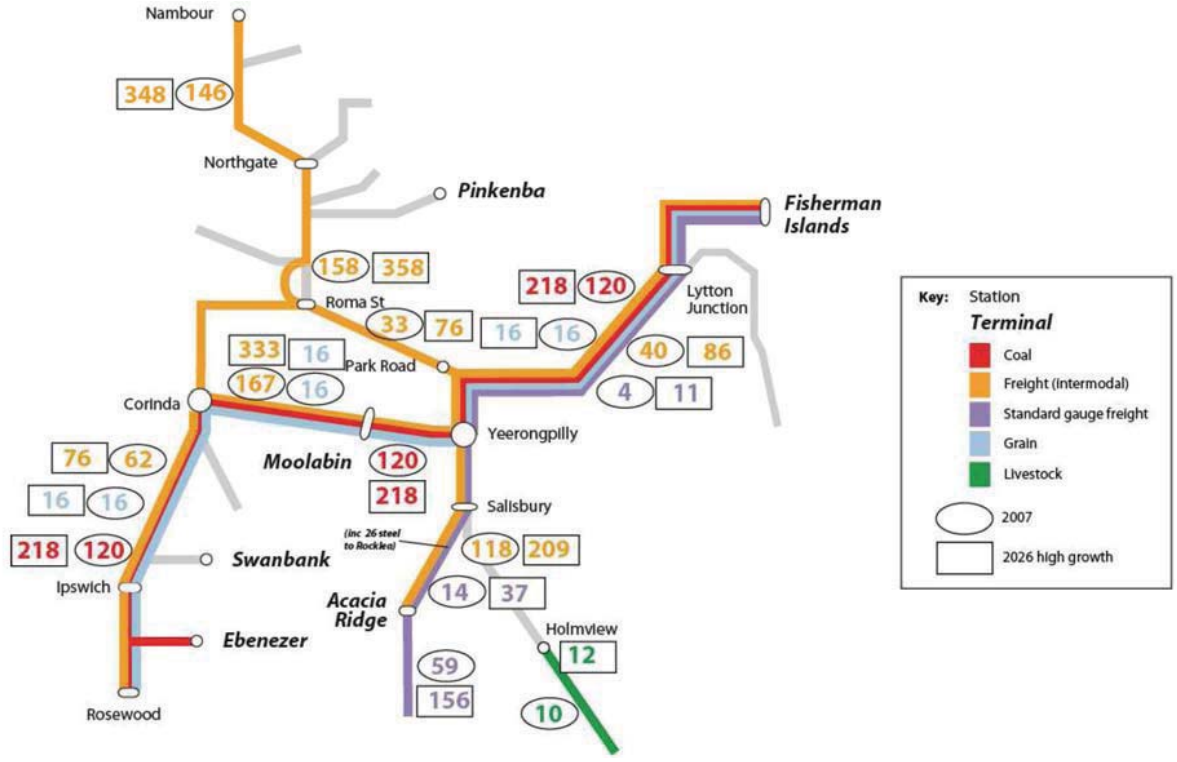


Figure 5-5 Brisbane freight rail network and weekly services

Source: Queensland Transport, 2008

5.2.3. Bus networks and services

The key bus-rail interchanges in the Cross River Rail study corridor and across the Brisbane metropolitan area are shown in **Figure 5-6.**

Northern section – Wooloowin to Bowen Hills

Across the northern part of the study corridor, bus services are principally grouped on Bowen Bridge Road/ Lutwyche Road to the west of the railway and Abbotsford Road/ Sandgate Road to the east of the railway. There are no dedicated bus–rail interchange facilities in this part of the study corridor.

On the Lutwyche Road corridor, approximately 50 buses per hour operate in the peak direction. Off-peak, there are around 18 buses per hour (in each direction) on the Lutwyche Road corridor (south of Lutwyche) including the corridor's only high frequency bus route (333 route), which operates at least every 15 minutes between 6.00 am and 11.00 pm seven days a week.

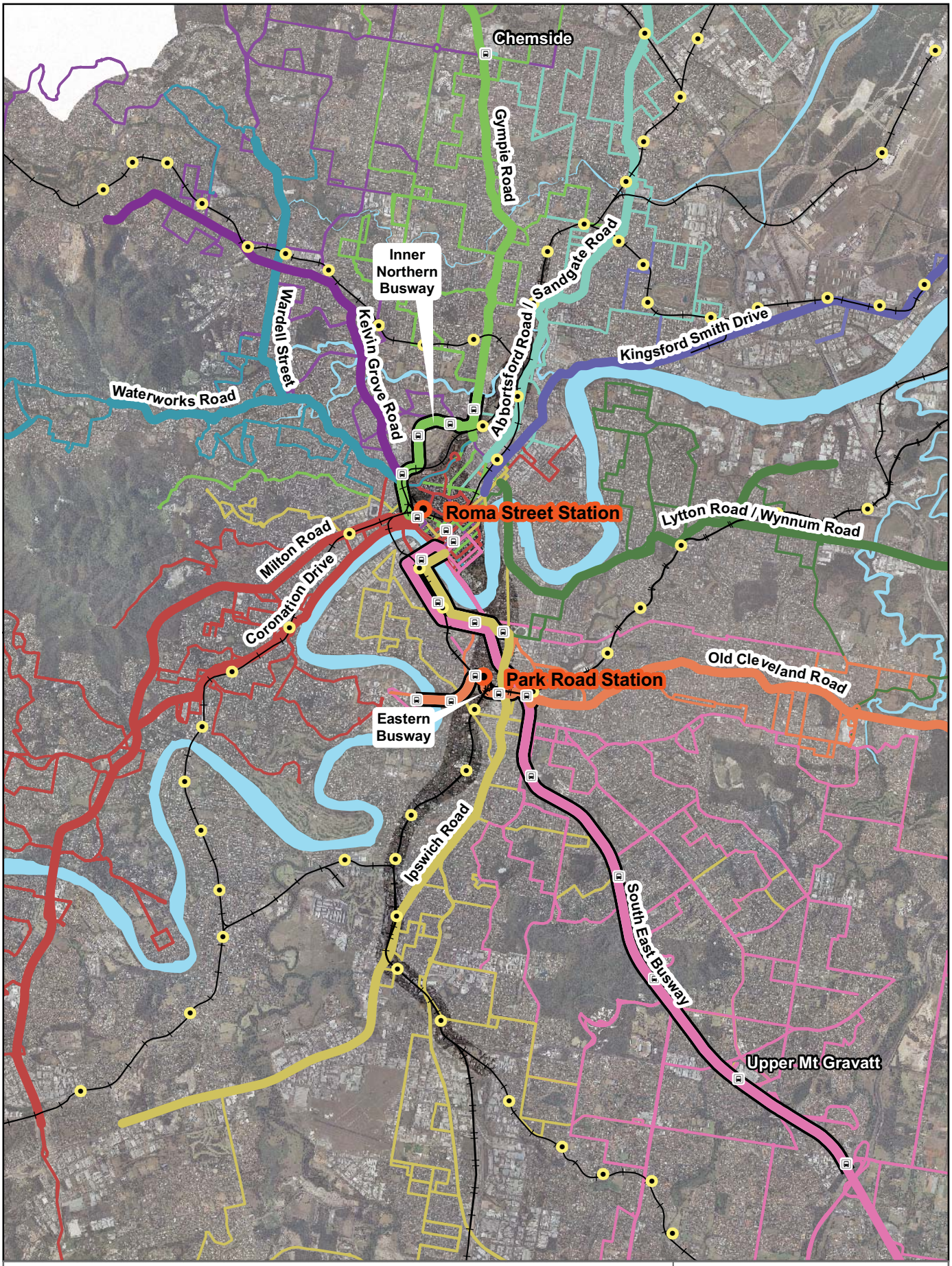
On Sandgate Road, a combination of 'limited stops' and 'all stops' buses combine to create a peak frequency of 12 buses per hour in the peak direction. Off-peak, approximately seven buses per hour operate in each direction.

The inner Northern Busway currently links the CBD and Cultural Centre to the Royal Brisbane and Women's Hospital (RBWH) busway stations via the Queensland University of Technology (QUT) and the Royal Children's Hospital (RCH) busway station. This is the first stage of the Northern Busway, which is ultimately destined for Bracken Ridge via Windsor, Lutwyche, Kedron, Chermside, Aspley and Carseldine.

Travel speeds on both Lutwyche Road and Sandgate Road are variable due to the lack of bus priority and heavy background traffic conditions. The Northern Busway (RBWH to Kedron) is currently under construction in the Lutwyche Road corridor, along with the Airport Link toll road; both are due for completion in 2012. Planning is underway for the Kedron to Bracken Ridge section of the Northern Busway. These initiatives are intended to address growing patronage and relieve surface traffic congestion in this corridor. The Northern Busway is expected to be the bus 'spine' for north Brisbane and serve a complimentary catchment to the rail line.

Bus services and facilities associated with each station in the northern section of the study corridor are summarised as follows:

- Wooloowin Station– there are no bus services within 500 m of Wooloowin Station
- Albion Station – stops at Albion are located within 200 m of the station on Sandgate Road near the Lever Street intersection. There are up to eight buses per hour in peak times (peak direction), dropping down to five buses per hour from each direction that stop near the station in the off-peak.
- Bowen Hills Station – six bus routes serve Bowen Hills Station via bus stops on Abbotsford Road. Stops are located approximately 100 m to 200 m from the station. In the peak periods, there up to 11 buses per hour in each direction. The existing outbound bus stop facilities on Abbotsford Road are located on a narrow footpath with limited seating space.
- Exhibition Station – buses are an important public transport mode in the Exhibition Station precinct given the lack of regular passenger rail services from the current Exhibition Station. The station is located within 500 m of both the RCH and RBWH busway stations on the Northern Busway. Bus stops serving the precinct are also located on Bowen Bridge Road (immediately north of Gregory Terrace) and O'Connell Terrace.



LEGEND

- Study Corridor
- Bus-Rail Interchange
- Station
- Track
- Busway
- South East Busway
- Ipswich Road
- Kelvin Grove Road
- Kingsford Smith Drive
- Lytton Road / Wynnum Road
- Northern Busway / Gympie Road
- Milton Road / Coronation Drive
- Abbortsford Road / Sandgate Road
- Waterworks Road / Wardell Street
- Old Cleveland Road

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-6

Key Bus Routes and Interchanges

0 0.5 1 1.5 2 2.5 3 km

1:100,000 at A4

N

CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\VAurecon\205555_CRR\G022_CCR_Trans_Regional_bus_A4_ver93.mxd 06/07/2011 14:48

Central section – Spring Hill to Dutton Park

Central Brisbane is the hub of the Brisbane bus network and the principal destination for bus commuters in Brisbane. Approximately 530 buses per hour enter the inner city in the morning peak, of which, over 300 buses come from the south, entering the city via the South East busway on the Victoria Bridge or the Captain Cook Bridge.

The key inner city bus termination and interchange locations are:

- Roma Street – busway station fully integrated with the railway station allowing for bus-rail and bus-bus interchange
- King George Square busway station – bus-bus interchange and termination for some bus services from the west
- Queen Street bus station – principally a termination destination from the south and west, with bus-bus interchange opportunities
- Cultural Centre busway station – a principal bus termination destination for buses from the north, with significant bus-bus and bus-rail interchange opportunities at nearby South Brisbane Station
- Adelaide Street -– bus-bus and bus-rail interchange opportunities near Central Station
- Elizabeth Street – principally a bus termination destination for buses from the south, with some potential for bus-bus interchange.

Bus operations are affected by both road and busway capacity limitations, particularly from the south and south-east, and the limited availability of on-street stopping space and layover.

The following provides a summary of bus services and facilities associated with each station in the central section of the study corridor.

Roma Street Station bus services and facilities

The Roma Street busway station is located adjacent to and integrated with Roma Street Station and is the principal bus-rail interchange hub for central Brisbane. The busway station includes two busway platforms accessed directly from the main pedestrian subway to the rail platforms. Local bus stops are also located along Roma Street.

From Roma Street busway station, outbound services travel to the western suburbs (Indooroopilly, Kenmore and Moggill) via Coronation Drive or Milton Road, to the north-west (The Gap) via Caxton Street/ La Trobe Terrace, and to the north (Aspley) via Kelvin Grove Road and the Northern Busway/ Gympie Road (to Chermside, Bracken Ridge and Carseldine).

Inbound services from Roma Street travel to either King George Square busway station, Queen Street bus station, or to on-street stops within the CBD. Services stopping at King George Square busway station, pass through Queen Street bus station (without stopping) and continue to the Cultural Centre busway station where most services from the north and west terminate. The completion of the Inner Northern Busway through Roma Street Station in 2007 has significantly enhanced bus-rail integration and interchange opportunities within Brisbane, with both high frequency bus services and rail services serving the same station. Seamless transfer is now possible between both modes, making many more public transport journey combinations more attractive.

Moderate levels of rail-bus interchange are estimated to currently occur at Roma Street in the morning peak (10% to 15% of train passengers alighting and transferring to a busway service). Over time, it is expected that bus-rail interchange would become more significant as the number and attractiveness of key busway services increase. For example, as the Northern Busway linking to Chermside and the Eastern Busway linking to Carindale are constructed, and bus journey times from Roma Street reduce, additional interchange between bus and rail services could be expected.

Central Station bus services and facilities

Central Station does not provide any dedicated integrated interchange facilities with the bus network. Passengers who wish to transfer to bus are required to use on-street bus stops at Ann, Edward, Creek or Adelaide streets. The station is not served by the busway network services and the Adelaide Street bus mall is approximately 150 m south of the station. Therefore, only a small proportion (3%) of passengers boarding at Central Station access the station by bus.

The City Centre free loop bus serves Queen Street Mall, City Botanic Gardens, Riverside Centre, QUT, the Government precinct and King George Square. It operates every 15 minutes between 7.00 am and 6.00 pm in each direction and can be accessed via stops near Central Station. The anti-clockwise city loop bus stop on Ann Street is located immediately opposite the station (as shown in **Figure 5-7**), while the clockwise city loop bus stop is located on Adelaide Street at Anzac Square, approximately 150 m from the station.

Current passenger demand for the City Centre free loop is observed to be high in the peak periods, with buses operating at capacity. The service covers the areas of the CBD that are currently not well served by rail.

The nearest alternative bus interchange opportunities for rail and bus patrons are located at the Queen Street bus station located approximately 430 m south of Central Station or King George Square busway station located approximately 300 m south-west of Central Station. A wide range of bus services can be accessed from these two busway stations.

Figure 5-7 Rail-bus passengers at the Ann Street bus stop near Central Station

Woolloongabba bus services and facilities

The suburb of Woolloongabba includes significant bus infrastructure and is a key part of the south-east Brisbane bus network. The South East Busway passes through the suburb, catering for high frequency bus services from the south-east most of which do not stop in Woolloongabba. A spur from the South East Busway includes the Woolloongabba busway station that caters for bus services that travel along the Ipswich Road, Logan Road and Stanley Street corridors to the south and east of the busway station.

Woolloongabba busway station accommodates over 110 stopping bus services per hour in the peak hours, 75 of which are inbound services. These buses operate on 24 different routes from the CBD and University of Queensland to destinations as far afield as Wynnum, Carindale, Garden City (Upper Mt Gravatt), and Forest Lake. A range of non-stop buses also pass through the Woolloongabba busway spur and on the South East Busway itself, which is 200 m to the west of the busway station.

Over 350 bus movements travel via the Woolloongabba area on the busway during each morning peak hour, with around 275 movements being inbound trips. Congestion occurs where the busway and spur merge.

Approximately 200 m further west of this junction is the intersection with Allen Street, where a large number of peak only buses exit the busway to join the M3 (Pacific Motorway) and enter the CBD via the Captain Cook Bridge. This busway exit is onto a congested motorway on-ramp, resulting in some queuing of buses within the busway with consequential bus congestion within the busway itself. This congestion sometimes prevents buses continuing on the mainline busway from moving past those buses waiting to exit the busway.

TransLink estimate that there are 15,000 passengers in the morning peak hour (two-way) on this part of the busway.

To service events at the Gabba stadium, special event shuttle buses operate predominantly from on-street event bus loading/unloading areas. Over 100 buses travel to a range of metropolitan area destinations from the assigned departure points for one hour following an event. Due to the high numbers of buses and people crossing roads to access buses after events, Stanley Street and Vulture Street (immediately surrounding the stadium) are closed for up to one hour after each major event. Main Street operates under traffic control to ensure priority for pedestrians crossing towards the Woolloongabba busway station and beyond.

Park Road Station bus services and facilities

The Boggo Road busway station is located immediately adjacent to the Park Road Station, which has an integrated interchange with common overbridge and station access points. Services operate via the Boggo Road busway station between University of Queensland (via the Eleanor Schonell Bridge) and Sunnybank, Eight Mile Plains and Carindale.

Up to 37 bus services per hour operate to the University of Queensland (some 2 km to the west) in the morning peak with six services per hour in the morning peak towards the PA Hospital, which is approximately 600 m west. Pedestrian access from Park Road Station to the PA Hospital is currently via an indirect 900 m long route, due to the presence of railway infrastructure, and hence a bus transfer provides an attractive access option from Park Road Station.

In addition to busway services, several on-street bus services travel along Annerley Road, approximately 250 m to the west, with a frequency of 10 buses an hour inbound to the city in the morning peak. On Ipswich Road, 400 m to the east of Park Road Station, a morning inbound peak frequency of up to 15 buses per hour operates.

Overall, the Park Road precinct is very well served by existing bus services and the opening of the Boggo Road busway station and Eastern Busway in 2009 has introduced a range of new integrated bus-rail journey opportunities.

Southern section – Dutton Park to Salisbury

The following provides a summary of bus services and facilities associated with each station in the southern section of the study corridor.

Dutton Park Station bus services and facilities

Dutton Park is well served by buses on several routes with stops at Annerley Road (200 m north and 55 m south of Dutton Park Station), Noble Street, Fairfield Road and Cornwall Street providing informal interchange opportunity. However, the estimated bus-rail transfer activity is low. Overall, there are up to 17 buses per hour in peak times (peak direction) in the vicinity of the station, reducing to eight buses per hour in the weekday off-peak period.

Fairfield Station bus services and facilities

The key bus stops in the vicinity of Fairfield Station are located approximately 400 m west of Fairfield Station, on and near Fairfield Road, and within the Fairfield Gardens Shopping Centre. During the morning peak, 10 buses per hour operate in the vicinity of the station, with five buses per hour operating in the weekday off-peak period.

Yeronga Station bus services and facilities

The nearest bus stops to Yeronga Station are located at Kadumba Street, approximately 200 m west of the station, and Park Road approximately 250 m east of the station. Service frequency is low, with only three services per hour in the peak direction and one service per hour during the off-peak period.

Yeerongpilly Station bus services and facilities

Bus stops in the vicinity of Yeerongpilly Station are located on Fairfield Road, Wilkie Street and Green Street. Bus stops on Wilkie Street are located within 50 m of the train station, while bus stops on Green Street are located approximately 150 m from the station. During the morning peak, five buses per hour operate in the vicinity of the station, with only two buses per hour operating in the weekday off-peak period.

Moorooka Station bus services and facilities

An outbound bus stop on Ipswich Road (approximately 110 m south of Moorooka Station) serves route 100 and route 116. The corresponding inbound bus stop is located approximately 170 m north of the station.

Services operate thorough the area between Forest Lake and the CBD, and Rocklea and the CBD. Overall, seven inbound services operate in the morning peak hour and two services per hour in each direction during the off-peak period.

Rocklea Station bus services and facilities

There is one bus route directly servicing Rocklea Station, which travels to the CBD on an hourly frequency throughout weekdays.

Salisbury Station bus services and facilities

Bus services are located near Salisbury Station, both east (Fairlie Terrace) and west (Beaudesert Road) of the station. On the eastern side, the Great Circle Line provides a cross-town connection to Garden City, Carindale, Indooroopilly, Mitchelton and Chermside with two services per hour provided in each direction.

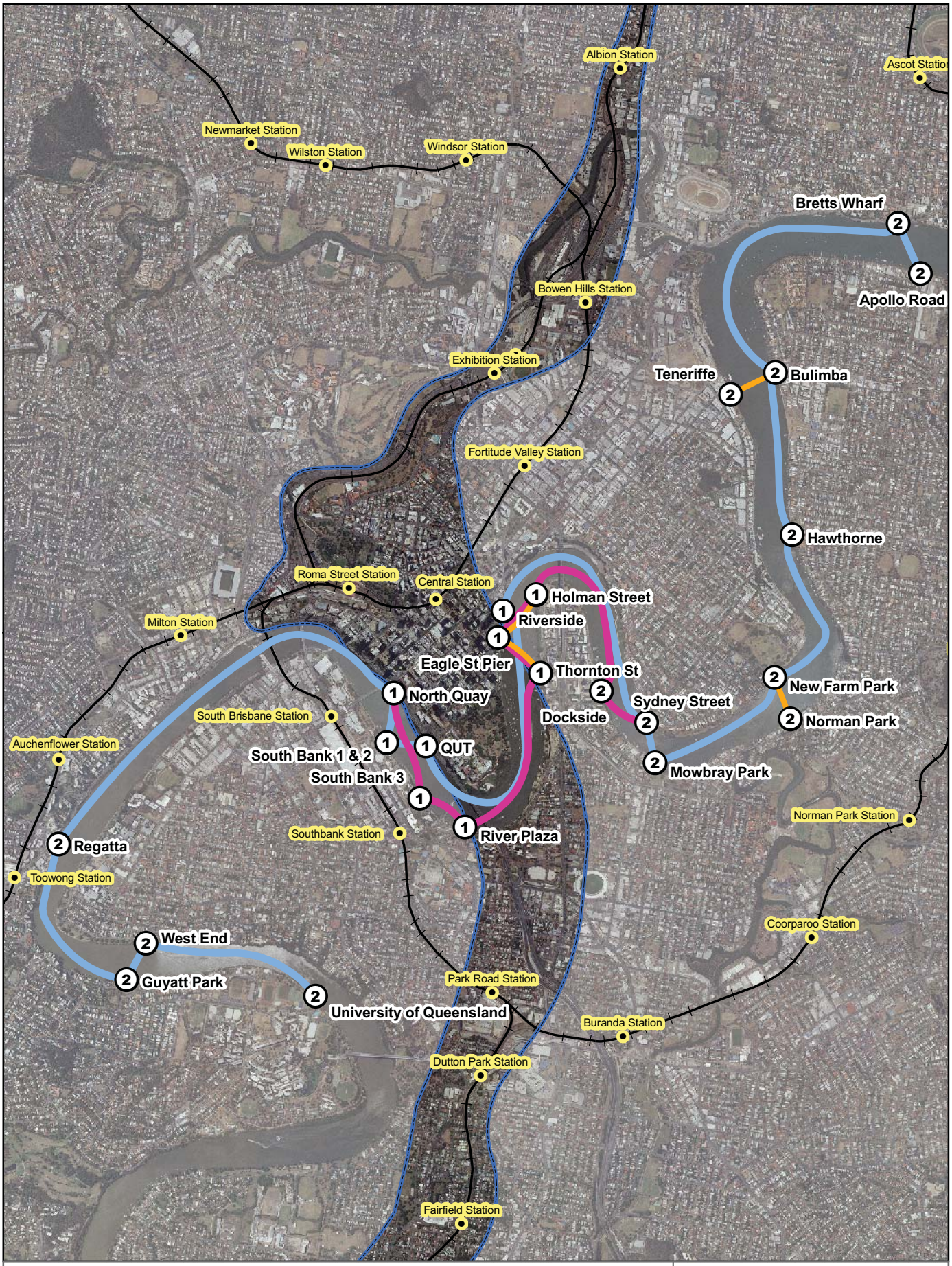
Bus stops on Beaudesert Road, approximately 300 m west of the station, have indented bus lay-bys, timetable information and shelters. Nine services per hour operate inbound to the CBD during the peak, with five services per hour operating during the off-peak period.

5.2.4. Ferry networks and services

Scheduled TransLink ferry routes and termini are shown in **Figure 5-8**. There are no ferry services in the northern or southern sections of the study corridor.

Ferry services operating in the central section of the study corridor include:

- CityCat – high capacity catamaran ferries accommodating up to 162 passengers and travelling up to 25 knots or 46 km/h
- City Ferry – single hull ferries accommodating between 54 passengers and 80 passengers and travelling up to 12 knots or 22 km/h.



LEGEND

- Study Corridor
- Station
- Track

Brisbane Ferry Routes

- Citycat
- Inner City Ferry
- Cross River Ferry

Brisbane Ferry Stops Zone

- 1 1
- 2 2

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-8

Key Ferry Routes

0 250 500 750 1,000 1,250 Meters

1:40,000 at A4

N

CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G023_CCR_Trans_Regional_ferry_A4_ver93.mxd 06/07/2011 14:49

CityCats operate between Apollo Road (Bulimba North) and the University of Queensland at St Lucia, generally every 15 minutes in each direction throughout the day (Monday to Sunday). City Ferries operate cross river and inner city distributor type ferry services within the study corridor generally every 10 minutes in each direction.

The main ferry terminals within the study area are Riverside and adjacent Eagle Street (the main terminals for the eastern part of the CBD), QUT (southern CBD) and North Quay (north-western CBD). The ferry terminal nearest to Central Station is Riverside, located on Eagle Street some 550 m to the south-east of Central Station. It is estimated that there is minimal modal interchanging between ferry and rail.

5.2.5. Regional, arterial and local road networks

Description of the road network within the study corridor

Those parts of Brisbane's regional road network that are of relevance to the study corridor include:

- the M1 (Gateway Motorway) – a north-south bypass at the eastern edge of the Brisbane Metropolitan area
- the M3/M7/A3 (Pacific Motorway/Clem Jones tunnel/Gympie Road) – a key north-south route through inner Brisbane
- the M5/Inner City Bypass (ICB)/Kingsford Smith Drive – an east-west route linking the western suburbs to the north-eastern suburbs and airport via inner north Brisbane
- the M2/M6 route (Logan Motorway) - an east-west bypass of Brisbane at the southern edge of the metropolitan area.

These regional roads and other major arterial roads are shown in **Figure 5-9**. The road network illustrating the road hierarchy and all road crossings of the rail corridor are shown in **Figure 5-10** (northern), **Figure 5-11** (central) and **Figure 5-12** (southern).

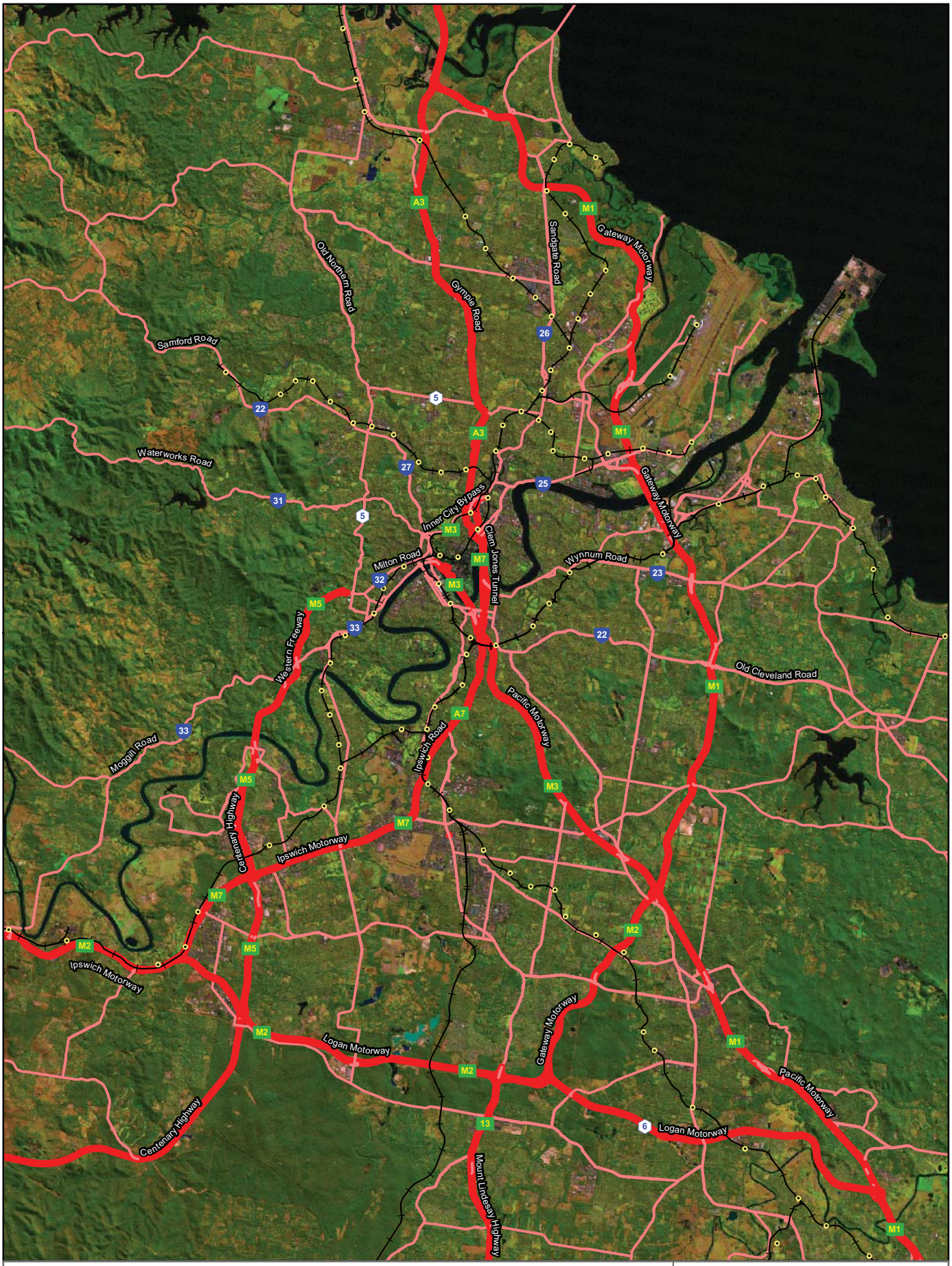
The major road network in the northern sub-area of the study corridor (**Figure 5-10**) includes Sandgate Road/Abbotsford Road, ICB, Bowen Bridge Road/Lutwyche Road and Clem Jones tunnel.

In the central part of the study corridor (**Figure 5-11**) the road network includes the major motorway connection to the CBD from the south formed by the Riverside Expressway, Captain Cook Bridge and Pacific Motorway.

Bowen Bridge Road/Lutwyche Road, ICB/Hale Street, Riverside Expressway and the Pacific Motorway are designated 'priority two' freight routes.

Within the CBD, the major arterial through-routes connecting to the Riverside Expressway are Ann and Turbot streets which operate as a one-way pair. The road network within the Brisbane CBD itself is characterised by a grid pattern, with east-west roads spaced approximately 100 m apart and north-south roads spaced approximately 220 m apart. Many streets operate for one-way traffic only. This road network pattern results in frequent intersections across the CBD in a north-south direction and a long city block pattern in an east west direction. Edward and George streets are key north-south distributors, while Elizabeth, Margaret and Alice streets are the key east-west distributors. Elizabeth, Margaret and Alice streets all have ramp connections to or from the Riverside Expressway.

In the southern part of the study corridor (**Figure 5-12**), Main Street/Ipswich Road, Fairfield Road and Beaudesert Road are major north-south arterials serving the CBD. The key east-west arterials across the southern part of the corridor are Muriel Road/Sherwood Road and Granard Road (part of the Brisbane Urban Corridor), the latter being a 'priority one' freight route.



LEGEND

- Station
- Track

Road Network

- Motorway/ Major Arterial Road
- Other Roads

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-9

Existing Brisbane Regional Road Network

0 1 2 3 4 5 6 7 km

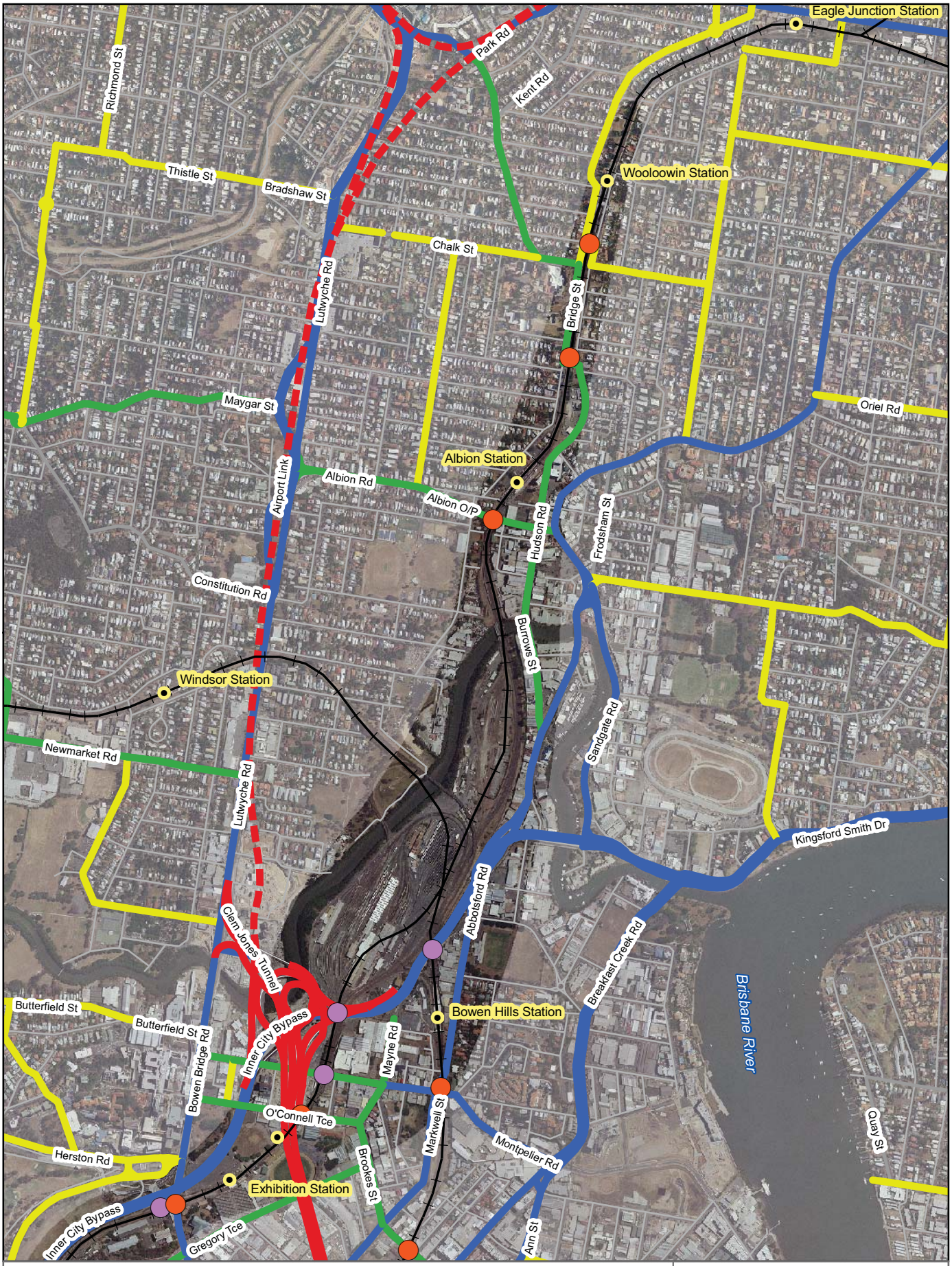
1:200,000 at A4

N

CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G071_CCR_Regional_Roads_A4_ver93.mxd 06/07/2011 14:50



LEGEND

- Study Corridor

Rail Crossings

- Vehicle Only
- Vehicle and Ped/Cycle
- Station
- Track

Road Hierarchy

- Motorway Route
- Future Transport Corridor
- Arterial Route
- Suburban Route
- District Access Route
- Road

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-10

Road Network (Northern Section)

0 0.25 0.5 0.75 km

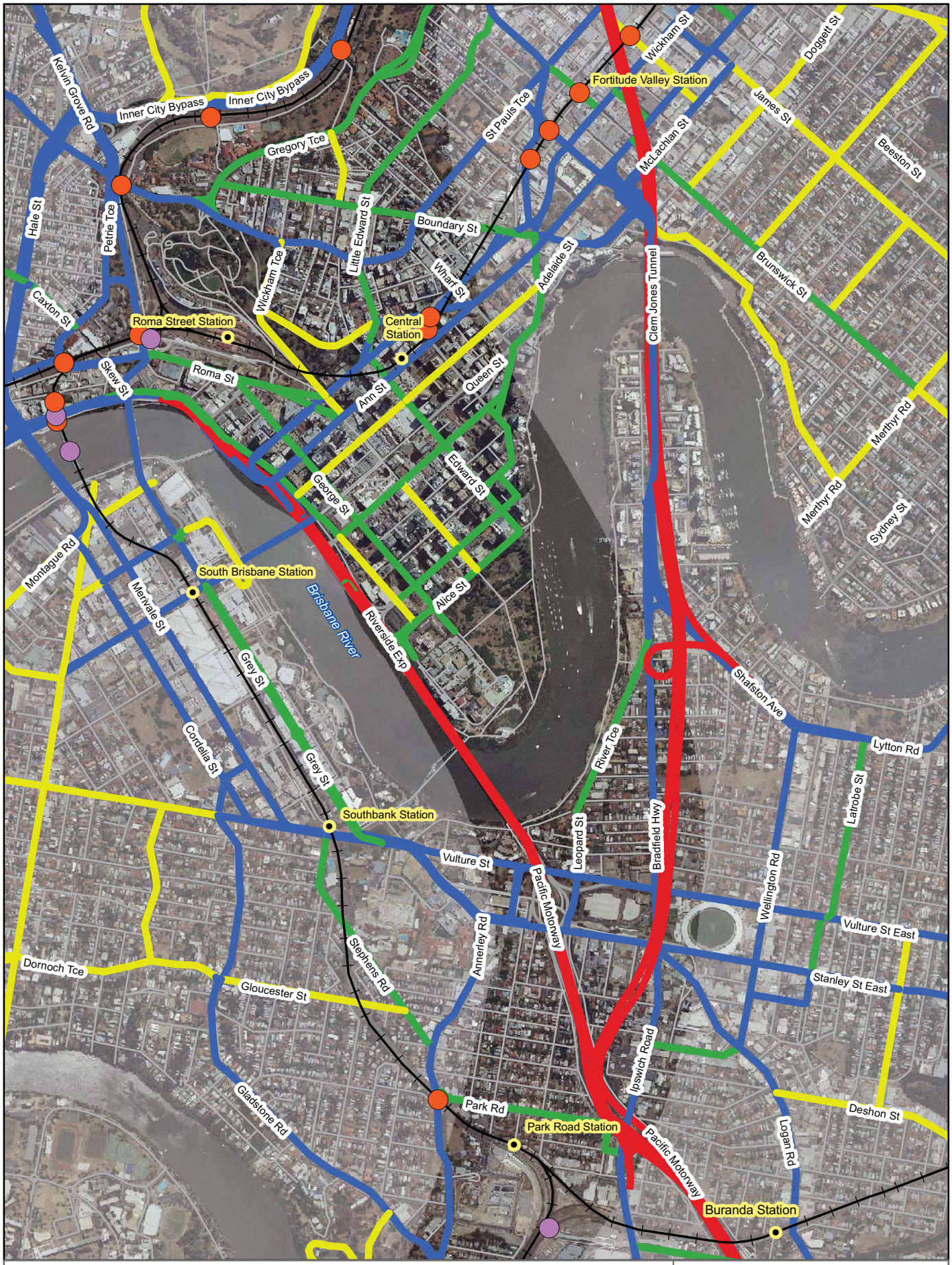
1:17,500 at A4

N

CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G030_CCR_Trans_road_network_North_A4_ver93.mxd 06/07/2011 14:51



LEGEND

Study Corridor

Rail Crossings

- Vehicle Only
- Vehicle and Ped/Cycle
- Station
- Track

Road Hierarchy

- Motorway Route
- Future Transport Corridor
- Arterial Route
- Suburban Route
- District Access Route
- Road

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-11

Road Network (Central Section)

0 0.25 0.5 0.75 km

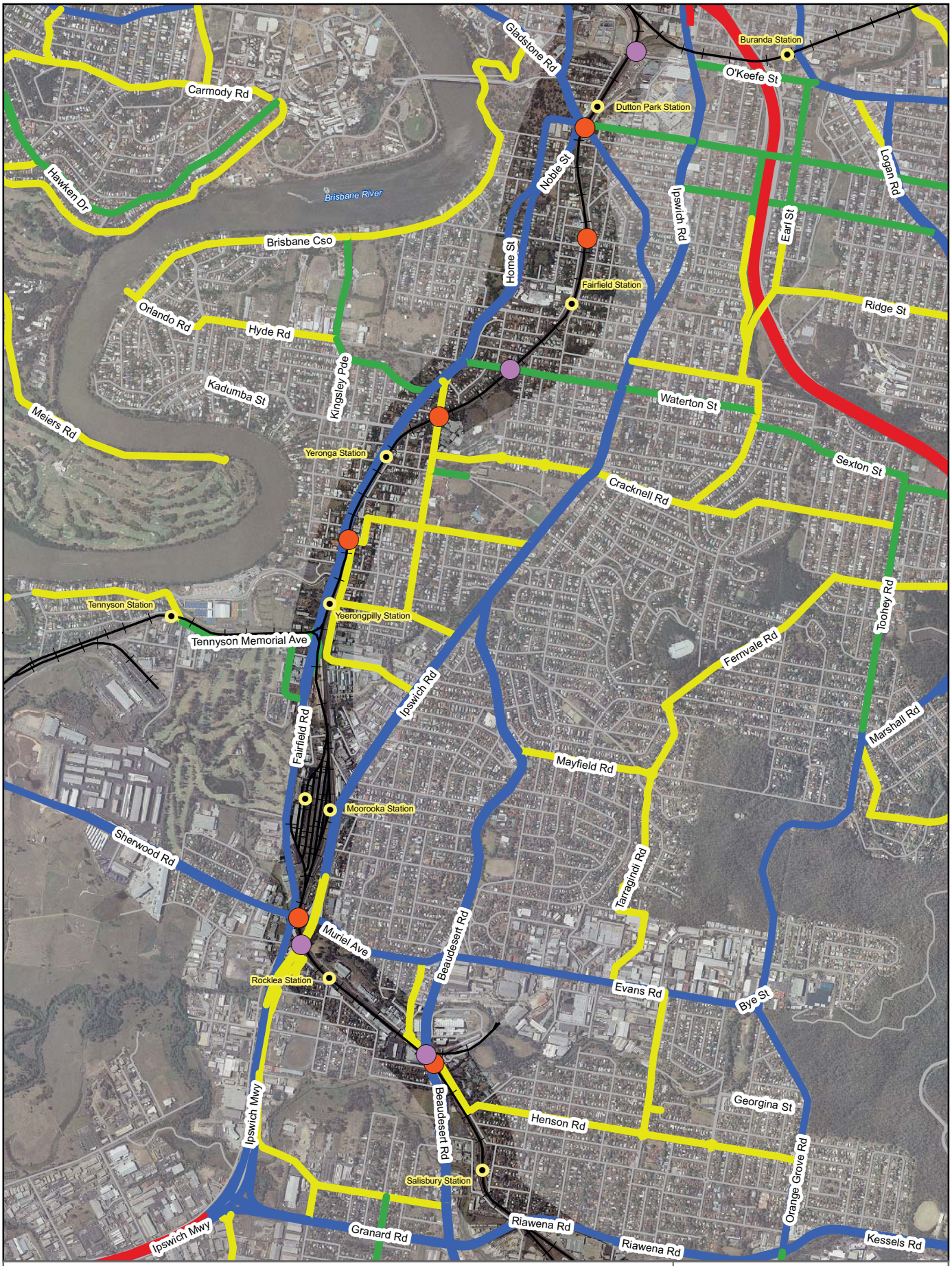
N

1:20,000 at A4

CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G031_CCR_Trans_road_network_Central_A4_ver93.mxd 06/07/2011 14:52



LEGEND

- Study Corridor

Rail Crossings

- Vehicle Only Crossing
- Vehicle and Ped/Cycle Crossing
- Station
- Track

Road Hierarchy

- Motorway Route
- Future Transport Corridor
- Arterial Route
- Suburban Route
- District Access Route
- Road

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-12

Road Network (Southern Section)

0 0.25 0.5 0.75 1 km

1:30,000 at A4

N

CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G032_CCR_Trans_road_network_South_A4_ver93.mxd 06/07/2011 14:53

Description of parking controls within the study corridor

Within large parts of the study corridor, on street parking and loading is controlled under traffic areas. These are listed in **Table 5-3** while the extent of these traffic areas is shown in **Figure 5-13**.

Table 5-3 Traffic areas and parking restrictions within the study corridor

Traffic area name	Suburbs included	Parking restrictions
Brisbane Central Traffic Area	Bowen Hills, Fortitude Valley, Spring Hill, Kelvin Grove, Newstead, Kangaroo Point (north), South Brisbane, West End (north), Woolloongabba (west)	Maximum two-hour parking 7.00 am to 6.00 pm Monday to Friday and 7.00 am to 12.00 noon Saturday. Resident permits excepted.
Gabba Traffic Area	Woolloongabba (east), Kangaroo Point (south), East Brisbane	Maximum two-hour parking 7.00 am to 7.00 pm Monday to Friday. Maximum 15 minute parking on event days from 7.00 am to 10.00 pm. Resident permits excepted.
Dutton Park Traffic Area	Highgate Hill (south), Dutton park, Buranda (west) Fairfield (north)	Maximum two-hour parking 7.00 am to 7.00 pm Monday to Friday (excluding public holidays). Resident permits excepted
Queensland Tennis Centre Parking Control Area	Tennyson, Yeronga (south), Yeerongpilly	Maximum one hour parking 7.00 am to 10.00 pm on event days only.

Within the Brisbane Central Traffic Area, short term (one hour and two hour) on-street parking bays in the CBD are charged at up to $4 per hour during weekdays (7.00 am to 7.00 pm). Where four hour or longer parking is available (such as in the city frame area) a fee of $2.50 per hour applies, up to a maximum daily charge of $10 on weekdays ($6 on weekends).

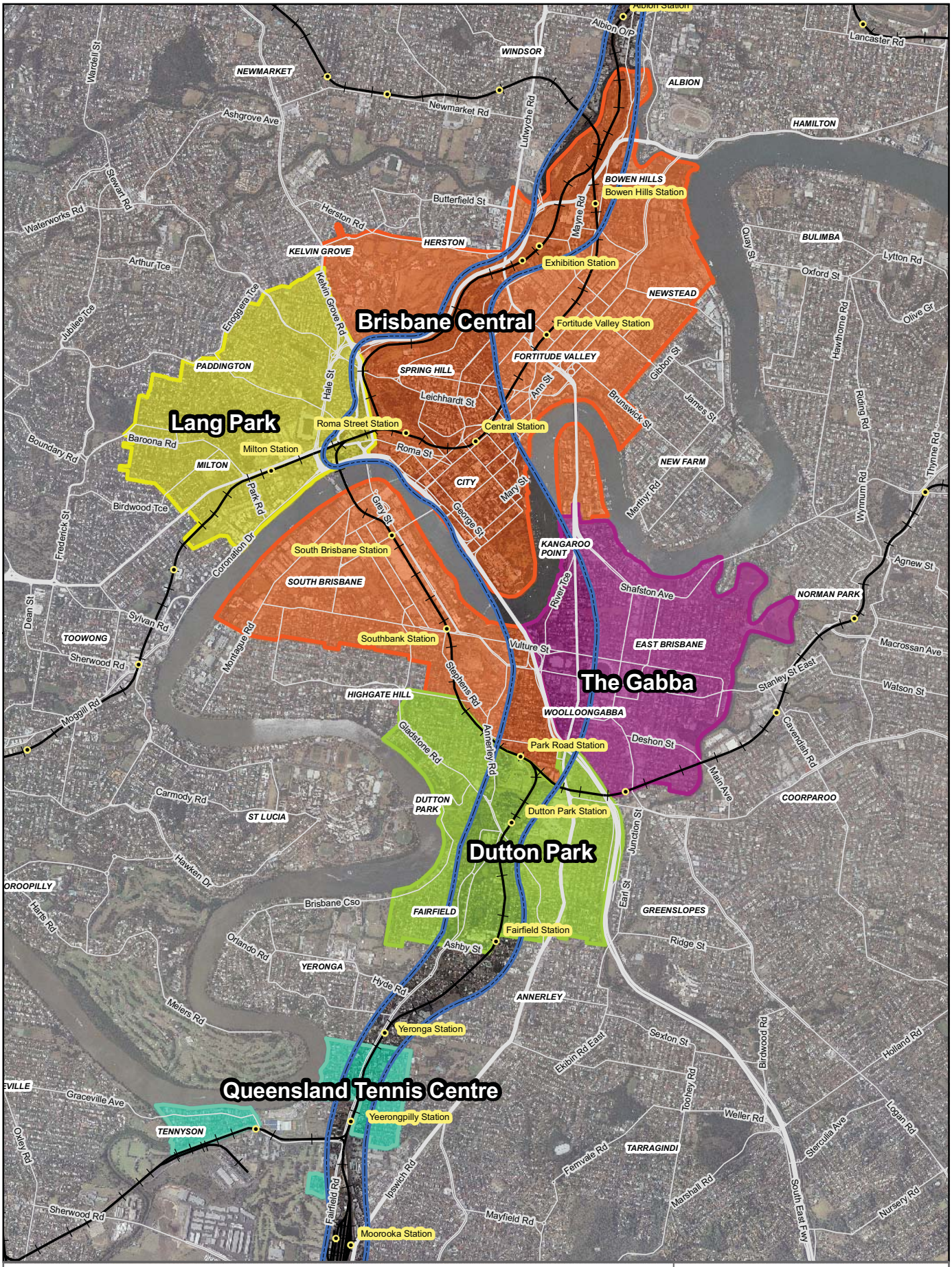
Description of parking and loading requirements for new development

Parking for new development within the study corridor is set by Brisbane City Council Code A7.3 of the Transport, Access, Parking and Servicing Code of the Brisbane City Plan (Brisbane City Council, 2000). It states:

> *On-site car parking numbers for development in the City Centre of City Frame[1] do not exceed 1 car space for every 200 m² of gross floor area for any development other than multi-unit or single unit dwelling or Short Term Accommodation.*

Parking must be provided, designed and located to ensure it is convenient and safe. However the policy states that parking in the City Centre must achieve a balance between controlling congestion and providing sufficient short term shopping and business parking to keep the City Centre viable. Long term parking within the City Centre is strongly discouraged, particularly in the case of purpose built car parks. Note that parking rates in the City Centre and Frame are maximum rates (that is parking is capped to a maximum of one space per 200 m² for any development other than dwellings) and as such no parking may be provided in these developments.

[1] On 10 May 2011 Council resolved to amend the Transport, Access, Parking and Servicing code to increase parking rates for the City Frame



Study Corridor
Railway Station
Railway Line

Parking Control Areas
- Brisbane Central
- Lang Park
- The Gabba
- Dutton Park
- Queensland Tennis Centre

0 500 1,000 1,500 2,000 2,500 Meters

1:50,000 at A4

N

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-13

Parking Control Areas

CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G0209_CRR_Trans_parking_zones_A4.mxd 07/07/2011 16:00

Outside of the City Centre and City Frame, minimum parking rates apply which are generally intended to cater for user car parking needs within the development.

Off street commercial parking opportunities within the CBD are limited and this is reflected in current pricing regimes. A 2010 Colliers International survey of global city centre parking charges found that Brisbane was the ranked 15th in the world in terms of most expensive unreserved monthly parking rates and equal 23rd for daily parking rates. Compared to other Australian cities, Brisbane is on par with Melbourne as the second most expensive city for daily parking charges (after Sydney) at around $35 per day (Colliers International, 2010).

Description of commuter car parking at stations within the study corridor

Parking at stations within the study corridor is outlined in **Table 5-4**. This shows that stations such as Wooloowin, Albion and Yeronga already experience significant parking overspill onto surrounding streets. None of these stations are within "traffic areas" where on street parking is regulated or controlled.

Table 5-4 Commuter parking at stations within the study corridor

Station	Formal park 'n' ride commuter parking bays	Overspill parking (weekday, 2009)
Wooloowin	190	150
Albion	290	160
Bowen Hills	0	0 (on street parking controlled under Brisbane Central Traffic Area)
Exhibition	0	0
Roma Street	0	0 (on street parking controlled under Brisbane Central Traffic Area)
Central	0	0 (on street parking controlled under Brisbane Central Traffic Area)
Park Road	28	11
Dutton Park	0	0 (on street parking controlled under Dutton Park Traffic Area)
Fairfield	7	60
Yeronga	64	160
Yeerongpilly	24	90
Moorooka	0	0*
Rocklea	40	0
Salisbury	21	28

Source: TransLink park 'n' ride survey (2009)

5.2.6. Pedestrian and cycle network

Pedestrians and cyclists - northern section

Within the northern part of the study corridor, pedestrian and cycle access includes crossing the railway via road as well as by way of dedicated pedestrian access bridges at all stations. Key routes are shown in **Figure 5-14**.

There are a number of existing on-road marked cycle routes parallel to and across the railway corridor, including a north-south on-road cycle route adjacent to the north coast railway between Wooloowin and Albion stations. This cycle route connects Chermside via Kedron to the north of the study corridor, with links at Kedron Brook towards Nudgee in the east and Mitchelton in the west. To the south, this cycle link provides a continuous connection to the CBD via Herston (Victoria Park) and QUT Kelvin Grove. Other existing designated cycle routes include the ICB and a range of minor local links.

Wooloowin Station

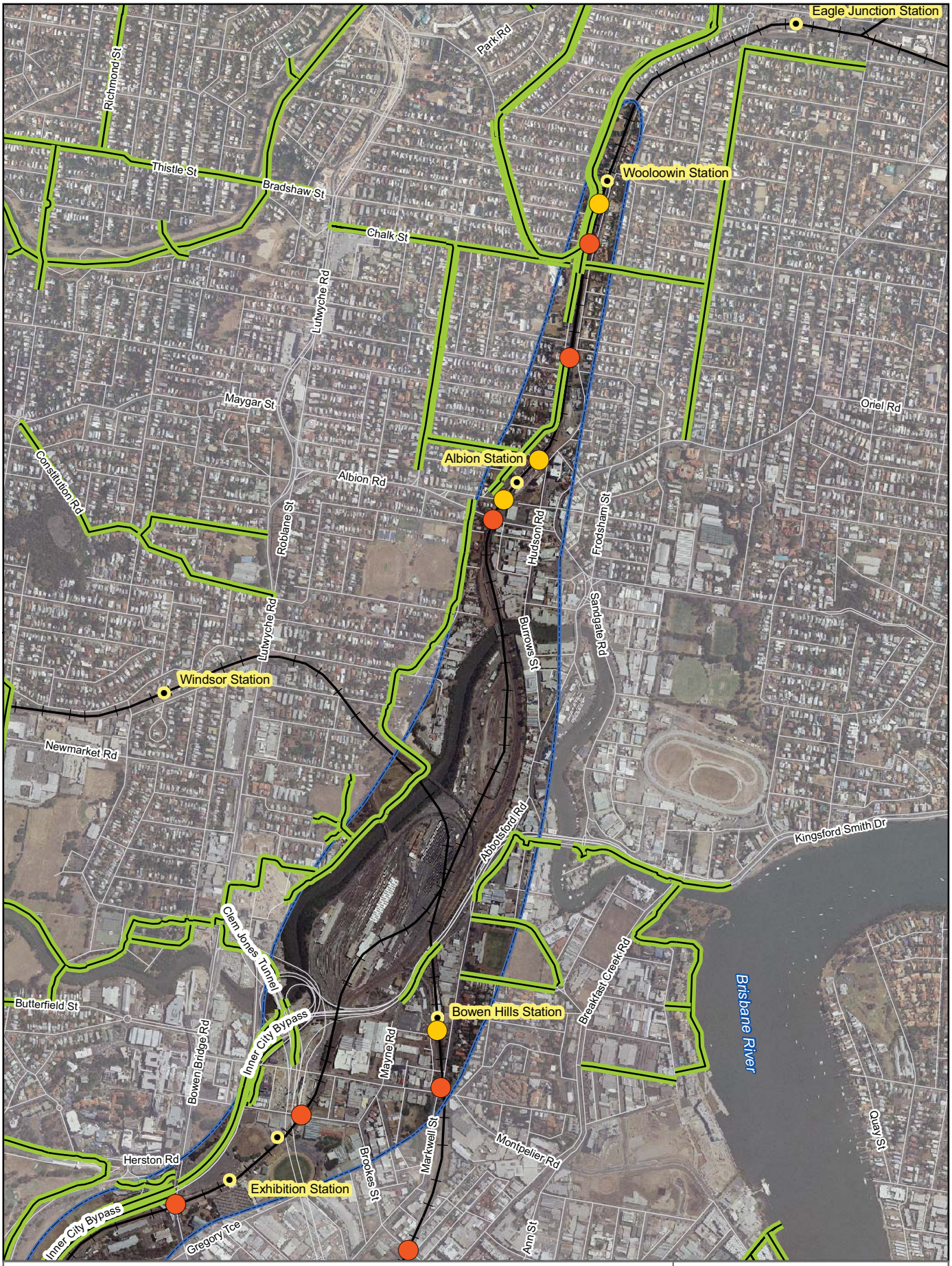
Pedestrian access is provided to the southern end of Wooloowin Station from both Hudson Street to the east and Bridge Street to the west. Access to the ticket office and four platforms is via a 3 m wide footbridge that is connected to the streets and platforms via stairs and ramps. The pedestrian infrastructure facility at Wooloowin Station is not compliant with the *Disability Discrimination Act 1992* (DD Act). Pedestrian access to Wooloowin Station is via roadside footpaths that are typically in good condition. A signalised pedestrian crossing is located on Bridge Street near the south-western entrance to the station, which provides a link to the park 'n' ride facility and the residential area to the west. On-road cycle lanes are located on Bridge Street, Chalk Street and Kedron Park Road, west of the station. Six cycle racks are provided at Wooloowin Station.

Albion Station

Pedestrian access to Albion Station is provided at both ends of the station platforms via two 2 m wide footbridges that provide access to all platforms. The northern bridge is connected to the platforms by stairs and the southern bridge is connected by ramps, neither of which are complaint with the DD Act. Access to the station from the east is provided across Hudson Road via a signalised pedestrian crossing at the north of the station and a zebra crossing to the south. Hudson Street has footpaths on both sides. Access from the west is provided via footpaths along the local street, which has no formal pedestrian crossings. Mawarra Street is also designated as an on-road cycle route but no formal cycle markings are provided. There are no designated cycle paths to the east of the station (eg at Hudson Road and Sandgate Road). Two secure cycle lockers are located near the platform one entrance.

Bowen Hills Station

Pedestrian access to Bowen Hills Station is from Abbotsford Road to the east of the station and Hudd Street and Mayne Rail Yard to the west of the station via pedestrian paths. Pedestrian bridges are provided to the north and south of the station. The northern bridge is linked to the four platforms by stairs and the southern bridge has lifts and stairs. Generally there is a lack of footpath provision and continuity to and from Bowen Hills Station. Where they exist, walkway spaces are often narrow, dark and difficult to navigate. Abbotsford Road, the main north-south arterial road immediately west of the station, is an unattractive pedestrian environment due to high traffic volumes and vehicle speeds. Crossing of Abbotsford Road can only be formally made via pedestrian facilities provided within traffic signal controlled intersections that are distant from the station. Cycle infrastructure is limited and restricted to on-road cycling that is not segregated from road traffic. Bike lockers are provided at the station, although these are typically under-utilised.



LEGEND

- Study Corridor
- Existing Bikeway
- Station
- Track
- Road

Rail Crossings

- Ped/Cycle
- Vehicles and Ped/Cycle

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-14

Key Pedestrian and Cycle Routes (Northern Section)

0 0.25 0.5 0.75 1 km

1:17,500 at A4

CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G026_CCR_Trans_Ped_Cycle_A4_aerial_ver93.mxd 06/07/2011 14:53

Exhibition Station

Exhibition Station is only used for passenger services during the two week annual Ekka and the Caravan and Camping Show and does not attract pedestrian activity over much of the year. Footpath widths are generally sufficient for the background pedestrian demand. However, the railway and Bowen Bridge Road are barriers to pedestrian movement between the RNA Showgrounds and the RBWH. Pedestrian facilities are provided at the traffic signal controlled intersections of Bowen Bridge Road with both Herston Road and O'Connell Terrace. However, pedestrian delay at these intersections can be excessive. Cycle access is generally north-south orientated in this area, catering for commuter cycle trips to and from the CBD with a low level of observed cycle activity due to discontinuous cycle routes, heavily trafficked routes and limited cycle facility provision.

There is a pedestrian underpass of Bowen Bridge Road that is located above the portal of the ICB tunnel. This underpass provides pedestrian access to the RNA Showgrounds but is closed except during the Ekka.

Pedestrians and cyclists – central section

In the Brisbane CBD, the footpath network generally follows the road network, which is characterised by a grid pattern, with east-west roads spaced approximately 100 m apart and north-south roads spaced approximately 200 m apart. This layout results in frequent intersections across the CBD in a north-south direction and a long block pattern in an east-west direction with few mid-block crossings.

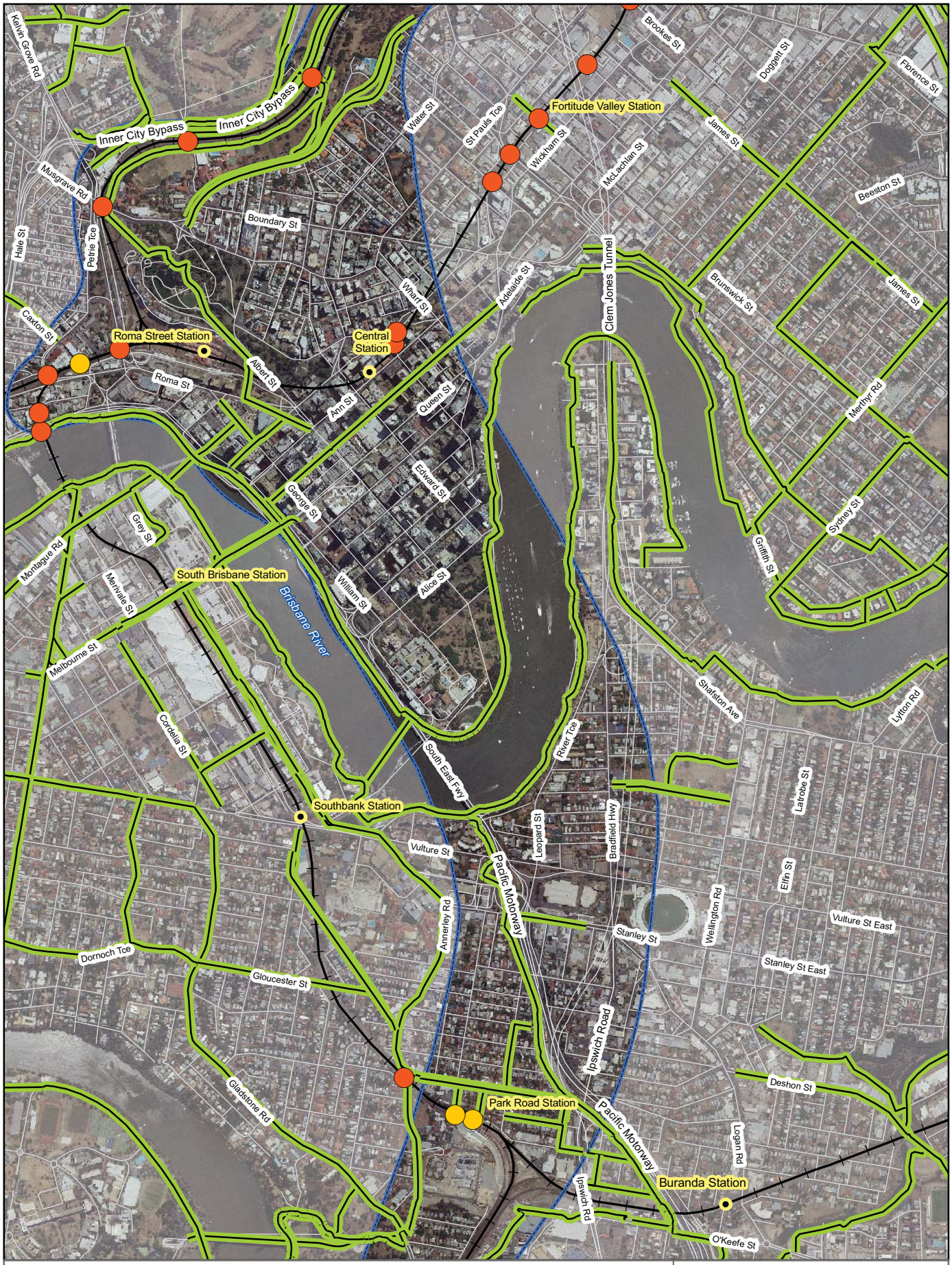
The walking environment along the footpath network in the CBD ranges from generous and wide to narrow and cluttered. There are also numerous pedestrian routes through retail and commercial buildings. Within the CBD, the railway is subsurface, meaning that it does not form a barrier to pedestrian movement until the immediate vicinity of Roma Street Station. Key pedestrian routes are shown in **Figure 5-15**.

Major off-road cycle and pedestrian routes in the central part of the study corridor include:

- routes through the City Botanic Gardens
- the Bicentennial bikeway (under the Riverside Expressway)
- the Normanby and Victoria Park bikeways (including the Victoria Park land bridge)
- the Riverside bikeway and boardwalk parallel to Eagle Street
- river crossings of the Goodwill Bridge and the Kurilpa Bridge
- the South East bikeway (cycles only).

Central Station

Central Station is surrounded on all four sides by multi-lane roads, namely Ann, Edward, Creek, and Turbot streets. Passengers must traverse these multi-lane roads to access the station. Station access points are typically located next to road intersections that provide pedestrian crossing facilities on all approaches. Central Station provides facilities such as lifts for mobility impaired passengers. A network of footpaths and subways connects the station with access points to the wider CBD street network. The subway under Central Station currently operates within its capacity.



LEGEND

- Study Corridor
- Existing Bikeway

Rail Crossings

- Ped/Cycle
- Vehicles and Ped/Cycle

- Station
- Track
- Road

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-15

Key Pedestrian and Cycle Routes (Central Section)

0 0.25 0.5 0.75 1 km

1:21,000 at A4

N

CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G027_CCR_Trans_Ped_Cycle_A4_aerial_ver93.mxd 06/07/2011 14:54

Key pedestrian infrastructure issues are:

- A lack of sufficient footway width and poor sight lines on Creek Street between Turbot and Ann streets east of Central Station. Insufficient storage space on the traffic island at the intersection of Creek Street and Ann Street, which results in pedestrian overspill.
- The footpath widths around Central Station are among the narrowest in the CBD (less than 3 m wide in some places). These footpaths correspond to the routes with the highest level of pedestrian activity in the CBD.
- The Central Station footbridge, which provides a link to the station entrance from the corner of Ann Street and Creek Street to Wickham Terrace, is unattractive and the access points are not easily visible and therefore are poorly utilised. Furthermore, the Wickham Terrace entrance to the station is dominated by roads.

There is currently no provision for cycle parking at Central Station and only a minor number of passengers cycle to and from Central Station. There are no dedicated cycle lanes on any roads immediately surrounding the station.

Roma Street Station

Roma Street Station has key pedestrian access routes from an entrance point within the Transit Centre building on Roma Street, to the CBD via George Street and Roma Street. The station entrance within the Transit Centre is not well defined and is accessed via steps or ramps. Although footpath width on Roma Street and George Street is adequate at present, the locations of pedestrian crossings of Roma Street are indirect with a high degree of pedestrian crossing activity taking place where there are no formal crossing facilities.

The southern station entrance at Roma Street connects to the platforms and a northern entrance connects via a subway. The northern entrance lacks clear and direct access to Spring Hill despite its close proximity. Roma Street Station provides facilities such as lifts for mobility impaired passengers to all platforms.

Cycle facilities in the Roma Street Station precinct include short sections of discontinuous on-road cycle lanes on Roma Street. A two-way segregated cycleway (Copenhagen Lane) on George Street, between Herschel Street and Turbot Street, provides access to the Kurilpa Bridge, which caters for pedestrians and cyclists only. Roma Street can also be accessed from the Bicentennial Bikeway (under the Riverside Expressway) at Herschel Street, 150 m south of the station. Off-road cycle routes to the north can be accessed via Roma Street Parkland from the intersection of Parklands Boulevard with Roma Street to the east of the station.

A BCC CityCycle station has recently been installed on Roma Street, adjacent to the station entrance, and the King George Square cycle centre is approximately 400 m to the south-east. No facilities for parking private bicycles are provided at Roma Street. Cycling, as a mode of access to the station, is minimal.

Woolloongabba

Although Woolloongabba does not have a railway station, the Woolloongabba busway station is a public transport hub and generator of walk trips. The busway station is located in the same precinct as the proposed Cross River Rail station. This precinct is surrounded on all four sides by heavily trafficked arterial roads, namely Stanley Street to the south, Vulture Street to the north, Ipswich Road/ Main Street to the east and the Pacific Motorway (M3) to the west. With no grade separated pedestrian crossings (except under or over the M3), all pedestrian trips to the surrounding precincts involve crossing one of these wide, heavily trafficked roads at signals.

Pedestrian crossing facilities are provided at all traffic signal controlled intersections surrounding the busway station, however crossing facilities are not provided on all approaches to these intersections. Priority is provided to traffic on these roads and therefore, the pedestrian crossing movement roads are often indirect, time consuming and unattractive due to high traffic volumes and traffic noise. There is a mid-block crossing to the south from the busway station to the Stanley Street retail strip, although there are six road lanes to cross (including a service road).

The precinct is adjacent to the Gabba stadium. Walking routes during events are constrained and pedestrian crossing movements along surrounding roads are controlled by police. Generally, the pedestrian infrastructure has sufficient capacity to cater for current non-event pedestrian demands. However, when events are held at the Gabba stadium, the high pedestrian volumes result in very congested pedestrian conditions on the surrounding footpaths pre and post-event.

The surrounding network of arterial roads is hostile to cyclists and there are no cycle lanes or off-road paths provided within the precinct, apart from a short westbound on-street cycle lane on Stanley Street, between the Pacific Motorway and the service lane opposite the busway station.

A key strategic cycle route in the vicinity of the station site is the South East bikeway (on the western side of the Pacific Motorway). This is a good quality, well used cycle link that connects the southern suburbs and the CBD (via the Goodwill Bridge). This would be expected to cater for CBD-bound cycle trips, with an added opportunity to provide good cycle links to the Gabba precinct from both north and south.

Park Road Station

Park Road Station has several pedestrian access points. The northern access to the station is via Quarry Street and pedestrian access is predominantly by way of footpaths alongside residential streets. To the east, access to the station is via an off-road pedestrian path between Quarry Street and Elliott Street, which is narrow and has little natural surveillance. Access to the south is available via the station's pedestrian overbridge and through to the Boggo Road Urban Village.

Access to the wider pedestrian network is somewhat disjointed and is severely constrained by the presence of major rail infrastructure that provides a barrier to pedestrian movement. Due to the lack of pedestrian crossings of the rail infrastructure, there is no direct pedestrian or cycle access between the station and the PA Hospital, which is located 500 m to the south-east of the station.

All four Park Road Station platforms and two busway platforms are connected by way of lifts and stairs to a common 2 m wide pedestrian overbridge that provides connections to Boggo Road in the south and Quarry Street in the north.

There are a range of cycle routes and paths around the station that provide good connectivity to the surrounding suburbs. To the west of the station, cycle provision exists along Annerley Road in the form of on-road cycle lanes. At the intersection of Annerley Road and Gladstone Road, these cycle lanes connect to the Eleanor Schonell Bridge and on to the University of Queensland.

To the south-east of the station, a cycleway (opened in 2009) exists adjacent to the Eastern busway, in the vicinity of the PA Hospital. This cycleway ends just north of Dutton Park Station with no dedicated facilities linking it to the Eleanor Schonell Bridge on the opposite side of Annerley Road.

To the north of the station, Bicycle Awareness Zone (BAZ) markings are present on Park Road, between Annerley Road in the west and Ipswich Road in the east. There is a direct link to the South East bikeway at the eastern end of Park Road. There is a lack of cycle parking at the station.

Pedestrians and cyclists – southern section

The pedestrian and cycle network in the southern part of the study corridor is generally associated with the road network. There are some local crossing points of the rail corridor, mostly co-located with road crossings. However, in some areas the railway corridor is a barrier to movement as there is a lack of railway crossings. There are also several designated local cycle routes in existence. Key routes are shown in **Figure 5-16**.

Dutton Park Station

Pedestrian access to Dutton Park Station platforms are via ramps from the Annerley Road overbridge, with a width of approximately 1.8 m. A second access for Platform 1 exists from Kent Street to the east. A zebra crossing is provided on Kent Street and a signalised pedestrian crossing is on Cornwall Street at a distance of 110 m from the Platform 1 entrance. The only wheelchair access is via ramps to both platforms as lifts are not provided.

The major pedestrian constraint is the width of the footway on the eastern side of Annerley Road, where the northbound platform access ramp joins the footway. At this point, the footway is less than 2 m wide. This footway caters for both pedestrians and cyclists and the narrow width has been observed to cause conflict between users.

Dutton Park is at the crossroads of several cycle routes between Annerley Road/Gladstone Road and the University of Queensland via the Eleanor Schonell Bridge, and an off-road route between the Station, the PA Hospital and onwards to the South East Bikeway. At Dutton Park there are missing links in the cycle network that result in a lack of safe, direct, convenient crossing from the western side of the Annerley Road/Gladstone Road intersection (i.e. from the Eleanor Schonell Bridge) to the eastern side of the railway line and the PA Hospital.

Fairfield Station

Fairfield Station can be accessed from the streets on both the eastern and western side of the railway. A 1.7 m wide pedestrian bridge connects the access points to both platforms. The bridge is narrow, unprotected from the weather and there are no lift facilities. Consequently, mobility impaired passengers cannot access the platforms.

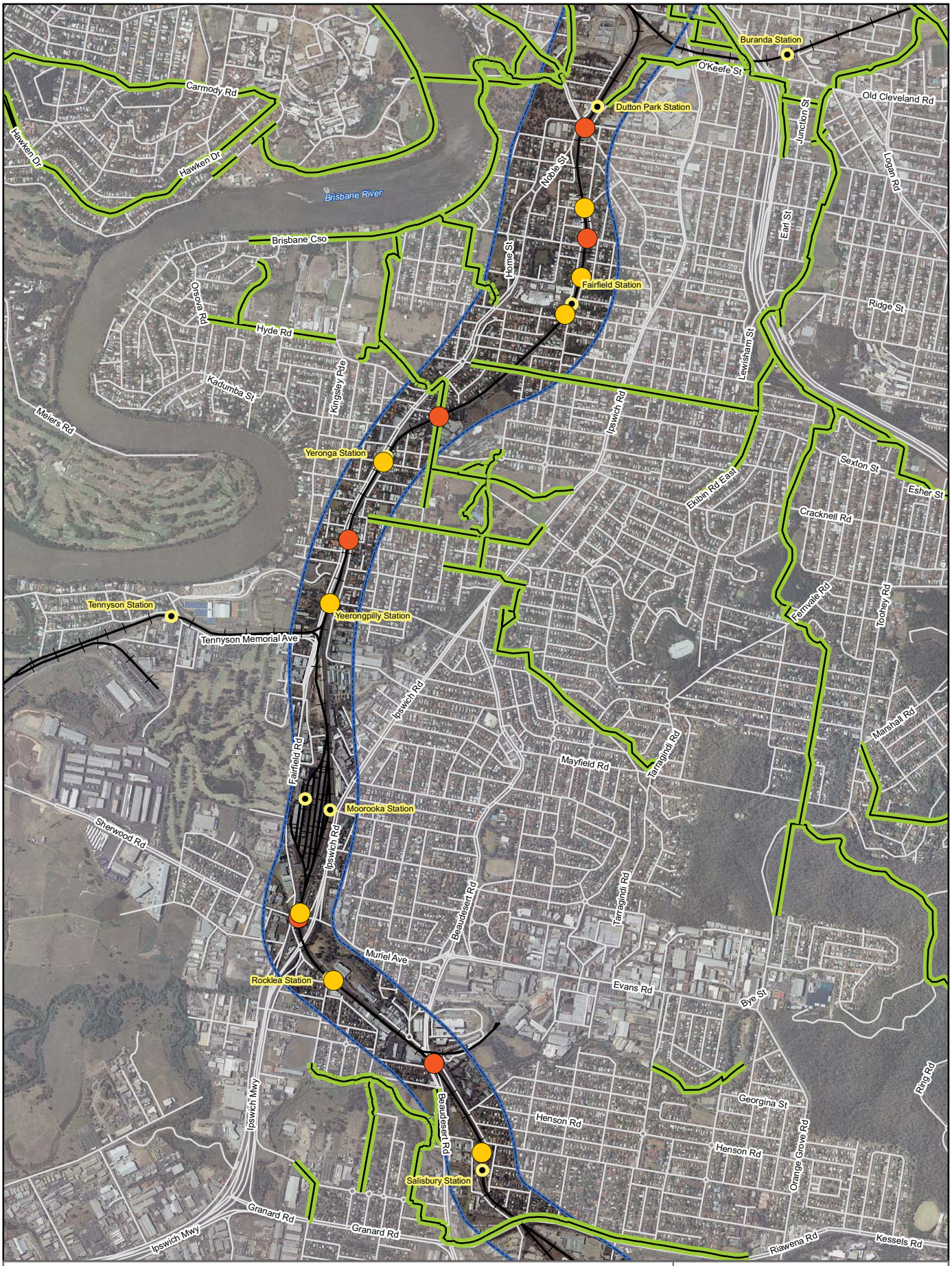
Pedestrian access to the station entrances is via footpaths on the adjacent local streets. There are no formal pedestrian crossing facilities at these roads, although traffic volumes are such that they are not required.

Cycle access to the station is via the local street network. Four secure cycle parking lockers and six bicycle racks are located on Platform 1.

Yeronga Station

Pedestrian access to Yeronga Station is via a footbridge that connects both platforms to Lake Street in the east and Fairfield Road in the west. Wheelchair access is possible to Platform 1 via a ramp located at Lake Street but no similar access is available to Platform 2. The width of the bridge is narrow at about 1.8 m wide and is unprotected from the weather. This footbridge extends over Fairfield Road and is narrow with low side walls and no anti-throw screens in place. Few pedestrians have been observed using this bridge as they prefer to cross Fairfield Road at grade.

Access from the wider station precinct is via footpaths on Fairfield Road and Lake Street but there is no footpath on the eastern side of Fairfield Road from the south. Pedestrian crossings of surrounding roads include signalised facilities on Fairfield Road and informal crossings of other local streets.



LEGEND

- Study Corridor
- Existing Bikeway
- **Rail Crossings**
  - Ped/Cycle
  - Vehicles and Ped/Cycle
- Station
- Track
- Road

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-16

Key Pedestrian and Cycle Routes (Southern Section)

0 0.25 0.5 0.75 1 km

1:30,000 at A4

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CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G028_CCR_Trans_Ped_Cycle_A4_aerial_ver93.mxd 06/07/2011 14:55

No bicycle lockers are located at the station. BAZ signs are located on School Road and Park Road close to the station. More strategic cycle connections exist from the south-east to north-west, connecting the TAFE campus at Yeronga with the University of Queensland via Hyde Road, Fairfield Park and Brisbane Corso.

Yeerongpilly Station

A pedestrian overbridge (approximately 75 m long and minimum 2 m wide) is the only means of access to the station from the western side of Fairfield Road and Wilkie Street. Lifts and stairs link the footbridge to the island platform (serving both northbound and southbound trains) as well as the Wilkie Street side of the station. The footbridge has recently been extended across Fairfield Road to the site of the Yeerongpilly transit orientated development (TOD), with lifts and stairs being installed to the western side of Fairfield Road. The footbridge can no longer be accessed from the eastern side of Fairfield Road.

Formal pedestrian crossing facilities are located on roads adjacent to the station, including a zebra crossing on Wilkie Street near the entrance to the pedestrian bridge and a signalised pedestrian crossing on Fairfield Road at its intersection with King Arthur Terrace, some 150 m north of the station.

Four secured cycle lockers are located at the Wilkie Street Station entrance. An on-road cycle lane is located on King Arthur Terrace to the west of the station; this cycle lane connects the Queensland Tennis Centre and the Yeerongpilly TOD area to Fairfield Road. No formal cycle lanes exist on Wilkie Street, however traffic volumes are low and the environment is conducive to on-road cycling.

Moorooka Station

Pedestrian facilities to access the Moorooka Station are poor, as the station can only be accessed by a narrow footbridge to/ from the east (Ipswich Road) and is only accessible by stairs. Pedestrian access from the west is not possible, due to the presence of the Clapham Rail Yard through which there is no pedestrian access.

At the station entrance, where the footbridge access stairs meet Ipswich Road, the footpath is narrow with a width that varies from 1 m to 2 m resulting in close proximity to high traffic volumes near the station entrance. Safety fencing is not provided. A signalised pedestrian crossing is located 15 m north of the station entrance on Ipswich Road. No formal and secure cycle parking facilities are located at the station and there are no cycle lanes or other cycle facilities on the surrounding road network.

Rocklea Station

The main entrance to Rocklea Station is from Brooke Street via a small park ‘n’ ride facility, located at the south-western side of the station. On the north-eastern side, access to the station is via a footpath located parallel to the southbound rail track, which links the southern end of the southbound platform to the northern end of Railway Parade. This is a long (approximately 250 m in length), narrow and exposed pathway surrounded by railway and industrial uses.

A footbridge and stairs link the two platforms to the surrounding street network and there are no lifts or ramps providing access to the footbridge. There are two cycle lockers located on the western side of the station, within the park ‘n’ ride facility. There are no marked cycle routes on the approaches to the station.

Salisbury Station

Pedestrian access to Salisbury Station is available via a central pedestrian overbridge, which links the surrounding streets (both at east and west) to the island platform. On the western side of the station, access to the overbridge is via a footpath from Dollis Street. There are a lack of pedestrian facilities including footpaths and formal road crossing facilities on Dollis Street. Of particular note, is the lack of any formal pedestrian crossing opportunities of Beaudesert Road on the desire line to the western residential catchment (in the vicinity of Dollis Street).

To the east, station access is via two footpaths leading to the station footbridge, one connecting to Fairlie Terrace and one connecting to Olivia Avenue. There is a zebra crossing of Fairlie Avenue in the vicinity of the station access path. There are no major pedestrian access barriers on the eastern side of the station.

There are 14 cycle lockers located on the eastern side of the station. There are no marked cycle routes on the immediate approaches to the station. Cyclists coming from the west need to cross busy Beaudesert Road.

5.3. Usage and performance of existing transport networks and services

5.3.1. Public transport usage

Currently, approximately 6.7 million person trips are made on an average weekday in the Brisbane metropolitan area, with public transport catering for 8.1% of all weekday person trips in 2009.

A breakdown of public transport use across rail, bus and ferry modes for a typical weekday in the Brisbane metropolitan area is provided in **Table 5-5**. This information was derived from surveys undertaken in recent years. A comparison of key statistics for the average weekday in 2009, extracted from the patronage forecasting model prepared for the Project, is also provided in **Table 5-5.**

Almost 550,000 trips are made by public transport on an average weekday and almost half of the demand for travel occurs during the morning and evening peak periods. The morning peak period is when there is the heaviest demand period for rail.

Table 5-5 Surveyed public transport use in Brisbane metropolitan area

Mode	Time period					
	AM peak 7.00 am to 9.00 am	**Inter-peak 9.00 am to 4.00 pm**	**PM peak 4.00 pm to 6.00 pm**	**Off-peak 6.00 pm to 7.00 am**	**Total Daily (1)**	**Modelled average weekday 2009 (2)**
Internal to internal public transport trips within the metropolitan area						
Bus	53,100	115,300	63,000	41,600	273,000	285,700
Ferry	2,600	5,700	2,700	2,600	13,500	17,200
Train	65,500	80,300	56,000	35, 000	236,800	243,200
External(1) rail trips						
External –internal	4,100	2,900	600	1,100	8,700	
Internal – external	500	3,500	3,200	1,600	8,700	
Combined total	125,800	207,600	125,500	81,900	540,700	546,000

Notes:

1 External trips are those from origins and destinations of travel into and out of the Brisbane metropolitan area via 15 cordon crossing points on the study area boundary. Of these two are most significant for rail (and Cross River Rail in particular), serving the Gold Coast and Sunshine Coast.

2. Source: Estimates based on 2006 survey data, combined with 2009 passenger count data.

3. Source: Cross River Rail Project model – validated base year model results.

5.3.2. Passenger rail network performance

Approximately 250,000 passenger trips are made by rail on an average weekday in the Brisbane metropolitan area.

The current service plans are complex with a mixture of 'all stops', express and semi-express, as well as multiple commencing or termination points on some lines. This requires passengers to have a detailed knowledge of the timetable for the most efficient travel around the network and discourages interchanges. The wide range of stopping patterns can also reduce network capacity and efficiency.

The lack of strict sectorisation within the network reduces schedule robustness and allows knock-on delays across lines. This sometimes results in long-distance rollingstock being used for short distance services and vice versa, reducing capacity on services to the CBD, which in turn results in passengers on longer distance commuter services not being guaranteed access to appropriate onboard facilities.

The current operations mean that inter-dependencies between the two sectors (ie the Main sector and the Suburban sector) constrain the rail network capacity as well as service reliability. The sharing of services and tracks between the Main sector and Suburban sector, especially between suburban lines to the north and western lines to the south-west, mean that an incident in one sector has the potential to cause delays across both sectors. For example, Shorncliffe services are currently connected to Ipswich services during the morning peak period, requiring trains to crossover from the Suburban sector to the Main sector and potentially delay other services in either sector.

The capacity of the Brisbane rail network is highly constrained by the inner city rail network. This is mainly due to inbound routes to the CBD being limited to one line from Milton (servicing trains from the Western line) and one line from Park Road (servicing trains from Beenleigh, Gold Coast and Cleveland). This results in trains from multiple lines needing to merge together on two inbound lines in order to access the CBD. This limits the potential capacity of the western and southern lines.

Figure 5-17 provides an overview of the key capacity constraints in the inner city rail network including:

- single directional track on the Merivale Bridge
- all Ipswich and southern lines each merge into single track on access to Roma Street Station
- congested junctions at Park Road and South Brisbane
- single platforms and long dwell times in CBD stations.

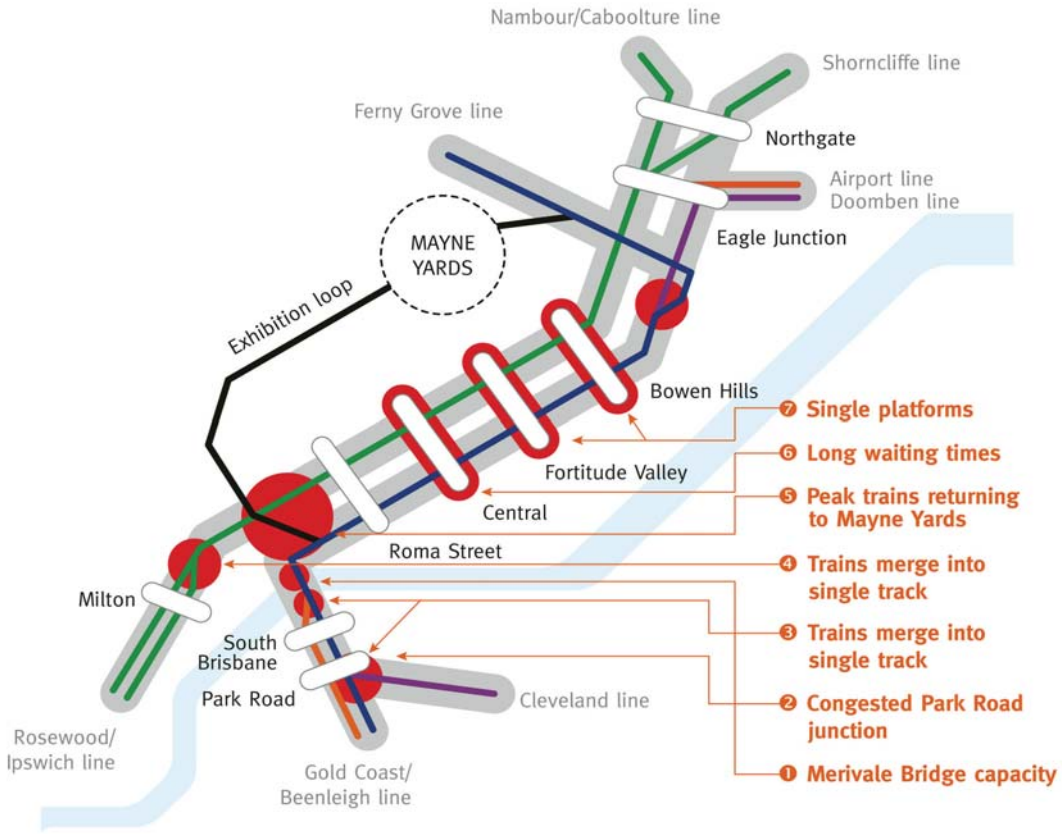


Figure 5-17 Existing capacity constraints on the Brisbane inner city rail network

On time reliability and level of service

The level of service for the passenger rail network during the morning peak period has been assessed using on time reliability data collected from Queensland Rail. **Table 5-6** presents the average on time reliability results for inbound services arriving at Central Station from start of daily operation until 10.00 am during a normal weekday, including the morning peak period.

Queensland Rail currently adopts an on time reliability benchmark that seeks to achieve 92.4% of trains operating within four minutes of the timetable. As shown in **Table 5-6**, the benchmark of four minutes is achieved on all lines for services arriving at Central Station, with the exception of the Nambour line. The Cleveland, Robina and Beenleigh lines just achieve the on time reliability benchmark.

Table 5-6 On time reliability results for the inbound direction measured at Central Station

Line	% of services with on time reliability within four minutes measured at Central Station
Nambour	90.1%
Caboolture	94.8%
Shorncliffe	93.9%
Airport	94.2%
Doomben	95.1%
Ferny Grove	95.9%
Cleveland	93.1%
Robina	93.3%
Beenleigh	93.1%
Rosewood	95.6%
Ipswich	94.7%

Source: Systemwide, December 2010 (based on Queensland Rail)

Line loadings and level of service

Modelled existing train loadings on the passenger network (expressed as a percentage of overall seated train capacity averaged over the two hour morning peak period) are provided in **Table 5-7**. This shows that during the morning and evening peak periods, many services exceed the seated capacity on the approaches to the inner city, requiring passengers to stand (shown as loadings higher than 100%). Some rail services within the busiest time of the two hour peak period experience much higher levels of crowding. Train loads are generally higher in the morning peak period (in the peak direction) than the evening peak period (in the peak direction) as education and work-based trips coincide in the morning peak period (7.00 am to 9.00 am).

In the morning two hour peak period, trains from Beenleigh and the Gold Coast are operating at or near their seated capacity (around 98%) when approaching Park Road Station. Three out of seven peak hour services on the Beenleigh line currently exceed the design load for Queensland Rail rollingstock (that is more than 750 passengers at any point or passengers standing for more than 20 minutes). On the Gold Coast line, all four services in the morning peak hour exceed the design load.

In the morning two hour peak period trains from the Sunshine Coast, Caboolture, Airport, Doomben and Shorncliffe lines are operating at or above their full seated capacity (around 114% of seated capacity) when approaching Bowen Hills southbound. On the Caboolture line, eight out of 10 services in the peak hour currently exceed the Queensland Rail design load.

Table 5-7 Existing line loadings (2009) between stations within the study corridor

Stations	Time period	Northbound	Southbound
Wooloowin-Albion	AM (7.00 am to 9.00 am)	22%	110%
	PM (4.00 pm to 6.00 pm)	51%	16%
Albion-Bowen Hills	AM (7.00 am to 9.00 am)	22%	114%
	PM (4.00 pm to 6.00 pm)	53%	16%
Bowen Hills-Fortitude Valley	AM (7.00 am to 9.00 am)	14%	101%
	PM (4.00 pm to 6.00 pm)	48%	12%
Fortitude Valley-Central	AM (7.00 am to 9.00 am)	23%	95%
	PM (4.00 pm to 6.00 pm)	44%	15%
Central-Roma Street	AM (7.00 am to 9.00 am)	68%	34%
	PM (4.00 pm to 6.00 pm)	14%	36%
Roma Street-South Brisbane	AM (7.00 am to 9.00 am)	72%	53%
	PM (4.00 pm to 6.00 pm)	17%	38%
South Brisbane-South Bank	AM (7.00 am to 9.00 am)	43%	25%
	PM (4.00 pm to 6.00 pm)	18%	45%
South Bank-Park Road	AM (7.00 am to 9.00 am)	48%	16%
	PM (4.00 pm to 6.00 pm)	21%	52%
Park Road-Dutton Park	AM (7.00 am to 9.00 am)	98%	33%
	PM (4.00 pm to 6.00 pm)	24%	50%
Dutton Park-Fairfield	AM (7.00 am to 9.00 am)	96%	31%
	PM (4.00 pm to 6.00 pm)	24%	50%
Fairfield-Yeronga	AM (7.00 am to 9.00 am)	92%	31%
	PM (4.00 pm to 6.00 pm)	24%	48%
Yeronga-Yeerongpilly	AM (7.00 am to 9.00 am)	87%	28%
	PM (4.00 pm to 6.00 pm)	23%	46%
Yeerongpilly-Moorooka	AM (7.00 am to 9.00 am)	93%	25%
	PM (4.00 pm to 6.00 pm)	26%	45%
Moorooka-Rocklea	AM (7.00 am to 9.00 am)	90%	29%
	PM (4.00 pm to 6.00 pm)	26%	45%
Rocklea-Salisbury	AM (7.00 am to 9.00 am)	92%	29%
	PM (4.00 pm to 6.00 pm)	25%	45%

Notes:

1. Line loading is expressed as a percentage of seated capacity available in all trains over the two hour peak period. Some services within the two hour peak period experience high levels of crowding.

2. No data for average weekday for Bowen Hills-Exhibition and Exhibition-Roma Street exists as passenger services only operate during special events.

5.3.3. Freight rail performance

There are limited dedicated rail freight lines in South East Queensland. However, there are some corridors (Park Road to the Port and Acacia Ridge to Melbourne/Sydney) that do offer a dedicated track for freight. The general lack of a dedicated track has resulted in rail freight sharing the network with passenger services.

The Inner City Rail Capacity Study (ICRCS) (Queensland Transport, 2008) highlighted that significant volumes of rail freight currently move through inner city and the associated rail corridors. Freight services pass through the inner city to destinations including the Port of Brisbane, Acacia Ridge and to regions serviced by the North Coast Line. The freight peak periods are between 4.00 am and 7.00 am and at 7.00 pm and 9.00 pm to match logistic trends. These morning peak periods clash with those of the passenger network. However, Queensland Rail avoid when possible freight rail operations on the lines shared with the passenger network during the morning or evening peak periods, with restricted access during the shoulder period. Likewise, the efficiency and performance of non-peak passenger operations are often affected by the need to schedule freight trains in the times available.

As a result of freight sharing the network with passenger services and the operational constraints due to avoidance of freight operations during the passenger rail peaks, the capacity for freight is constrained. In particular, rail capacity constraints on the Western Line have resulted in the demand for coal being unmet.

A series of specific conflicts exist that affect the operation of freight trains. These include network conflicts and conflicts with the operation of passenger trains around the inner city. The capacity for freight movements from one side of the city to the other is determined by these key freight capacity constraints within the inner city area. Specific performance issues are:

- rail freight operational hours are currently restricted by Queensland Rail as they attempt to avoid operating freight rail during the passenger morning or evening peak periods. This prevents freight operations for approximately four hours of the day.
- operations on the Merivale Bridge. Passenger train operations have priority on the Merivale Bridge. This route is only used opportunistically when train paths are available for freight traffic. The primary route for all freight to and from Acacia Ridge from the North Coast is via Corinda.
- operation of freight during the passenger off-peak services is facilitated by the provision of 30 minute, off-peak passenger frequencies on most lines. Freight services then place a constraint on ability of the off-peak passenger service frequency to be increased.
- network constraints exist such as
  - freight services arriving from the North Coast crossing the path of passenger services heading to the North at Bowen Hills junction
  - non-freight services entering and exiting Mayne Rail Yard causing flat junction conflicts with the freight services on the Exhibition Loop tracks
  - the area around Normanby Yard has many potential crossing and merging conflicts, especially with passenger services finishing at Roma Street and then travelling to Mayne Rail Yard
  - junction conflicts between freight and passenger services at the Milton and Roma Street junction
  - passenger and freight trains sharing the single bi-directional dual gauge track between Salisbury and Park Road, preventing freight trains from operating on this part of the network in peak commuting hours, and limiting the number of both freight and express passenger (i.e. Gold Coast) services in the off-peak to approximately current levels.
  - the existing freight services are capacity constrained. Operations are limited by track access and as a result performance and customer delivery times are affected. As passenger growth is maintained, rail freight growth will become further constrained.

5.3.4. Bus network performance

There are approximately 285,000 bus users on an average weekday in the Brisbane metropolitan area, which represents approximately 50% of total public transport trips across the Brisbane metropolitan area.

The Brisbane bus network is highly CBD-centred with over 500 bus services per hour entering the CBD in the morning peak. The two busways within the study corridor, the Inner Northern Busway and South East Busway, carry around two-thirds of buses into the CBD. The South East Busway carries almost 300 inbound buses per hour at its busiest point at Woolloongabba, while the Inner Northern Busway carries over 90 inbound buses per hour at Roma Street in the morning peak period.

Peak hour bus operations in Brisbane consist of a range of peak-only routes, which supplement the standard timetable and offer single seat express journeys into the CBD. From the south-east, most of these peak-only express services use the Captain Cook Bridge to enter the CBD itself, rather than the inner South-East Busway route via the Victoria Bridge.

Across inner Brisbane and the study corridor, there is a general lack of dedicated bus-rail interchange infrastructure with two exceptions being at Roma Street and Park Road stations.

Buses in the CBD use almost every road and are consequently susceptible to delays due to traffic conditions in peak periods, resulting in poor journey time reliability on many routes. There is limited on-street bus priority in the CBD with exceptions being the Adelaide Street bus mall and approach lanes, Edward Street southbound bus lane, and the Ann Street westbound bus lane (Boundary Street to George Street).

Bus layover space in the CBD is also limited, with a range of on-street spaces already dedicated for buses including sections of Alice, William and Wickham streets, as well as off-street space at Woolloongabba (South East Busway), Petrie Terrace (Inner Northern Busway) and at the Queen Street bus station. This limits the ability for TransLink to provide more terminating bus services in the CBD.

Particular congestion and operational constraints are now apparent on the South East Busway, including:

- bus queuing and delays around the Melbourne Street portal caused by interaction with on-street surface traffic
- congestion within the Cultural Centre busway station, which causes buses to queue over the Victoria Bridge
- bus congestion at the Allen Street busway exit (onto the Captain Cook Bridge) at Woolloongabba, caused by general traffic congestion on the bridge, which is a major CBD approach route from the south.

Overall, the bus network is currently experiencing high levels of demand with congestion occurring on several routes causing delays and reliability concerns. Some bus corridors, such as the South East Busway, could be considered saturated in peak times, whilst the performance of bus services that use the road network is affected by delay caused by congested general traffic conditions in peak periods.

5.3.5. Ferry network performance

Passenger ferries cater for a very small component of trips within South East Queensland, with more than 13,000 daily ferry trips in 2009. This represents around less than 3% of total daily (weekday) public transport trips. In the study corridor, the ferry network primarily provides access to the CBD with key terminals at North Quay (around 900 m from Roma Street Station), South Bank (around 500 m from South Bank Station) and Riverside Centre (around 600 m from Central Station). As there are significant distances between rail stations and the ferry terminals, ferry-rail interchange is very limited.

5.3.6. Road network performance

Over 4 million car/light vehicle trips and approximately 370,000 commercial vehicle (freight) trips occur within the Brisbane metropolitan area on an average weekday (2009).

Level of service (LOS) is a key measure of the performance of the regional and urban road network. It can be measured at a mid-block point or at an intersection and provides an assessment of the road network performance in terms of conditions experienced by drivers.

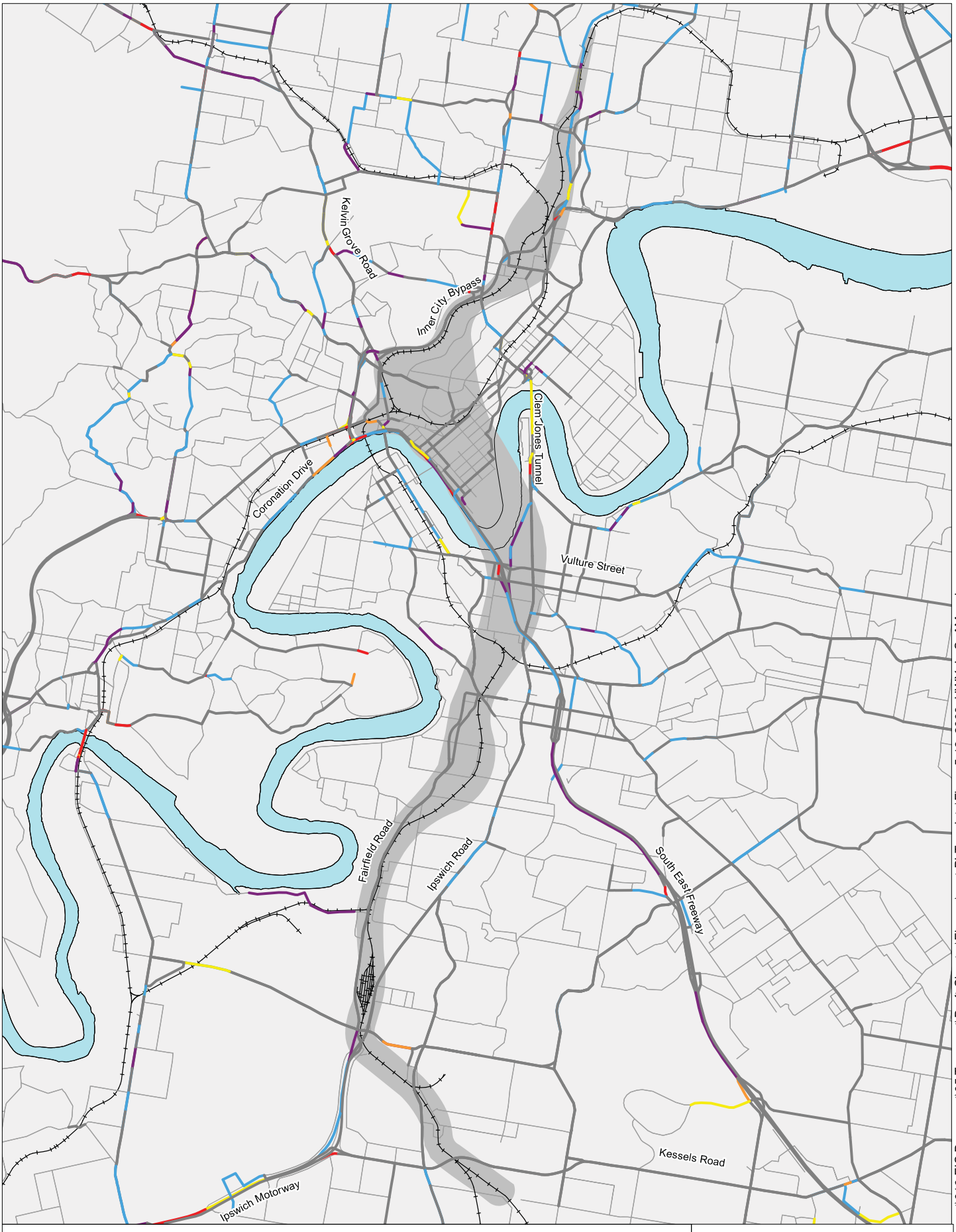
The LOS for roads within each sub-area of the study corridor has been determined for existing conditions for the base year 2009 using travel speed (as forecast by the Cross River Rail Project Model) as the defining measure for urban and suburban arterial roads, with interrupted flow using Austroads (2009) definitions. As travel speeds decrease from the optimum free-flow condition, the LOS to road users deteriorates. The LOS range is from A (very good) to E (congested) and F (very congested).

The existing mid-block LOS for the study corridor road network during the morning peak period is shown in **Figure 5-18**.

This assessment shows that in the morning peak, the radial road network centred on the CBD is heavily constrained with several key road corridors experiencing congested conditions (LOS E or F) with significant delays and low average travel speeds. This occurs at sections of:

- Riverside Expressway (both directions)
- Pacific Motorway (Captain Cook Bridge) inbound
- Sandgate Road/Abbotsford Road (north of the ICB)
- Lutwyche Road/Bowen Bridge Road
- Story Bridge (inbound/northbound)
- Coronation Drive and Milton Road (inbound)
- Ipswich Road and the Ipswich Motorway.

Recent investment in road capacity around the CBD, for projects such as the Clem Jones tunnel and the Go Between Bridge (part of BCC's TransApex strategy), is aimed at providing alternative routes to avoid many of the abovementioned congested roads. However, there are no State or Local Government proposals for major road capacity upgrades into and through the CBD. As such the ability of the regional and arterial road network to satisfactorily cater for further growth in travel demand by private vehicles to Brisbane's CBD during the peak periods is constrained.



LEGEND

AM peak (2 hrs) level of service
for directional links carrying more than 1000 vehicles

LoS A
LoS B
LoS C
LoS D
LoS E
LoS F

Study Corridor

Model ID: CRR_2009_02X

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-18

Existing AM peak road network level of service within the study corridor

N

CrossRiverRail

SKM aurecon
CRR JOINT VENTURE

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5.3.7. Pedestrian and cycle network performance

Most suburban stations on the rail network within the study corridor generally have pedestrian and cyclist infrastructure with sufficient capacity for the current pedestrian demands. At some stations pedestrian infrastructure provision does not comply with the DD Act requirements. At Central and Roma Street stations some deficiencies are evident in the surrounding network as follows:

Central Station

Central Station caters for over 100,000 passenger movements on a typical weekday. Walking is the primary mode of access and egress to Central Station accounting for around 90% of trips. Most passengers have final destinations south of the station, within the CBD.

The pedestrian footways to the south of the station, particularly at the intersections of Ann Street with Edward and Creek streets and the intersection of Edward and Adelaide streets, are operating at pedestrian capacity. High congestion is evident at storage areas at these signalised intersections. The footpath widths surrounding the station are narrow (less than 3 m wide in places), with high activity. The roads that immediately surround the station have heavy traffic, no dedicated cycle lanes and steep topography, which combine to make this an unattractive environment for cyclists.

Roma Street Station

Passenger alighting movements at Roma Street in the morning peak are pedestrian-orientated with around 5,600 passengers/75% of all alighting passengers walking from the station to the surrounding precinct. Approximately 90% of pedestrians walking from the station go to the CBD via George Street or Roma Street. Although the pedestrian infrastructure has sufficient capacity for the current usage, existing formal pedestrian crossings of Roma Street do not align with movement desire lines, resulting in a high degree of informal, potentially unsafe pedestrian crossing activity.

5.4. Future transport conditions without Cross River Rail

5.4.1. Forecasting methodology

The patronage forecasts used in this assessment have been extracted from the Cross River Rail Project Model, based on the Brisbane Strategic Transport Model – Multi-Modal version (BSTM-MM). The BSTM-MM public transport network model uses a database of road and rail links and public transport services operating along these links within the Brisbane metropolitan area. The network model within the Cross River Rail Project Model uses a forecast of public transport travel patterns (passenger trips between every pair of zones) and assigns passenger demands to the best route through the network based on factors such as journey time, service headways and the need to interchange.

The Cross River Rail Project Model network model includes enhancements to CBD zones and station representation. In these processes, for rail travel, the network model determines the optimum stations to use at the start and end of a journey and if necessary, the optimum interchange location. The degree of CBD zoning detail has been improved to represent accessibility to alternative stations more accurately. In addition, the representation of key stations (such as Bowen Hills, Fortitude Valley, Central, Roma Street, South Brisbane, South Bank, Woolloongabba and Park Road stations) has incorporated individual platform identification as a means of monitoring interchange patterns.

The network model also included the effects of crowding. In the model validation process, all assignment routing parameters were tuned to better represent the routing decisions evident in the observed public transport origin destination data. This included the weightings for walk access time, boarding penalties (by mode and station) and bus travel time functions.

Public transport crowding

The effects of passenger crowding have been incorporated in the Cross River Rail Project Model network assignment model, principally for two key reasons:

- As rapid growth of Brisbane increases pressure on public transport service capacity, the consequence is likely to be increased crowding on some services, which may affect both passengers' choice of services and the level of public transport patronage.
- Cross River Rail is designed to increase rail capacity and reduce crowding, therefore the associated passenger benefits need to be formally accounted for in the Project assessment.

To represent crowding, the Cross River Rail Project Model adopts a philosophy that the experience of using crowded trains is unpopular with passengers. This effect can be represented by increasing the weighting applied to in-vehicle journey time above the normal value of 1.0, typically used within the generalised cost formula in the model. This additional weight is referred to as the 'crowding weight'. The values used in the Cross River Rail Project Model were based on a review of international practice.

In the model validation process, all assignment routing parameters were tuned to better represent the routing decisions evident in the observed public transport origin destination data. This included the weightings for walk access time, boarding penalties (by mode and station) and bus travel time functions.

Forecasting years

Public transport patronage was modelled for the following years:

- 2021 – the year closest to expected opening of Cross River Rail for which key inputs were available
- 2031 – the last forecast year for which key inputs were available.

An assessment of the impacts of the Project has been undertaken by comparing modelled scenarios with and without the Project in the years 2021 and 2031.

Land use patterns and trip rates

The adopted land use patterns in the Cross River Rail Project Model are consistent with the *South East Queensland Regional Plan 2009-2031* (SEQ Regional Plan). These land use patterns and demographic assumptions are based on the draft *Connecting SEQ 2031: An Integrated Regional Transport Plan for South East Queensland* (Connecting SEQ 2031). The draft Connecting SEQ 2031 has been developed as the guiding transport planning and policy document to support the desired outcomes of the SEQ Regional Plan.

Population and employment by zone (demographic inputs to the model), are the most influential factors driving forecast transport demand. **Table 5-8** presents the population and employment forecasts for the inner Brisbane statistical local area and the Brisbane metropolitan area covered by the transport model.

The importance of the Brisbane CBD as a major employment node and travel generator for South East Queensland is illustrated in the future regional employment distribution, which is shown schematically in **Figure 5-19**.

Table 5-8 Population and employment forecasts

Year	2009		2021		2031	
	Population	Employment	Population	Employment	Population	Employment
Inner Brisbane statistical local area*	38,000	245,000	53,000	333,800	66,000	387,000
Brisbane metropolitan area	1,892,000	1,042,000	2,346,500	1,341,100	2,657,000	1,514,000

Source: TMR (Regional Plan Consistent V3)

Notes: The Inner Brisbane statistical local area consists of the statistical local areas of City – Inner, City – Remainder, Fortitude Valley, Spring Hill, Bowen Hills, Milton, South Brisbane, Kangaroo Point and Woolloongabba

The trip generation rates applied within the Cross River Rail Project Model are those embodied in the overarching BSTM-MM model. These rates are applied for a range of individual trip purposes such as home to work, home to education, home to shopping, and non-home based travel and are used to estimate trips produced and attracted to zones as a function of demographic attributes (such as population, household size, workforce). These trip generation rates have been calibrated using data from the extensive South East Queensland Travel Survey (SEQTS), conducted by TMR in 2003/04 for the Brisbane metropolitan area and periodically updated.

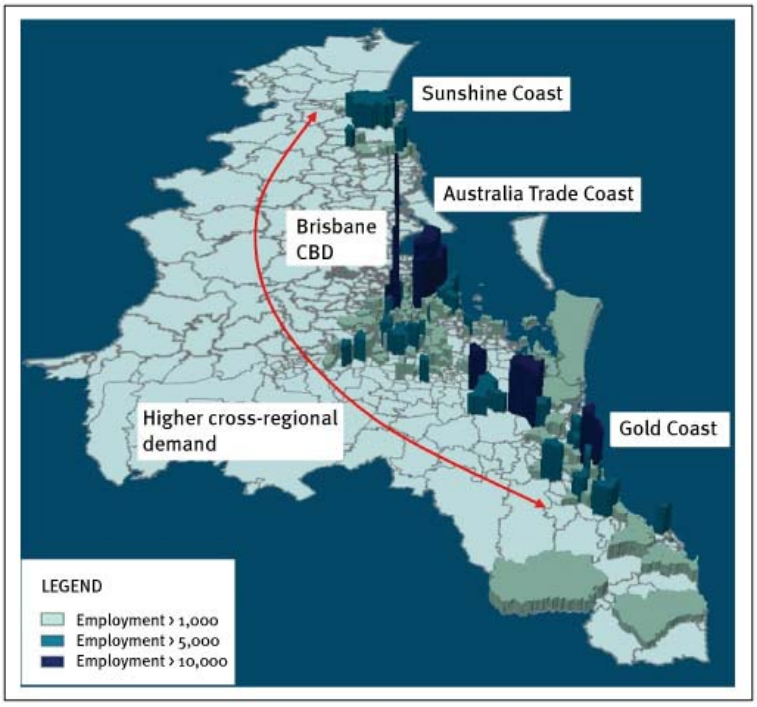


Figure 5-19 Forecast distribution of employment in South East Queensland by 2031

5.4.2. Transport network assumptions

Key assumptions incorporated into the Cross River Rail Project Model include growth in public transport fares, parking charges and road tolls, growth in the value of time as well as strategic transport network improvements. A detailed list of assumptions used and exclusions to the assessment is documented in *Technical Report No. 1 – Transport.* The network changes included in the modelling have been endorsed by the Cross River Rail Transport Advisory Group, comprised of representatives from TMR, TransLink, Queensland Rail and BCC.

The public transport network and service provision would evolve between 2009 and 2031 consistent with strategic directions described in the draft Connecting SEQ 2031 and the TransLink Transit Authority Strategic Plan 2010–2015.

For the EIS assessment, assumptions have been adopted that are generally consistent with these plans. Key future rail transport projects, service changes and policy assumptions included:

- new railway extensions and improvements, including Springfield extension (2016), Moreton Bay Rail Link (2016) and other rail capacity enhancements
- by 2031, Gold Coast line extensions to Elanora, Beerwah to Caloundra branch line, Ipswich to Ripley branch line and the North West Transport Corridor (NWTC) from Alderley to Strathpine
- improved off-peak rail frequency is introduced by 2021, allowing for 'turn up and go' frequencies of 15 minutes or less on most lines throughout the day and evening (seven days a week)
- increase in public transport fares above the Consumer Price Index (CPI) to 2014, in line with State Government policy, after which fares are assumed to increase in line with CPI.

Other key transport network planning projects within the Brisbane metropolitan area assumed to be completed prior to 2031 include:

- a range of new busways by 2021, including the Eastern Busway to Coorparoo, Northern Busway to Chermside and an extension of the South East Busway to Underwood
- key motorway projects, including the recently completed Clem Jones tunnel toll road, Airport Link toll tunnel (2012), Northern Link toll tunnel (2014), Gateway Bridge duplication (tolled) and Gateway Motorway upgrade (2010).

The first stage of a Brisbane subway is included as part of the rail strategy in the draft Connecting SEQ 2031. This proposes a new east-west subway between Toowong and Bowen Hill/Newstead via West End and the City segregated from the remaining heavy rail network. Given the likely function of the subway as an inner city distributor mode, it has not been assumed as integral to the base network of infrastructure projects for either the 2021 or 2031 modelled years. However it was included as a sensitivity test in 2031 and is reported in **Section 5.9**.

5.4.3. Future rail service plans

Possible service plans for the future base case scenario without Cross River Rail have been developed for 2021 based on the above service planning policies and infrastructure assumptions. In 2031, service plans developed for the without Cross River Rail scenario attempted to meet demand as much as possible using available capacity.

The proposed service plans without Cross River Rail for the morning (AM) peak one hour in 2021 and 2031 are shown in **Figure 5-20** and **Figure 5-21** respectively. Service plans for other time periods are contained in *Technical Report No. 1 – Transport.*

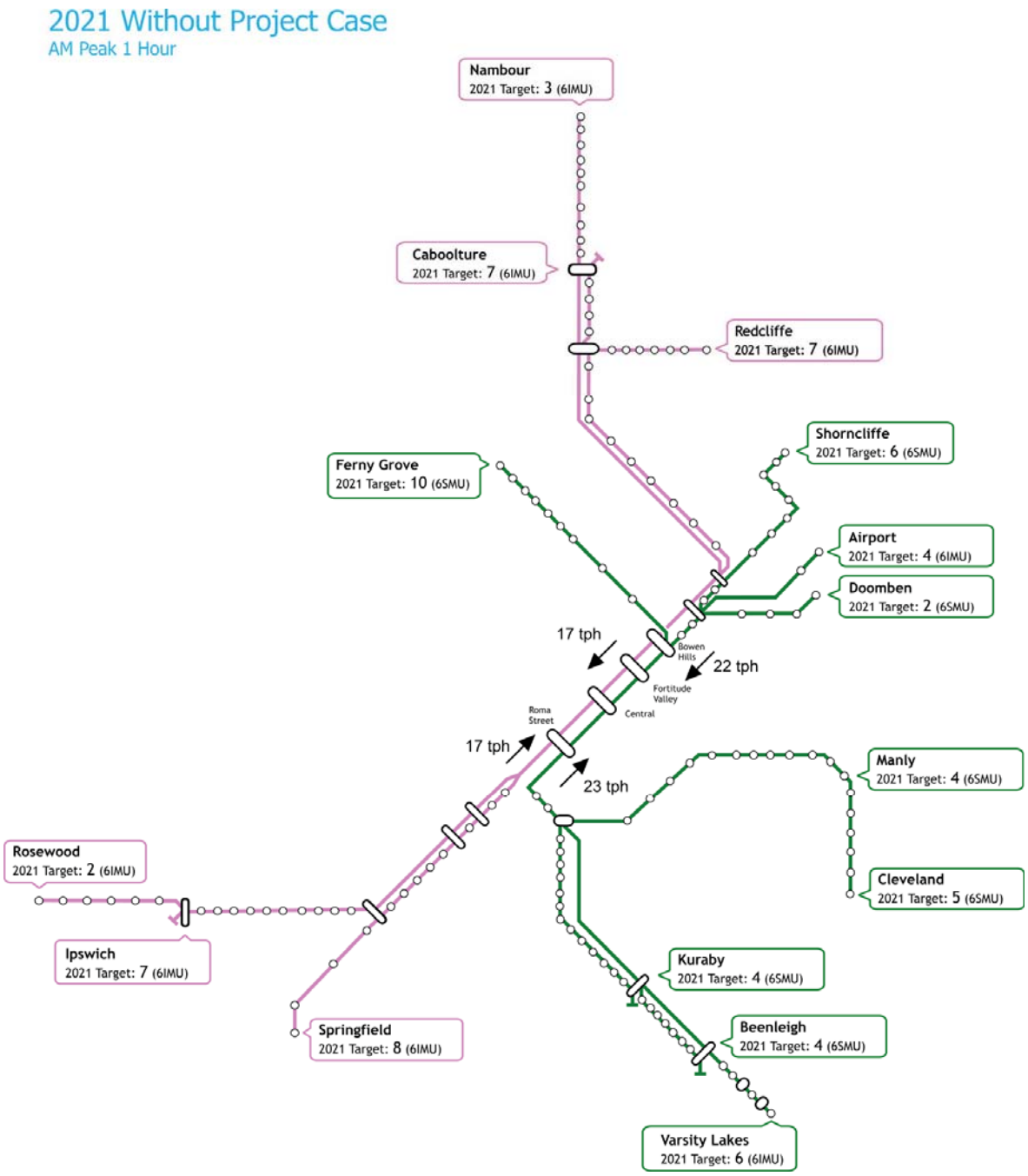


Figure 5-20 Overview of 2021 service plan – morning one hour peak without Cross River Rail

Note: Provided by Systemwide, June 2011

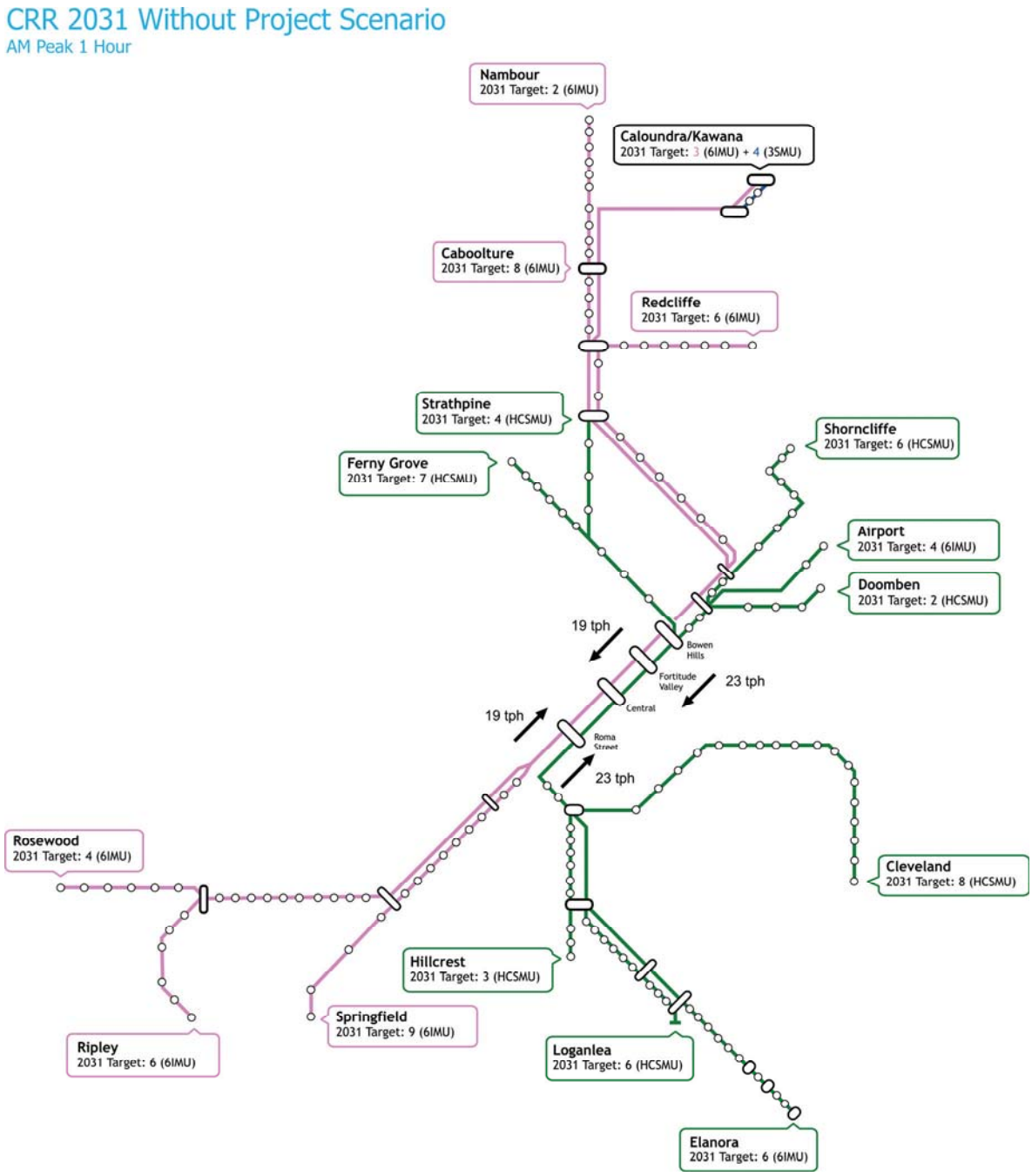


Figure 5-21 Overview of 2031 service plans – morning peak one hour without Cross River Rail

Note: Provided by Systemwide, June 2011

Sectors have been assumed to be fundamentally similar to the current situation. The creation of strict sectors will help facilitate the partial introduction of the UrbanLink, ExpressLink and CoastLink service groups as outlined in the draft Connecting SEQ 2031. The two sectors which are assumed to operate by 2021 in the base case (without Cross River Rail) are:

- **Suburban sector** (shown as green on **Figure 5-20**), which would cater for half of the network including the Gold Coast, Beenleigh and Cleveland lines in the south, and the Ferny Grove, Shorncliffe, Airport and Doomben lines in the north. This sector would remove the requirement to have permanent flat-junction crossing movements in day to day operations. In this sector, Gold Coast services would be connected to Airport services (as existing), Beenleigh services would be connected to Ferny Grove services (as existing), Cleveland and Manly services would be connected to Doomben and Shorncliffe services, with one Cleveland or Manly service turning back in Mayne Rail Yard using the Ferny Grove flyover.
- **Main sector** (shown as pink on **Figure 5-20**), which encompasses Rosewood, Ipswich and Springfield services (in the west) and Petrie, Caboolture and Nambour services (in the north). The sector would have services travelling through the existing inner city via the Main lines. This sectorisation would remove the requirements for flat-junction crossing conflicts between Northgate and Bowen Hills.

Wherever possible, this sectorisation connects Springfield services with Petrie services and Caboolture/Nambour services with Rosewood/Ipswich services, so that suburban rollingstock with higher standing capacity could be operated on the shorter lines and inter-urban style rollingstock (more seats and less capacity) could be operated on the longer lines.

In 2021, the morning one hour peak (the busiest of the two peak periods), provides for 39 trains per hour on the northern approach to the CBD, with 17 trains per hour on the western approach and 23 trains per hour on the southern approach. In total, 79 train movements per hour are expected through the CBD (two-way) in the morning peak hour in 2021 (compared to 57 in 2009). In 2021, this total of 23 train movements in the morning peak hour period across the Merivale Bridge is considered to represent the maximum capacity of the southern part of the inner city rail network.

In 2031, peak hour train movements increase slightly to 42 trains per hour from the north and 19 trains per hour from the west but remain at capacity as 23 trains per hour from the south. This would provide the maximum possible total of 84 trains per hour through the CBD. Between 2021 and 2031 a change in rollingstock is proposed, which would see high capacity suburban multiple unit (HCSMU) trains being introduced on some of the inner suburban sections of the network. These new trains with more doors and standing space and fewer seats would carry around 50% more people than an equivalent length Suburban Multiple Unit train (eg current City Train rolling stock).

It must be noted that the assumed 2031 network without Cross River Rail includes all future rail projects such as new branch lines included in the draft Connecting SEQ 2031 and *South East Queensland Infrastructure Plan and Program 2010-2031* (SEQIPP), with the exception of Cross River Rail. However, the assessment of the performance of such a network concludes that this approach would be optimistic due to crowding and reliability problems encountered and unacceptable impacts on rail freight.

The assessment of the operational performance of the base rail network and service provision to cater for forecast future demand for rail travel is described in **Section 5.4.5** and **Section 5.4.6**.

5.4.4. Future transport demand without the Project

Forecast growth in weekday travel demand across Brisbane is shown in **Table 5-9**. The highest percentage growth forecast is expected to occur in public transport trips, with almost double the number of trips forecast for 2031, compared to 2009. Vehicle trips are anticipated to grow at a slower rate, increasing by 47% between 2009 and 2031.

A change in mode share for public transport is forecast from 8.1% of all weekday person trips in 2009 to 11.6% in 2031.

Table 5-9 Forecast growth in weekday travel demand in the Brisbane metropolitan area without Cross River Rail

Parameter	2009	2021	2031
Total person trips by all motorised modes (car and public transport)	6,700,600	8,283,800	9,259,900
Total person trips by car	5,533,200	7,009,800	7,771,700
Percentage growth in person trips by car (on 2009)	-	27%	40%
Public transport person trips	546,000	824,200	1,074,000
Percentage growth in public transport trips (on 2009)	-	51%	97%
Public transport mode share (of all person trips)	8.15%	9.95%	11.60%
Total rail patronage (24 hour)	243,200	421,900	529,500
Percentage growth in rail patronage (on 2009)	-	73%	118%
Number of rail trips to CBD (morning peak period)	37,100	61,600	73,700
Percentage growth in rail trips to CBD (on 2009)	-	66%	99%
Total vehicle trips*	4,383,200	5,652,100	6,460,200
Percentage growth in vehicle trips (on 2009)	-	29%	47%

** Note: Includes commercial vehicle trips*

Travel to the Brisbane CBD is expected to be increasingly met by public transport modes, with minimal growth in vehicle trips, as shown in **Figure 5-22**.

Rail is expected to cater for a greater number of trips, as well as a greater proportion of all trips to the CBD, by 2031 compared to 2009. Growth in bus trips to the CBD is constrained (refer to **Section 5.4.8**). Car travel to the CBD is expected to plateau at around 40,000 to 45,000 person trips in the morning peak period.

This change in mode share is reflective of changes in road conditions (as outlined **Section 5.4.9**) as well as changes in likely car parking availability in the CBD as it continues to grow and provide more employment opportunities. Restrictive car parking ratios mean that new commercial development will be heavily reliant on public transport to cater for employee trips with less than one in 10 workers in new office buildings in the CBD likely to have access to on-site car parking. This will lead to changes in mode share for journeys to work in the CBD over the coming decades.

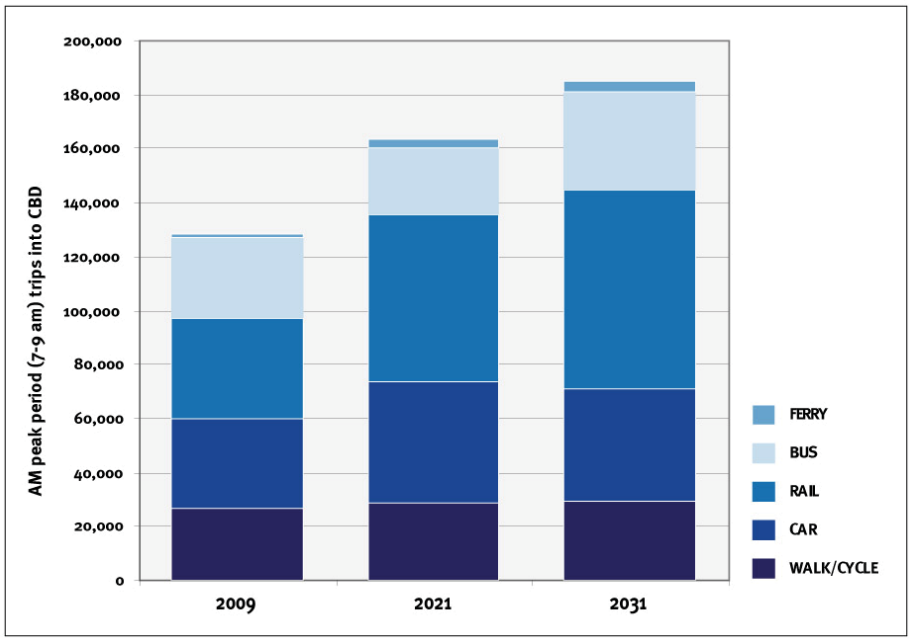


Figure 5-22 Forecast morning peak period travel demand (person trips) into the Brisbane CBD without Cross River Rail

Table 5-10 shows the forecast growth in rail patronage in the region. Both peak period and daily rail trips are forecast to more than double between 2009 and 2031. By 2031, over half a million daily rail trips are expected in the Brisbane metropolitan area. **Section 5.4.5** to **Section 5.4.8** provides discussion on the impact of this high growth in travel demand on the performance of the transport network.

Table 5-10 Forecast growth in rail travel in the Brisbane metropolitan area without Cross River Rail

Time Period	2009	2021		2031	
	Rail users	Rail users	Growth	Rail users	Growth
AM peak (7.00 am to 9.00 am)	67,000	108,300	62%	141,900	112%
PM peak (4.00 pm to 6.00 pm)	58,400	104,400	79%	131,700	126%
Average weekday (24 hours)	243,200	421,900	73%	529,500	118%

5.4.5. Future rail operational requirements without the project

Rail patronage and CBD station throughput

The significant increase in rail patronage forecast across the metropolitan area that would result in increased rail patronage on the inner city rail network is illustrated in **Table 5-11**.

Between 2009 and 2021, the morning peak period rail patronage in the inner city is forecast to increase by around 50%, while by 2031, rail patronage would generally have more than doubled. The busiest sections of the rail network would carry over 50,000 passengers in the morning peak two hour period.

Daily patronage is forecast to increase by a slightly greater percentage than for the morning peak period due to growth in rail travel during the off-peak periods. The busiest section of the rail network between Central and Fortitude Valley stations is forecast to carry almost 200,000 rail passengers during an average weekday.

Table 5-11 Forecast growth in rail patronage without Cross River Rail

Line Segment	2009	2021	% growth	2031	% growth
Morning peak period (two hours)					
Fortitude Valley to Bowen Hills	27,400	40,600	48%	52,600	92%
Central to Fortitude Valley	28,000	41,900	50%	53,300	90%
Roma Street to Central	25,200	41,400	64%	51,100	103%
South Brisbane to Roma Street	15,200	25,400	68%	32,500	114%
South Bank to South Brisbane	17,600	29,300	66%	39,000	122%
Park Road to South Bank	17,700	29,300	66%	37,800	114%
Dutton Park to Park Road	11,200	17,600	57%	23,700	112%
Average weekday (24 hour)					
Fortitude Valley to Bowen Hills	98,800	154,000	56%	192,900	95%
Central to Fortitude Valley	99,700	158,400	59%	194,300	95%
Roma Street to Central	82,900	144,600	74%	181,000	118%
South Brisbane to Roma Street	49,000	92,900	90%	118,100	141%
South Bank to South Brisbane	55,800	105,000	88%	135,400	143%
Park Road to South Bank	66,200	126,700	91%	140,900	113%
Dutton Park to Park Road	41,600	84,200	102%	99,200	138%

Table 5-12 and **Figure 5-23** show the forecast number of boarding and alighting passengers at a selection of stations. Passenger activity in the morning peak period at inner city and CBD stations would almost double at most stations by 2031. Daily usage of station would increase at a higher rate as greater use of the network during off-peak is also forecast.

Central Station has an estimated capacity of almost 43,000 passengers (boardings and alightings combined) in a two-hour period based upon the fixed ultimate capacity of the existing pedestrian infrastructure including stairs and platform waiting space. Forecast demand would have reached this capacity by 2021 and exceed it by 2031, with more passengers trying to use the station than can be comfortably accommodated. Forecast growth in passenger use of Central Station is relatively low as passengers would be discouraged from using this facility and would divert to alternative stations such as Roma Street Station.

Despite the capacity constraints of Central Station, the demand for passenger alightings in the CBD in the morning peak period is forecast to double from approximately 37,000 passengers (in 2009) to almost 74,000 passengers by 2031 without Cross River Rail. However, much of the growth would occur at other stations within the CBD, or outside of the CBD itself, with passengers walking into the CBD. For example, growth in patronage at Roma Street Station and South Bank Station is forecast to be significantly higher than for Central Station.

Table 5-12 Forecast growth in total passenger movements at stations without Cross River Rail

Station	2009	2021	% growth	2031	% growth
Morning peak period (two hours) boardings and alightings*					
Bowen Hills	3,600	6,700	86%	7,600	111%
Fortitude Valley	4,700	7,000	49%	10,800	130%
Roma Street	9,300	15,300	65%	26,700	187%
Central	34,500	47,300	37%	49,400	43%
South Bank	2,800	9,700	83%	9,800	250%
South Brisbane	5,300	5,900	111%	9,900	87%
Park Road	1,200	3,800	217%	5,200	333%
Yeerongpilly	700	1,300	86%	1,900	171%
Average weekday (24 hour) boardings and alightings					
Bowen Hills	12,700	25,900	104%	32,000	152%
Fortitude Valley	16,900	28,600	70%	40,700	141%
Roma Street	36,500	62,200	70%	94,600	159%
Central	104,300	152,500	46%	177,600	70%
South Bank	23,000	62,800	174%	44,300	93%
South Brisbane	7,500	18,400	149%	25,800	244%
Park Road	3,900	11,600	197%	17,300	344%
Yeerongpilly	1,500	3,500	133%	5,800	287%

** Note: Passenger boardings and alightings include transfers between all modes, including rail to rail.*

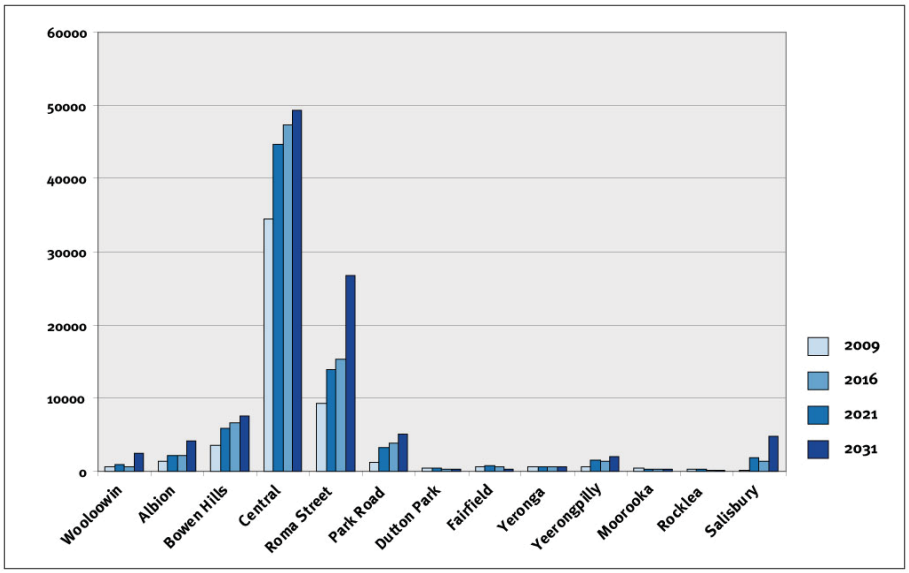


Figure 5-23 Forecast growth in station boarding and alighting demand in the morning peak without the Project

Rail movements

By 2021, the demand for rail use without Cross River Rail would be close to the capacity for train movements within the inner city network during peak periods. **Table 5-13** summarises the service levels feasible for the peak hour, based on the service plans described in **Section 5.4.3**.

The planned additional infrastructure upgrades on the rail network as described in **Section 5.4.3**, in conjunction with changes in stopping patterns and network connections, would allow only five more trains to be added to the Brisbane network in the peak hour between 2021 and 2031.

A 50% increase in rail demand across the Brisbane metropolitan area in the morning peak is forecast between 2021 and 2031. The small increase in additional train services in 2031 (compared to 2021), would not be sufficient to cater for this scale of passenger demand increase, even with a shift in some demand for travel to the shoulder peak and off-peak periods and higher capacity rollingstock.

Table 5-13 Forecast morning peak hour train numbers – without Project

Scenario	Trains from the south and west to CBD in morning peak hour	Trains from the north to CBD in morning peak hour
2009	30	27
2021 without CRR	40	39
2031 without CRR	42	42

Source: Systemwide, December 2010

5.4.6. Future rail network performance without the project

Rail network speeds

Table 5-14 and **Table 5-15** show the forecast significant increase in overall Brisbane rail network usage between 2009 and 2031. Over this period, total passenger rail kilometres and passenger rail hours would increase faster than rail patronage, indicating that longer average rail trip lengths and journey times are estimated.

These increases in rail passengers, kilometres and hours are expected to grow faster in the morning peak than across the overall weekday by 2031. The average rail speed is forecast to increase slightly over time without Cross River Rail due to an increase in the number of longer distance express services.

Table 5-14 Forecast growth in rail usage in the Brisbane metropolitan area – average weekday

Parameters for average Weekday (24 Hours)	2009	2021		2031	
		Forecast	% growth	Forecast	% growth
Rail passenger kilometre	5,178,200	9,645,100	86%	12,741,900	146%
Total rail passenger hours	124,400	226,200	82%	291,400	134%
Total rail patronage	243,200	421,900	73%	529,500	118%
Average rail trip length (km)	21.3	22.9		24.1	-
Average rail trip time (mins)	30.7	32.2		33.0	-
Average rail trip speed (kph)	41.6	42.6	86%	43.7	-

Table 5-15 Forecast growth in rail usage in the Brisbane metropolitan area – morning peak period

Parameters for average weekday AM peak (7.00 am to 9.00 am)	2009	2021		2031	
		Forecast	% growth	Forecast	% growth
Rail passenger kilometre	1,318,600	2,292,100	74%	3,404,600	158%
Total rail passenger hours	34,000	57,300	69%	82,300	142%
Total rail patronage	67,000	108,300	62%	141,900	112%
Average rail trip length (km)	19.7	21.2		24.0	-
Average rail trip time (mins)	30.4	31.7		34.8	-
Average rail trip speed (kph)	38.8	40.0		41.4	-

Rail network level of service and passenger crowding

An assessment of passenger crowding forecast without the Project was measured through the Cross River Rail Project Model that forecasts crowding over an average of the two-hour peak periods and a more detailed assessment of passenger crowding was undertaken using the Train Load Predictor (TLP) model. The Train Load Predicator tool forecasts crowding for each rail service.

During the current morning peak periods passenger crowding is already experienced on the approaches to the Brisbane CBD. In the future years the degree of passenger crowding is forecast to significantly increase with each line becoming increasingly more crowded. Passenger crowding in 2031 would be greater than in 2021, on all key approaches to the CBD.

By 2021, load factors (line loadings expressed as a proportion of seated capacity) on all rail lines are forecast to increase substantially. Those services most impacted by the inner city capacity constraints, the Beenleigh and Gold Coast lines, are forecast to have load factors of 150% (50% more passengers than the seated load capacity) on average across the entire two hour morning peak period. All-stopping Kuraby services are forecast to be significantly overcrowded while Gold Coast services would be catering for substantial numbers of standing passengers, many of whom would be standing for longer than 20 minutes. Without Cross River Rail, train crowding will increase from 13,200 daily hours (2009) to 48,400 daily hours in 2021, an increase of 267% over the 12 years.

By 2031, the forecast volume of passengers in excess of seated capacity is critical with train crowding forecast to increase to 67,900 daily hours (up from 48,400 daily hours in 2021). All lines approaching the CBD would have passengers standing for more than 20 minutes from Central Station and most lines would have a forecast load factor of greater than 150%. Load factors approaching 200% are forecast on the southern lines around Park Road.

Figure 5-24 provides an overview of crowding increases in key segments of the network.

The appropriate seated load design capacity of an intercity rail service is considered to be 450 passengers per service. High levels of overcrowding are experienced when more than 750 passengers are on a service. By 2021, all peak hour services on the Gold Coast Line at Park Road (in the inner city) would have standing passengers and most of these services would be experiencing high levels of passenger crowding.

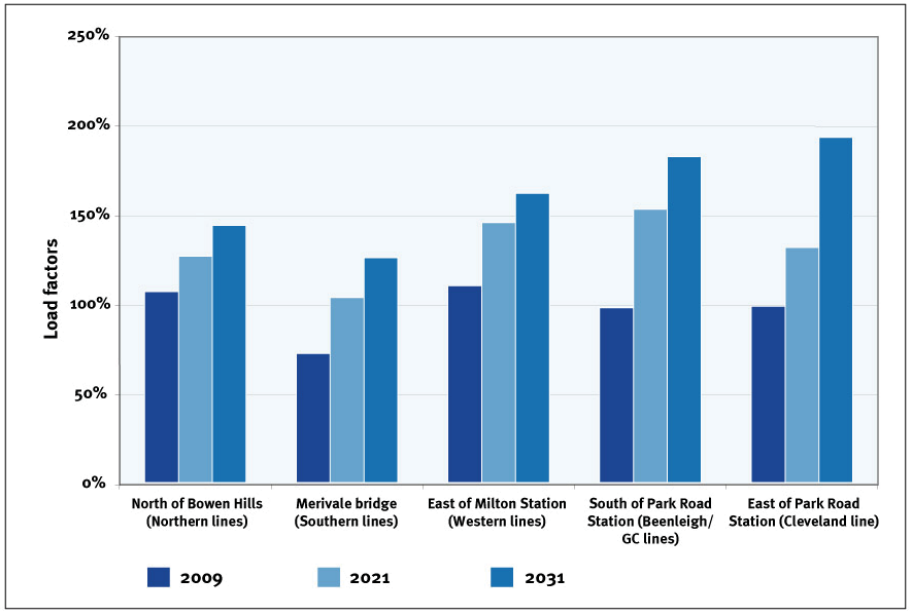


Figure 5-24 Increase in rail network crowding

Figure 5-25 shows the forecast service loads for the Gold Coast line in 2031. This shows that all services exceed the standard (more than 450 passengers per service) and all peak hour services are forecast to exceed 750 passengers – meaning passengers would experience high levels of crowding from the Gold Coast. Such crowded conditions would result in extremely uncomfortable conditions for rail passengers such that they could be discouraged from using the rail system during the peak periods.

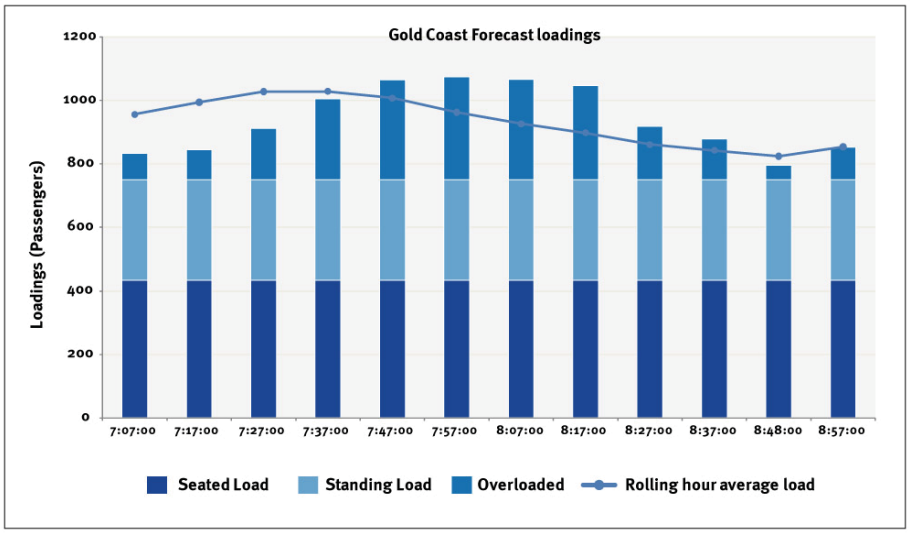
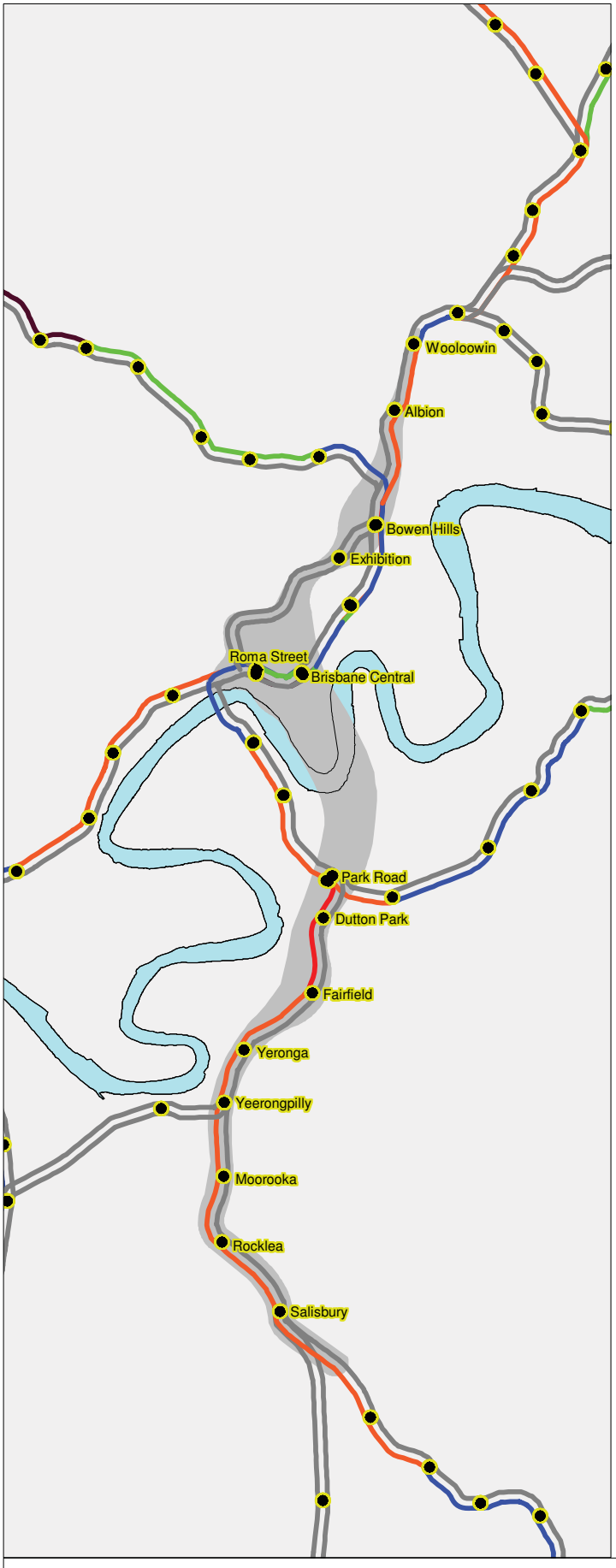


Figure 5-25 2031 Gold Coast service load forecast at Park Road across the AM Peak two hour period

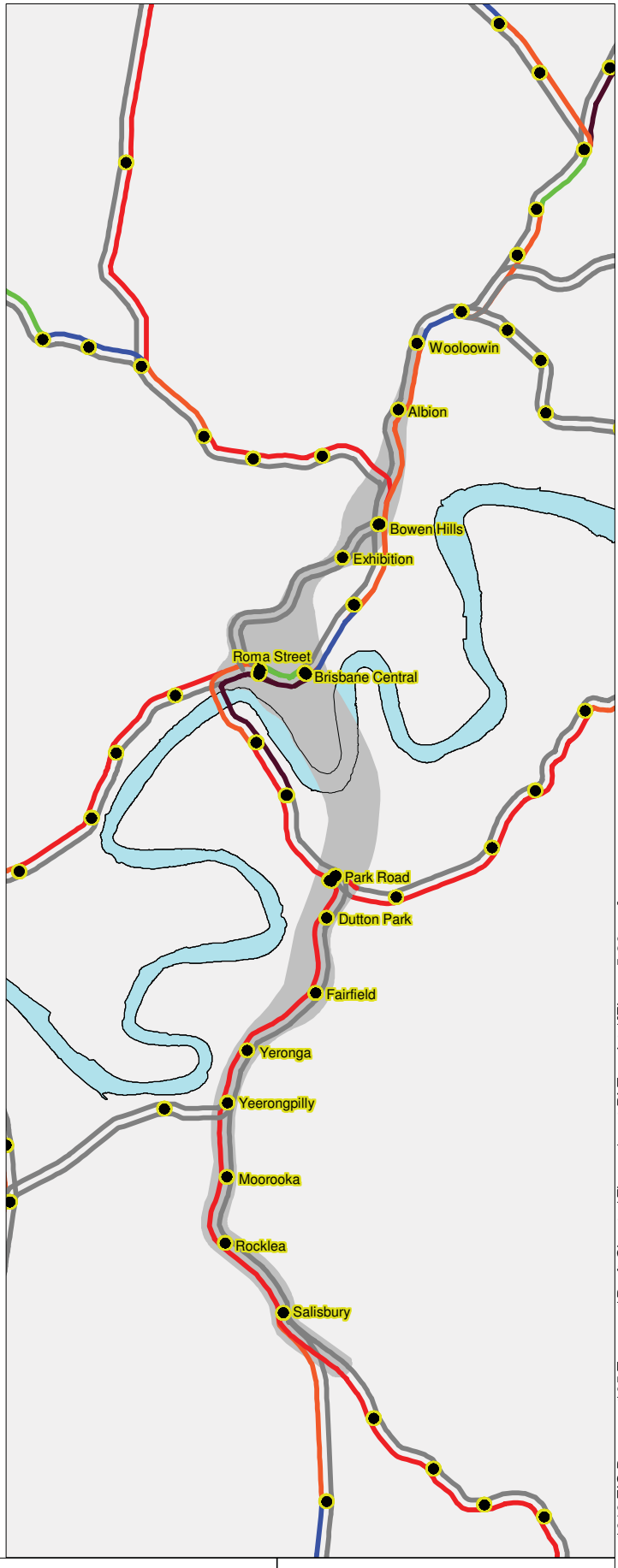
Source: Systemwide, December 2010

Load factors in the morning peak period by rail segment by direction are presented in **Figure 5-26**.

Year 2021 - without Cross River Rail



Year 2031 - without Cross River Rail



LEGEND

AM peak (2 hrs) seat load factor (v/c ratio)

- > 1.50
- 1.25 to 1.50
- 1.00 to 1.25
- 0.75 to 1.00
- 0.50 to 0.75
- < 0.50

Study Corridor

Railway stations

Model ID: CPM_2021_013 (2021) CPM_2031_104 (2031)

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-26

Morning peak period rail load factors 2021 to 2031 without Cross River Rail

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CrossRiverRail

SKM aurecon CRR JOINT VENTURE

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Rail network level of service - reliability

Rail dynamic simulations were conducted (Systemwide, December 2010) for 2009 and 2031 for the "without Project" case and indicatively for 2021. These forecasts showed that the on-time reliability weighted network average would deteriorate to 80% in 2021 without Cross River Rail, and to 65% in 2031. This compares to around 94% of trains currently (2009) arriving within four minutes of the timetable.

Figure 5-27 provides an overview of decreased reliability of the rail network. By 2031, all lines, including the Nambour, Caboolture, Doomben, Shorncliffe and Airport lines, would experience a significant decrease in reliability to the extent that no lines would meet the service standard. Some lines are likely to experience less than 40% on time reliability. This forecasted poor reliability of rail services would result in passengers continuously experiencing unacceptably late trains across the network.

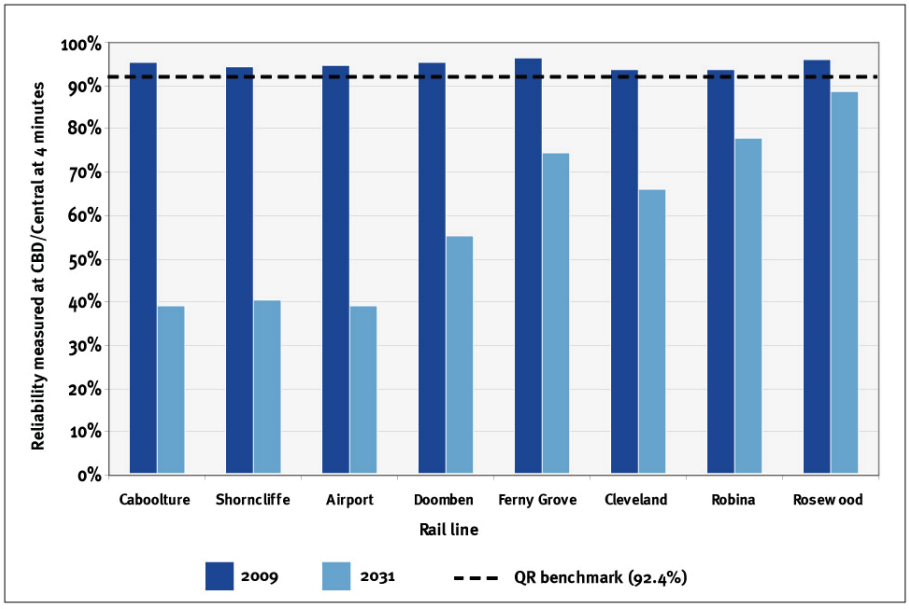


Figure 5-27 Decrease in reliability of the rail network

Source: Systemwide, December 2010

Station operations

An analysis of the station performance in terms of forecast pedestrian level of service on the key components of the station pedestrian infrastructure such as stairs and walkways has been carried out for the "without Cross River Rail" scenario. This is described in detail in *Technical Report No. 1 – Transport.*

At most stations, the pedestrian system would have sufficient capacity to cater for future demands. However, at Central Station, modelling indicates that the existing arrangement of pedestrian infrastructure would not have sufficient capacity to accommodate forecast passenger volumes without the Project.

Figure 5-28 shows the results of simulation modelling of pedestrian activity for the morning peak in 2031 at Central Station. These results clearly illustrate that stairs and escalators would experience extended periods of congestion and queuing (an average LOS F is sustained during the busiest 15 minutes) and heavy congestion would occur on platforms.

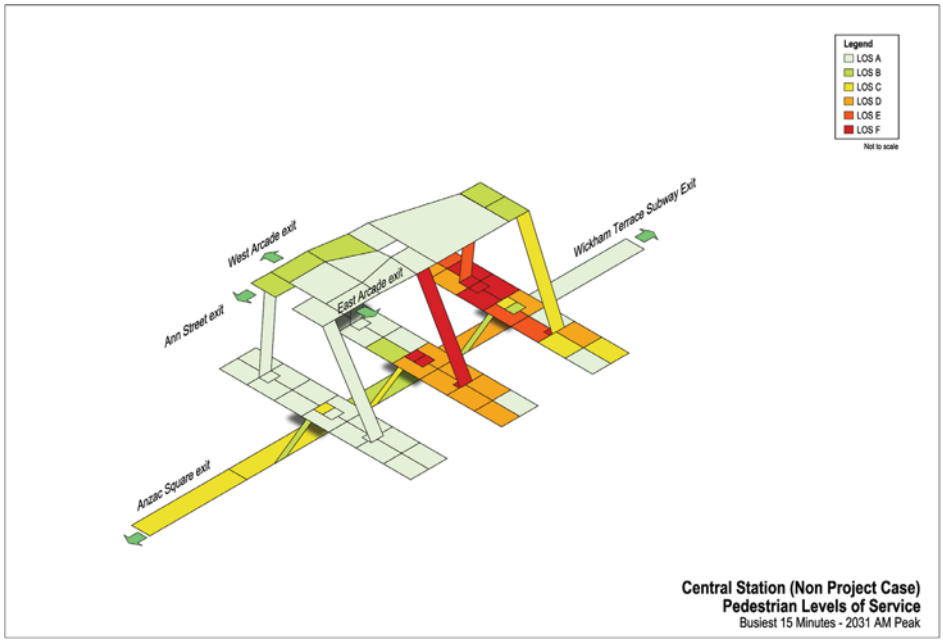


Figure 5-28 Central Station pedestrian LOS in 2031 during the morning peak without Cross River Rail

Source: Cross River Rail ClicSim model

5.4.7. Rail freight access

With the increase in demand for passenger services and the provision of 15 minutes off-peak frequencies that are expected in a metro rail network, there will be few paths available for freight services in the future.

Without Cross River Rail, a dedicated track for freight rail would not be available throughout the day from Salisbury to Park Road and the existing dual gauge track from Salisbury to Park Road would continue to be used by both express passenger rail (Gold Coast) services as well as freight trains between Acacia Ridge or the Western Lines (via Tennyson) and the Port of Brisbane. The continued presence of passenger rail operations would mean the continuation of avoiding rail freight operation during the peak periods and would also prevent any increase in rail freight during the passenger off-peak frequency on the Gold Coast line. This would constrain the freight throughput between Salisbury and Tennyson and between Tennyson and the Port of Brisbane.

Table 5-16 shows the shortfall in rail paths anticipated in 2021 and 2031 without Cross River Rail to meet projected demands. By 2021 the majority of freight demand between Salisbury and Tennyson would not be able to be transported by rail (some 86%) while around 30% of freight demand between Tennyson and the Port would not be able to be transported by rail.

By 2031, anticipated increases in off-peak passenger rail frequency would mean very little anticipated freight demand on the North Coast Line could be accommodated on rail, while almost 90% of freight demand between Salisbury and Tennyson and 43% of freight between Tennyson and the Port would not be accommodated on rail.

Overall the shortfall in train paths to meet rail freight demand on the network without Cross River Rail would be in the order of 222 trains per week in 2021, and 616 per week in 2031. This equates to 123,000 tonnes of freight per week that would need to be transport by other modes such as roads in 2021 and 350,000 tonnes of freight per week in 2031.

Table 5-16 Shortfall in rail freight capacity without Cross River Rail

	Trains per week (both directions) - Cross River Rail scope only					
	2021			2031		
	Demand	Without Project	Shortfall	Demand	Without Project	Shortfall
North Coast	264	264	0	322	16	306
Salisbury - Tennyson	172	24	148	209	24	185
Tennyson - Port (IM)	78	3	75	94	3	91
Tennyson - Port (Coal)	197	197	0	232	198	34
Tennyson to Port Total	275	201	75	326	201	125
Total	711	489	222 (31% of demand)	857	241	616 (72% of demand)

Source: Systemwide, December 2010

5.4.8. Bus and ferry services

Bus services

Forecast demands for bus services without Cross River Rail are shown in **Table 5-17.** This shows a large proportional increase in forecast bus patronage (over 96%) from 2009 to 2031. With around 550 buses per hour entering the CBD in the morning peak hour in 2009, such growth would require over 1,000 buses to enter the CBD by 2031 (assuming the same passenger occupancy rate as existing).

Table 5-17 Forecast trips by bus in Brisbane metropolitan area without Cross River Rail

24 Hour	2009	2021		2031	
		Forecast	% change*	Forecast	% change*
Person trips by motorised modes	6,079,400	7,834,000	28.9%	8,845,700	45.5%
Public transport trips	546,100	824,200	50.9%	1,074,000	96.7%
Total bus patronage	285,700	393,500	37.7%	560,800	96.3%
Percentage bus trips (motorised trips)	4.70%	5.02%	N/A	6.34%	N/A
Total bus passenger kilometres	3,252,100	4,080,400	25.5%	5,632,000	73.2%
Total bus passenger hours	139,700	162,100	16.0%	245,100	75.4%
Average bus trip length (km)	11.38	10.37	-8.9%	10.04	-11.8%
Average bus trip time (minutes)	29.34	24.72	-15.7%	26.23	-10.60%

** Note: % change on 2009 volumes*

Between 2009 and 2021 extensions to the Northern Busway and Eastern Busway are planned to be operational with additional services using these key bus corridors. On the Northern Busway a major interchange would be provided at The RBWH (now operational) in addition to the existing facility at Roma Street. On the Eastern Busway intermodal interchanges would be provided at Buranda and Park Road (Boggo Road busway station).

TransLink's progressive rollout of the high frequency priority network (HFPN), termed UrbanLink in the draft Connecting SEQ 2031, would put more emphasis on simplifying and improving the bus network. This would involve more feeder routes to rail and busway hubs with an increasing need to transfer to another service, particularly from outer suburban areas, in the off-peak.

The strategy would trend towards marginally shorter bus trip lengths and bus journey times between 2009 and 2031, due to introduction of more bus feeder routes to rail stations that would encourage bus-rail interchange (that is a change from current single seat bus journeys to the CBD to two-seat, two-mode journey patterns). Bus services within 5 km of CBD are planned to generally remain as single seat journeys (that is with no need for interchanging).

A substantial increase in demand on services is forecast for Ipswich Road, the South-East Busway, the Captain Cook Bridge, the Northern Busway and Given Terrace (Paddington) without Cross River Rail. There would be some relief shown on the Ipswich Motorway which is expected to be the result of the opening of the Springfield railway line by 2013, taking demand away from bus route 100 in particular.

With increasing demand for inner city accessibility and limited road and rail capacity, demand for the bus network would continue to grow. Consequently, there is a forecast large proportional increase in bus patronage from 2009 to 2031 of almost 100%. Considering around 550 buses per hour were entering the CBD in the morning peak hour in 2009, future growth would require over 1,000 buses to enter the CBD by 2031.

The number of buses able to access the inner city is restricted by bus station and kerbside bus bays capacity, as well as access road conditions which are already congested with limited potential to increase the capacity of these key items of bus infrastructure. Even on the busways, the inner city parts of the South East Busway and Inner Northern Busway would experience growing demand and worsening congestion.

By 2021, overcrowding would be common on the South East Busway and the Captain Cook Bridge bus services approaching the CBD. This overcrowding is forecast to deteriorate further by 2031. Between 2021 and 2031, even with provision of additional bus capacity, crowding is forecast to worsen on the northern corridor (Northern Busway), Waterworks Road (through Red Hill) and St Pauls Terrace.

Ferry services

No major changes to ferry operations are expected within the study corridor. However, moderate frequency improvements are expected to continue to provide more regular services.

By 2031, ferry patronage is forecast to increase significantly compared to 2009 to just over 30,000 trips per average weekday. Ferries would continue to cater for only a small percentage of overall trips across the city – less than 1% of all travel. There would be a trend towards slightly longer average trip lengths and average trip times by ferry between 2009 and 2031, mainly due to likely extensions to the CityCat network downstream to Northshore Hamilton.

There is no proposed development of any ferry to rail interchanges and transfer between these modes is expected to remain negligible.

5.4.9. Road network performance in the future

Forecast growth in vehicle trips across the Brisbane metropolitan area, inclusive of commercial vehicle volumes, is shown in **Table 5-18**. This shows a forecast overall increase in daily vehicle trips of approximately 47% by 2031, with growth in commercial vehicles slightly lower.

Table 5-18 Forecast changes in vehicle trips in Brisbane metropolitan area without Cross River Rail

24 hours	2009	2021	2031
Total person trips	6,700,600	8,283,782	9,259,900
Total person trips by motorised travel modes	5,533,200	7,009,803	7,771,700
Car/light vehicle trips	4,015,600	5,237,458	5,937,200
Commercial vehicle trips	367,600	414,672	523,000
Total vehicle trips	4,383,200	5,652,130	6,460,200
Percentage growth in vehicle trips compared to 2009	-	29%	47%

Between 2009 and 2021, a range of significant new road projects have or are forecast to open, including Gateway Upgrade Project, Clem Jones tunnel, Go Between Bridge, Airport Link and Northern Link (Legacy Way). These regional road network changes are forecast to reduce traffic on some routes such as the Story Bridge, Milton Road, Kingsford Smith Drive, Lutwyche Road and Sandgate Road, and increase demands on other routes including the Pacific Motorway, Western Freeway, Gympie Road and Stafford Road.

The performance of the road network in the peak hour is forecast to decline between 2009 and 2021 despite the above projects. Volume to capacity ratios in excess of 90% over extensive sections of the Pacific Motorway, Ipswich Motorway, Gympie Road, Old Northern Road and Beaudesert Road would be experienced during peak periods.

Between 2021 and 2031, fewer major improvements to the road network are envisaged within the metropolitan area. Traffic volumes on the regional road network on several routes within the study corridor including the Pacific Motorway, Clem Jones tunnel, Ipswich Road, Fairfield Road, ICB and Airport Link would increase, with a progressive decline in level of service.

Traffic volumes on the inner city river crossings of the Go Between Bridge, William Jolly Bridge, Victoria Bridge, Captain Cook Bridge, Clem Jones tunnel and Story Bridge are forecast to increase from a combined two way average morning (AM) peak volume of 46,000 vehicles in 2009 to 60,000 vehicles in 2021.

By 2031 the traffic volume using these river crossings is forecast to reach approximately 69,000 vehicles per day. This equates to an increase in demand of 30% over the 12 years between 2009 and 2021 (an average of approximately 2.5% per annum) but only 15% in the 10 years from 2021 to 2031 (an average of approximately 1.5% per annum) indicating growth in vehicle trips slowing as congestion worsens. As such there would be increasing congestion pressures on the road traffic network feeding the CBD, particularly from the south.

Table 5-19 shows a sample of the reduction in travel speeds for key city inner city access routes that illustrates the likely impact of increasing traffic congestion.

Table 5-19 Decrease in travel speeds (km/h) for key routes during the morning peak without Cross River Rail

Route	2009	2031	Change
Captain Cook Bridge	55	37	43.6%
Story Bridge	23	20	13.0%
Coronation Drive	33	29	12.1%
Kelvin Grove Road	21	13	38.1%

5.4.10. Declining levels of transport service

An analysis of the future transport network indicates that without Cross River Rail, there would be declining levels of rail passenger and freight services. The inner city rail infrastructure has not received the major investment that is needed to unlock physical capacity constraints that would effectively accommodate the recent high levels of existing and forecast rail passenger movement growth to the Brisbane CBD and freight rail movements across Brisbane.

The expected growth of the Brisbane CBD as an attractive destination, for jobs (which would double by 2031) and cultural and social activities, would put increasing pressure on the existing inner city rail network to service this demand.

Passenger rail

Expected growth in rail network passenger use and peak commuter demand to the Brisbane CBD would reach the inner city rail capacity within the next six to eight years as future network conditions without Cross River Rail restricts the number of additional trains through the CBD.

The existing arrangement of pedestrian infrastructure at Central Station would be under significant pressure to accommodate forecast passenger volumes without the Project and would be unlikely to function safely and efficiently in its current form by 2021.

Progressively poorer levels of rail service, including high levels of train crowding for commuting trips and increasing train unreliability would continue without investment in the Project. Rail commuters would be forced to take off-peak trains, use alternative transport or change trip making decisions.

Freight rail

Due to the number of peak and off-peak passenger rail services the capacity for rail freight would be minimal such that the demand for rail freight could not be met.

Bus

With increasing demand for inner city accessibility the demands on the bus network would continue to grow. The number of new buses able to access the inner city is restricted, as road and bus stop infrastructure nears capacity and with limited future capacity. Consequently, the bus network would experience increasing levels of congestion.

A greater tendency toward shorter bus journeys is forecast which is indicative of a trend towards more feeder bus journeys from outer suburban areas to rail or busways, as single seat journeys from outer areas to the Brisbane CBD on urban arterials become congested and unreliable to operate and hence unattractive to passengers.

Road

A 50% increase in vehicle trips between 2009 and 2031 across the metropolitan area will place significant pressure on an already congested road network during peak periods.

There is very limited capacity on key routes to the inner city to support additional growth in peak period travel. With limited capacity on the road network and continued increase in demand for inner city accessibility, congestion will continue to grow.

5.5. Rail network and operations with Cross River Rail

This section presents the rail operating strategy, rollingstock assumptions and the changes to the rail network and its operation that would be put in place with Cross River Rail.

5.5.1. Rail operating strategy

Possible service plans and operating strategies for Cross River Rail have been developed consistent with the existing policy and planning framework. Key service planning principles adopted for the 2021 and 2031 rail operating strategies with Cross River Rail include:

- provide sufficient services during the peak period to minimise overloading on individual trains
- adopt a regular and simple timetable to allow passengers to adjust travel patterns to match the capacity supplied
- implement stopping patterns which provide an efficient trade-off between express and all-stations running to maximise the utilisation of available track capacity over the entire peak period, while having regard to interchange and travel-time constraints
- where possible, increase the capacity of height-of-peak services rather than the number of services, to conserve track-capacity and avoid attracting passengers from shoulders to the height of the peak
- rationalise the number of different stopping patterns to provide passengers with a more reliable and simpler to understand journey
- standardise the sectorisation to enable, by 2031, nine-car train set operations through the new CBD tunnel, consisting of outer-suburban (Express Link) and intercity (Coast Link) services, while the other railway sectors generally move to high-frequency all stations operations (UrbanLink) servicing the inner suburbs
- design the initial sectorisation to route the fastest growing lines through the new Cross River Rail tunnel.

5.5.2. Rollingstock assumptions

Passenger forecasts for 2021 have been based on using six-car train sets, as currently operated by Queensland Rail. For 2031, forecasts have assumed that nine-car services can be operated on Cross River Rail infrastructure (including stations) as well as stop at stations north of Petrie and south of Kuraby. Assumptions for train capacity are based on current Queensland Rail rollingstock and assumed future potential rollingstock configurations, including:

- current six-car electric multiple unit (EMU)/suburban multiple unit (SMU) sets: 472 seated passengers (750 design capacity including a comfortable number of standees)
- current six-car interurban multiple unit (IMU) sets: 434 seated passengers (750 design capacity including a comfortable number of standees)
- future nine-car equivalent train sets: seated capacity for 651 passenger and total capacity of 1,125 passengers
- future UrbanLink ‘metro-style’ HCSMU train sets: design capacity of 900 passengers, including 350 seated passengers and 550 standing passengers.

5.5.3. Rail network changes proposed

The key components of the proposed Cross River Rail Project include:

- twin-track tunnel from Yeerongpilly in the south to the Exhibition Loop in the north
- new nine-car platforms to serve Cross River Rail tracks at Yeerongpilly, Boggo Road, Gabba, Albert Street, Roma Street and Ekka stations
- northern approach consisting of a new elevated track pair from the portal, around the Exhibition Loop, past Mayne Rail Yard, and connecting to the Main lines (ie the western pair of tracks) south of Breakfast Creek, and a new surface freight connection between Exhibition Loop and the Main lines south of Breakfast Creek, to allow freight to operate independently of services using Bowen Hills station
- southern approach consisting of a new narrow gauge track in the east of the alignment from the portal to Beaudesert Road (providing four passenger tracks) and a new dedicated dual gauge bi-directional freight track from Salisbury to Yeerongpilly operating independent of the passenger tracks.

5.5.4. Rail operation changes

The key operating strategy change that would occur with the Project in 2021 would be the creation of a new sector servicing areas between the Gold Coast and Kuraby in the south and connecting via the new tunnel to growth areas in the north. This is shown as the blue sector in **Figure 5-29**.

With this new sector, three stand alone sectors would operate with the Project in 2021 (compared to two sectors without the Project) as follows:

- North-south Cross River Rail sector (blue on **Figure 5-29**), which would connect Beenleigh and Gold Coast services to Caboolture/North Coast and Redcliffe services.
- East-west interurban sector (pink on **Figure 5-29**), which would connect Springfield and Ipswich/Rosewood services to Shorncliffe and Airport services. This requires a change in operating paradigm, as Airport services would no longer be connected to the Gold Coast services.
- Brisbane suburban sector (green on **Figure 5-29**), which would connect Ferny Grove and Doomben services to Kuraby and Cleveland/Manly services.

The possible service plans with Cross River Rail for 2021 for the morning peak hour are illustrated in **Figure 5-29.** Service plans for other time periods are contained in *Technical Report No. 1 – Transport.*

In 2021, with the Project, the morning peak one-hour timetable would provide 45 services to approach the CBD from the north (six more than without Project), and 19 services from the west (two more than without the Project).

From the south and east, 36 services would arrive in the peak hour, compared to 23 services without the Project. Of these 36 trains from the south and south-east, 17 trains would travel via the Cross River Rail tunnel and 19 trains would travel across the Merivale Bridge. This use of the Merivale Bridge would be four trains per hour fewer than without the Project, which would free up line capacity and would improve reliability for the surface rail services.

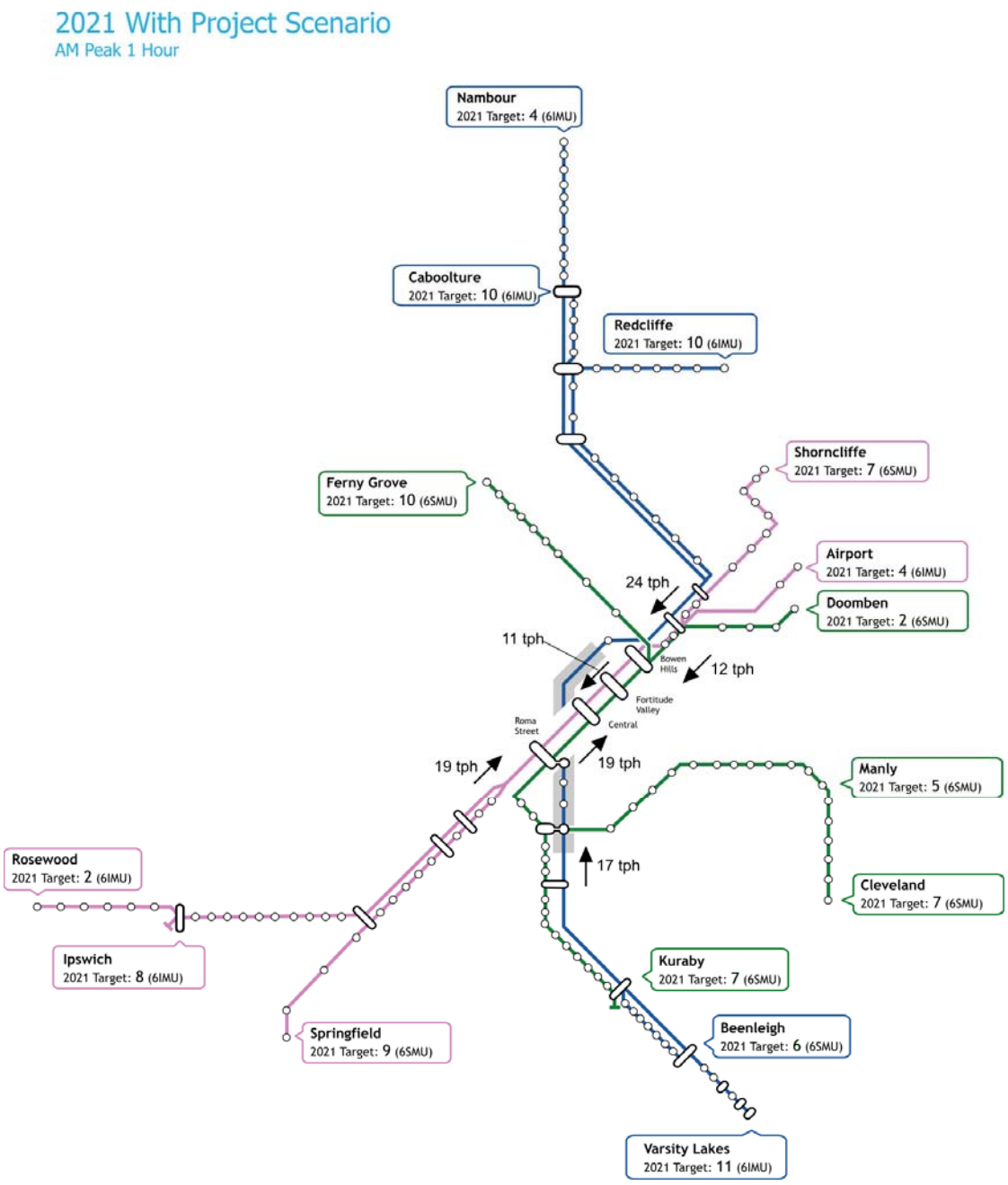


Figure 5-29 2021 service plan with Cross River Rail – morning one-hour peak

Note: Provided by Systemwide, June 2011

In 2031, the possible operating strategy proposed with Cross River Rail includes the creation of four stand alone sectors, compared to two sectors without the Project. The proposed service plan with Cross River Rail for 2031 for the morning peak hour showing these four sectors are illustrated in **Figure 5-30**. Service plans for other time periods are contained in *Technical Report No. 1 – Transport.*

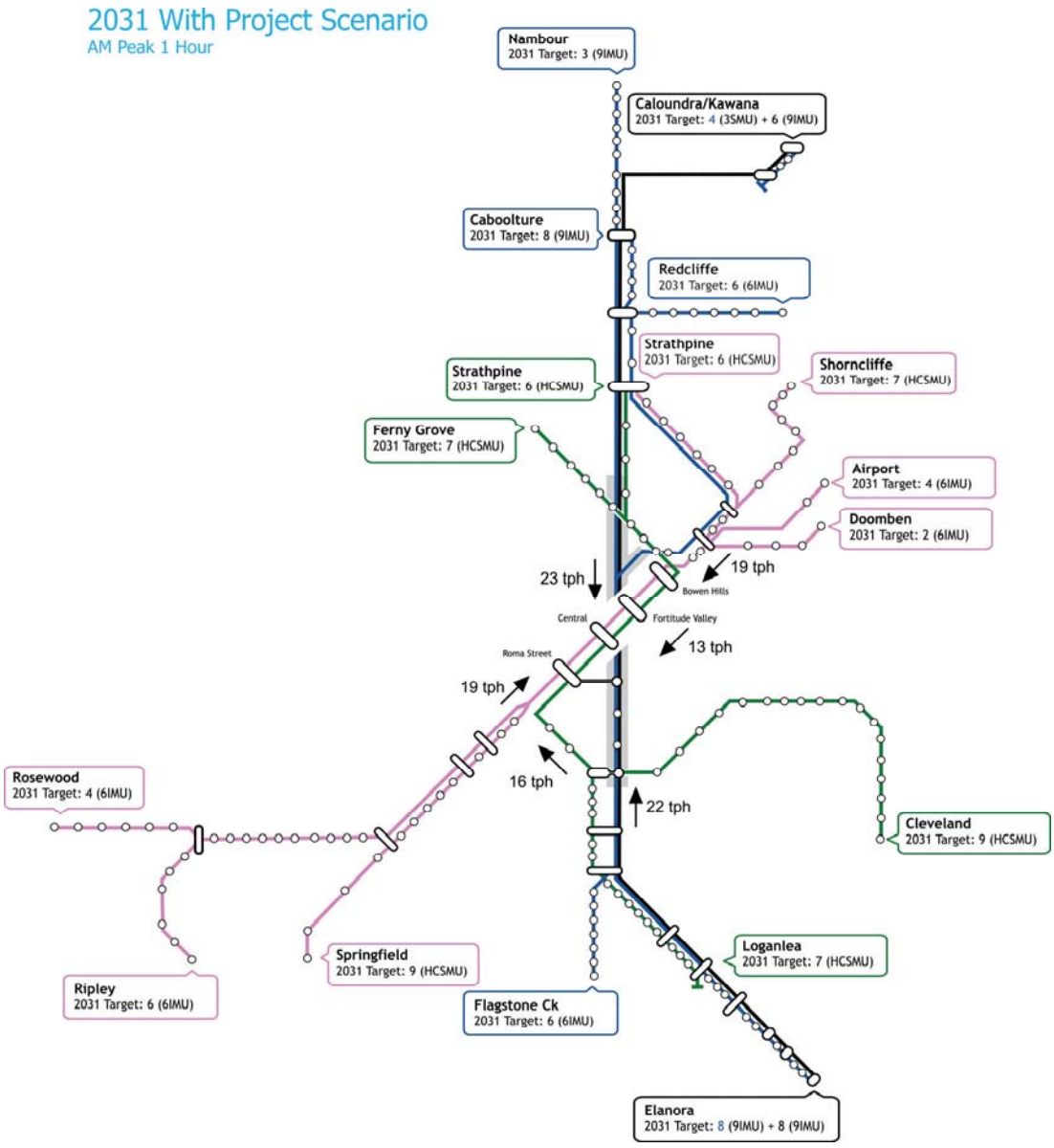


Figure 5-30 2031 service plan with Cross River Rail – morning one-hour peak

Source: Systemwide, December 2010

The four proposed sectors that would operate with the Project in 2031 include:

- Inter-city sector (black on **Figure 5-30**), which caters for the intercity Elanora and Caloundra services which run express through the NWTC (partly in tunnel) from Strathpine to Roma Street with a direct connection into Cross River Rail at Roma Street. This sector would provide the fastest journey between the two regional centres of the Sunshine Coast and Gold Coast and is intended to form the rail backbone of the future regional South East Queensland transport network. The Elanora and Caloundra intercity services are connected and would operate mostly as through services connecting key regional centres along the route with express services. Nine-car train sets were assumed to operate on this sector.

- North-south Cross River Rail sector (blue on **Figure 5-30**), which would connect Caboolture services with Elanora interurban services and Redcliffe services with Flagstone Creek services. Nambour services would not be connected to any southern services and would turn back in the south, at a location such as Clapham Rail Yard. Nine-car train sets were assumed on this sector except for the Redcliffe and Flagstone Creek service that would have six-car sets.
- East-west interurban sector (pink on **Figure 5-30**), which would connect Rosewood services to Airport services, Springfield services to Shorncliffe services and Ripley services to Doomben services. Strathpine all station services in this sector would only operate in the peak two hours. Redcliffe services in the off peak would then become all stations stopping. High capacity suburban multiple units were assumed to operate on this sector.
- Brisbane suburban sector (green on **Figure 5-30**), which would connect Strathpine services to Loganlea services and Ferny Grove services to Cleveland services. High capacity suburban multiple units were assumed to operate on this sector.

5.6. Strategic transport impacts and benefits of Cross River Rail

Cross River Rail would provide much needed inner city rail capacity improvements to accommodate future rail patronage to and from the Brisbane CBD. It would allow increased public transport accessibility to the CBD from new or improved railway stations. This improved transport accessibility would support planned CBD population and employment growth by providing more effective and efficient transport services compared with not investing in the Project. Cross River Rail would also free up capacity such that the rail freight demand could be met.

The forecasted transport benefits of the Project would have three main beneficiaries groups:

- Government; in terms of the project contributing to wider transport objectives
- transport users of all modes of transport
- public transport operators: TransLink, Queensland Rail and Brisbane Transport.

The key transport benefits, which are described following this introduction, would be:

- an increase in rail passenger capacity
- an increase in rail patronage
- an increase in the public transport mode share
- faster rail trip speeds and reduced wait times that would lead to shorter rail trip times
- improved rail passenger level of service through reduced passenger crowding and improved travel time reliability
- an increase in rail patronage and accessibility in the CBD
- a significant increase in rail freight capacity such that the demand for rail freight could be met in 2031
- improved bus operations (shorter trip times) and reduced crowding on buses
- a reduction in road trips to the CBD and on some roads in the study corridor.

5.6.1. Changes to rail passenger capacity

The development of Cross River Rail allows for a fundamental transformation in rail capacity to and through the CBD. The new Cross River Rail tunnels would allow up to an additional 48 trains per hour (two way) through the CBD, creating a combined total capacity of 132 trains per hour. This equates to a 57% increase in train paths compared to the current infrastructure's maximum capacity of 84 trains per hour through the CBD. With nine-car sets being introduced on longer distance routes such as between the Gold Coast and the Sunshine Coast the increase in rail passenger capacity would be even greater.

With such a step change in capacity, the Project would free up surface rail paths at existing bottlenecks such as the Merivale Bridge, enabling additional passenger and freight services to be provided.

Table 5-20 provides a summary of CBD station peak hour train frequencies achievable for the morning peak period without and with the Project.

Table 5-20 Forecast morning peak train numbers (per hour) at CBD stations – with the Project compared to without the Project

Scenario	Trains from the south/ west to CBD	Trains from the north to CBD	Total two-way through CBD
2009	30	27	57
2021 without Project	40	39	79
2021 with Project	55	47	102
2031 without Project	42	42	84
2031 with Project	57	55	112

Note: Provided by Systemwide, June 2011

In 2021, the Project would accommodate an additional 13 trains per hour during the peak period from the Gold Coast, Beenleigh and Cleveland corridors, compared to without the Project. As such, in 2021, the Project would allow a significant increase in service provision within the newly created inter-city-outer suburban sector along the Gold Coast/Beenleigh corridor. By 2031, with Cross River Rail and together with a series of branch lines and extensions, more services would be added to the Brisbane rail network, especially from key regional centres such as Strathpine, Caloundra, Redcliffe from the north and Ripley, Flagstone Creek and Elanora from the south.

The 2031 strategy with the Project would also allow for the introduction of nine-car trains on inter-city-outer suburban sectors and HCSMU trains on suburban sectors increasing passenger throughput. With the Project in operation in 2031, an additional 28 trains per hour would be added to the Brisbane rail network during the morning peak compared to without the Project. This represents around a 33% increase in capacity (based upon passenger throughput, and taking into account the use of new rollingstock) compared to the scenario without the Project.

The capacity of the rail network through the CBD would be around 132 trains per hour. In 2031, with 112 trains per hour required in the morning peak hour to meet demand the network would be operating with spare capacity to cater for future growth beyond 2031.

5.6.2. Rail patronage with Cross River Rail

Table 5-21 presents the forecast average weekday travel and total person trip growth without and with Cross River Rail from 2009 to 2031. The forecast total number of trips made by all motorised modes (ie car and public transport) across the Brisbane metropolitan area is similar both with and without the Project. However, the proportion of trips by public transport (or mode share) is higher with the Project in both 2021 and 2031.

By 2031, with the Project, 12.1% of motorised trips are expected to be by public transport on an average weekday, compared to 11.6% without Cross River Rail. A significant increase in the absolute number of trips by public transport would also be achieved.

Total rail patronage would be significantly higher with the Project compared to without the Project In 2021, a 8% increase to 454,200 rail trips per average weekday is forecast and by 2031 daily rail trips would reach 595,000 trips, an increase of 12% compared to without the Project. By 2031, the total number of weekday rail trips would be over double current levels.

The forecast increase in rail trips to the CBD during the morning peak period due to the Project is even greater, 18% in 2021 rising to 29% by 2031. Cross River Rail allows rail passenger volumes to the CBD in the morning peak period to more than double between 2009 and 2031 and allow rail to fulfil a larger role in CBD-based travel, from its current 33% to a potential 55% of all trips in 2031.

Table 5-21 Average weekday trip changes with and without project in the Brisbane metropolitan area

Parameter	2009	2021			2031		
		Without CRR	With CRR	% change	Without CRR	With CRR	% change
Total person trips by car	5,533,300	7,009,800	6,988,400	-0.31%	7,771,700	7,736,500	-0.45%
Public transport trips	546,000	824,200	841,800	2.13%	1,074,000	1,120,800	4.36%
Public Transport Mode share	8.15%	9.95%	10.16%		11.60%	12.10%	
Total rail patronage (24 hour)	243,200	421,900	454,200	7.66%	529,500	595,400	12.45%
Total vehicle trips (24 hour)	4,383,200	5,652,100	5,635,500	-0.29%	6,460,200	6,431,500	-0.44%
Number of rail trips to CBD (AM peak period)	37,100	61,600	72,800	18.24%	73,700	95,100	29.04%

The forecast change in rail patronage with the Project in the morning peak period across the Brisbane metropolitan area is presented in **Table 5-22**. With the Project, there is expected to be 13% and 23% more morning peak rail patronage in 2021 and 2031 respectively than without the Project.

Table 5-22 Morning peak rail patronage without and with the Project in the Brisbane metropolitan area

AM peak period	2021			2031		
	Without CRR	With CRR	% change	Without CRR	With CRR	% change
Total rail passenger kilometre	2,292,100	2,541,300	10.87%	3,404,600	3,910,900	14.87%
Total rail passenger hours	57,300	61,000	6.34%	82,300	85,300	3.65%
Total rail patronage	108,300	122,600	13.18%	141,900	174,000	22.62%
Average rail trip length (km)	21.2	20.7	-2.04%	24.0	22.5	-6.31%
Average rail trip time (min)	31.7	29.8	-6.05%	34.8	29.4	-15.44%
Average rail trip speed (km/h)	39.2	41.6	6.12%	41.4	45.8	10.80%

Table 5-23 provides a summary of the forecast rail patronage, expressed as two-way line loadings of travel in each direction, between rail stations in the inner city, and on Cross River Rail, for the morning peak period. In 2021, over 24,000 passengers would use Cross River Rail between Albert Street and Roma Street stations during the morning peak period. By 2031, the busiest peak period section would be between Gabba and Albert Street stations where almost 40,000 passengers would use the Project.

Overall the busiest section of Cross River Rail is between Gabba and Albert Street stations. In 2021 this section of the Project would carry 91,000 passengers per day increasing to almost 125,000 passengers in 2031.

Table 5-23 Forecast change in rail patronage with Cross River Rail – morning peak period (2 hours)

Segment	Average weekday morning peak passengers (2 hours)						
	2009	2021			2031		
		Without CRR	With CRR	% change	Without CRR	With CRR	% change
Cross River Rail							
Ekka to Bowen Hills	-	-	22,500		-	6,600	
Roma Street to Ekka	-	-	22,700		-	7,100	
Roma Street to Alderley	-	-	0		-	22,700	
Albert Street to Roma Street	-	-	24,300		-	33,200	
Gabba to Albert Street	-	-	21,900		-	39,300	
Boggo Road to Gabba	-	-	18,600		-	33,500	
Yeerongpilly to Park Road	-	-	16,400		-	31,100	
Surface							
Fortitude Valley to Bowen Hills	27,400	40,600	21,100	-48%	52,600	32,700	-38%
Central to Fortitude Valley	28,000	41,900	23,300	-44%	53,300	35,800	-33%
Roma Street to Central	25,200	41,400	35,200	-15%	51,100	42,600	-17%
South Brisbane to Roma Street	15,200	25,400	17,200	-32%	32,500	18,100	-44%
South Bank to South Brisbane	17,600	29,300	18,700	-36%	39,000	19,600	-50%
Boggo Road to South Bank	17,700	29,300	18,500	-37%	37,800	18,900	-50%
Dutton Park to Park Road	11,200	17,600	7,000	-60%	23,700	7,900	-67%

5.6.3. Impacts on transport mode share

The forecast changes to overall CBD modal share by motorised modes in the morning peak with and without Cross River Rail, is shown in **Figure 5-31**. This clearly shows that rail will transform to become the dominant mode for CBD access in the future, and would cater for over half of all travel demand. Compared to the existing situation, car is expected to reduce proportionally, with growth in travel demand increasingly served by public transport modes.

With the Project, bus travel would reduce in significance as a mode of access to the CBD in the morning peak, although would still carry more overall trips than currently throughout the metropolitan area. By 2031, with Cross River Rail in operation, 59% of CBD trips made by motorised modes are forecast to use rail.

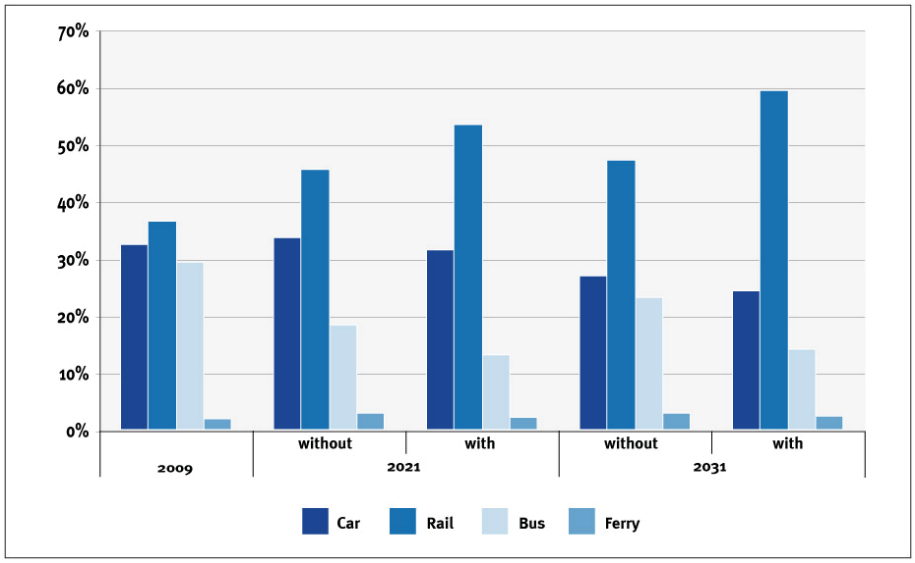


Figure 5-31 Forecast change in morning peak motorised mode share to the Brisbane CBD

Analysis of cross river trips in the morning peak as illustrated in **Figure 5-32**, shows a strong trend towards more rail trips and less bus and car trips.

In 2031, for all cross-river trips in the CBD, ie from the Go Between Bridge to the Story Bridge, rail will capture almost as many trips as road with the Project. This includes major bypass roads not serving the CBD. Without the project, rail captures less than half the number of trips as road.

Across the Brisbane metropolitan area, total rail patronage in 2031 is 65,000 more daily trips than without the Project, while total vehicle trips is around 30,000 less trips. This reinforces the trend towards mode shift from car to public transport (predominantly rail), with a shift from bus to rail also evident.

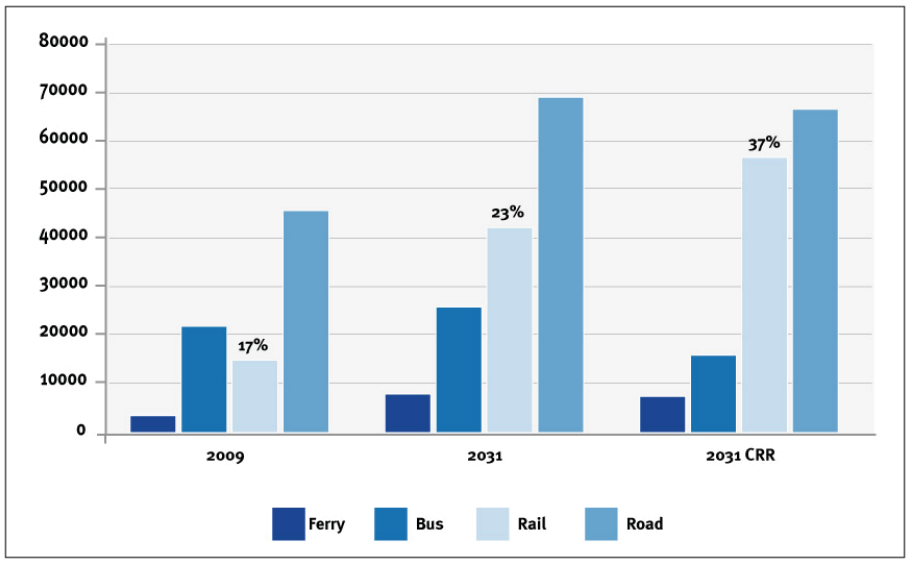


Figure 5-32 Forecast morning peak period travel demand (person trips) across the Brisbane River

5.6.4. Effect on rail network journey travel times

There is forecast to be a decrease in average trip length and average trip time with the Project (compared to without the Project) in both 2021 and 2031 This correlates to higher average trip speeds with the Project compared to without the Project in 2021 (over 6% faster) and 2031 (over 10% faster).

The direct rail connection from the North Coast/Caboolture line to the Gold Coast/Beenleigh line provided by the Project, would give a 10 minute journey time reduction to Roma Street Station from the south. Up to five minutes of journey time reduction to Roma Street Station from the north in 2021 would also be realised due to efficiencies with sectorisation and new express running patterns for some services.

Specific examples in estimated travel time savings during peak periods from key stations include:

- Helensvale and Beenleigh stations – about a 10 minute travel time saving to the CBD
- Petrie and Caboolture stations – about a five minute travel time saving to the CBD (principally due to new express running patterns achievable with the project).

With Cross River Rail, trips by train from the Gabba Station to the CBD and from Ekka Station to Roma Street Station would be two minute journeys. A trip from Yeerongpilly Station to the CBD would take about 10 minutes, which is approximately half the existing journey time.

With the Project in 2031, passenger travel times to the CBD will further improve for the North Coast line, with faster express running services able to utilise the more direct NWTC providing an up to 15 minute journey time reduction to the CBD from Nambour and Caloundra. Direct connection from the North Coast/Caboolture to the Gold Coast/Beenleigh would still provide up to 10 minutes journey time saving from the south compared to without the Project.

Due to the proposed changes to sectorisation with the Project some journeys which are currently direct, would subsequently require an interchange. For example a passenger travelling from the Gold Coast to Brisbane Airport would no longer have a single seat journey with passengers transferring to Airport services at Roma Street.

However with higher travel speeds from the Gold Coast to the CBD coupled with higher frequencies on all lines with Cross River Rail compared to without, overall journey times including transfer and wait time are expected to be comparable. Furthermore, the change in sectorisation would mean some journeys that currently require an interchange subsequently become direct (single seat) journeys, such as Ipswich to the Airport.

Due to increases in service frequencies across the network average wait times per passenger are forecast to reduce, from around eight minutes in 2009 to six minutes in 2021 with the Project and 4.3 minutes in 2031 with the Project.

5.6.5. Effect on level of service – passenger crowding

The introduction of Cross River Rail is forecast to reduce passenger crowding on numerous lines during peak periods providing significantly improved capacity to manage future growth in public transport demand. Examples of reduced passenger crowding in the morning peak include:

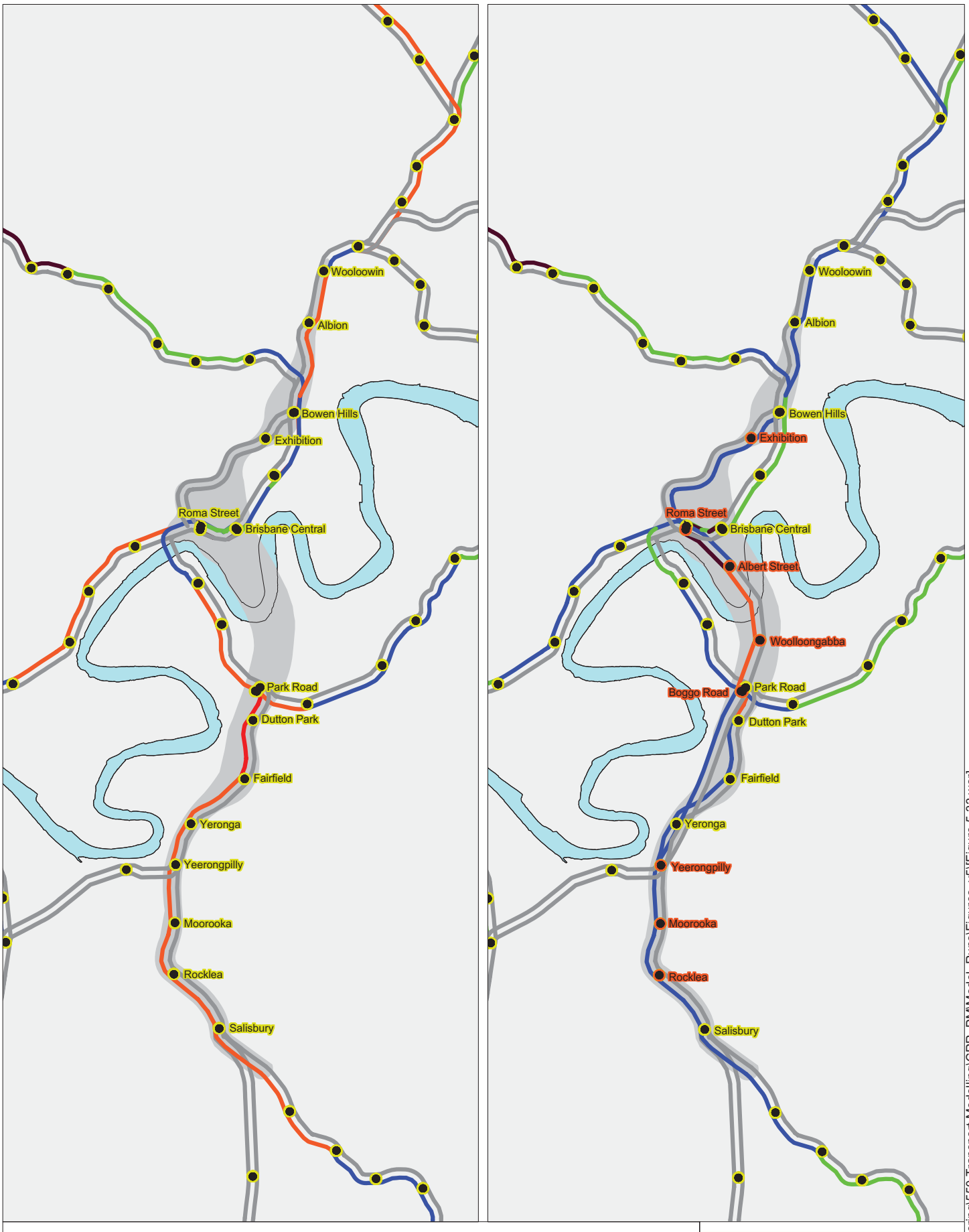
- a reduction, in the order of 50% in 2031, in the number of passengers using the existing surface rail network between Park Road and Roma Street stations
- a 70% reduction in the number of passengers on the surface rail network between Dutton Park and Park Road stations
- by 2031, the Project would facilitate travel by rail for 20,000 passengers between Alderley and Roma Street stations via the NWTC. This would reduce the number of passengers using Cross River Rail between Roma Street and Ekka stations in 2031 compared to the 2021 levels.

With Cross River Rail the line load factors (calculated as the ratio of the number of passengers compared to seated capacity), are forecast to be significantly lower. This is illustrated in **Figure 5-33** and **Figure 5-34** which compare forecast load factors during the morning peak by line in 2021 and 2031 respectively, with and without the Project.

In 2021, without the Project there would be significant crowding during the morning peak period on all rail approaches to the CBD. With the introduction of Cross River Rail by 2021, crowding would decrease significantly on the Beenleigh and Gold Coast, Ipswich and Cleveland lines as well as crowding relief on the northern lines between Northgate and Albion.

By 2031 without the Project, the degree and extent of over-crowding on all approaches to the CBD would worsen. With the introduction of the Project, significant crowding relief to a large portion of the network is forecast, including the Beenleigh and Gold Coast lines, the Ferny Grove line, the North Coast line through Wooloowin and Albion, the Cleveland line and on the Merivale Bridge.

Significant crowding inbound from Park Road and Bowen Hills during the morning peak would be reduced as the Project allows for much of this demand to be carried in the separate north-south corridor (that is the Cross River Rail tunnel and by 2031, the NWTC).



LEGEND

AM peak (2 hrs) seat load factor (v/c ratio)

- > 1.50
- 1.25 to 1.50
- 1.00 to 1.25
- 0.75 to 1.00
- 0.50 to 0.75
- < 0.50

Study Corridor

Railway stations

CRR railway stations

Model ID: CPM_2021_013 (without) CPM_2021_008 (with)

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-33

2021 morning peak period rail load factors with and without Cross River Rail

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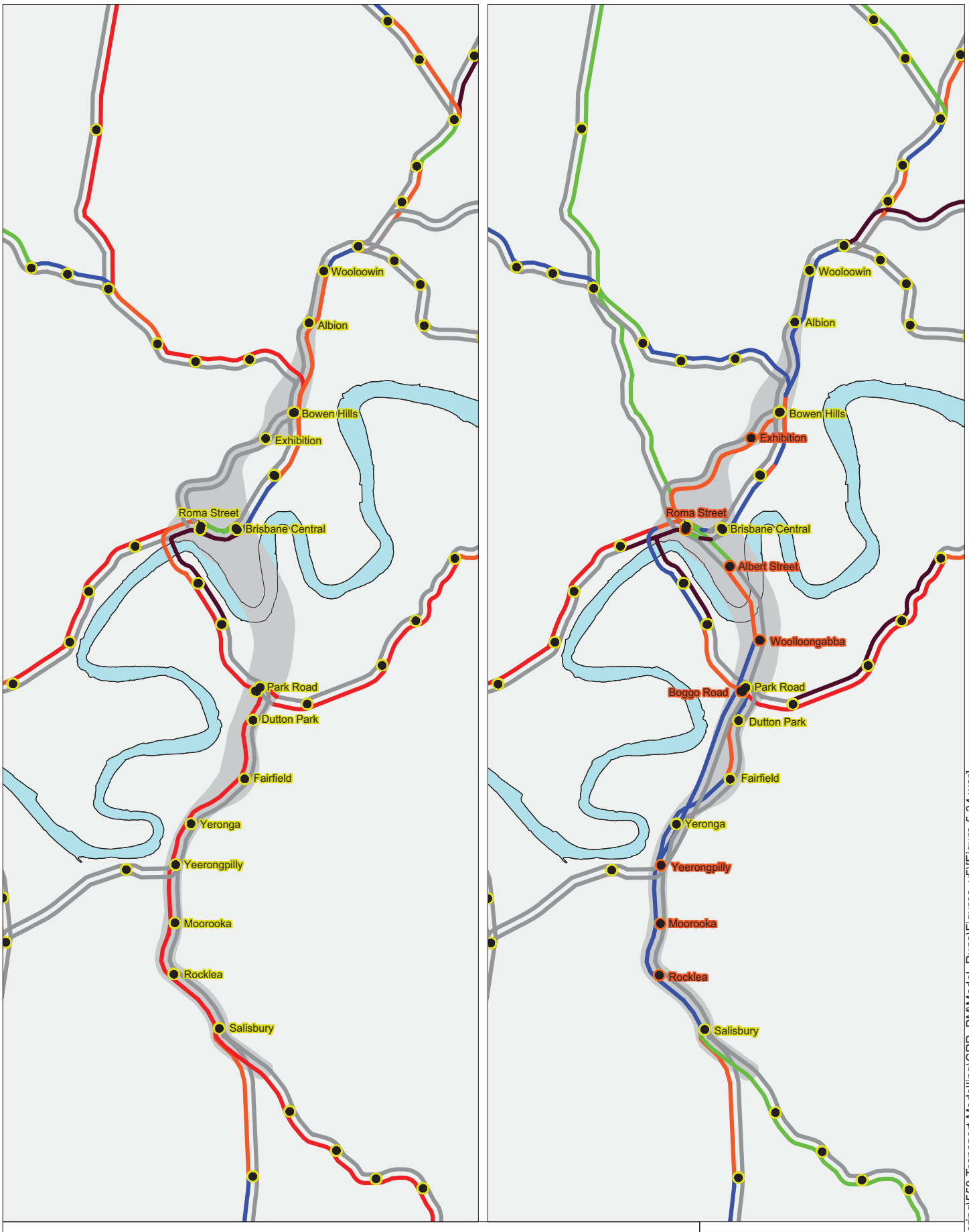

LEGEND

AM peak (2 hrs) seat load factor (v/c ratio)

- > 1.50
- 1.25 to 1.50
- 1.00 to 1.25
- 0.75 to 1.00
- 0.50 to 0.75
- < 0.50

Study Corridor

Railway stations

CRR railway stations

Model ID: CPM_2031_104 (without) CPM_2031_078 (with)

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-34

2031 morning peak period rail load factors with and without Cross River Rail

N

CrossRiverRail

SKM aurecon
CRR JOINT VENTURE

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5.6.6. Effect on level of service – rail network travel time reliability

Modelled changes in on-time reliability (OTR) forecast for each of the Cross River Rail connected lines with the Project compared to the scenario without the Project are shown in **Figure 5-35** for 2031. Additional indicative results for 2021 and 2031 are in *Technical Report No 1 - Transport*.

By 2021, Cross River Rail would bring punctuality improvements for rail to the Brisbane CBD during the morning peak period. A 10% to 12% improvement of on time reliability is estimated. This improvement would occur because Cleveland and Kuraby services no longer would interact with Beenleigh and Gold Coast services on the suburban lines once Cross River Rail is operational.

In 2031, the Project would bring significant reliability benefits (39% to 57% improvement) for northern services (Caboolture, Redcliffe, Nambour and Kawana). This is because the additional services made possible with the Project reduces overcrowding and allows shorter dwell times at stations, especially in the inner city. In particular, a major improvement in reliability on the Caboolture line is predicted, increasing from 39% to 96% of services 'on time' (within four minutes). In 2031 reliability improvements are also forecast for the Hillcrest, Gold Coast, Ferny Grove and Strathpine services during the morning peak period.

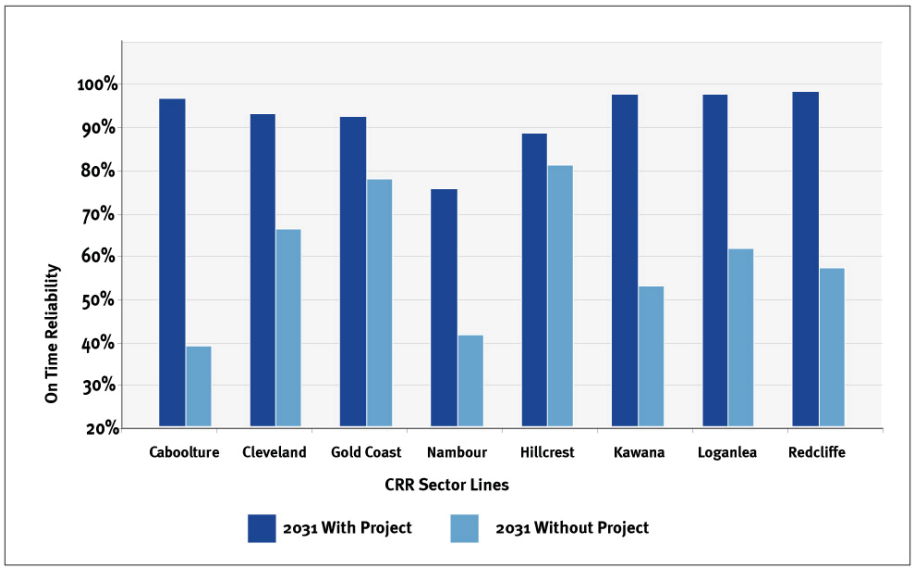


Figure 5-35 Comparison of on time reliability at CBD with and without the Project in 2031

Source: Systemwide, December 2010

5.6.7. Increase in rail patronage and accessibility in the CBD

Significant growth in rail patronage to the CBD is forecast and with the Project approximately 95,000 passenger alightings in the CBD would occur during the 2031 morning peak period compared with 74,000 passenger alightings without the Project.

Figure 5-36 illustrates how Cross River Rail would effectively increase CBD station capacity to meet an increase in demand of 55,200 passengers or 79% by 2031. An even distribution of usage across the three CBD rail stations is expected, with the forecast number of passengers alighting rail services in the CBD similar for Roma Street Station, Central Station and Albert Street Station in 2031. This would significantly decreases cross town pedestrian movements.

Station activity at Central Station is forecast to be lower in the morning peak with the Project than without the Project. In 2021, passenger numbers would be 30% lower and by 2031, passenger numbers would be 16% lower. This is because Cross River Rail train services would use Roma Street Station and Albert Street Station in the CBD and not Central Station.

The forecast reduction in overall passenger movements at Central Station with the Project is forecast to provide crowding relief within the station and the surrounding pedestrian precinct. South Brisbane and South Bank stations are forecast to have less passenger activity with the Project (compared to without the Project) reflecting the attractiveness of Albert Street Station compared to the need to alight at South Bank or South Brisbane stations to access the southern parts of the CBD.

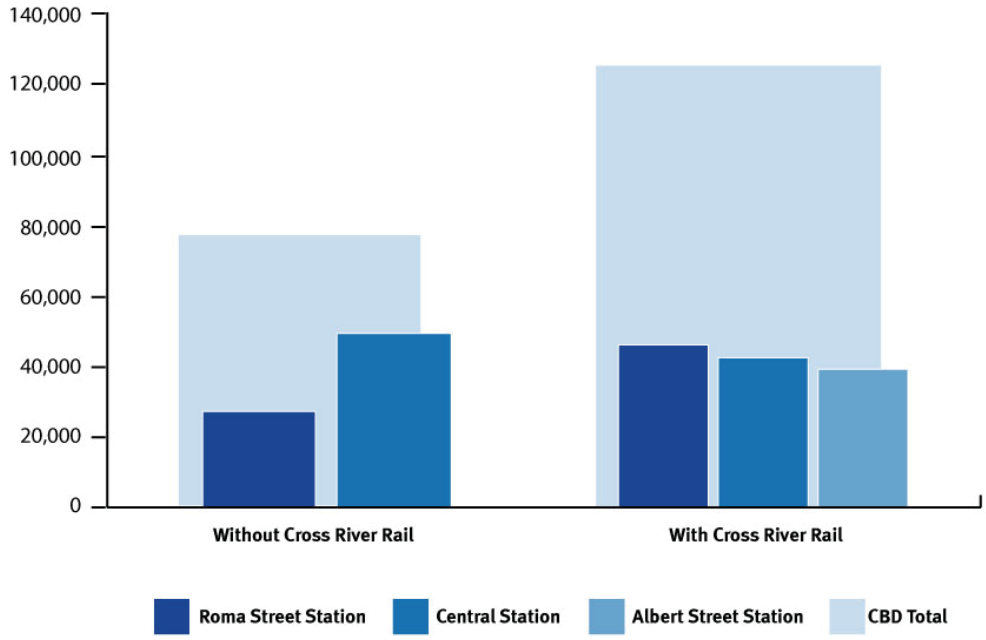


Figure 5-36 CBD station patronage: 2031

Number of rail passengers in the CBD

With Cross River Rail, there would be more pedestrians walking from CBD rail stations in the morning peak, compared to without the Project. Average walk distances from public transport nodes would also be shorter with the Project. This is illustrated in **Figure 5-37** that presents the forecast final alighting passenger volumes and average distances from public transport nodes.

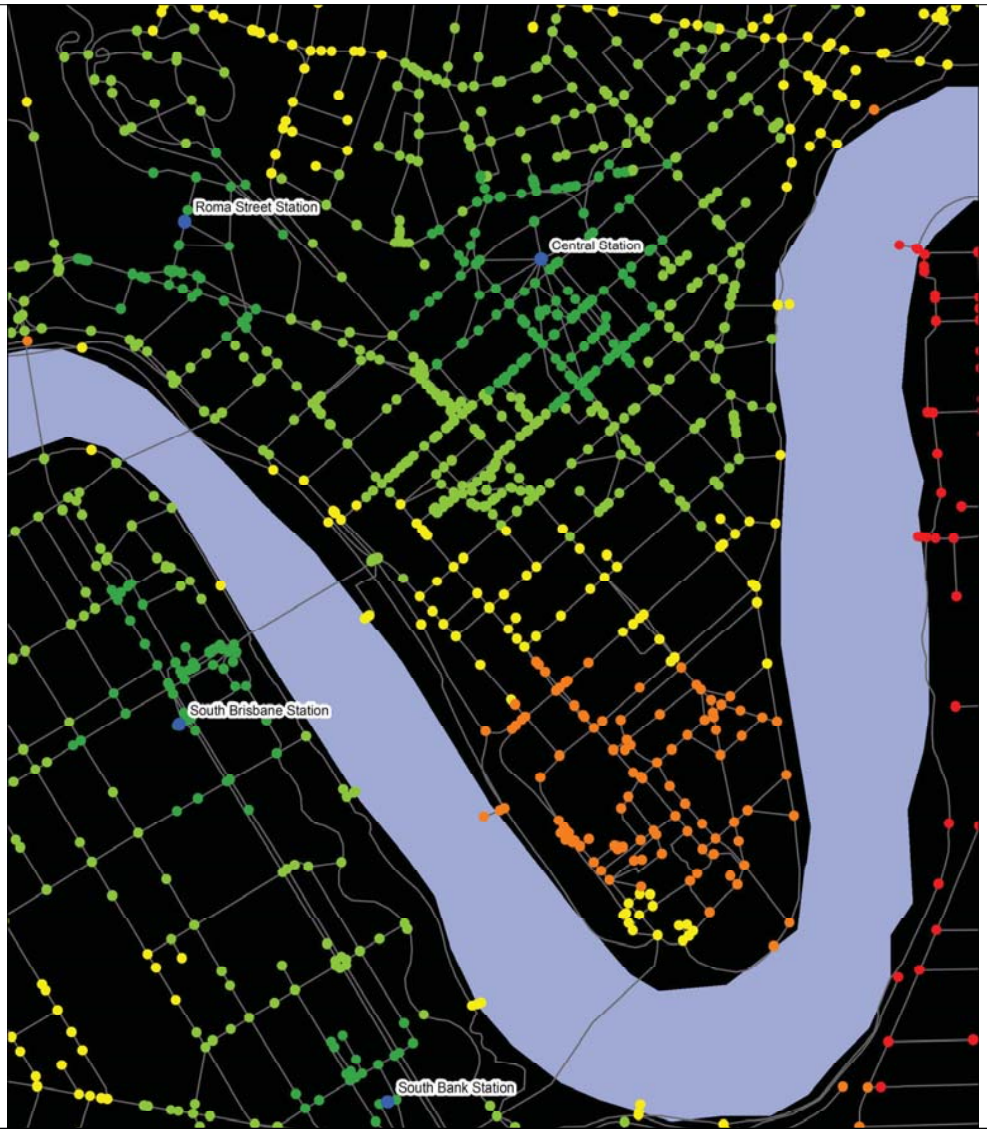
Improved pedestrian accessibility in the CBD

Cross River Rail is forecast to increase the accessibility of CBD employment destinations by rail and walk trips as illustrated in **Figure 5-37**. Cross River Rail, with a new station in Albert Street, would improve access to CBD destinations by rail and walk, with no part of the CBD more than 15 minute walk from a railway station, with the vast majority within 10 minutes walk.

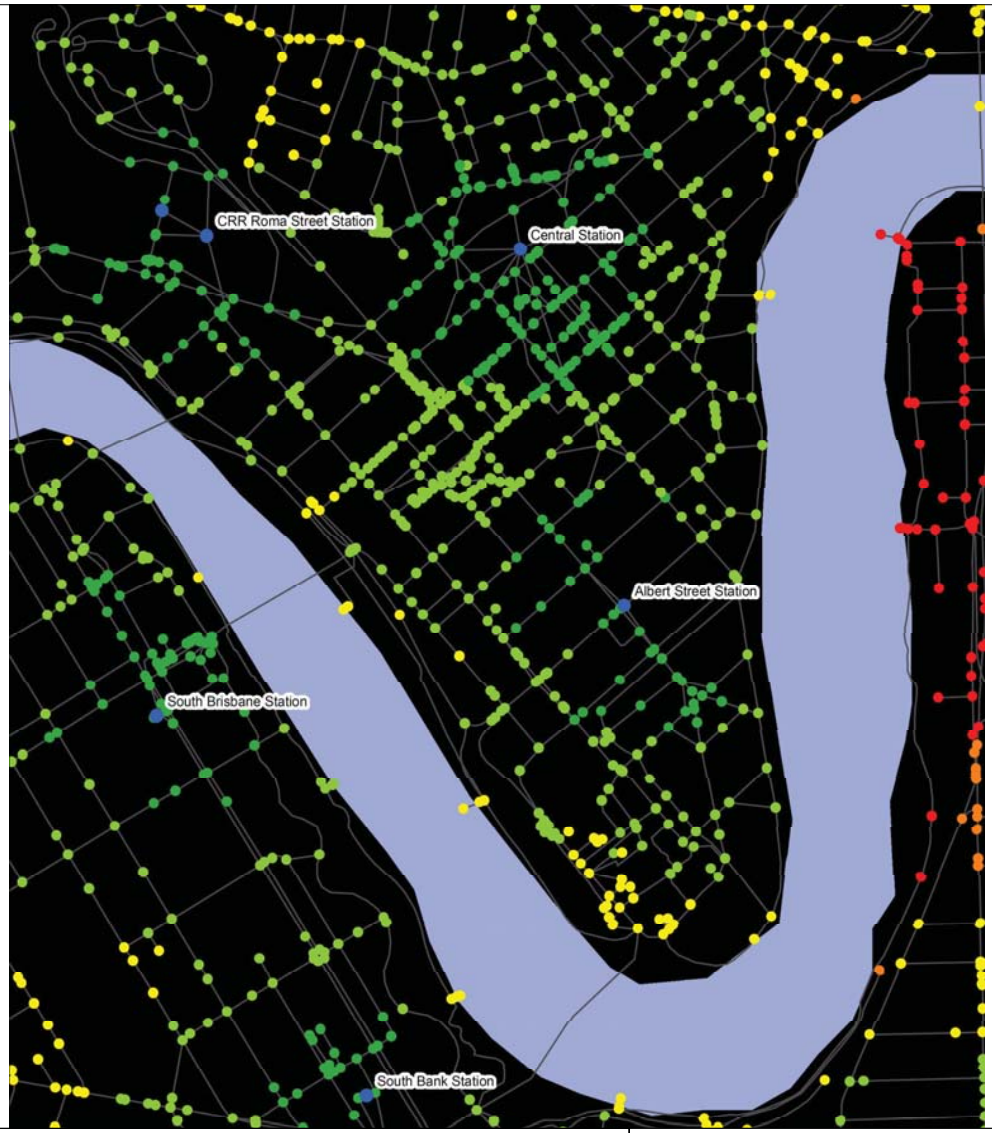
The number of employees, residents and students forecast to be within a 400 m catchment of a rail station in the CBD with the Project is illustrated in **Figure 5-38**. This shows over 55,000 jobs could be within a direct 400 m walk catchment of a railway station in 2031 with Cross River Rail. In addition to this over 13,000 student places and 3,500 residents would also be within 400 m of a station.

When combined with the existing rail catchment of Roma Street and Central stations, the total 400 m walk catchment of the rail network in the CBD with the Project would be 7,300 city residents, 139,000 jobs and over 35,000 tertiary enrolments (including QUT). The Albert Street Station increases the walk-up employment catchment in the CBD by in the order of 65%.

Without Cross River Rail



With Cross River Rail



LEGEND

Walk Access to Train

- < 5 Mins
- 5 - 10 Mins
- 10 - 15 Mins
- 15 - 20 Mins
- > 20 Mins

Train Stations

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-37

Walk access time to railway stations within the CBD with and without Cross River Rail

N

CrossRiverRail

SKM aurecon
CRR JOINT VENTURE

Source: LUPTAI, Copyright, State of Queensland

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LEGEND

Resident population = 3,500
Employment (jobs) = 55,300
Students (tertiary enrolments) = 13,500

Additional Albert Street Station 400m catchment

Note - for partial zones contained in catchment the population is decreased by the proportion of the zone area not contained in catchment

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-38

Additional CBD catchment within 400m of a railway station, with Cross River Rail

N

CrossRiverRail

SKM aurecon
CRR JOINT VENTURE

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5.6.8. Impacts on rail freight operations

An assessment of the effects of the Project on freight movement by rail was undertaken and detailed information is contained in *Technical Report No. 1 – Transport.*

Separate economic and operations analyses of the rail freight task were undertaken which assessed future rail freight demand, volumes and train movements on the network with and without the Project. Rail freight train paths were tested using the train operating model for consistency with passenger operations.

The Project provides for a dedicated dual gauge freight track from Salisbury to Park Road, by providing additional passenger tracks through this corridor and removing passenger services from this line. This would provide the missing section of a dedicated freight route through the southern Brisbane rail network, from Acacia Ridge to the Port of Brisbane. This freight line would provide significant advantages for freight rail operations, including removing peak period conflicts with passing rail and allowing all projected 2031 rail freight demand to be accommodated on rail.

Table 5-24 provides a comparison of freight operability outcomes with and without the Project. This shows the increased freight capability of Cross River Rail north of Salisbury. By 2031, with the Project, the available weekly train paths would increase from 24 freight trains to over 200 freight trains such that the demand for rail freight would be met.

Table 5-24 Summary of 2021 and 2031 freight operability outcomes with and without the Project

	Trains per week to match demand (both directions) – within Cross River Rail scope only					
	2021			2031		
	Demand	Without CRR	With CRR	Demand	Without CRR	With CRR
North Coast	264	264	264	322	16	322
Salisbury-Tennyson	172	24	172	209	24	209
Tennyson-Port (IM)	78	3	78	94	3	94
Tennyson-Port (Coal)	197	197	197	232	198	232
Tennyson to Port TOTAL	275	201	275	326	201	326

Source: Systemwide, December 2010

Note: Demand paths assume current length consists

Whilst it is forecast that the availability of freight paths would be able to match the rail freight demand for all lines, this analysis may provide an underestimation of the number of possible paths. Rail freight could have a greater capability due to factors such as:

- lower off-peak frequencies pre-morning peak and post-evening peak
- lower off-peak frequencies on weekends
- increased capacity of freight services (length or carrying capacity)
- flighting (one train closely following another)
- fewer restrictions on freight operating hours.

5.6.9. Impacts on bus and ferry operations

Bus patronage impacts

Changes in overall modelled bus patronage and performance across the Brisbane metropolitan area are shown in **Table 5-25**. This shows small decreases of around 2% to 4% in overall bus passenger kilometres travelled with the Project in both 2021 and 2031. A marginal increase in overall bus patronage (1.4%) in 2031 with the Project is forecast compared to the scenario without the Project.

By 2031 with the Project, forecast trip lengths by bus would be shorter (-3.4%), while bus trip times would be less (-5.2%). The change to shorter bus journeys is likely to be the result of greater levels of bus-rail interchange while increased use of the high frequency priority bus network would continue to sustain bus patronage across the whole network, particularly in corridors without rail.

Table 5-25 Forecast trips by bus with the Project compared to without the Project in Brisbane Metropolitan Area

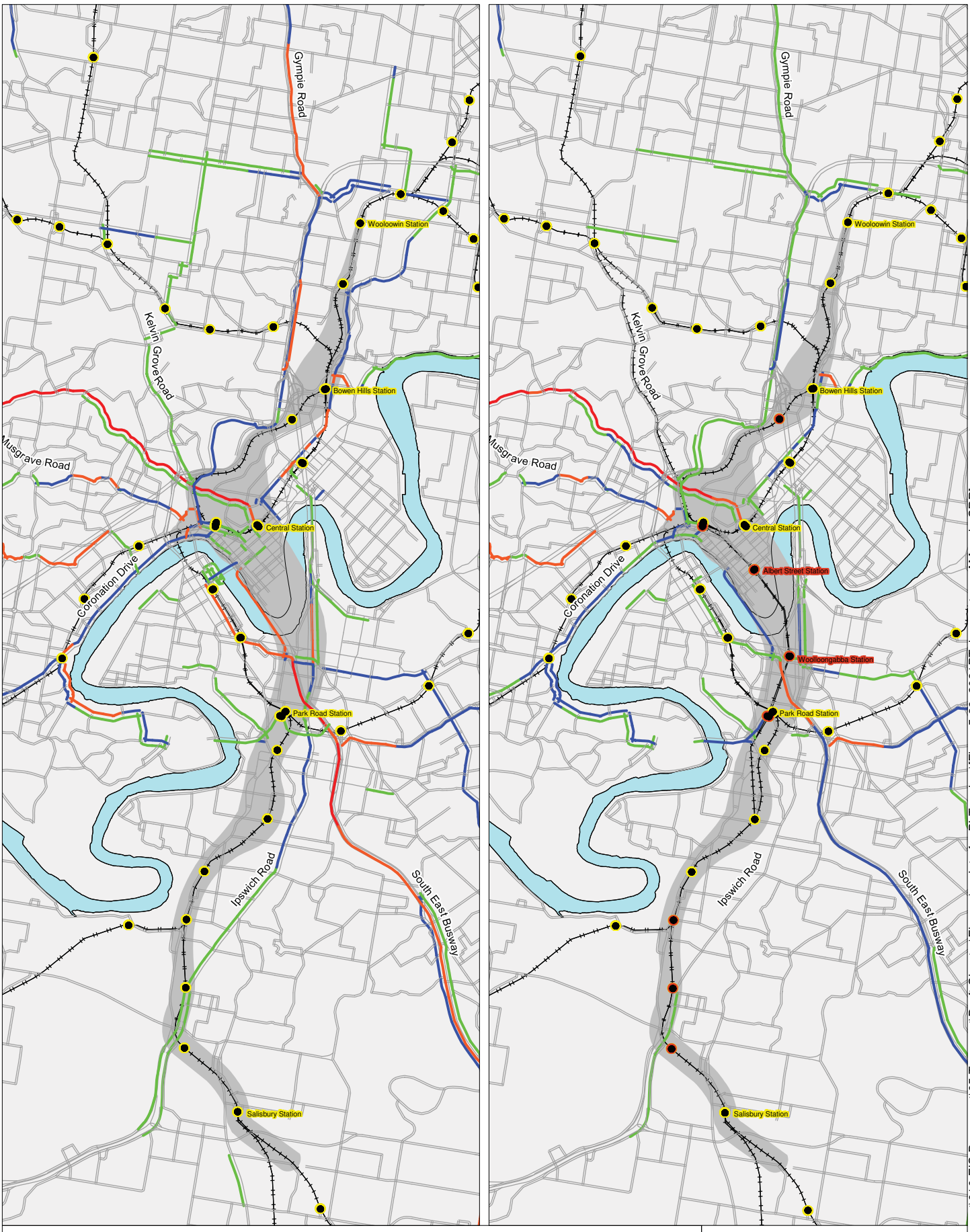
24 hours	2021			2031		
	Without Project	With Project	% change	Without Project	With Project	% change
Motorised person trips	7,834,000	7,830,100	-0.05%	8,845,700	8,857,300	0.13%
Public transport trips	824,200	841,800	2.14%	1,074,000	1,120,800	4.36%
Total bus patronage	393,500	387,000	-1.65%	560,800	568,600	1.39%
Total bus passenger kilometres	4,080,400	3,912,700	-4.11%	5,632,000	5,513,100	-2.11%
Total bus passenger hours	162,100	154,600	-4.63%	245,100	235,800	-3.79%
Average bus trip length (km)	10.37	10.11	-2.51%	10.04	9.70	-3.39%
Average bus trip time (minutes)	24.72	23.97	-3.03%	26.23	24.88	-5.15%

Forecast changes in bus crowding have been examined by assessment of changes in bus load factors. Bus load factors are a proportion of total bus passengers divided by total seated bus capacity. The forecast 2031 morning peak bus load factors, with and without the Project, are shown in **Figure 5-39**. This comparison indicates a significant reduction in crowding on several bus routes including Ipswich Road, the South East Busway (including the Victoria Bridge and Captain Cook Bridge approaches to the CBD), Northern Busway/Gympie Road, and Kelvin Grove Road.

Overall, buses are expected to benefit from improved levels of service as a result of the introduction of Cross River Rail primarily through reduced crowding in-vehicle, less bus congestion on several bus routes such as the South East Busway and reduced dwell times at stops and stations due to lower patronage on some corridors in peak periods.

Ferry patronage impacts

Overall passenger ferry usage would reduce marginally (around 3% less in 2021 and approximately 4% less in 2031) with the Project compared to the scenario without the Project. Only very small changes are indicated because ferry and rail trips are largely non-competing and there is little or no transfer between modes.



LEGEND

AM peak (2 hrs) seat load factor (v/c ratio)

- > 1.25
- 1.00 to 1.25
- 0.75 to 1.00
- 0.50 to 0.75
- < 0.50

Study Corridor

Railway lines

Railway stations

CRR railway stations

Model ID: CPM_2031_104 (without) CPM_2031_078 (with)

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-39

2031 morning peak period bus load factors with and without Cross River Rail

N

CrossRiverRail

SKM aurecon
CRR JOINT VENTURE

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5.6.10. Impacts on the road network with the Project

The impact of Cross River Rail on the road network has been assessed using underlying principles of a road impact assessment. Analysis of the following model results has been undertaken to inform this assessment:

- differences in traffic volumes and mode share with and without the Project in 2021 and 2031 across the Brisbane metropolitan area
- forecast changes in traffic volumes and levels of service along five screen lines across the study corridor and a cordon of road links surrounding the CBD
- changes in traffic volumes on State-Controlled roads within or immediately surrounding the study corridor for both the morning peak, and average weekday, to determine whether the Project leads to an increase of (5% or more) in traffic on these key road links. This benchmark is typically the trigger for the need for detailed analysis of impacts and mitigation measures in accordance with TMR's Guidelines for the Assessment of the Road Impacts of Development.

Changes at the regional level

Road network volumes and performance on a typical weekday with the Project in operation, are forecast for the wider Brisbane metropolitan area, overall cumulative benefits are significant. By 2031, the reduction in private vehicle use associated with the Project (compared to the without the Project) is forecast to reach 275 million vehicle kilometres per annum.

A comparison of total vehicle trips (average weekday) is presented in **Table 5-26** which shows that there would be almost 30,000 fewer road vehicle trips on the network with Cross River Rail operational compared to the scenario without the Project in 2031 in the Brisbane metropolitan area.

Table 5-26 Average weekday trip changes with and without the Project in the Brisbane metropolitan area

Average weekday (24 hours)	2021			2031		
	Without CRR	With CRR	Change	Without CRR	With CRR	Change
Total vehicle trips	5,652,100	5,635,500	16,600	6,460,000	6,433,000	29,000

Changes within the study corridor

Within and surrounding the study corridor, traffic volumes crossing selected major links along five screen lines and the CBD cordon are reported in **Table 5-27**.

This table shows that across all screen lines, two-way traffic volumes in the morning peak period would be less with the Project than without the Project. The reduction in vehicle trips across the CBD cordon would be 2,300 vehicles by 2031 during the morning peak period.

Table 5-27 Two-way vehicle volume changes in the AM peak period (7 am-9 am) on selected screen lines

	2021 AM peak vehicle trips			2031 AM peak vehicle trips		
Screen line location	**Without CRR**	**With CRR**	**Change**	**Without CRR**	**With CRR**	**Change**
Inner north	39,800	39,100	-700	45,900	45,500	-400
Inner south	37,200	35,500	-1,700	43,500	41,900	-1,600
Outer north	42,500	42,100	-400	45,400	44,400	-1,000
Outer south	41,300	40,700	-600	47,300	46,500	-800
CBD cordon	85,500	83,200	-2,300	89,500	87,200	-2,300
CBD river crossings	60,200	58,400	-1,800	68,900	67,200	-1,700

Notes:

1. *Inner north includes Kelvin Grove Road, Lutwyche Road, Airport Link, Abbotsford Road*
2. *.Inner south includes Annerley Road, Ipswich Road, M3, Logan Road*
3. *Outer north includes Samford Road, South Pine Road, Shand Street, Webster Road, Lutwyche Road, Sandgate Road*
4. *.Outer south includes Fairfield Road, Ipswich Road, M3, Logan Road*
5. *.CBD cordon is bounded by the Brisbane River, Hale Street, ICB, Constance Street*
6. *CBD river crossings include the Go Between Bridge, William Jolly Bridge, Victoria Bridge, Captain Cook Bridge, Story Bridge and Clem Jones tunnel.*

Changes in road traffic volumes in the morning peak period for specific State Controlled road links are presented in **Table 5-28**. This illustrates a forecast reduction in road traffic volumes on State Controlled Roads in, and immediately surrounding, the study corridor in the morning peak period.

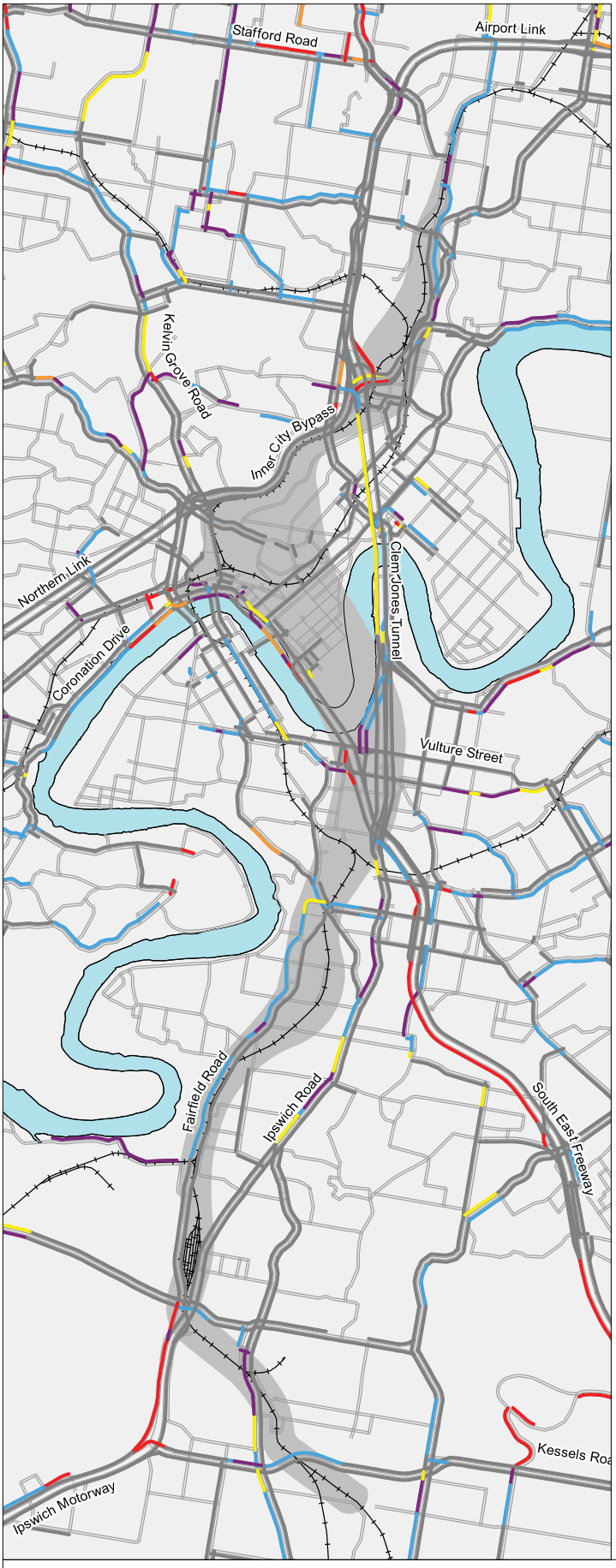
The forecast traffic changes over the 24 hour period for 2021 with the Project are shown in **Figure 5-40** indicating less than 0.5% in volumes compared to without the Project on the State controlled road links. The pattern of forecast changes in traffic volumes in 2031 is similar to 2021. Cross River Rail would therefore result in a small reduction in traffic volumes on individual links and screen lines within the study corridor as well as across the regional network.

Table 5-28 Vehicle volume changes (two-way) in the AM peak period (7am-9am) on State-Controlled Road links

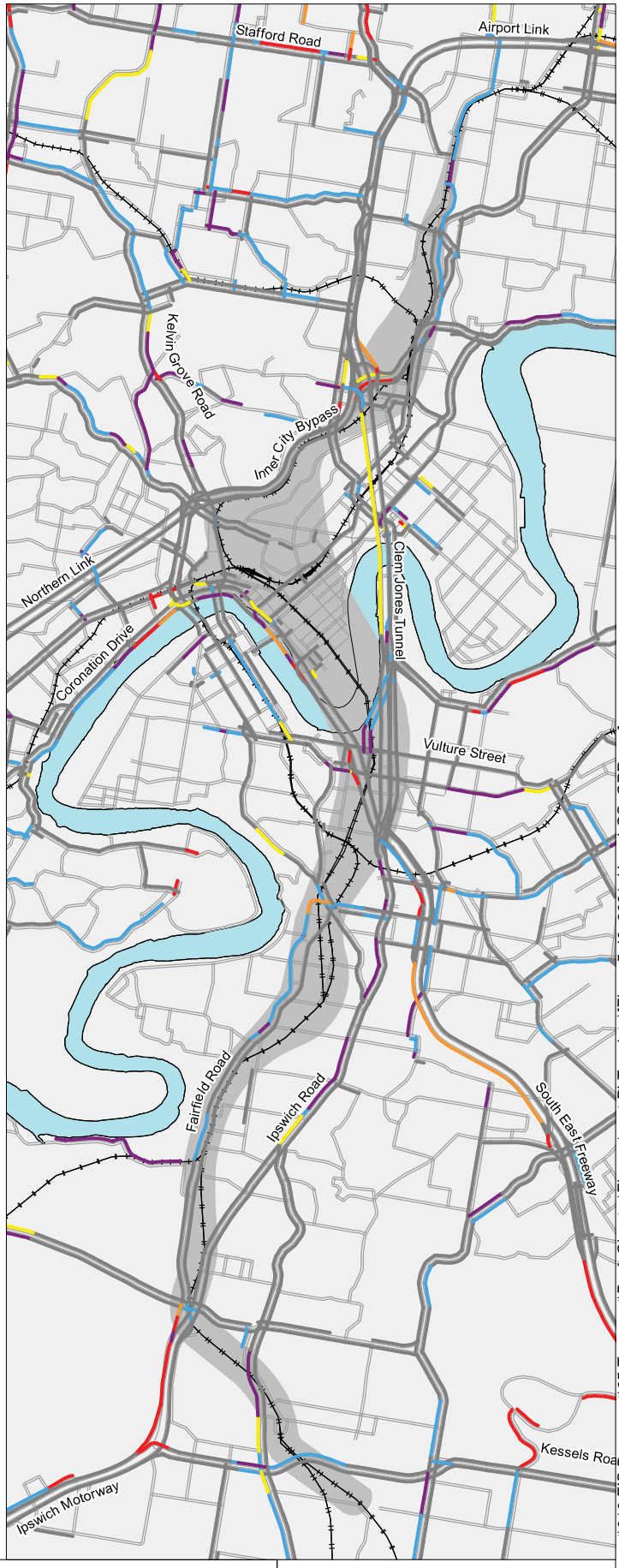
	2021 AM peak vehicle trips			2031 AM peak vehicle trips		
Location	**Without CRR**	**With CRR**	**Change**	**Without CRR**	**With CRR**	**Change**
M3 Pacific Motorway (north of O'Keefe Street)	18,600	17,800	-900	20,500	20,200	-300
Gympie Road (north of Stafford Road)	14,700	14,600	-100	16,000	15,700	-300
M3 Pacific Motorway (north of Klumpp Road)	22,700	22,500	-200	25,200	25,000	-200
Captain Cook Bridge	20,000	19,100	-900	21,500	21,100	-400

To further confirm the extent of impact of the Project on the road network in the Brisbane metropolitan area, a comparison of traffic performance on individual road links in 2021 and in 2031 was undertaken using a level of service analysis for scenarios with, and without, the Project. This analysis highlighted very few differences in network performance across the Brisbane metropolitan area and around the study corridor in 2021 or 2031. While reductions in vehicle volumes (and consequently, kilometres travelled, fuel used and emission produced) are predicted across screen lines, no material difference in the performance of the road network is expected. Further information is contained in *Technical Report No. 1 – Transport*.

Without Cross River Rail



With Cross River Rail



LEGEND

AM peak (2 hrs) level of service
for directional links carrying more than 1000 vehicles

- LoS A
- LoS B
- LoS C
- LoS D
- LoS E
- LoS F

Study Corridor

Model ID: CRR_2021_001X (without) BEN2021_013_008_HWY (with)

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-40

2021 morning peak period road traffic level of service with and without Cross River Rail

N

CrossRiverRail

SKM aurecon
CRR JOINT VENTURE

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Road crash cost savings

Road crashes and their costs vary by vehicle kilometres travelled and the type of road (motorway, arterial, local). Furthermore, the type of crash also varies by the speed of traffic/vehicle. Only changes to private vehicles are significant, with VKT reducing by up to 1% in 2031 when the Project is in the network. Based on this change (a reduction of up to 275 million kilometres per year in 2031), up to two lives and 24 serious crashes a year could be avoided as a benefit of the Project (crash rates from Austroads, 2010).

5.6.11. Transport benefits of Cross River Rail

Cross River Rail would improve the efficiency and sustainability of South East Queensland's transport system particularly for the modes of bus and rail. The key transport benefits of Cross River Rail have been derived from an assessment of the modelled difference in the future travelling and operating conditions on the regional and inner city rail, bus and road networks with and without the Project in the network. **Table 5-29** summarises the key transport benefits that are attributable to Cross River Rail.

Table 5-29 Transport benefits of Cross River Rail

Benefit	What does this mean?
Additional rail capacity and growth in rail patronage	Provides the additional cross-river rail capacity to accommodate passenger growth to 2031 and beyond – total additional growth in rail passenger demand of about 66,000 daily passengers (2031) would be accommodated over and above the growth without Cross River Rail. Provides for 134% forecast growth of public transport kilometres travelled by 2031. Increased ability to use currently under-utilised parts of the network. Increased ability to extend the network.
Improved mode share to public transport	Assists in increasing public transport mode share to 12.1% by 2031.
Improved modal integration	Cross River Rail would provide opportunities for the development of greater rail/bus integration at rail stations served by the Project. More effective transfers and less wait time would be provided by Cross River Rail.
Improved rail reliability and performance	Opportunities to simplify rail operations (including sectorisation) and improve service reliability would be provided by Cross River Rail. More trains at higher frequencies would access the CBD. Daily public transport travel time savings, allowing for additional rail patronage and a fall in bus patronage, would be about 7,700 passenger hours in 2021 and about 12,300 passenger hours in 2031. Cross River Rail would reduce total network-wide wait times by about 3% (2021) and 5% (2031), compared to without Cross River Rail.
Reduced crowding	54% less crowding in 2021 and 49% less crowding in 2031, compared to without Cross River Rail (public transport network wide). Cross River Rail would provide capacity relief to Central Station. Cross River Rail would provide crowding relief on buses.

Benefit	What does this mean?
Improved CBD accessibility	Allows an additional 34 trains into the CBD in the two-hour peak period upon commencement in 2021 (compared to 2009 services). Provide capacity for an additional 52 trains into the CBD in the peak hour in 2031, compared to without Cross River Rail. Better and more effective passenger distribution between CBD stations. Reduced CBD station interchange delays and station access times – proposed changes to CBD station arrangements, including improved access arrangements to the CBD south areas through the new Albert Street Station, would provide access time benefits for those passengers using these stations.
Reduced dependence on private transport	Cross River Rail would avoid 275 million private vehicle kilometres in 2031 and reduce the need for car travel in the CBD.
Reduced road congestion	Cross River Rail would attract car drivers to rail and generate less road traffic, less vehicle kilometres travelled resulting in a reduction of around 0.5% of vehicles using State Controlled Roads on approaches to the inner city.
Rail freight	There would be an increase in rail freight benefits since Cross River Rail would provide more rail capacity and a reduction in passenger/freight conflicts and creation of new freight paths such that the demand for rail freight could be met which would not be the case without Cross River Rail.

5.7. Local transport impacts of Cross River Rail

5.7.1. Changes to patronage at existing rail stations and interchanging

The morning peak period usage at inner city and CBD stations in 2021 and 2031 with Cross River Rail are forecast to increase significantly particularly at stations such as Roma Street, Boggo Road and Yeerongpilly. Daily usage of these stations would increase at a greater rate due to an increase in the number of off-peak rail trips made. Other characteristics of the patronage changes at stations with Cross River Rail are summarised below:

- Significant growth in rail patronage to the CBD is forecast and with Cross River Rail approximately 95,000 passenger alightings in the CBD would occur during the 2031 morning peak period compared with 74,000 passengers without the Project.
- An even distribution of usage across the three CBD rail stations is expected, with the forecast number of passengers alighting rail services in the CBD similar for Roma Street, Central and Albert Street stations in 2031. This would significantly decreases cross town pedestrian movements.
- Station activity at Central Station is forecast to be lower in the morning peak with the Project than without the Project. In 2021, passenger numbers would be 30% lower and by 2031, passenger numbers would be 16% lower. This is because Cross River Rail train services use Roma Street and Albert Street stations in the CBD, and not Central Station. The forecast reduction in overall passenger movements at Central Station with Cross River Rail is forecast to provide crowding relief within the station and the surrounding pedestrian precinct.

- At Central Station a reduction in transfers in 2021 are expected. However, an increase in bus to rail transfers is forecast in 2031 with the Project. This is indicative of more interchange in general occurring in 2031 with the Project due to the splitting of services between different CBD stations.
- At Bowen Hills Station an increase is forecast in rail to rail transfers with the Project compared to without the Project in 2031 (around 60% more). Changes in stopping patterns will require more people to change between express and all stops trains at Bowen Hills Station.
- A high number of rail to rail transfers at Roma Street Station are expected to occur between the Cross River Rail and surface platforms in both 2021 and 2031.
- Boggo Road Station would become a strategic rail hub in the south-west of the CBD and would be served by Cross River Rail services and surface rail services from Kuraby and Cleveland, leading to significant interchanging activity.
- Rail to rail transfers would become very significant at Salisbury Station by 2031, particularly due to the ability to interchange from services on the future Flagstone Creek line to the Gold Coast line services.
- South Brisbane and South Bank stations are forecast to have less passenger activity with the Project (compared to without the Project) reflecting the attractiveness of Albert Street Station compared to the need to alight at South Bank or South Brisbane stations to access the southern parts of the CBD.

For each station, the ability of the existing infrastructure to accommodate forecast passenger activity changes including interchanging has been assessed and is documented in detail in *Technical Report No. 1 – Transport.* On the northside, at Wooloowin, Albion and Bowen Hills stations, the existing pedestrian infrastructure would adequately cater for the forecast increase in passenger demand at a minimum pedestrian LOS D. On the southside, at Dutton Park, Yeronga, Fairfield, Moorooka and Rocklea stations passenger activity changes are small with Cross River Rail and would not have a significant impact on the level of pedestrian service. The existing pedestrian infrastructure would have sufficient capacity. The pedestrian infrastructure performance at new Cross River Rail stations and locations where significant patronage or interchange activity changes are forecast are described in detail below.

Ekka Station

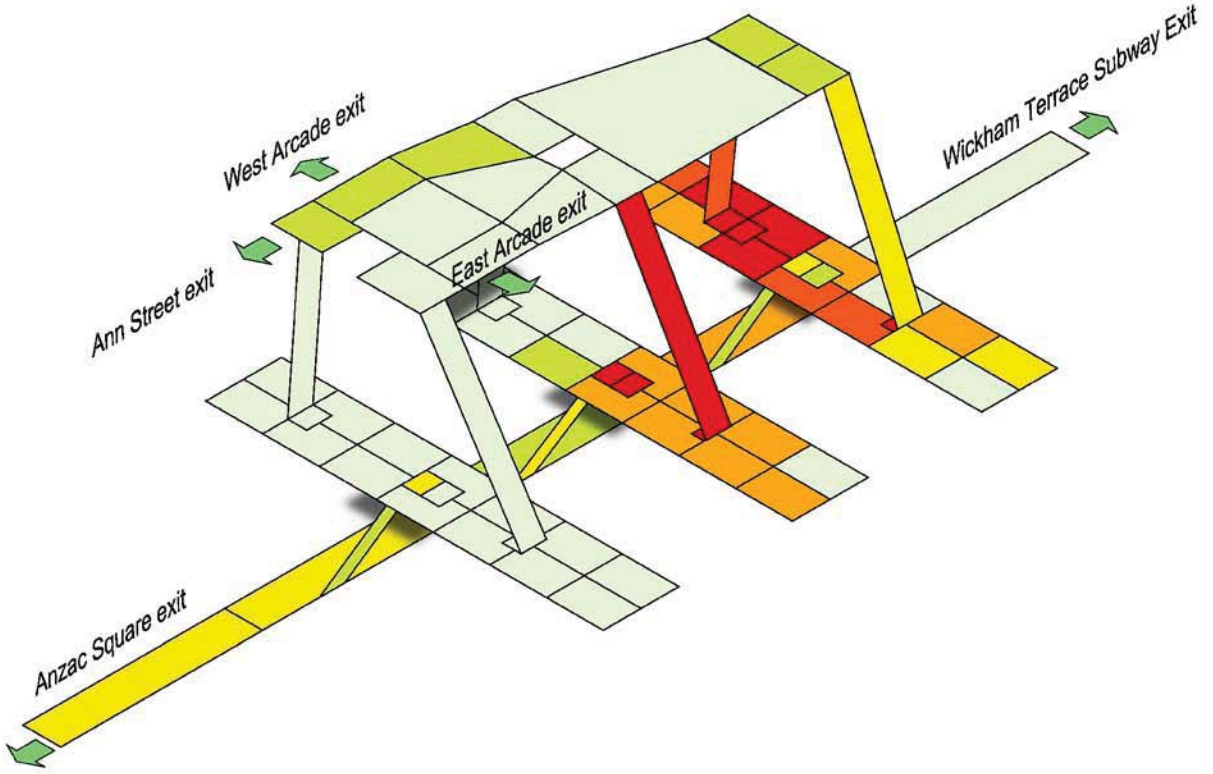
Ekka Station is a proposed new Cross River Rail station. The station elements incorporated in the reference design provides adequate widths at the walkways and stairs to perform better than a LOS D under modelled peak conditions.

Central Station

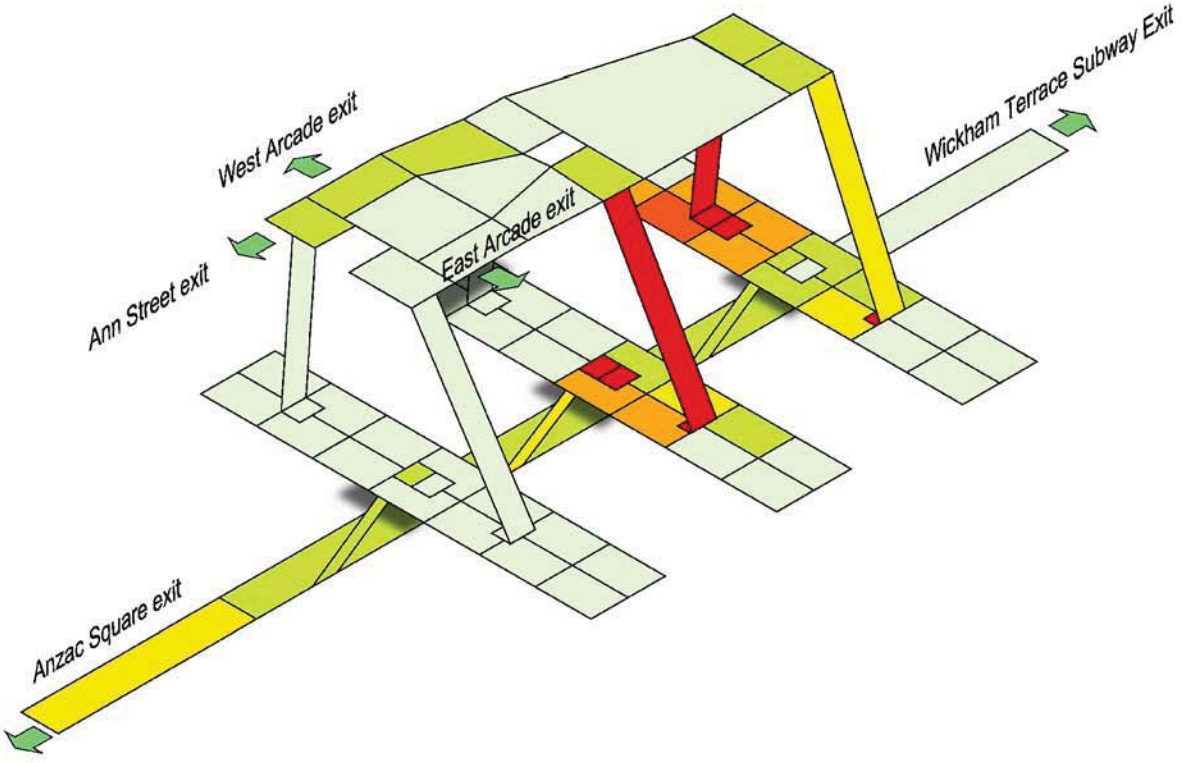
Central Station has a nominal capacity of 43,000 boardings and alightings during a two hour period. An assessment of the adequacy of the station pedestrian infrastructure at Central Station was carried out using the ClicSim pedestrian simulation model. By 2021, passenger activity at Central Station without Cross River Rail is forecast to be at capacity in the AM peak. However with Cross River Rail, the station would be able to accommodate the reduced demands, with just over 30,000 boardings and alightings. By 2031, passenger activity at Central Station without the Project would be well beyond its capacity with around 50,000 passenger movements. However with the Project, the station would need to accommodate around 42,000 passengers.

The forecast reduction in overall passenger movements at Central Station with the Project in 2031 is expected to improve the station's performance compared to the scenario without the Project. This is illustrated in **Figure 5-41**. Even under these improved conditions (with the Project), exceptionally large passenger volumes on Platforms 5 and 6 would cause some congestion on these platforms as well as the escalators and stairs linking to the concourse (LOS E and F). Platforms 3 and 4 are also expected to be congested during the busiest part of the morning peak. The analysis illustrates that the Project provides essential congestion relief to Central Station, which would be operating over its capacity in 2031 without the Project.

Pedestrian Levels of Service
Without Cross River Rail



Pedestrian Levels of Service
With Cross River Rail



Legend
- LOS A
- LOS B
- LOS C
- LOS D
- LOS E
- LOS F

Busiest 15 minutes

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-41

Central Station
Pedestrian Levels of Service
2031 Morning Peak

CrossRiverRail

SKM aurecon
CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G089_CCR_Trans_Ped_LOS_Central_Sta_A4_ver93.mxd 07/07/2011 15:34

Roma Street Station

Table 5-30 presents the access and interchange characteristics for Roma Street Station. With the introduction of Cross River Rail, Roma Street Station would become a key regional multi-modal hub and the principal CBD station being served by both Cross River Rail services as well as surface rail services.

Increased passenger activity is forecast for all access modes in both 2021 and 2031 with the biggest change forecast to occur in rail to rail transfers. Transfers would increase by 129% in 2021 and 242% in 2031 compared to without Cross River Rail. Bus access and interchange would also be greater, particularly in 2031, where double the number of transfers is forecast compared to without the Project.

Table 5-30 Roma Street Station forecast passengers and mode of access in morning peak period

AM peak	2009	2021			2031		
Mode		Without CRR	With CRR	% change	Without CRR	With CRR	% change
Walk/cycle	5,900	10,000	17,100	71%	18,500	21,600	17%
Rail	1,800	3,800	8,700	129%	6,000	20,500	242%
Bus	1,600	1,400	2,200	57%	2,100	4,200	101%
Car	0	0	0	0%	0	0	0
Total	9,300	15,300	28,000	83%	26,600	46,300	74%

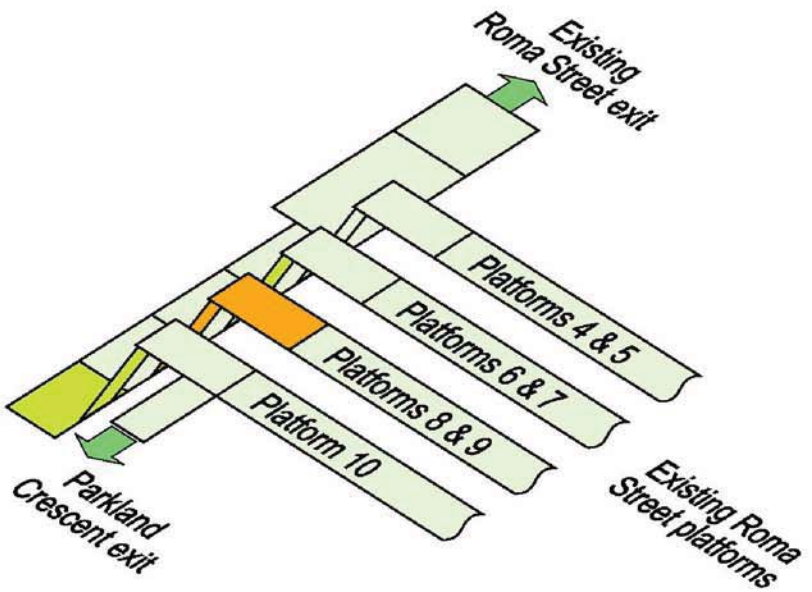
An assessment of the adequacy of the pedestrian infrastructure at Roma Street Station in 2031 with Cross River Rail operational has been carried out using the ClicSim pedestrian simulation software.

The expected large increases in transfer volumes would place additional pressure on connections to the existing platforms at Roma Street Station, especially the stairs and escalators linking the subway to the platforms.

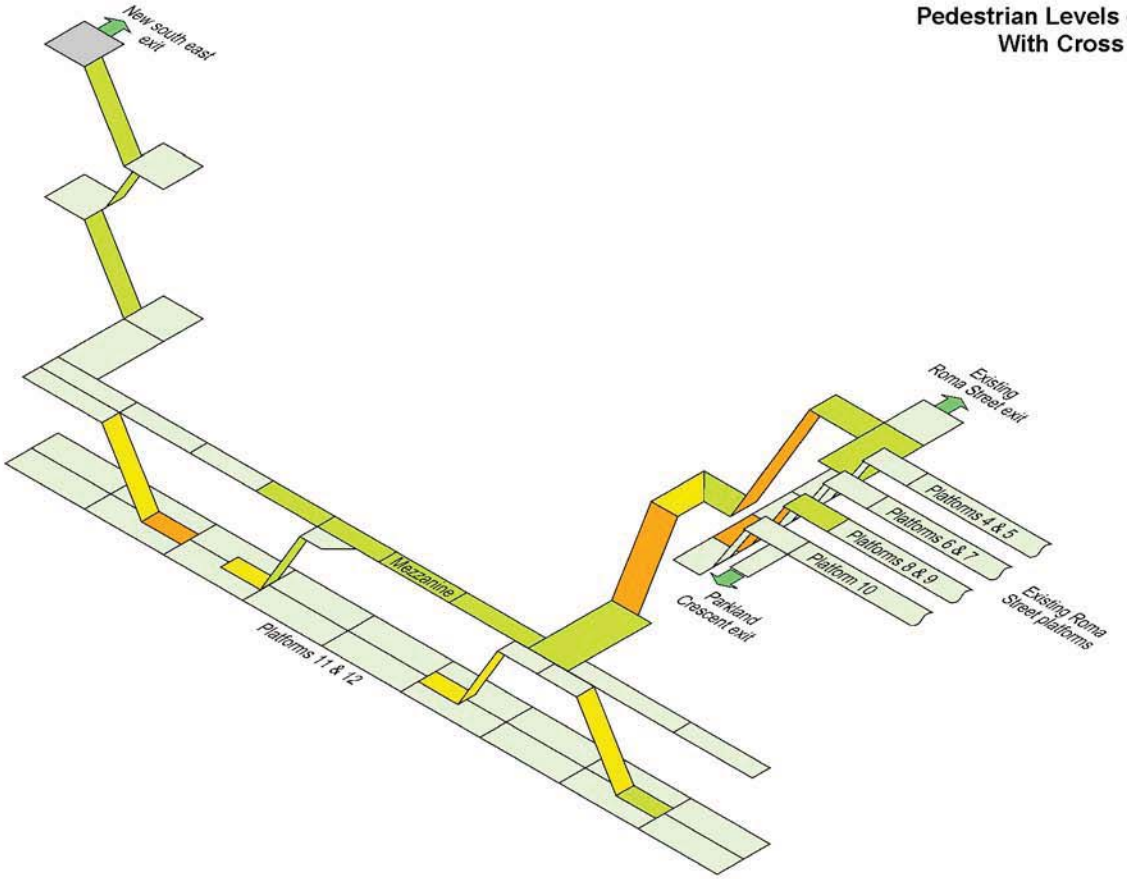
Modelled average levels of service for pedestrian activity at Roma Street Station during the morning peak are shown in **Figure 5-42**.

The model results illustrate that the reference design of the new underground section of Roma Street Station generally provides sufficient capacity to accommodate forecast pedestrian movements (with a LOS C or above). The most significant flows occur in the northern part of the station (principally the escalators linking the mezzanine with the existing Roma Street subway). This is due to the large forecast interchange volumes (approximately 10,000 interchanges from 7.00 am to 9.00 am between the surface and underground platforms. However, the modelled congestion levels are within acceptable bounds.

Pedestrian Levels of Service
Without Cross River Rail



Pedestrian Levels of Service
With Cross River Rail



Legend
- LOS A
- LOS B
- LOS C
- LOS D
- LOS E
- LOS F

Busiest 15 minutes

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-42

Roma Street Station
Pedestrian Levels of Service
2031 Morning Peak

CrossRiverRail

SKM aurecon
CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G088_CCR_Trans_Ped_LOS_Roma_St_Sta_A4_ver93.mxd 07/07/2011 15:36

Albert Street Station

Albert Street Station is forecast to cater for over 37,000 rail passenger boardings and alightings in the morning peak in 2031, virtually all of whom would arrive/depart on foot.

Albert Street Station has been modelled using ClicSim and average levels of service during the morning peak are shown in **Figure 5-43**. The pedestrian modelling indicates that the proposed design of Albert Street Station generally provides sufficient capacity to accommodate forecast movements in the 2031 morning peak. The most significant flows occur in the northern part of the station, corresponding to the heavier use of the northern exit. The model suggests that there may be intermittent congestion on and around the northern escalators. However, as multiple exit points are available from the station, it is expected that re-distribution of pedestrian access demand would occur if one entrance was more congested than another, and periods of congestion on the northern bank of escalators would be minimised.

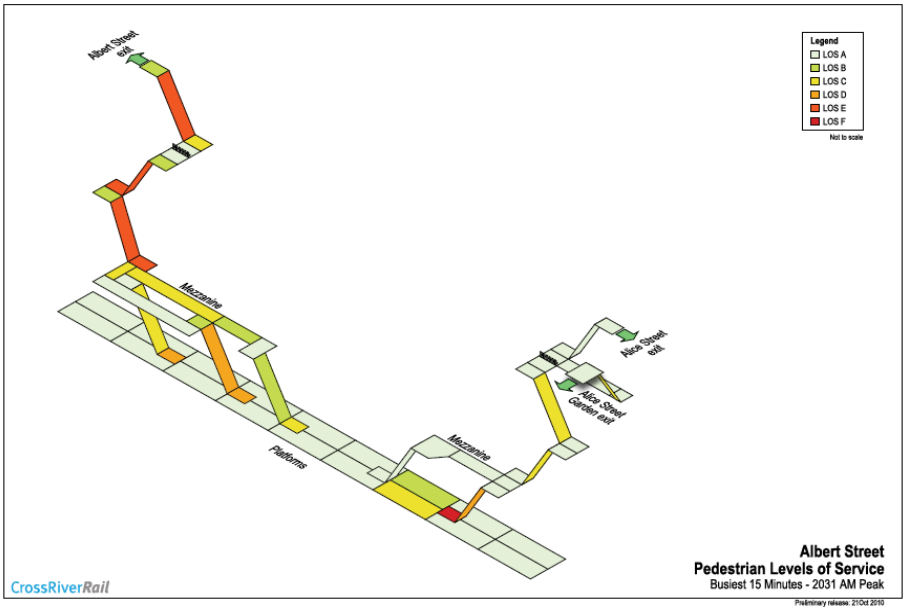


Figure 5-43 Albert Street Station pedestrian level of service in 2031 morning peak

Gabba Station

Gabba Station is forecast to cater for over 6,000 passenger boardings and alightings in the morning peak in 2021, and almost 11,000 passenger boardings and alightings by 2031.

Gabba Station would be a major bus rail interchange with almost 40% of station boardings and alightings involving a bus transfer in 2021, and over 30% in 2031. By 2031, the expected development of the surrounding precinct of high density mixed use activities would lead to an increase in pedestrian access to the station.

It is not expected that car (park ‘n’ ride or kiss ‘n’ ride) would be significant access modes for station passengers. The proposed pedestrian infrastructure at Gabba Station in 2031 with Cross River Rail operational has been modelled and assessed using ClicSim. Modelled average levels of service at Gabba Station during the morning peak are shown in **Figure 5-44**.

The assessment shows that the station design would provide ample capacity for 2031 morning peak forecast passenger demand. All parts of the station operate well within capacity across the morning peak.

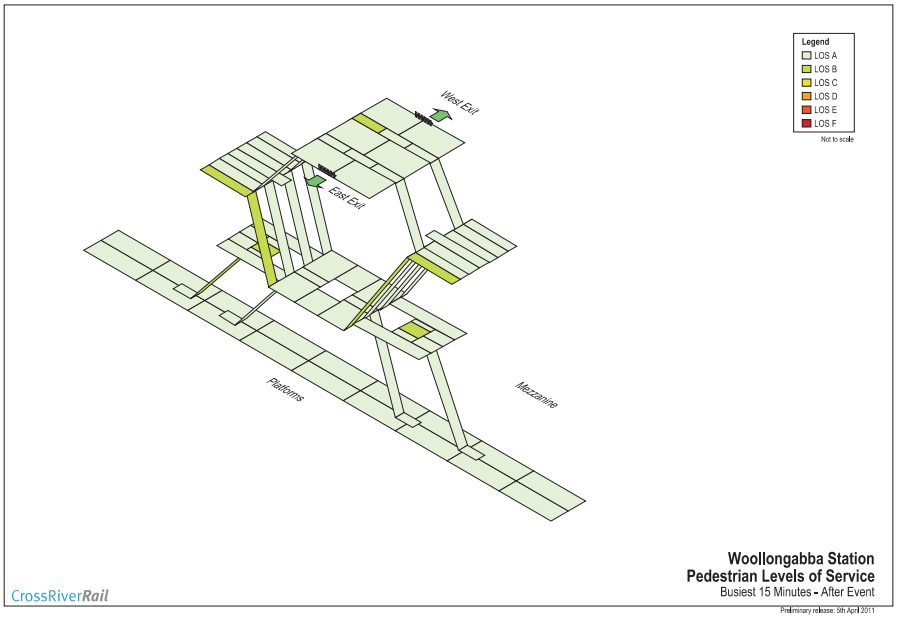


Figure 5-44 Gabba Station pedestrian level of service in 2031 morning peak

Maximum pedestrian activity will occur at this station after events at the nearby Gabba stadium which can accommodate up to 42,000 attendees. A detailed review of the expected performance of the Gabba Station design operating a public transport focussed transport strategy for a major event at the stadium is included in *Technical Report No. 1 – Transport.*

This assessment was based on a potential use of rail by 69% of the overall stadium crowd, with bus use by approximately 11% of attendees. Although it was found that pedestrian congestion is unavoidable during special events, particularly in the post-event period, sufficient pedestrian capacity and throughput could be achieved to facilitate clearance of rail passengers within 65 to 70 minutes, which is similar to the benchmark adopted for other venues. The station would require event crowd management to ensure escalators and platforms do not become overloaded, and that passenger volumes are regulated at or before the gate line on ground level.

Boggo Road Station

The Boggo Road Station is proposed to integrate with the existing surface rail and bus station. The station would become a strategic transport hub and forecast passenger activity including interchanging is shown in **Table 5-31**. Overall boardings and alightings would be greater in the morning peak in 2021 (+65%) and 2031 (+64%) with the Project. Both bus-rail and rail-rail transfer activity would increase due to the Project.

Table 5-31 Boggo Road Station forecast number of passengers and mode of access in morning peak period

AM peak	2009	2021			2031		
Mode		Without CRR	With CRR	% change	Without CRR	With CRR	% change
Walk/cycle	600	1,300	1,300	4%	2,500	2,700	5%
Rail	400	800	2,000	157%	1,200	2,000	63%
Bus	200	1,700	2,800	70%	1,300	3,700	180%
Car	100	100	100	32%	100	100	0
Total	1,200	3,800	6,300	65%	5,100	8,400	64%

ClicSim modelling has been undertaken for the Boggo Road Station and the forecast average levels of service for pedestrian movement during the morning peak with Cross River Rail are shown in **Figure 5-45**. The analysis demonstrates that the proposed design for the underground platforms and vertical circulation elements provide ample capacity for forecast 2031 morning peak conditions.

However, Cross River Rail is forecast to increase pedestrian flows on the existing pedestrian bridge connecting the platforms at Park Road Station due to interchanging passenger movements. For short periods during the busiest part of the peak, LOS D would be experienced, which is considered acceptable.

Yeerongpilly Station

Yeerongpilly Station would be relocated to become a strategic rail hub with four platforms, serviced by Cross River Rail trains from the Gold Coast and Beenleigh as well as surface rail services from Kuraby. The forecast passenger activity at Yeerongpilly Station is shown in **Table 5-32**. At this station a major increase in overall boardings and alightings in the morning peak in 2021 (+180%) and in 2031 (+63%) would occur with the Project compared to without the Project.

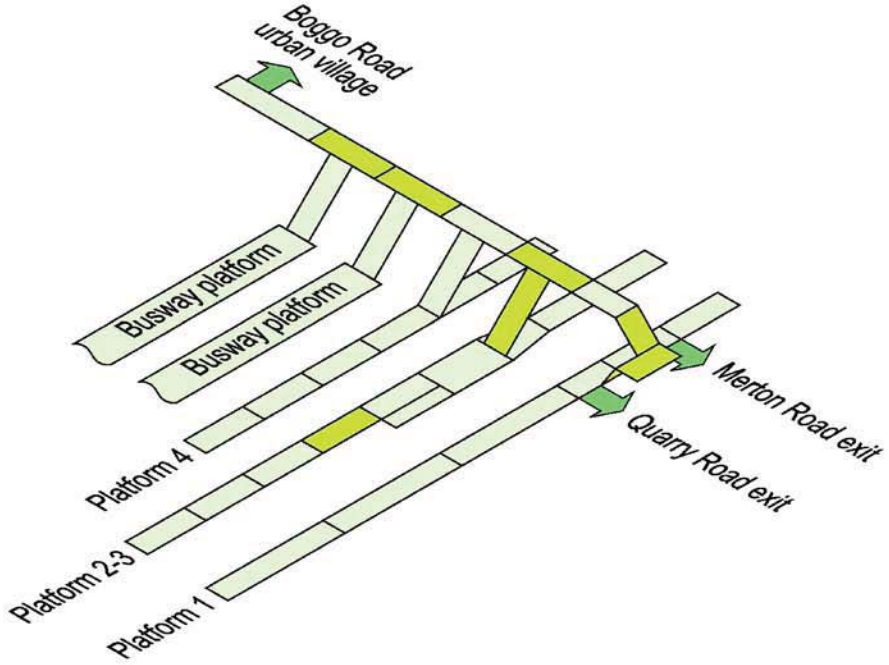
A significant increase in rail-rail transfers is forecast, with this activity being over 900% higher in 2021 with Cross River Rail compared to without the Project, and 280% higher in 2031. The forecast number of passengers transferring rail services is much greater than in 2021 than in 2031. This is due to the service pattern in 2021 that has less opportunity for rail passengers to use Cross River Rail services south of Yeerongpilly without interchanging. For example, services from Flagstone Creek are operational in 2031 and not 2021, which includes an interchange with Cross River Rail services at Salisbury in 2031.

Analysis for Yeerongpilly Station found that that in 2021 and 2031, the higher number of passengers with Cross River Rail has increased the required width (compared to existing) of some pedestrian infrastructure to achieve the desired LOS D or better. The station upgrades for Cross River Rail at Yeerongpilly Station will provide adequate widths to satisfy these performance requirements.

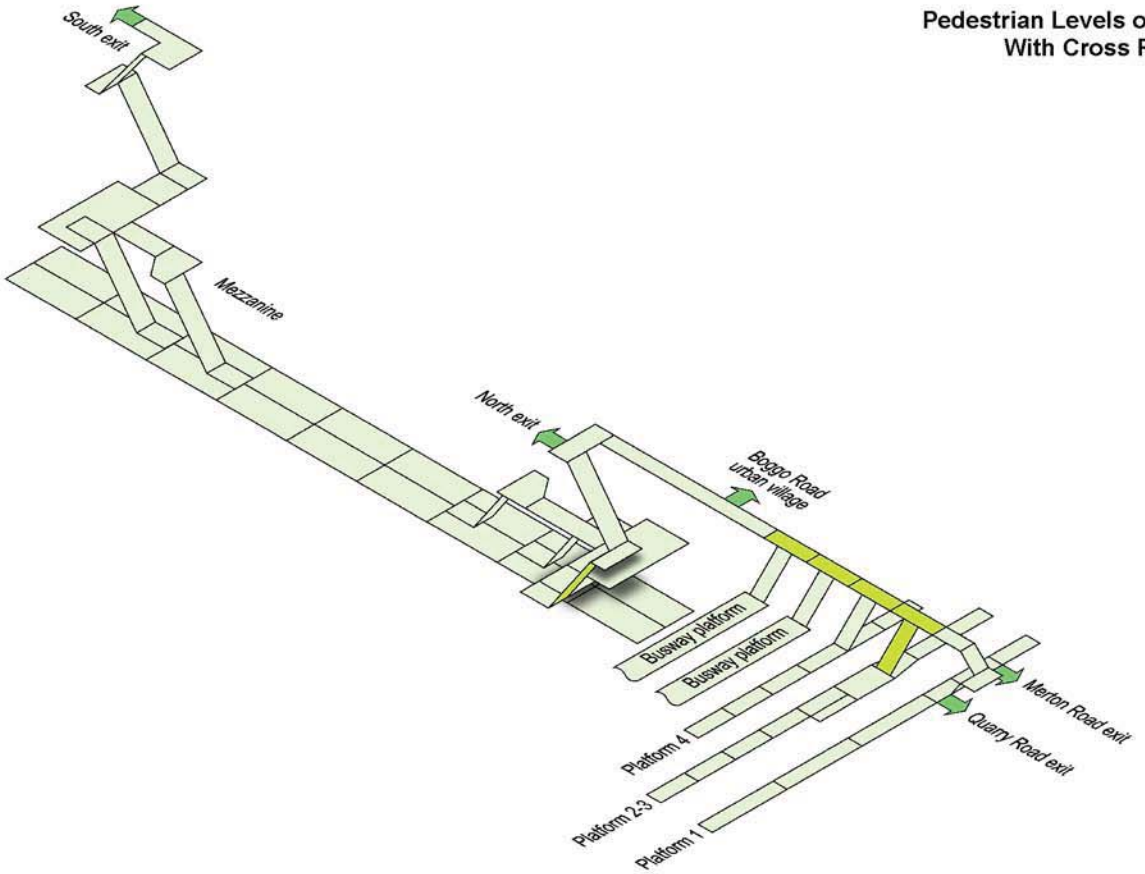
Table 5-32 Yeerongpilly Station forecast number of passengers and mode of access in morning peak period

AM peak	2009	2021			2031		
Mode		Without CRR	With CRR	% change	Without CRR	With CRR	% change
Walk/cycle	600	1,000	1,500	44%	1,700	2,300	35%
Rail	0	200	2,100	952%	200	800	280%
Bus	0	0	0	0%	0	0	0
Car	100	100	100	-1%	100	100	0
Total	700	1,300	3,700	180%	2,000	3,200	63%

Pedestrian Levels of Service
Without Cross River Rail



Pedestrian Levels of Service
With Cross River Rail



Legend
- LOS A
- LOS B
- LOS C
- LOS D
- LOS E
- LOS F

Busiest 15 minutes

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-45

Boggo Road
Pedestrian Levels of Service
2031 Morning Peak

CrossRiverRail

SKM aurecon
CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G090_CCR_Trans_Ped_LOS_Park_Rd_Sta_A4_ver93.mxd 07/07/2011 15:37

Rocklea Station

In 2021 there is forecast to be an increase in overall station activity with the Project compared to without the Project (+61%) due to an increase in rail service frequencies through Rocklea (from four to six trains per hour inbound) (refer to **Table 5-33)**. In 2031, there are more significant changes proposed in train service frequency with only three to four inbound trains per hour without the Project, but 13 inbound trains per hour with the Project. As such, patronage would be significantly higher (+121%) in 2031 with the Project than without the Project, with the majority of that increase coming from walk trips (an additional 220 trips), and some from car (an additional 35 trips). Bus and rail interchange at this station would be negligible both with and without the Cross River Rail in all future years.

A station capacity analysis of Rocklea Station showed that in 2031, the introduction of Cross River Rail would not have a significant impact on the level of service and the pedestrian infrastructure would have sufficient capacity for the forecast passenger demand.

Table 5-33 Rocklea Station forecast number of passengers and mode of access in morning peak period

AM peak		2021			2031		
Mode	2009	Without CRR	With CRR	% change	Without CRR	With CRR	% change
Walk/cycle	300	200	300	60%	200	400	129%
Rail	0	0	0	0%	<50	<50	-29%
Bus	0	<50	<50	-47%	<50	<50	-91%
Car	<50	<50	100	74%	<50	100	101%
Total	300	200	400	61%	200	500	121%

Salisbury Station

At Salisbury Station, in 2021 there is expected to be a reduction in overall activity with Cross River Rail and a slight increase by 2031, as illustrated in **Table 5-34**. The reduced frequency of stopping services at Salisbury Station in 2021 with Cross River Rail (six trains per hour inbound) compared to without the Project (14 trains per hour inbound) results in the forecast patronage drop. However, in 2031, significantly more services, up to 29 trains per hour, would use the station with Cross River Rail. Services in 2031 would include those from the proposed rail extension to Flagstone Creek, which would provide an interchange opportunity between the Flagstone Creek line and the Gold Coast and Beenleigh/Kuraby lines. Rail to rail transfers would become very significant by 2031.

Pedestrian infrastructure at the station would be satisfactory in 2021, however in 2031, with the assumed increase in train services and operating patterns, the current stair widths would not be satisfactory and the proposed operating pattern would require additional platforms and/or station accesses to be constructed. A station upgrade however is being planned as part of the Salisbury to Beaudesert (Flagstone Creek line) project.

Table 5-34 Salisbury Station forecast number of passengers and mode of access during morning peak period

AM peak	2009	2021			2031		
Mode		Without CRR	With CRR	% change	Without CRR	With CRR	% change
Walk/cycle	100	500	400	-12%	800	1,000	27%
Rail	10	400	<50	-98%	3,600	4,000	11%
Bus	30	300	200	-54%	300	400	21%
Car	50	100	100	34%	100	100	70%
Total	200	1,300	700	-48%	4,700	5,400	15%

5.7.2. Local road and traffic effects with Cross River Rail

Local traffic impacts at the affected rail stations were assessed through an analysis of:

- changes to forecast demands for park 'n' ride and kiss 'n' ride activity during peak periods at railway stations within the study corridor with the Project, compared to without the Project. The expected effects of any additional trips related to Cross River Rail relative to the available road, parking and loading infrastructure has also been assessed.
- modelled effects of changes in road capacity and intersection operations in the CBD with the Project, including for the new Albert Street Station. Based upon consultation with Brisbane City Council, the methodology applied to examine the effect of CBD road network changes, such as widened footways and additional pedestrian crossings, included a combination of SIDRA and Transyt intersection and traffic network analysis models.

Stations with minor local road and traffic changes

Seven stations within the study corridor would not require any physical changes to local access, parking or loading as a result of the Project. None of these stations would be directly served by Cross River Rail services, although some effects would result due to changes in operational arrangements and travel patterns. At **Wooloowin Station**, forecast differences in both park 'n' ride and kiss 'n' ride activity in the morning peak are small and the overall park 'n' ride demands could be accommodated within the current park 'n' ride facility which has capacity for 190 vehicles.

At **Albion Station**, little change is forecast in morning peak or daily kiss 'n' ride activity with or without the Project. Morning peak kiss 'n' ride trips would be around 8% more in 2031 with Cross River Rail compared to without the Project. As there is a range of provision for kiss 'n' ride opportunities in the vicinity of the station, no additional infrastructure would be required. With current park 'n' ride capacity of around 300 cars, park 'n' ride demands in excess of supply are forecast with or without the Project.

At **Bowen Hills** Station park 'n' ride demands are negligible. Minor changes in peak and daily kiss 'n' ride activity are expected with around 6% more trips across the day (5% in the morning peak) in 2031 with the Project compared to without the Project. There are sufficient provisions for kiss 'n' ride activity on Hudd Street near the station to accommodate the minor increase with the Project, and no infrastructure or mitigation would be required.

At **Dutton Park** Station there are no forecast park 'n' ride demands although kiss 'n' ride activity is expected to increase slightly with the Project. With the Project, overall kiss 'n' ride demands, in 2031, are forecast to be 3% more daily, and 5% higher in the morning peak, compared to without the Project. Kiss 'n' ride demands would be equivalent to only one or two vehicles per minute in the peak 15 minutes. Park 'n' ride demand is minimal, and considering the existing 2P (two hour) controlled parking on most of the surrounding streets, any additional kiss 'n' ride activities would be restricted to short sections of unrestricted parking. Given the current taxi facility on Cornwall Street and kiss 'n' ride opportunities on Kent Street no detrimental traffic or parking impacts are expected.

At **Fairfield Station**, park 'n' ride demands are forecast to be minor and not expected to change significantly between 2009 and 2031 with or without the Project. Daily kiss 'n' ride activity is expected to increase by around 26% across the morning peak in 2031 with the Project (compared to without the Project) which would be the equivalent of one to two vehicles per minute in the peak 15 minutes. These could be accommodated on Midmay Street and Lagonda Street without detrimental impacts.

At **Yeronga Station**, park 'n' ride demands are forecast to be relatively high with up to 29% more trips forecast in the 2031 morning peak with the Project compared to without the Project. On a daily basis expected demands are only 7% higher. Currently there are 64 formal park 'n' ride spaces at Yeronga station, with further on-street parking totalling a supply for 160 cars. Increased parking demands with or without the Project, would exceed current park 'n' ride capacity, and as such on-street parking controls may be required to manage demands at and around this station, regardless of the Project.

Daily kiss ‘n’ ride activity is forecast to increase with the Project, with morning peak kiss ‘n’ ride demands in 2031 up by around 48% compared to without the Project. Kiss and ride demands in the 2031 morning peak 15 minutes would be the equivalent to about one to two cars per minute with Cross River Rail compared to without the Project. This level of activity could be accommodated via use of the existing short term drop-off zone on Lake Street or side streets off Fairfield Road.

At **Moorooka Station** park ‘n’ ride demands are forecast to be relatively low with up to 50 daily park ‘n’ ride trips in 2031 with the Project. Without the Project these demands are expected to be around 4% less in 2031. Park ‘n’ ride demands associated with the station are relatively small and the Project has a negligible effect on overall demands. Daily kiss ‘n’ ride activity is forecast to increase to 190 per day (100 per day in the morning peak) by 2031 with the Project. Cross River Rail would result in a 65% increase in overall kiss ‘n’ ride demands at this station which would translate into around 40 additional morning peak period drop-off trips, or around one additional car every two minutes. The kiss ‘n’ ride demands with the Project could be satisfactorily accommodated within existing on-street zones on Ipswich Road with no further works proposed.

Impacts on roads around Ekka Station

Changes in local road network and demands

O’Connell Terrace immediately adjacent to the northern entrance of the proposed Ekka Station would be rebuilt as part of the Project, due to the need to provide greater clearance over the rail corridor. The existing road capacity would be retained (two westbound lanes and one eastbound lane) along with space for three taxi bays and four passenger drop-off bays. The raising of the bridge would also require the re-grading of O’Connell Terrace for around 70 m to the east and 150 m to the west. Current private accesses from O’Connell Terrace would need to be amended and re-graded.

Future accesses to O’Connell Terrace as outlined in the approved RNA masterplan would not be achievable. Reconfiguration of proposed internal access roads within the RNA Showgrounds would be likely. Car park entrances and vehicle loading zones would be moved to ensure an operable alternative. Detailed access proposals for each development site within the RNA masterplan area would form part of individual planning applications to the ULDA. These would need to consider Cross River Rail requirements, including future changes in the level of O’Connell Terrace.

There is no park ‘n’ ride activity associated with the Ekka Station forecast with Cross River Rail. In the morning peak period in 2021, 240 kiss ‘n’ ride drop-off trips in the morning peak period are forecast.

Impact assessment and mitigation

The proposed alterations to O’Connell Terrace would not result in any loss of existing road capacity and would allow an additional eastbound lane (as and when required) in response to wider network needs through the removal of parking bays. As no park ‘n’ ride demands are expected at Ekka Station, there would be no changes required to existing on-street parking controls in the vicinity of the station. Forecast kiss ‘n’ ride activity in the 2021 morning peak (the busiest forecast year) equates to around three cars per minute in the busiest 15 minutes of the morning peak. As three taxi bays and four passenger drop-off bays are proposed on the southern side of O’Connell Terrace, adjacent to the station’s northern entrance, these demands would be satisfactorily catered with no detrimental impacts on surrounding roads.

Impacts on roads around Central Station

Changes in local road network and demands

There are no physical road network changes planned as a result of Cross River Rail in the vicinity of Central Station. Cross River Rail would not serve Central Station. The Project is forecast to reduce the overall number of passengers using Central Station, compared to without the Project, in both 2021 and 2031.

As with the current situation, there are no forecast park ‘n’ ride trips at Central Station in future years. Minor changes in peak and daily kiss ‘n’ ride activity are forecast for Central Station in both 2021 and 2031.

Impact assessment and mitigation

The expected changes to kiss ‘n’ ride activity at Central Station are small and would not generate adverse traffic impacts around Central Station, or the need for additional provisions.

Impacts on roads around Roma Street Station

Changes in local road network and demands

Road network changes at Roma Street would include:

- provision of a new right turn from Roma Street west to Makerston Street for buses only that would require a new phase at this signal controlled intersection
- closure of the current right turn for buses from Roma Street to George Street, and from George Street to Herschel Street, combined with a new signalised pedestrian crossing of Herschel Street on the northern side of George Street
- minor modifications to the intersection of Roma and Herschel streets to accommodate a new pedestrian crossing on the western side of the intersection
- minor modifications to the intersection of Roma Street and Parklands Boulevard to accommodate a new pedestrian crossing on the eastern side of the intersection.

The key change to vehicle circulation associated with Cross River Rail would be the redirection of buses from Herschel Street to Makerston Street in the eastbound (inbound) direction. Outbound buses would continue to use George and Roma streets.

There are no other changes to vehicle access or circulation required as part of the Project. All existing turning movements, private accesses and on-street parking and loading opportunities would remain as per the existing situation.

As with the scenario without the Project, negligible park ‘n’ ride activity at Roma Street Station for suburban rail users is expected in either 2021 or 2031. Kiss ‘n’ ride activity would be expected to increase from current levels, with and without the Project.

Impact assessment and mitigation

There would not be any significant changes in road traffic demands associated with Cross River Rail in relation to forecast changes in kiss ‘n’ ride or park ‘n’ ride demands. The forecast morning peak kiss ‘n’ ride demands in 2031 of 270 drop-off trips would equate to around four vehicles trips per minute in the busiest 15 minutes. This activity could comfortably be accommodated in the existing off-street provisions within the Transit Centre car park, where there is capacity for at least six taxis and other vehicles. No additional facilities or mitigation measures would be required.

Traffic modelling using Transyt has also been undertaken to assess the traffic impacts of the proposed physical road network changes in the vicinity of Roma Street Station in both the morning and evening peaks, in 2016 and 2031, with and without Cross River Rail. Note that 2016 modelling results have been reported as indicative of anticipated 2021 traffic conditions due to low background traffic growth in the CBD, calculated at less than 1% per annum.

A summary of the results of the Transyt modelling analysis, and a comparison with existing (2010) conditions, is shown in **Table 5-35**.

Table 5-35 Effect on traffic operations in the vicinity of Roma Street Station

Intersection	Peak	2010		2021				2031			
		Existing		Without CRR		With CRR		Without CRR		With CRR	
		DOS	LOS	DOS	LOS	DOS	LOS	DOS	LOS	DOS	LOS
Roma Street/ Makerston Street	AM	0.63	A	0.65	A	0.64	A	0.71	A	0.68	B
	PM	0.59	B	0.61	B	0.64	A	0.66	B	0.71	B
Roma Street/ Herschel Street	AM	0.42	A	0.44	A	0.54	A	0.47	A	0.58	A
	PM	0.52	B	0.51	B	0.45	A	0.57	B	0.51	A
Roma Street/ Parklands Boulevard	AM	0.92	B	0.95	B	0.70	B	0.93	B	0.79	B
	PM	0.93	B	0.96	B	0.66	B	0.92	B	0.71	B
George Street/ Herschel Street	AM	0.83	D	0.85	D	0.55	B	1.00	F	0.59	B
	PM	0.72	C	0.73	C	0.67	C	0.78	D	0.67	C

Source: AECOM, 2010d

Note: Intersection LOS has been calculated based upon average delay.

The assessment of effect on traffic operations shows:

- At the intersection of Roma and Makerston streets, overall level of service (LOS) would remain the same (LOS A) in 2021 and would be slightly worse (LOS B rather than LOS A) in 2031 in the morning peak. In the evening peak, the overall level of services would remain similar with Cross River Rail. The degree of saturation (DOS) during morning and evening peaks for both 2021 and 2031 would be within desirable maximum capacity.
- The intersection of Roma and Herschel streets would experience a slight increase in average intersection delays in 2021 with the Project but negligible change in the 2031 morning peak, with the intersection performing well (LOS A) in all scenarios. In the evening peak, an improvement in intersection performance is forecast with less average delay in 2021 and 2031 and an improvement in overall level of service from LOS B to LOS A in both 2021 and 2031 evening peaks. The intersection degree of saturation would be within the desirable maximum capacity in all years for both peak periods.
- The intersection of Roma Street and Parklands Boulevard is forecast to show reduced overall intersection delays in both 2021 and 2031 with the Project compared to without the Project, and experience an overall LOS B in all scenarios and years in the morning peak. The DOS would improve, reducing from 0.93 in 2031 without the Project to 0.79 with the Project. In the evening peak, there would be a similar outcome.
- The proposed modifications to the intersection of George and Herschel streets would lead to an improvement in the morning peak performance of the intersection from an expected LOS D in 2021 and LOS F in 2031 (without Cross River Rail) to LOS B in 2021 and 2031 with the Project. The degree of saturation would also improve with the Project. Similarly, in the evening peak, the intersection would experience improved level of service and reduced saturation, operating within capacity with the Project.

An analysis of journey times from the Transyt model shows that in 2021 Cross River Rail would provide a general improvement in network journey times with the exception of an average 16 second increase for the eastbound movement along Roma Street in the morning peak. This increase in delay would be due to the new pedestrian crossing facility provided at the Herschel Street intersection which would reduce the available phase green time for this movement.

Whilst Cross River Rail would provide a general improvement to journey times in the network during the evening peak, increased journey times compared to without Cross River Rail along Roma Street in 2031 of the order of 18 seconds westbound and 16 seconds eastbound are forecast. This would occur due to the additional pedestrian crossing facilities along Roma Street and the substantial increase in pedestrian volumes. The increased pedestrian volumes would require a higher percentage of the phase time splits at the signalised intersections to be allocated to the side roads such as Parklands Boulevard and Makerston Street.

In both 2021 and 2031, a benefit of Cross River Rail would be journey time savings at the intersection of George and Herschel streets due to the removal of the two bus-only right turn phases. In the morning peak this change would provide a 50% reduction in bus journey times along the George Street area.

The redirected inbound buses would be expected to experience a slight reduction in route distance compared to the current 300 m route from Roma Street to North Quay via Herschel Street compared to the proposed route from Roma Street to North Quay via Makerston Street (approximately 260 m), inclusive of one set of traffic signals. Bus journey times are forecast to have marginal time savings with Cross River Rail.

The assessment has shown that the road network changes in the vicinity of Roma Street Station would facilitate acceptable traffic performance. Intersections would operate within capacity with an improvement compared to the without Cross River Rail scenarios in some cases. The overall impacts of the Project's proposed surface changes to the local road network around Roma Street are considered minimal and manageable.

Impacts on roads around Albert Street Station

Changes in local road network and demands

Proposed permanent road network changes at Albert Street are described in **Chapter 4 Project Description**. Footpath widening is required at some locations to cater for the pedestrian demand that are facilitated through amendments to the traffic layout, namely:

- Minor reductions in lane capacity at the intersection of Albert and Charlotte streets including removal of the dedicated right turn lane from Charlotte Street (east) in order to widen the footway. A schematic representation of the proposed changes is shown in **Figure 5-46**.
- Minor reductions in lane capacity at the intersection of Albert and Mary streets, as shown in **Figure 5-47**, including reduction of the Albert Street north approach to a single lane, conversion of one lane on the Mary Street east approach to a dedicated right turn and creation of a second lane on the Mary Street west approach as a dedicated right-turn lane.
- Conversion of redundant carriageway to footway at the corner of Margaret and Albert streets on the Margaret Street exit side of the intersection. Existing full time kerbside currently prevents through traffic using these lanes. This change would not reduce intersection capacity.
- Removal of the left lane of Alice Street at Albert Street. This lane is currently allocated for kerbside use at all times. This change would not reduce intersection capacity.
- Relocation of 30 m of taxi loading zone from Albert Street into Mary Street in order to widen approximately 50 m of the western side of Albert Street between Charlotte and Elizabeth streets. This change does not alter lane configurations or traffic capacity at the intersection of Albert and Elizabeth streets.
- A range of other minor changes to parking and loading bay location or capacity.
- The addition of the Albert Street Station would also generate some kiss 'n' ride activity, although no park 'n' ride demand is expected. By 2031, with Cross River Rail there is expected to be up to 170 kiss 'n' ride drop-off trips per day (100 trips in the morning peak) which would be equivalent to less than one vehicle per minute.

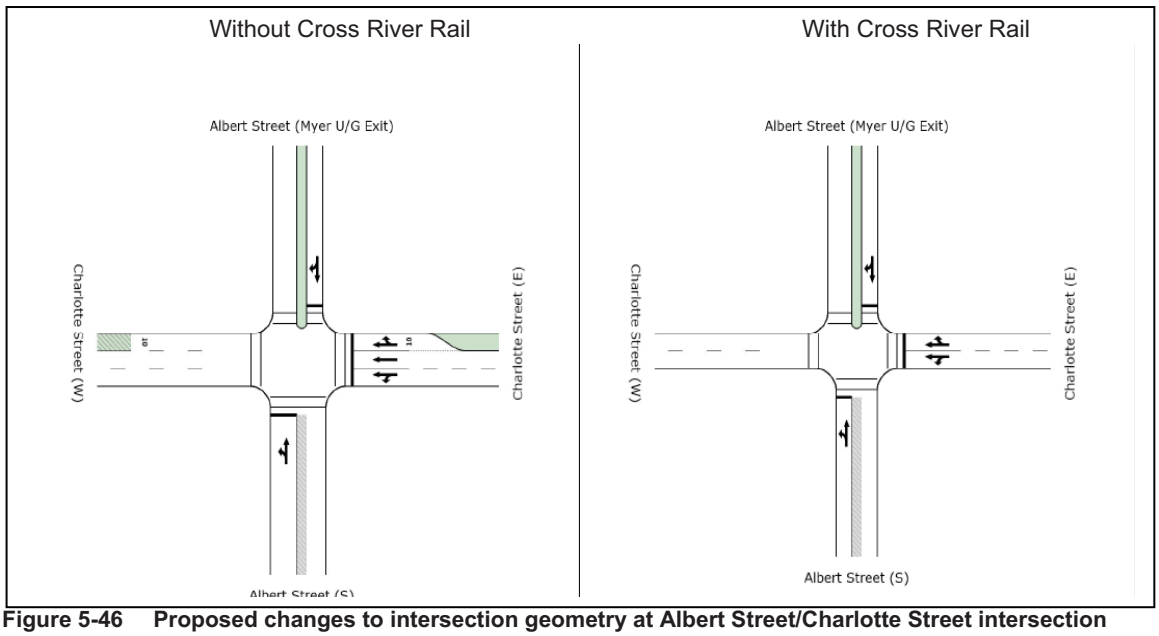


Figure 5-46 Proposed changes to intersection geometry at Albert Street/Charlotte Street intersection

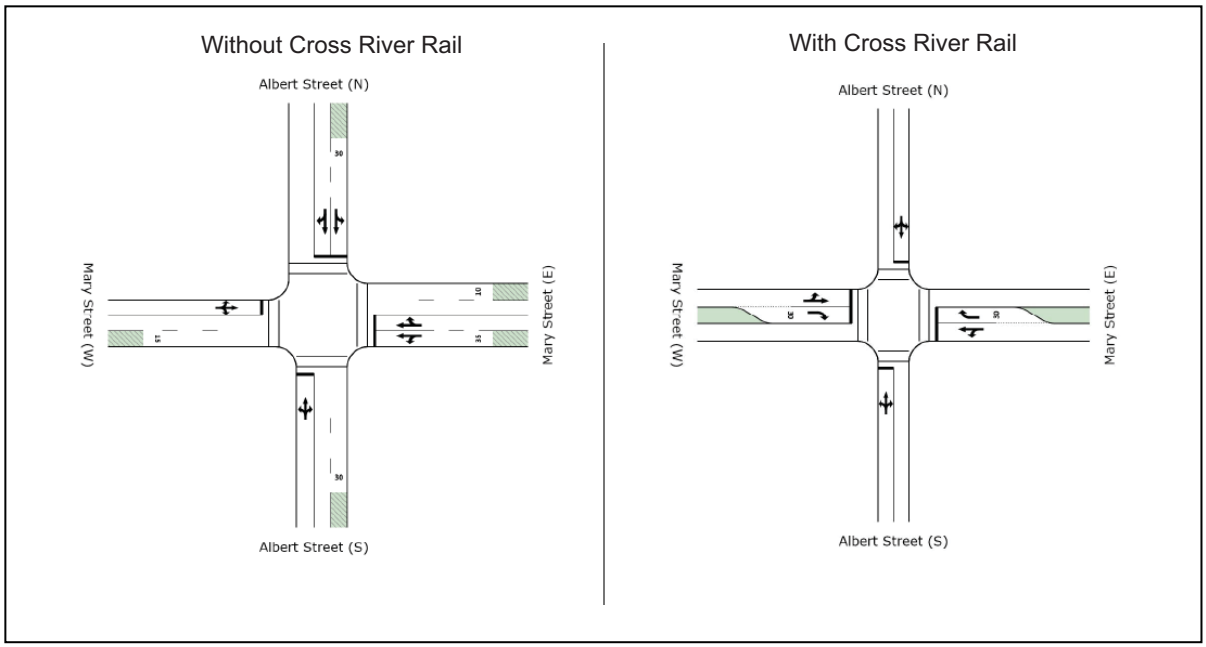


Figure 5-47 Proposed changes to intersection geometry at Albert Street/Mary Street intersection

Impact assessment and mitigation

The traffic operational impacts of the proposed capacity changes at the intersection of Albert and Mary streets and Albert and Charlotte streets is summarised in **Table 5-36**. Both morning and evening peaks have been modelled using SIDRA, with and without Cross River Rail for 2016 and 2031, and compared to the existing (2010) performance. Note that 2016 modelling results have been reported as indicative of anticipated 2021 traffic conditions due to low background traffic growth in the CBD, calculated at less than 1% per annum.

Table 5-36 Effect on traffic operations in the vicinity of Albert Street station

Intersection	Peak	2010		2021				2031			
		Existing		Without CRR		With CR CRR		Without CRR		With CRR	
		DOS	LOS	DOS	LOS	DOS	LOS	DOS	LOS	DOS	LOS
Albert and Charlotte streets	AM	0.37	B	0.56	B	0.59	B	0.71	B	0.80	C
	PM	0.54	B	0.58	B	0.65	B	0.74	B	0.93	C
Albert and Mary streets	AM	0.52	B	0.53	B	0.49	B	0.63	B	0.60	B
	PM	0.50	B	0.49	B	0.54	B	0.58	B	0.64	B

Source: AECOM, October 2010d

Table 5-36 shows that there would be a minimal change in the level of service and degree of saturation at the intersection of Albert and Charlotte streets in 2021, but a slight worsening of both indicators in 2031 with the Project compared to without the Project. Nevertheless the intersection would operate within capacity and the estimated traffic impacts would be relatively minor and considered necessary in order to mitigate potential impacts to pedestrian safety and comfort, should footway widening not be achieved.

Changes to the intersection of Albert and Mary streets would result in no change in level of service due to the Project in both peak periods in either 2021 or 2031. The analysis also reveals minor improvements in degree of saturation in the morning peaks in 2021 and 2031 (with the Project compared to without the Project) although with a slight worsening of degree of saturation in the evening peak for both 2021 and 2031 as a result of Cross River Rail. Nevertheless, the intersection would perform well and would be well within capacity, in both 2021 and 2031 with Cross River Rail implemented.

A wide range of parking and loading changes are proposed to accommodate Albert Street Station and the related footway widening works. Changes to parking and loading can have a detrimental impact to businesses in terms of access for deliveries and customers. The key issues associated with each of the proposed road network changes, inclusive of parking and loading bay changes, are summarised in **Table 5-37** along with mitigation measures, where appropriate.

Table 5-37 Summary of road network changes and mitigations in vicinity of Albert Street station

Reference design feature and/or road network change	Likely impact and proposed mitigation
Conversion of redundant carriageway to footway on the Margaret Street exit side at the corner of Margaret and Albert streets. Existing full time kerbside uses prevent through traffic using these lanes. No change to capacity on the Margaret Street western approach to the intersection.	This is an efficient use of space with no detrimental impact on traffic. A positive benefit to both cars and pedestrians likely as pedestrian crossing distance is reduced (with shorter clearance times). Left and right turning traffic across the pedestrian streams could clear the intersection sooner.
Remove the left lane of Alice Street at Albert Street, which has current kerbside uses at all times.	This would result in no loss of traffic capacity and therefore no detrimental impacts on traffic operations. Refer also separate assessment of parking and loading impacts.

Reference design feature and/or road network change	Likely impact and proposed mitigation
Reduction in taxi loading bay on western side of Albert Street (between Charlotte and Elizabeth streets) from 70 m to 40 m in order to widen approximately 50 m of the western side of Albert Street between Charlotte and Elizabeth streets.	Relocation of 30 m of this taxi loading zone to Mary Street is a potential strategy to offset the loss of taxi loading from this location. The Mary Street location could then function as a secondary taxi loading zone and/or taxi holding area. However there is still a possibility of taxis joining the shortened Albert Street taxi rank and over-spilling into the through lane, and as such this is considered a short term solution only. Longer term changes to close this link to general traffic and or better manage taxi queuing should be further considered in conjunction with BCC.
No change to lane configurations or traffic capacity at the intersection of Albert and Elizabeth streets.	No detrimental impacts in terms of traffic or parking/loading at the intersection of Albert and Elizabeth streets would be expected
Loss of four two-hour parking bays on Alice Street.	This is considered a minor impact as retail and commercial activity is very low in this CBD precinct and likely to remain so in the future.
Loss of two two-hour parking bays on south side of Mary Street (west of Albert Street) due to alignment of proposed new westbound lane.	This is necessary to accommodate footway widening and is considered a minor detrimental impact.
Loss of one 5 m loading bay on south side of Mary Street (west of Albert Street) due to alignment of proposed new westbound lane.	This is considered to be a detrimental impact. However this 5 m loading bay could be relocated 15 m west of its current location through removal of one additional two hour parking bay (immediately west of the two listed above on the south side of Mary Street).
Loss of two loading bays (10 m) on the north side of Mary Street (east of Albert Street) due to new 30 m taxi loading zone.	This is considered a minor detrimental impact, given that on-street loading demand in this location is likely to be reduced by the removal of the adjacent buildings to accommodate the station entrance.
Loss of two loading bays (10 m) and two two-hour parking bays on the south side of Mary Street (east of Albert Street) for additional taxi loading.	As previously described, the loss of these parking and loading bays would eventuate from a strategy to off-set taxi loading losses in Albert Street. As effects are difficult to manage, it is recommended that these bays remain, and alternative taxi management measures are pursued.
Removal of 15 m of loading zone from the western side of Albert Street and 10 m from the eastern side of Albert Street (between Mary and Charlotte streets).	Re-provision of 30 m of timed (off-peak) footway loading zone on the eastern side of Albert Street is likely to sufficiently compensate for this loss of loading zone. It is noted that the current 10 m loading bay is immediately adjacent to buildings which would be removed to accommodate the station entrance, thereby reducing on-street loading demands overall.
Loss of three motorcycle spaces removed on the south side of Charlotte Street (west of Albert Street).	It is possible that minor kerb design alterations could mean these motorcycle bays (which are currently being converted to CityCycle bays) could be retained and further design refinement is recommended.
Loss of one loading bay on the north side of Charlotte Street (west of Albert Street).	Minor changes to kerb geometry could result in this loading bay being retained and therefore further design refinement is recommended to maintain this bay.
Loss of one two-hour parking bay on the north side of Charlotte Street (east of Albert Street).	Minor changes to kerb geometry could result in this parking bay being retained and therefore further design refinement is recommended to maintain this bay.

Impacts on roads around Gabba Station

Changes in local road network and demands

The implementation of the Project requires permanent realignment of the bus layover zone on the South East Busway (Woolloongabba spur), immediately west of the Woolloongabba Busway Station.

No other changes to traffic signals or external site accesses are proposed as part of the Project, although it is noted that network changes are being investigated by TMR, the ULDA and BCC as part of the Woolloongabba UDA development. These broader changes are not required to support the implementation of Cross River Rail and therefore have not been assessed as part of this EIS.

Cross River Rail is not expected to generate any park 'n' ride traffic at this station. Up to 460 kiss 'n' ride trips per day (250 trips in the morning peak two-hour period) are forecast by 2031 for the Gabba Station.

Impact assessment and mitigation

The realignment of the bus layover zone includes proposed minor changes to layout of the layover area which will result in no net loss of bus parking or operational flexibility.

Additional demands generated by kiss 'n' ride trips to the Gabba Station would be equivalent to around three to four vehicles per minute (in the busiest 15 minutes) by 2031. In the short term after Cross River Rail opening, kiss 'n' ride and taxi access could occur on the Stanley Street service road immediately opposite the station on the southern side of Stanley Street. The ultimate planned development of the Woolloongabba UDA would include a range of internal roads and additional drop-off zones to serve the station and other activities.

Impacts on roads around Boggo Road Station

Changes in local road network and demands

Changes to the road network in the vicinity of the Boggo Road Station would be limited to provision of two new pedestrian crossings on roads within the Boggo Road Urban Village and minor kerb and footway changes on the western side of Annerley Road. The crossings would be located on Boggo Road and Peter Doherty Street.

Park 'n' ride demands at Boggo Road Station are forecast to be relatively low with up to 114 daily trips in 2031 (25 trips in the morning peak) with the Project. Without the Project, these demands are expected to be 5% to 10% less.

Forecasted daily kiss 'n' ride trips are expected to reach 500 trips per day (290 trips in the morning peak) by 2031 with the Project. These 290 morning peak drop-off trips would be equivalent to around four trips per minute in the peak 15 minutes. Cross River Rail would not significantly increase overall kiss 'n' ride demands, ie in 2031, daily drop-off volumes are forecast to be 3% more with the Project.

Two taxi bays and two passenger loading bays are proposed on the northern side of Boggo Road as part of the Project, through conversion of currently undesignated kerb line (indented bays) within the EcoSciences Precinct construction zone.

Impact assessment and mitigation

The proposed new zebra pedestrian crossings would be an appropriate form of control for the forecast traffic, pedestrian volumes and function of the roads.

Park 'n' ride demand by 2031 would be equivalent to around 100 cars. As there are existing parking controls in place as part of the Dutton Park Traffic Area, on-street parking intrusion into sensitive areas close to the station would be mitigated.

Kiss ‘n’ ride demands are not expected to generate significant traffic impacts The two taxi bays and two passenger loading bays proposed on Boggo Road as part of the Project, along with existing on-street drop-off opportunities on Quarry Street and Merton Road (to the north of the station) would be more than sufficient to meet forecast demands.

Impacts on roads around Yeerongpilly Station

Changes in local road network and demands

Several road and parking changes are required to accommodate new Cross River Rail tracks and the relocated Yeerongpilly Station including:

- the realignment of Wilkie Street to the east, including the introduction of a reverse curve north of Crichton Street to tie the realigned route back into the existing Wilkie Street south of Cardross Street
- retention of on-street parking on Wilkie Street with provision for indented bus bays on Wilkie Street adjacent to Yeerongpilly Station
- provision for recessed taxi bays and four kiss ‘n’ ride bays on Wilkie Street adjacent to the station entrance
- introduction of new bus lay-bys on Fairfield Road to cater for existing and new bus services
- removal of the two existing off-street park ‘n’ ride zones which have a current capacity for 24 commuter vehicles.

Park ‘n’ ride demands at Yeerongpilly Station were observed to be relatively low in 2009. The 2009 TransLink park ‘n’ ride survey indicated current demand for over 90 informal park ‘n’ ride cars as well as 24 formal park ‘n’ ride cars – a total of 114 cars. The modelled demand for park ‘n’ ride boarding trips is forecast to increase to over 200 cars in 2031 with the Project. Without the Project in 2031, parking demands are forecast to be around 6% less.

Daily kiss ‘n’ ride activity is expected to increase from 100 drop-offs per day (50 drop-offs in the morning peak) in 2009 to up to 230 drop-offs per day (120 drop-offs in the morning peak) by 2031 with the Project. The Project would result in a 50% increase in daily kiss ‘n’ ride activity at this station.

Impact assessment and mitigation

The changes to the road network, in particular the realignment of Wilkie Street would not alter the current connectivity to east-west local roads with no changes to overall vehicle permeability or connectivity for residents. The impact of these changes is not considered to have any detrimental impact on traffic flow or efficiency of the local network.

The loss of off-street parking at the station would have some overspill impacts, with commuter parking likely to transfer onto surrounding streets. The introduction of fast, frequent Cross River Rail services from Yeerongpilly would result in a travel time of 10 minutes to the CBD that would be at least twice as quick as from adjacent stations. This improvement in travel time is likely to result in many more rail users travelling to Yeerongpilly to commence their rail journey to the CBD. Further investigation of potential on-street commuter parking restrictions is recommended as a mitigation strategy, ie through the introduction of a weekday resident parking scheme in the streets that surround the station. An area extending to Park Road in the east, School Road and Cook Street in the north, the Queensland Tennis Centre in the west and Moolabin Creek in the south (representing the core 400 m to 500 m catchment of the station) are recommended for consideration of such a scheme.

Forecast kiss ‘n’ ride demands in 2031 with Cross River Rail translate into around 45 additional morning peak period drop-off trips or around one additional car every two minutes. Total morning peak drop-off trips equates to one to two cars per minute. The Project includes provision for two taxi bays and four passenger loading bays which would be expected to be sufficient to cater for 2031 demands.

Impacts on roads around Rocklea Station

Changes in local road network and demands

Cross River Rail would not serve Rocklea Station. However, changes are required to the road alignment at the intersection of Muriel Avenue, Fairfield Road and Sherwood Road to cater for a new rail overbridge. Furthermore, in order to accommodate an additional two rail tracks underneath the Ipswich Motorway, the existing Station Road (and motorway on ramp) would need to be reduced to one lane. A new underpass would be required under the Ipswich Motorway with the remaining one lane road used for local access to Station Street.

Cross River Rail would require the closure of the Beaudesert Road service road open level crossing. This would require traffic to divert along an alternative route. Alternative access from the southern side of the crossing, to northern destinations would be via Beaudesert Road service road (on the eastern side of Beaudesert Road) and via turning right at the intersection of Beaudesert Road and Lillian Avenue, representing a maximum diversion of around 800 m. Given the additional right turn demands likely to be placed on the intersection of Lillian Avenue and Beaudesert Road as a result of this diversion route, signalisation of this intersection is proposed as part of the Project. From the northern side of the level crossing, access to the south is available via Gladstone Street, Muriel Avenue and Beaudesert Road. This would represent a maximum diversion of around 1.4 km. Signalisation of the intersection of Gladstone Road and Muriel Avenue is proposed as part of the Project to address this diversion route.

No proposed changes are planned to property access, parking or loading.

Differences in forecast park ‘n’ ride demands at Rocklea Station with or without the Project are negligible. However, daily kiss ‘n’ ride activity is expected to increase to 130 trips per day (70 trips in the morning peak) by 2031 with the Project. Cross River Rail would result in a 60% increase in overall kiss ‘n’ ride demands at this station which would translate into around 24 additional morning peak drop-off trips, or around one additional car every three minutes.

Impact assessment and mitigation

The proposed changes at the intersection of Muriel Avenue, Fairfield Road and Sherwood Road would maintain connectivity for all traffic (including pedestrians) to the Station Street precinct while also providing a higher speed, higher capacity on-ramp to the Ipswich Motorway (M7) southbound. Minor changes proposed to the geometry of the traffic island at Muriel Avenue (approaching Fairfield Road) would not impact on lane capacity and also allows for a short length of cycle lane. The impacts of these changes are considered negligible.

The impact of signalisation of has been assessed using Transyt software with a signal coordination strategy in place from Musgrave Road, Acacia Ridge to Muriel Avenue, Rocklea. The results of Transyt analysis for the intersection of Muriel Avenue and Gladstone Street (as shown in **Table 5-38**) shows an improvement in overall intersection performance by 2031 AM and PM peaks with the proposed signalisation.

This is principally due to delays experienced by Gladstone Road traffic without signalisation either with or without diverted traffic. As such, while the proposed signalisation would lead to some minor delays for Muriel Avenue traffic, overall intersection LOS and DOS is the same or better in both peaks. Queues on the Muriel Street east approach do not extend beyond 49 m in either peaks (in 2031), which is well within the 144 m distance between this and the adjacent intersection of Muriel Avenue and Beaudesert Road. As such, no queuing impacts on adjacent intersections are forecast.

Table 5-38 Intersection of Muriel Avenue and Gladstone Street

	2010 Existing		2021* Without CRR		2021* With CRR		2031 Without CRR		2031 With CRR	
	DOS	LOS	DOS	LOS	DOS	LOS	DOS	LOS	DOS	LOS
AM	45	A	49	A	61	A	83	F	82	B
PM	59	A	64	A	65	A	111	C	84	B

Source: AECOM 2011f

** Note: 2021 results are based on 2016 modelling due to low background traffic growth forecast between 2016 and 2021 (see Technical Report No 1 – Transport for further information)*

The proposed signalisation of the intersection of Lillian Avenue, Tramore Street and Beaudesert Road has been tested using Transyt software with the results of the traffic analysis presented in **Table 5-39**. This shows that in the morning peak there is little difference between with and without the Project with the intersection performing well in all scenarios/years, ie LOS A. Queues in the morning peak were also modelled with a maximum inbound queue on Beaudesert Road in 2031 (with project) of 175 m which is not likely to create any queuing impact on the next signalised intersection, some 600 m south.

In the evening peak, only in 2031 is there a noticeable difference with DOS over 92% with the proposed project change (although this is specifically related to the left turn from Lillian Avenue and is not considered to be of significant concern). The overall intersection level of service remains LOS B in 2031 with the proposed additional diverted traffic and the intersection signalised. Maximum queues on the north approach of Beaudesert Road are forecast to be around 190 m in 2031 (PM peak) which would not cause queuing impacts on the upstream intersection some 1,050 m north.

Table 5-39 Intersection of Beaudesert Road and Lillian Avenue

	2010 Existing		2021* Without CRR		2021* With CRR		2031 Without CRR		2031 With CRR	
	DOS	LOS	DOS	LOS	DOS	LOS	DOS	LOS	DOS	LOS
AM	45	A	49	A	61	A	83	A	82	A
PM	44	A	48	A	60	A	87	A	92	B

Source: AECOM, 2011f

** Note: 2021 results are based on 2016 modelling due to very low background traffic growth forecast between 2016 and 2021*

The existing car parking facility at Rocklea Station, with capacity for 40 vehicles could accommodate overspill from other stations as well as kiss ‘n’ ride demands with no detrimental impacts on parking and loading in the vicinity of Rocklea Station as a result of the Project.

Impacts on roads around Salisbury Station

Changes in local road network and demands

Cross River Rail would not serve Salisbury Station in 2021 but by 2031 with the opening of the Flagstone Creek line and additional platforms, Salisbury Station would become a rail hub served by up Cross River Rail and surface rail services.

The Project requires realignment of Dollis Street immediately west of Salisbury Station in order to accommodate an additional freight rail track on the western side of the current tracks. This realignment improves the geometry of the road, removing three tight curves found in the current alignment.

Forecast park ‘n’ ride trips at Salisbury Station would be expected to remain at around 60 trips per day or around 30 trips in the morning peak period. There would be very small differences in park ‘n’ ride demands with and without the Project, ie potentially up to five vehicles (or 2%) less in 2031 morning peak period without the Project compared to with the Project.

Daily kiss 'n' ride activity would be expected to increase from 110 drop-offs per day (50 drop-offs in the morning peak) in 2009 to up to 160 drop-offs per day (80 drop-offs in the morning peak) by 2031 with the Project. Cross River Rail would result in a 65% increase in overall kiss 'n' ride demands.

Impact assessment and mitigation

The realignment of Dollis Street (immediately west of the station) would improve the geometry of the road, removing three constrained curves within the current alignment and lead to potential improvement in road safety.

Given low projected park 'n' ride demands and current off-street parking capacity for around 50 vehicles, no detrimental on-street parking impacts are expected in future years. The modelled kiss 'n' ride activity with the Project (at around one drop off per minute in 2031 morning peak) can be comfortably accommodated within the existing park 'n' ride car park or on Dollis Street, Olivia Avenue or Lillian Avenue immediately adjacent to the station with no likely detrimental impact on parking or traffic in the vicinity of the station.

5.7.3. Local pedestrian and cycle effects with Cross River Rail

Changes to the pedestrian and cycle networks and operations and their performance as a result of the Project have been assessed by consideration of forecast changes at each station of pedestrian and cyclist activity and by review of physical changes that are proposed to accommodate the Project. The assessment is covered in two parts:

- effects at stations within the study corridor that would not be served by Cross River Rail
- effects at stations that would be served by Cross River Rail and CBD stations.

Stations in the study corridor not served by Cross River Rail

With the exception of Central Station, existing stations in the study corridor that would not be served by Cross River Rail are forecast to have minimal changes to the pedestrian and cycle demands and operations compared to the scenario without the Project. A detailed assessment of the changes in modal access for each station is contained in *Technical Report No. 1 – Transport.*

A number of surface stations in the study corridor would also have no network changes due to Cross River Rail. As such, impacts of the Project on the pedestrian and cycle network would be negligible – such stations include Wooloowin, Albion, Bowen Hills, Dutton Park, Fairfield and Yeronga stations. No further assessment has been undertaken for these stations.

At three other stations (Moorooka, Rocklea and Salisbury), minor pedestrian and cycle impacts would occur due to infrastructure changes associated with accommodating the Project. The effect of these changes has been considered for each station.

Moorooka Station

Proposed changes to pedestrian and cycle operations at Moorooka Station include:

- provision of a new relocated 2 m wide DD Act compliant lift, stair and overpass structure to provide access to the station platform from Ipswich Road
- provision of a new station concourse with improved passenger facilities including ticketing, information and cycle parking
- retention of the existing pedestrian activated signalised crossing of Ipswich Road.

These changes would have a range of beneficial impacts for passengers. Station access for pedestrians and cyclists would be improved as the new station concourse would be directly aligned with the existing pedestrian crossing. As access to platforms would be compliant with the DD Act, this would provide improved access.

The wider bridge (from current width of 1.5 m to 2 m) would provide more comfortable pedestrian environment and higher capacity. The provision of cycle parking would provide for a facility that is currently not provided.

Rocklea Station

Approximately 250 m north-west of Rocklea Station, changes would be required to the road and footway in the vicinity of the Ipswich Motorway southbound on-ramp. All pedestrian and cycle access routes would be maintained with the re-configuration with no detrimental impacts to network operations.

At Rocklea Station, the existing platforms would remain in their current position but changes to passenger access would occur. To the north, the additional passenger rail track would require the relocation of the pedestrian access walkway linking Platform 1 (southbound platform) to Railway Parade. All current accesses to the station would be maintained. The proposed 2.0 m wide overpass would be slightly wider than the existing overpass. Lift access would be provided from the new overpass to all platforms as well as to the northern and southern access points, allowing full DD Act compliant access to the platforms from both directions. These changes to Rocklea Station with Cross River Rail would improve the access environment for pedestrians and cyclists.

Salisbury Station

The key change in the vicinity of Salisbury Station with the Project would be the removal of the current at-grade pedestrian level crossing of the railway tracks (adjacent to the Beaudesert Road service road level crossing) located approximately 600 m north of the station. There is currently a lack of convenient alternative pedestrian and cycle crossings in this area. To maintain and improve accessibility across the rail corridor, a new pedestrian overbridge with lifts and stairs would be provided in this location. This would maintain east-west connectivity for pedestrians and cyclists, and improve access between Nyanda High School on the eastern side of the railway tracks and the residential suburb of Rocklea on the western side.

The introduction of additional railway tracks immediately west of Salisbury Station requires an additional span to be added to the pedestrian bridge to maintain connectivity between Dollis Street, Salisbury Station and the residential area of Salisbury. The extension of the pedestrian bridge would provide continued access from Dollis Street. No lifts or ramps are included in this extended bridge structure and Salisbury Station would continue to be non-DD Act compliant.

Central Station

Cross River Rail would not serve Central Station. As such, no changes are proposed to the walking or cycling infrastructure around Central Station. Overall passenger activity at Central Station is forecast to reduce as a result of the Project providing congestion relief benefits to users of this station and the surrounding precinct.

Stations in the study corridor served by Cross River Rail

Ekka Station

Ekka Station would have access at both ends – from O'Connell Terrace to the east and from the RNA Showgrounds to the west. The station would comprise of two stairs and a lift at the western end of the platform (connecting to a western ticket concourse underneath platform level) and another set of stairs and a lift at the eastern end of the platforms connecting to an eastern ticket concourse above platform level, leading directly onto O'Connell Terrace.

The Project would include the following changes to the pedestrian and cycle network in the immediate vicinity of the station entrances:

- provision of a 17 m deep plaza in front of the station building and continuous wide (4.7 m) footpath on the southern side of O'Connell Terrace as well as a wider footpath on the northern side (from current 1.8 m to a proposed 3.5 m)
- widening of the current underpass at the western end of the station from its current 6 m to a proposed 15 m
- inclusion of a new westbound kerbside cycle lane in front of the station entrance on O'Connell Terrace
- re-provision of the signalised pedestrian crossing in front of the eastern station entrance to allow safe direct crossing to and from the northern side of O'Connell Terrace.

Forecast rail station related pedestrian movements in 2021 (morning peak period) are illustrated in **Figure 5-48**. This shows that with Ekka Station in operation (with the Project) there would be significantly more public transport-related walk trips along O'Connell Terrace and crossing Bowen Bridge Road, compared to the case without the Project. As illustrated, 610 alighting rail passengers are forecast to cross Bowen Bridge Road which would translate into around 23 pedestrians in a two-minute traffic signal cycle compared to only four pedestrians per cycle without the Project.

When combined with background pedestrian trips, it is probable that the current pedestrian refuge island (which has an area of approximately 9 m²) would have insufficient capacity to accommodate additional pedestrians associated with the Project. The number of pedestrians using the traffic island could be greater than its capacity and so there is a risk that pedestrians would overspill onto the heavily trafficked Bowen Bridge Road. In the short term it is recommended that the size of this island be increased as illustrated in **Figure 5-49**.

Figure 5-48 Changes in public transport related pedestrian trips around Ekka Station/Bowen Bridge Road – 2021 AM peak hour

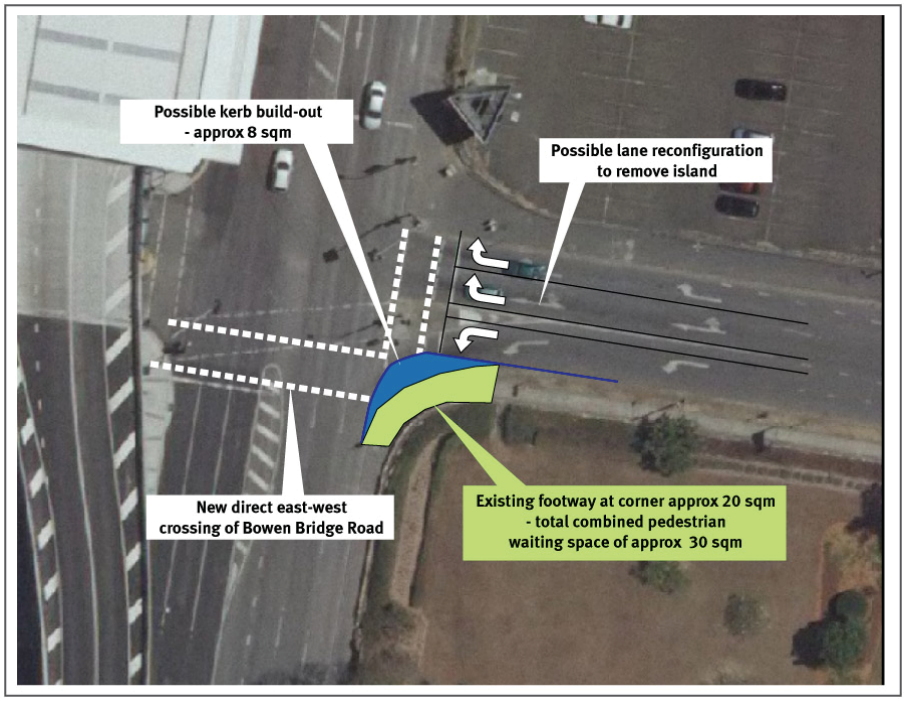


Figure 5-49 Possible enhancement to pedestrian waiting zone at corner of O'Connell Terrace and Bowen Bridge Road

This intersection arrangement has been tested in SIDRA using existing phase arrangements (two phases) and an assumed peak period cycle time of 150 seconds with SIDRA optimised phase timings. 2021 background traffic volumes were derived from August 2010 traffic counts (post Clem Jones tunnel opening) and increased 2.4% per annum to 2021 in line with growth rates for the Brisbane metropolitan area.

The result of SIDRA optimising phase timings results in the performance of the overall intersection worsening slightly from LOS B to LOS C in the morning peak but remaining LOS C in the evening peak, albeit with a slight worsening of average delay. Nevertheless, the intersection would still operate within capacity and any minor worsening of delay is considered appropriate in order to achieve pedestrian safety improvements through the removal of a sub-standard traffic island.

Future pedestrian and cycle operations at the CBD stations

Cross River Rail is forecast to increase the number of rail trips to the CBD and consequently, the number of pedestrians walking from rail stations. The provision of a new station at Albert Street and increased use of Roma Street Station would result in improved accessibility to CBD rail stations, an even distribution of rail passengers across three stations and lower average walk distances for public transport users (as presented in **Section 5.6.7**).

Roma Street Station

The Project-related pedestrian network changes would include:

- provision of a new Cross River Rail station entrance on Roma Street (north-east corner of the intersection with Parklands Boulevard) with the allowance for a connection to a potential pedestrian bridge over Roma Street linking Emma Miller Place to the Magistrates Court and George Street. This pedestrian bridge is currently planned, but not committed, as part of the Supreme and District court project.
- implementation of a new at-grade signalised pedestrian crossing of Roma Street on the eastern side of its intersection with Parklands Boulevard to facilitate direct pedestrian crossings.

- creation of new cycle lanes on Roma Street between Makerston Street and Parklands Boulevard.
- a new signalised mid block pedestrian crossing between Makerston Street and Parklands Boulevard.
- a new signalised pedestrian/cycle crossing of Herschel Street on the northern side of George Street.
- footway widening on the northern side of Roma Street of up to 1.2 m.

Cross River Rail, in combination with the potential new pedestrian bridge, would increase the number of pedestrian crossing facilities of Roma Street (between Parklands Boulevard and Makerston Street) from the current four to seven crossings. These proposed changes would provide significantly enhanced and convenient facilities for pedestrians. This would assist in distributing pedestrians over a number of crossing facilities, leading to less crowding on footways and at crossings. The proposed facilities should also increase the likelihood of pedestrians making use of formalised crossings rather than exacerbate existing tendencies for informal pedestrian crossing activity along Roma Street.

In 2021, in the morning peak period, around 14,500 alighting rail passengers are forecast to move through the surrounding precinct from the station. Key operational issues are:

- 7,100 alighting passengers are forecast to access the Roma Street footpath from the current station entrance in 2021 with the Project, compared to around 8,500 alighting passengers who would use this entrance without the Project.
- 7,300 alighting passengers are forecast to access the Roma Street footpath from the proposed new Cross River Rail station entrance in 2021.
- the dominant movement from the station would be alighting passengers heading south-east across Roma Street towards George Street. This is forecast to represent the movement desire line for approximately 5,500 alighting passengers from the current entrance and approximately 3,900 passengers from the new entrance in the morning peak two hours of 2021.
- a key secondary movement is expected to be to the east towards King George Square, with approximately 2,900 passengers expected to move in this direction in the AM peak two hours in 2021.

For 2021 pedestrian demands, the footpath widths proposed by the Project would have sufficient capacity. However, given further forecast increases in passenger volumes by 2031, there is a need to mitigate pedestrian congestion. In conjunction with the proposed kerb realignment and footway build out on the northern side of Roma Street, current obstructions such as garden beds within the public footway, signage, bins and phone boxes should be rationalised or removed in consultation with BCC, to allow a continuous minimum footway width of 3 m.

Albert Street Station

Albert Street Station would have two entrances, including a northern entrance located adjacent to the intersection of Albert and Mary streets and a southern entrance at the intersection of Albert and Alice streets, with an access from the eastern side of Alice Street. A large new public square as well as changes to footpaths widths are proposed as part of the Project.

Albert Street Station would generate significant pedestrian activity in the surrounding precinct. Based on average forecast growth rate in jobs and CBD population of 2.4% per annum between 2009 and 2031 background pedestrian volumes in 2031 are forecast to be 165% of 2009 volumes.

Key forecast pedestrian demand characteristics issues include:

- over 27,000 passenger movements in the morning two hour peak period in 2021 and around 37,000 passenger movements in 2031
- the majority of these morning peak pedestrian movements in the morning peak would be alighting passengers due to the tidal nature of commuting to the CBD
- around 66% of morning peak alighting passenger movements would occur at the northern entrance with 34% occurring at one of the two southern entrances on Alice Street.

Of the alighting passenger movements at the northern entrance in the morning peak period, a significant proportion would be expected to walk north along Albert Street (around 35%) or east along Mary Street (around 30%). A further 20% would be expected to walk west along Mary Street while 15% would travel south or be destined for immediately surrounding destinations as illustrated in **Figure 5-50**.

Several pedestrian links and intersection facilities would be expected to experience increases in pedestrian activity due to Cross River Rail. A comprehensive assessment of pedestrian footpath and intersection capacity impacts and requirements is documented in *Technical Report No.1 – Transport.*

Key pedestrian operational effects and capacity issues are:

- The pedestrian footway at the intersection of Elizabeth and Albert streets would be close to capacity in 2021 with the Project assuming no changes to on street dining or the timing of traffic signals. The key physical constraints to footway widening in this location are the current taxi rank on the western side of Albert Street and the loading zone on the eastern side of Albert Street. No widening of footpaths at this intersection is proposed as part of the reference design as the forecast pedestrian volumes could be accommodated in 2021 and it is likely that continuing background growth in pedestrian volumes in this location may trigger the need to address this issue in due course regardless of (rather than because of) the Project.
- The pedestrian footway at the intersection of Charlotte and Albert streets would be operating over capacity in the 2021 morning peak period. Therefore kerb build outs are proposed as part of the reference design to increase pedestrian capacity at this intersection.
- The pedestrian footway at the intersection of Mary and Albert streets would be over capacity and additional footway space would be required. Likewise, the pedestrian footway at the intersection of Alice and Albert streets would be over capacity with additional footway space required. Both of these are addressed in the reference design through the provision of kerb build outs.

Mid-block footpaths are also forecast to be overcrowded with Cross River Rail operational. At present there are several pinch points and constraints along the Albert Street footway with some sections experiencing less than 2 m of unobstructed width as illustrated in **Figure 5-51.**

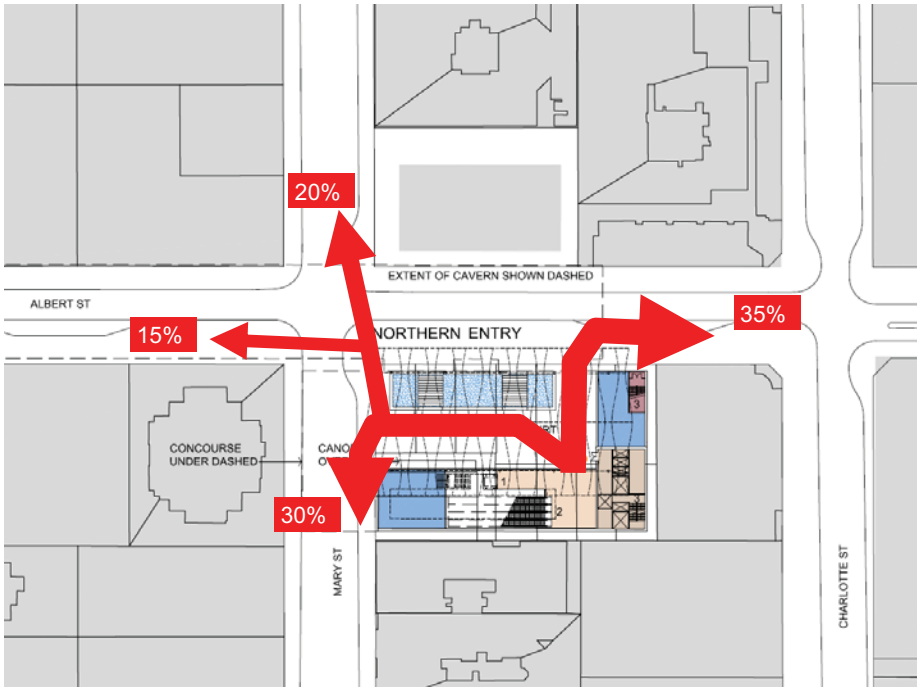


Figure 5-50 AM peak alighting movements proportions from Albert Street Station northern entrance

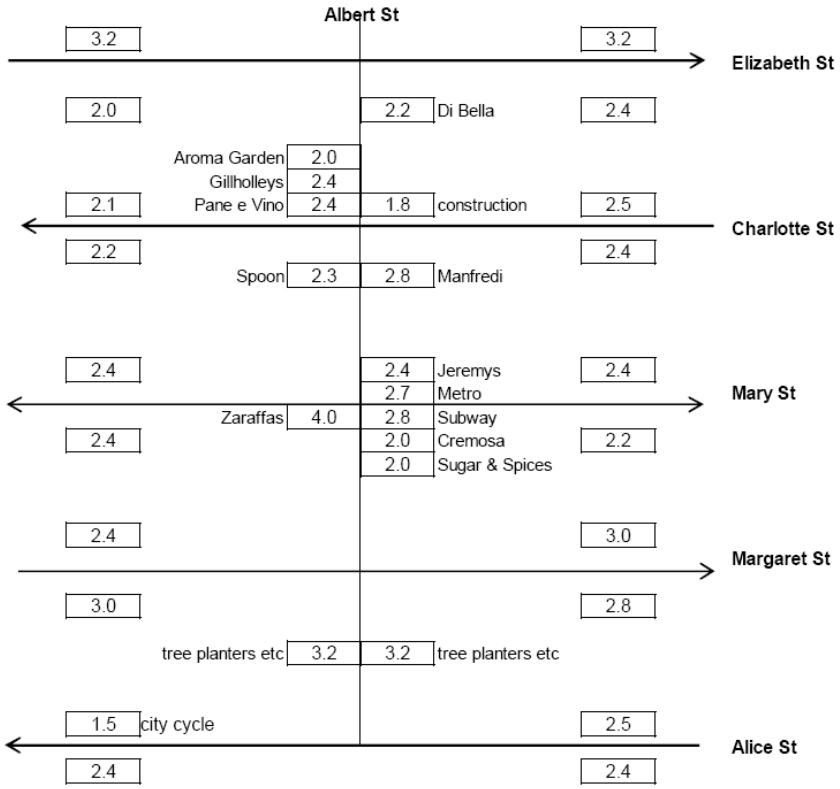


Figure 5-51 Current critical footpath widths on Albert Street

An assessment of pedestrian volumes along Albert Street has been undertaken and is presented in *Technical Report No.1 – Transport.* Without mitigation, Cross River Rail pedestrian traffic would lead to LOS E to F on critical sections of the Albert Street footway between Mary and Elizabeth streets by 2031 and so there would be a need to widen footways at several locations to be able to safely accommodate increased pedestrian demands.

A range of pedestrian footway widening works are required to provide an appropriate level of service for pedestrians. The Project includes the following footway capacity enhancements in order to provide an appropriate level of service for pedestrians:

- widening of the eastern footway of Albert Street between Mary and Charlotte streets by approximately 3.5 m
- widening of the southern 50 m of the western footway of Albert Street between Charlotte and Elizabeth streets by approximately 2 m
- kerb build outs of approximately 2 m on all corners of the intersection of Charlotte and Albert streets to allow more pedestrian waiting space and shorten the crossing distance
- creation of a large pedestrian plaza on the corner of north-eastern corner of Albert and Mary streets to create a station forecourt
- kerb build outs at the northern side of Mary Street at its intersection with Albert Street
- widening of key pedestrian crossings at the intersections of Albert and Mary streets and Albert and Charlotte streets from 3 m to 5 m
- use of a new station entry plaza on the north-eastern corner of Albert and Alice streets creating a large pedestrian waiting and circulation space
- rationalisation of street furniture and consolidation of on-street dining into discrete zones
- provision of part time loading bays in the footway zone on the eastern side of Albert Street.

Gabba Station

In 2021 the Gabba Station is forecast to have 1,600 boarding and 2,200 alighting passengers in the morning peak period. The expected passenger movements to and from the station for the peak one hour are illustrated in **Figure 5-52**.

The peak passenger accumulation forecast on the footways and crossing points leading away from the station over a two minute period (the longest expected waiting time between pedestrian green phases at traffic signals) would be such that the relevant pedestrian crossings would operate within their current capacity. No footway widening or kerb build-outs are required in the opening year to accommodate pedestrian demands from the Project.

Proposed changes to the pedestrian and cycle infrastructure as part of the Project are described in **Chapter 4 Project description**. Pedestrian and cycle infrastructure changes are principally related to providing adequate pedestrian width within the land bounded by Stanley Street, Vulture Street, Main Street and the Pacific Motorway for pedestrians demands associated with events at the Gabba stadium. These provisions would include 17 m of footway width between the station and Main Avenue to cater for post-event crowds (split approximately into one 10 m wide footway on the northern side of the busway and one 7 m wide footway on the southern side of Vulture Street). Main Street itself could continue to operate under police control during events subject to approval from the relevant authorities.

There are a wide range of major changes to pedestrian and cycle access (as well as vehicle access) that may occur in the precinct as a result of redevelopment within the Woolloongabba UDA. The development scheme for the Woolloongabba UDA was approved on 15 April 2011 and includes the station site and surrounding land bounded by Vulture Street, Main Street, Stanley Street and Allen Street.

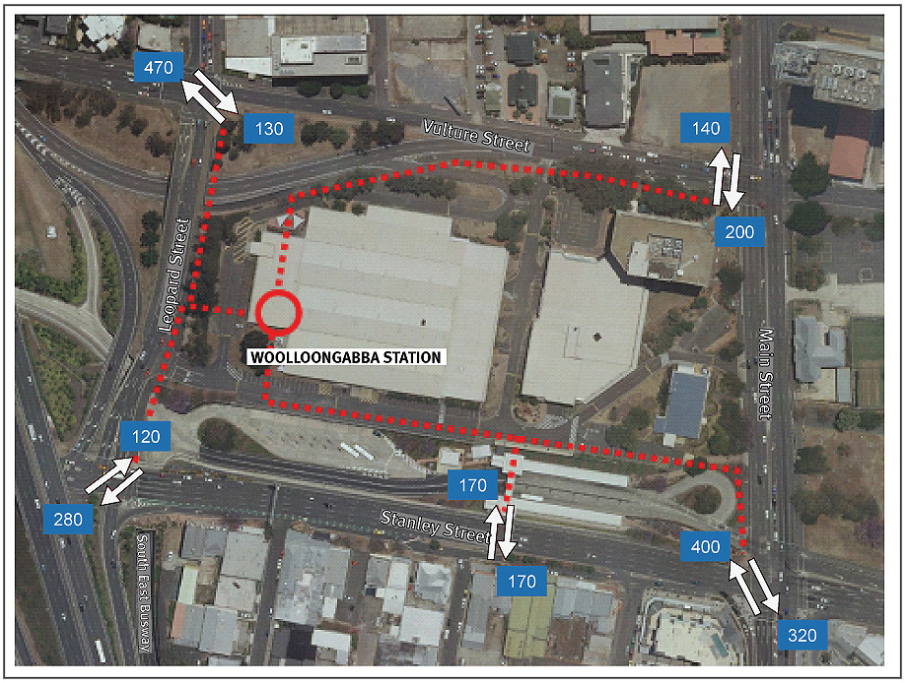


Figure 5-52 Forecast 2021 Gabba Station and busway passenger movements in the morning peak hour

The changes to pedestrian and cycle connectivity within the precinct proposed as part of the approved Woolloongabba UDA development scheme are illustrated in **Figure 5-53** and include:

- new pedestrian and cycle connections along the northern side of Stanley Street extending under the Pacific Motorway to the west of the site
- new cycle connections north-south on the eastern side of the current Leopard Street
- a new signalised intersection with Vulture Street midway between Leopard Street and Main Street providing an opportunity for mid-block crossing by pedestrians.

Given the wide range of potential proposed changes in the precinct as described above, and ongoing ULDA consultation on the master plan and surrounding development, analysis of Cross River Rail pedestrian and cycle access within its surrounding precinct has been confined to opening year. Nevertheless, at opening year, the pedestrian and cycle access to the station would function adequately with no identified requirements for external upgrades or infrastructure changes.

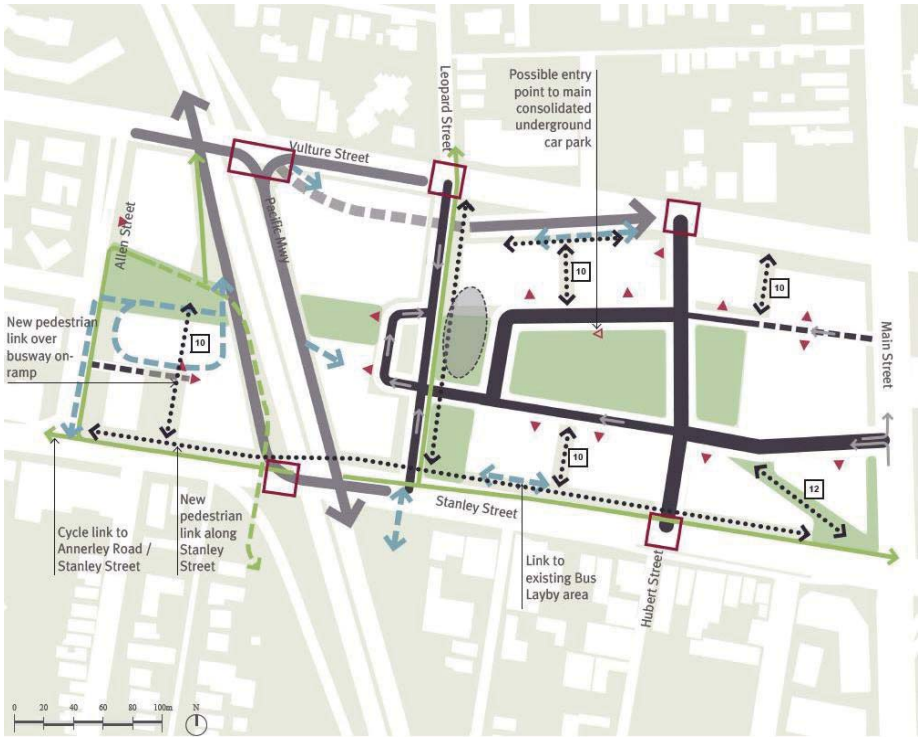


Figure 5-53 Proposed movement and circulation plan as part of the approved Woolloongabba UDA Development Scheme (source ULDA, 2010b)

Boggo Road Station

The Boggo Road Station would be co-located and connected with the existing Park Road Station and the Boggo Road busway station. Proposed changes to pedestrian and cycle operations in the vicinity of the station as part of the Project include:

- provision of a zebra crossing of Boggo Road adjacent to the station's northern entrance
- provision of a zebra crossing of Peter Doherty Street adjacent to the station's southern entrance
- minor kerb and footway changes on the western side of Annerley Road.

An assessment of pedestrian crossing volumes around Boggo Road Station has been undertaken and is presented in *Technical Report No.1 – Transport.* Traffic volumes (in dark blue) and pedestrian volumes (in light blue) are illustrated in **Figure 5-54**.

An assessment of the warrant for both zebra crossings was carried out by the method defined in the Queensland Manual for Uniform Traffic Control Devices (TMR, 2009). This found that both zebra crossings are required and that pedestrian-activated signals are not warranted.

Figure 5-54 Boggo Road Station pedestrian and vehicle crossing volumes – 2021 morning peak hour with the Project

Yeerongpilly Station

Changes to pedestrian and cycle infrastructure at Yeerongpilly Station as part of the Project include:

- new footpaths on both side of the realigned Wilkie Street
- provision of a pedestrian (zebra) crossing of Wilkie Street
- extension of current footbridge over new platforms and reconnect to the realigned Wilkie Street as well as a new covered walkway linking the current station footbridge with the proposed new station concourse.

Forecast pedestrian and traffic volumes in the morning peak hour (2021) are shown in **Figure 5-55**. This shows the majority of passengers accessing or leaving the station to the east with around 670 two-way passenger movements, compared to an estimated 380 two-way movements to/from the west. The pedestrian infrastructure measures proposed as part of the Project would be adequate for the pedestrian demands.

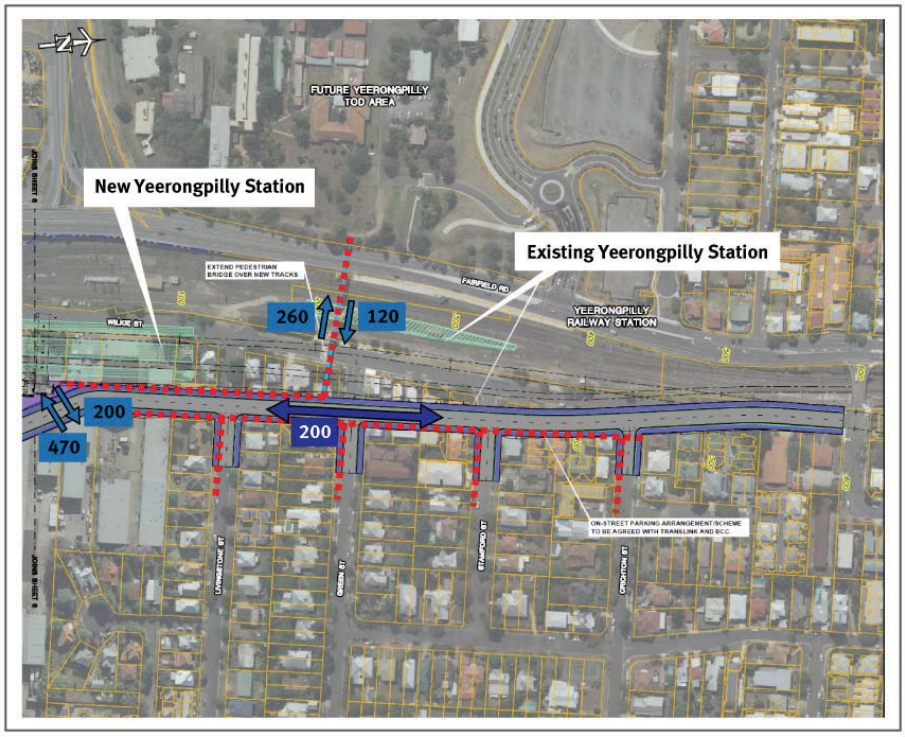


Figure 5-55 Yeerongpilly Station pedestrian and vehicle crossing volumes – 2021 morning peak hour with the Project

5.8. Impacts to rail maintenance operations

It is anticipated that rail maintenance would remain the responsibility of the rail asset manager, Queensland Rail, who are currently maintaining the existing rail network. Maintenance operations would be similar to current practices except where Cross River Rail infrastructure differs from the current infrastructure and operating arrangements, such as:

- underground tunnels – the extent of underground tunnels is significantly longer than existing tunnels
- underground stations – stations are at greater depth than existing stations
- signalling and control systems – new systems are proposed as part of Cross River Rail
- rollingstock – rollingstock to operate on Cross River Rail would be required to be fit for purpose and meet a specification which may be different to the fleet operating on the remainder of the network. Cross River Rail rollingstock would be operable on the remainder of the network.
- incident response procedures – because of the length of tunnels involved new procedures will need to be in place
- maintenance procedures – because of the nature of the proposed infrastructure new maintenance procedures are anticipated.

5.8.1. Underground tunnels

Existing Queensland Rail tunnels are relatively short compared to the proposed Cross River Rail tunnels. The new tunnels would differ in features that involve special maintenance requirements. Services would operate 18 hours per day and seven days per week with the non-service times being generally available for maintenance activities. The design has adopted, where relevant, low maintenance features.

This would reduce the requirement for personnel to enter the constrained tunnel environment. However, it is noted that the tunnels are to be designed with specific attention for personnel access and safety. The key features of the tunnels that would require revised maintenance practices include:

- proposed over head line equipment (OHLE) power supply system
- track support systems
- fire and emergency evacuation and access systems
- tunnel drainage and discharge systems
- communication and train control systems
- floodgates and control systems
- tunnel ventilation.

5.8.2. Tunnel maintenance

Compared to the existing maintenance of ballasted surface tracks with wired OHLE catenaries, the tunnel route maintenance would be very different with much less active work attention. Using non-ballasted track and fixed rail OHLE for traction power, most of the regular maintenance work would consist of non-active inspection and monitoring work during the nightly four to six hour maintenance periods.

In the longer term, the maintenance would need to include renewals of track components and other electrical and mechanical components. At various periods of 15 to 25 years, depending on curvature and traffic density, some sections of rail would need to be transposed or replaced along with rail pads and some fastenings. These activities, including renewals of OHLE contact insert wire, are no more frequent than surface track maintenance.

The tunnel maintenance activities would have a much lower impact than for surface ballasted tracks, and apart from the possibility of periodic dust wash-downs, it is not anticipated that any new types of maintenance or new major maintenance impacts would be introduced.

5.8.3. Underground stations

Station facilities would include typical facilities provided and maintained in existing major rail stations as well as facilities that are unique to Cross River Rail or new to Queensland Rail. The depth of the underground stations is significantly greater than existing stations, resulting in greater emphasis on vertical transportation of patrons. Lifts and escalators are fitted to existing stations but the scale and importance for Cross River Rail stations is more significant and management and maintenance processes will need to reflect this importance.

Other new facilities proposed in underground stations include:

- platform screen doors
- air conditioned platforms
- ventilation and smoke control systems
- incident management responses
- communication and train control systems
- flood control facilities.

Maintenance practices would need to be identified during detailed design to ensure all facilities can be safely maintained. Above ground station facilities would be similar to existing Queensland Rail stations and no special maintenance requirements are envisaged.

5.8.4. Rolling stock

Rollingstock that operates on Cross River Rail would be required to be fit for purpose and may need to meet performance specifications that are different from those for rollingstock operating on the reminder of the network. While other rollingstock may not be able to operate on Cross River Rail infrastructure, Cross River Rail rollingstock would need to be able to operate on other parts of the network and be interoperable with surface rail signalling, track and station infrastructure. Any features required specifically for Cross River Rail rollingstock are not expected to involve any significant change in maintenance practices and procedures.

5.8.5. Signalling and control systems

New signalling and train control systems are anticipated to be in place for Cross River Rail. These systems would need to be installed and integrated into the rail network. The introduction of new systems would be part of a broader process of implementation within Queensland Rail. The process would require the identification and implementation of appropriate maintenance practices and procedures.

5.9. Patronage forecast sensitivity testing

Patronage forecasting was undertaken to test the sensitivity of overall transport demand, forecast patronage and benefits of the Project to alternative future land use and transport infrastructure scenarios.

Test 1: River City Blueprint (high growth in inner city)

A sensitivity test was undertaken to examine the effect of the proposed River City Blueprint land use scenario. This test indicated an insignificant change in daily total public transport and rail use within the Brisbane metropolitan area. The targeted growth areas of the River City Blueprint would generate a change to the patronage forecast at specific Cross River Rail stations. Compared to the station patronage forecasts in 2031 with the Project, likely changes with the River City Blueprint land use scenario would include:

- a 2% increase in rail alightings during the morning two hour peak period within the CBD
- an increase of over 50% in morning peak period rail alightings at Boggo Road Station (with a forecast total of 7,500 rail passengers alighting at Boggo Road Station)
- a potential 80% increase in forecast rail passenger alightings at Gabba Station (to a total of 9,500 morning peak period alightings).

This scale of patronage change due to increased concentration of CBD and inner city employment would be able to be accommodated by the proposed Cross River Rail stations and track infrastructure.

Test 2: Low employment growth in CBD

A second sensitivity test examined the effect of a 10% reduction in CBD employment on Cross River Rail forecasts. This scenario indicated a reduction in both daily public transport and rail users of approximately 2%. Reduced forecast employment in the CBD would result in lower forecast passenger alightings in the morning peak period with Cross River Rail with key changes being:

- a 10% reduction in rail passenger alightings at Albert Street Station in 2031
- an overall reduction in the number of final alightings at the three CBD rail stations of 8%.

If this scenario were to eventuate, these patronage reductions would represent approximately a few years growth, and would therefore be equivalent to providing two to three years spare rail capacity on the inner city network.

Test 3: Impact of new Brisbane subway line in 2031

The first line of a new subway system for Brisbane is a strategy of the draft Connecting SEQ 2031. The priority corridor for delivery would be from Toowong to West End to Bowen Hills/Newstead. This corridor would provide additional east-west rail capacity under the CBD with stations assumed to be located at Queen Street, Anzac Square and Riverside Centre.

The Toowong to Newstead subway line would have an overall positive impact on public transport increasing the overall number of rail passenger trips across Brisbane by almost 6%. While alightings at other CBD stations (Central, Roma Street Albert Street stations) would reduce by 4% with the subway in operation, there would be no reduction in patronage at the Albert Street Station and very minor changes in Cross River Rail line loadings.

Should the subway be in operation in 2031, the effect on Cross River Rail patronage would be minimal suggesting that this metro line would serve a complimentary and not competing function with Cross River Rail.

5.10. Construction transport impacts

5.10.1. Assessment methodology

This construction transport impact assessment includes traffic impact assessments undertaken in accordance with the TMR Guidelines for Assessment of Road Impacts of Development (TMR, 2006) as well as wider transport (non-traffic) impact assessments undertaken in line with Section 3.1 of the EIS ToR. The overall aim of this assessment is to assess the impact of the Project's construction on the surrounding transport networks, including roads, railways, footway and bikeways.

Specific analysis has been undertaken of the likely range of impacts at each of the proposed construction worksites arising from construction traffic (inbound and outbound) together with construction workforce movements, including parking. Proposed construction spoil haulage routes and estimated construction vehicle volumes were used to assess the traffic implications of construction traffic on key intersections and road links including assessment of the impacts on road pavements. Implications for the safe movement of all transport modes were also assessed at each site.

Impacts arising from construction activities on the rail network have also been assessed. Mitigation measures are also proposed to manage the potential adverse impacts of construction activities.

5.10.2. Demolition and construction methodology overview

Prior to commencement of construction activities, there would be a need for demolition works of existing buildings to accommodate the station access points, ventilation shafts and other sub surface works. The significant demolition sites are the Royal on the Park hotel in the CBD and the Goprint site at Woolloongabba. Demolitions are expected to generally take place within the confines of the worksites although with short term diversion of closures of footways or streets where necessary fore safety reasons. Driveways may also need to be provided to enable demolition vehicles to access each site.

Any spoil and other demolition material would be removed using approved haulage routes. Although demolition may require specific approvals, these would only be for a relatively short period of time of a few weeks. The frequency of truck movements are expected to not exceed that of the excavation stage.

The construction of Cross River Rail would be organised around the worksites and spoil disposal site identified in **Chapter 4 Project Description**.

Construction worksites include Mayne Rail Yard, O'Connell Terrace; Exhibition Station, northern portal, Roma Street, Albert Street, Woolloongabba, Boggo Road, Fairfield (ventilation and emergency access shaft and building), Yeerongpilly, Clapham Rail Yard, Moorooka Station, Rocklea (Ipswich Motorway) Rocklea Station and Salisbury southern surface works.

The proposed spoil disposal site for the Project is at Swanbank, as detailed in **Chapter 4 Project Description**. Spoil haulage to the spoil disposal site has been assumed for the purposes of this assessment by road to ensure a worst case analyse of road and traffic impacts.

Working hours are detailed in **Chapter 24 Draft Outline EMP**. Work hours for above ground surface works outside of acoustic sheds, would typically be between 6.30 am to 6.30 pm Monday to Saturday (6:30 am to 10.00 pm Monday to Friday at Roma Street, Albert Street, O'Connell Terrace and Ipswich Motorway) with no surface works expected to be carried out on Sunday or public holidays. However, a significant proportion of works within the existing rail corridor would need to be undertaken outside of rail passenger operating times, including night-time, weekends and public holidays.

Works on major roads (such as the Ipswich Motorway on ramp works) would also need to be carried outside of standard construction hours, if the impacts of daytime works are considered unacceptable by the relevant approval agencies (Brisbane City Council, TMR and the Queensland Police Service). All other controls and restrictions are expected to be consistent with typical working hours and the approvals processes as described in **Chapter 4 Project description**.

Underground works and works carried out inside an acoustic enclosure, or distant from sensitive receivers could be carried out 24 hours a day, seven days a week.

Spoil haulage on arterial roads is proposed to occur 24 hours, seven days per week. Spoil haulage relying on local roads would occur in day-time hours only, and for special circumstances as determined by a specific Construction Traffic Management Plan (CTMP).

There would be haulage of major construction equipment, materials and components outside these hours to avoid impacts on day-time traffic flows.

5.10.3. Detailed planning and approvals processes

Construction activities have the potential to disrupt existing movement patterns on the transport network. A fundamental measure of the success of the Project would be the minimisation, and where possible, elimination of disruption caused by construction. This would be achieved through effective management techniques, collaboration with stakeholders, agreement of the preferred arrangements for managing and monitoring construction impacts and where necessary amending those techniques.

A Framework Transport Management Plan would be prepared as a high level overarching document outlining the principles of construction traffic management and detailed consultation, approvals processes and monitoring.

It is envisaged that the Framework Transport Management Plan would be approved by TMR (Metropolitan Region) and BCC as appropriate, and in consultation with the Brisbane Metropolitan Transport Management Centre (BMTMC), Queensland Police Services and emergency services. While the framework plan should outline the likely level of disruption to the rail network and the principals for accessing the rail system, specific rail shutdowns (track possessions) would be sought and approved through Queensland Rail and their Scheduled Closure Access System.

Subsequent to the approval of the Framework Transport Management Plan, CTMPs would be developed for each individual worksite prior to the commencement of works. Within each CTMP, detailed active transport management plans and workforce car park management plans would be required.

Separate to the overall traffic and transport management approval process, any changes to the road network should be subject to road safety audits, to be undertaken at the following stages to ensure an independent check of road network changes as a result of construction:

- Detailed design stage – at this stage, the geometric design, traffic signing scheme, line marking plans, lighting plans and landscaping plans would be assessed in relation to the operation of the road.
- Pre-opening stage – prior to opening a site, an inspection would be made for all relevant conditions at night and during the day for all likely road users to ensure that the construction has addressed earlier audit concerns and to check for any hazardous conditions that were not apparent at the feasibility or design stages.
- Road safety audits of temporary work – Cross River Rail would undertake regular safety audits of work zones to ensure all worksite safety arrangements are in place.
- Road safety audit procedure – all road safety audits would be undertaken in accordance with Austroads Guide to Road Safety Part 6 January 2009.

Key objectives of construction traffic and transport management

The construction traffic arrangements of the Project would be designed to address the following key objectives which would be reflected in the Framework Transport Management Plan:

- minimise impacts, including delays and disruptions, to rail services and operations
- minimise impacts on the operation of the road network (particularly for emergency services and buses)
- minimise impacts on the community and safety
- maintain access to properties, particularly residential and commercial properties.

Performance criteria proposed to achieve these objectives would also be included in the Framework Transport Management Plan and addressed in each CTMP. These would include:

- disruptions to the operation of passenger and freight rail services, the road network and the public transport network due to construction works are avoided during peak periods and minimised during off-peak periods
- passenger rail services and schedules during peak travel times are maintained
- freight rail services and key schedules nominated by the rail network manager are maintained
- haulage vehicles, ie spoil haulage, fill haulage, construction equipment and associated material haulage, only travel on designated construction routes, unless approved by the relevant traffic authority
- local roads are not used by construction vehicles, unless approved by the relevant traffic authority in consultation with the local community serviced by such roads
- traffic flows near construction works are maintained during peak traffic periods and managed during off-peak periods to minimise disruption
- construction traffic is managed and worker parking is provided in sufficient numbers and managed to avoid impact on communities near to construction worksites
- information about the timing and scale of changes to traffic and transport conditions on passenger rail operations and the road network in the vicinity of construction works is provided in good time to the local community, commuters and on request to other people interested in the construction works
- safe access is maintained for passers-by and for passengers to and from public transport facilities, including rail stations, busway stations and bus stops

- pedestrian and cycle access to community facilities is not disrupted by construction works, unless approved by the relevant traffic authority in consultation with the manager of the community facilities.

5.10.4. Rail services – assessment of construction effects

The construction of the Project would include both major surface and underground works. Much of the surface rail works would interface with the existing rail network, which would result in extensive sections of rail construction being carried out in or close to areas where passenger and freight rail services operate.

The detailed construction methodology would include measures such as maximising works outside the "danger zone" through the isolation of the worksite from rail traffic and overhead energy by such measures as overhead isolation, closing of tracks and locking of points.

Underground works would have minimal impact on current operations. Of the underground stations, only Roma Street has construction activities that would have a direct impact on the current rail network.

The extent of surface works south of the portal at Yeerongpilly and north of the portal at Victoria Park would be significant. Generally all passenger and freight rail services would continue to operate except when Cross River Rail takes possession of the tracks through targeted night-time (outside of passenger rail operations), weekend and other longer period rail shutdowns.

Construction activities requiring a railway shutdown would be planned well in advance to minimise disruption to the network as a whole by, for example coordinating the Project construction with already scheduled rail maintenance activities. Shutdowns would not typically be permitted during major events, such as the State of Origin, Ekka, Broncos home games and Riverfire.

Surface Rail works south of the southern portal

South of the southern portal, all passenger services would generally continue with the exception of a temporary closure of Moorooka Station for around 12 months. This closure would affect around 350 passengers whom currently use Moorooka Station during the morning two-hour peak period. Other stations south of the southern portal (Yeerongpilly, Rocklea and Salisbury stations) may also be subject to a shutdown for short periods.

The existing passenger access points to the stations in this section would be maintained with the exception of Yeerongpilly Station. At this station the existing pedestrian footbridge that provides access to the station platforms from Wilke Street would be extended across the worksite to the re-aligned Wilke Street.

There is not expected to be any significant impact (including rail shutdown periods) on freight operations that use the Tennyson loop to access the rail corridor at Yeerongpilly. This applies to rail freight services that operate between locations to the west of Brisbane through to the Port of Brisbane. Rail freight services that could be impacted are those that use track between the Tennyson loop and Salisbury (estimated to be 132 two-way freight movements in 2007).

Surface Rail works north of the northern portal

The extent of rail infrastructure alterations north of the northern portal, in the immediate vicinity of Mayne Rail Yard is significant and complex. A regular and frequent series of nightly and weekend shutdowns would be required and the possibility of longer shutdown periods at Easter or Christmas may also be required. However works would be designed and timed so that there was sufficient track capacity to allow typical weekday peak period rail schedules to be maintained.

Exhibition Station and the Exhibition Loop

Passenger rail services do not currently serve Exhibition Station except during the annual Ekka and the Caravan and Camping Show. It is expected that construction works would result in Exhibition Station being closed for one Ekka and Caravan and Camping Show. Should construction require a station closure, alternative transport would be provided. Construction works would be temporarily suspended at Exhibition Station when the Ekka is held as access for materials delivery would be reduced due to large crowds and access restrictions.

Freight and other passenger rail operational movements could continue on the Exhibition Loop during the construction period except during shutdown periods. Diesel freight trains would be able to continue to operate when shutdowns are limited to the removal of electrical power from the OHLE.

Roma Street Station

The construction of the major connection between the existing Roma Street Station subway and the new underground station would require acquisition of the staff car park at the city end of the railway heritage building that occupies Platform 3.

The major vertical shaft and works at the northern end of the station would require the demolition of the existing baggage handling facility and the rubbish disposal area on Platform 10.

Works at Roma Street Station may also need the temporary diversion of trains to other platforms.

Rail maintenance

Cross River Rail construction works would occur within close proximity to a number of existing railway stabling and maintenance facilities and staff access points to such facilities. While accesses would generally be maintained for staff and trains throughout the construction period, any temporary closure or diversion would need to be indentified in detail in each CTMP and require prior approval of Queensland Rail.

Surface works would be carried out and managed such that all emergency service and maintenance vehicles would still be able to access the rail corridor at all times.

5.10.5. Impact at worksites

Mayne Rail Yard construction worksites

The Mayne Rail Yard construction worksite is wholly located on land owned by Queensland Rail and is a critical operational area. Construction activities would be carried out predominantly along its eastern edge adjacent to the ICB. Construction works would need to be carefully staged to minimise impacts on rail operations.

Worksite location and proposed truck access

Access for construction vehicles would be as follows:

- Main access and egress via Lanham Street/O'Connell Terrace. This access point is likely to be modified due to construction staging of the O'Connell Terrace bridge, however access for 19 m heavy vehicles will be maintained at all times.
- Potential alternative access and egress at particular stages of construction via McDonald Road and Queensland Rail access point off Grafton Street.
- Access and egress via Mayne Road and the Queensland Rail Mayne Control Centre driveway.
- Queensland Rail track access point/s from Abbotsford Road, south-west of Allison Road.

The heavy vehicle access routes to this worksite are shown in **Figure 5-56**. These represent the main routes used for delivery vehicles.

Traffic staging and network changes

As all identified Cross River Rail works in Mayne Rail Yard occur off the road network, there would be no changes to the existing road network. Construction works at the Mayne Rail Yard worksite would not affect traffic flows on the ICB.

Pedestrians and cyclists

Generally there would be no impact to existing pedestrian or cyclist movements on the external road network from operation of the Mayne Rail Yard worksite. Construction traffic vehicle access and egress would be managed to prevent conflicts where pedestrian and cycle routes cross site access points.

Buses

There would be no impacts to existing bus operations resulting from operation of the Mayne Rail Yard worksite.

Parking

Existing Queensland Rail staff parking areas within Mayne Rail Yard would be impacted by the Project and existing Queensland Rail staff parking would be required to be relocated to alternative areas within Mayne Rail Yard. This may result in some additional walk distance between car parking and destinations within the Mayne Rail Yard for Queensland Rail staff.

Additional parking is proposed to be provided within the Mayne Rail Yard worksite to accommodate 50 parking spaces for the construction workforce. This would be accessed by the current Mayne Rail Yard access (Lanham Street) off O'Connell Terrace. A further 45 car parks are proposed on O'Connell Terrace, creating a total of 95 dedicated car parking spaces for the construction workforce at the Mayne Rail Yard and O'Connell Terrace worksites. Estimates of peak workforce numbers on-site at these two construction worksites total 156 people, which is expected to last for between 50% and 75% of the construction time of the Project.

The proposed car parking would accommodate around two-thirds of the projected peak workforce number which is considered reasonable given:

- some of the workforce would be expected to, and would be encouraged, to car pool
- some of the workforce would use public transport to access the construction worksites given that the RBWH busway station and Bowen Hills Station are in close proximity to the construction worksite
- some of the workforce could use commercial off-street parking such as at the RNA Showgrounds
- surrounding streets are included within the Brisbane Central Traffic Area (BCTA) (with some limited exceptions) and as such parking on surrounding streets is generally restricted to two hours and is unsuitable for all day workforce parking.

Excess parking at the northern portal site, ie approximately 40 car parking spaces in excess of peak workforce numbers, could be used to accommodate overspill parking demand from the Mayne Rail Yard and O'Connell Terrace construction worksites.

LEGEND

- Potential Material Delivery Inbound Routes
- Potential Material Delivery Outbound Routes
- Worksite Extent
- Worksites

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-56

Mayne Rail Yards Heavy Vehicle Access and Egress Routes

0 100 200 300 400 m

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CrossRiverRail

SKM aurecon CRR JOINT VENTURE

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Access, servicing and provision for adjacent development

There would be no impacts on adjacent developments and access for Queensland Rail operations at Mayne Rail Yard would be maintained at all times.

Emergency services

There would be no changes to emergency services access to Mayne Rail Yard. Any adjustment to existing emergency service routes or evacuation within the Mayne Rail Yard would only be contemplated through consultation with Queensland Rail, and any change notified to all emergency service providers.

Special events

No public special events take place within Mayne Rail Yard, and as such there is no impact related to special events.

Ekka Station and O'Connell Terrace construction worksites

The Ekka Station construction worksite would be located within the RNA Showgrounds at Bowen Hills and would support the construction of the proposed Ekka Station while the adjoining O'Connell Terrace worksite is required to support construction of widening O'Connell Terrace itself including a new road over rail bridge.

Construction worksite location and proposed truck access

Access to the Ekka Station construction worksite would be directly to and from O'Connell Terrace and facilitated via a temporary ramp from the construction worksite gates. The O'Connell Terrace construction worksite would be accessed from O'Connell Terrace, Sneyd and Tufton streets.

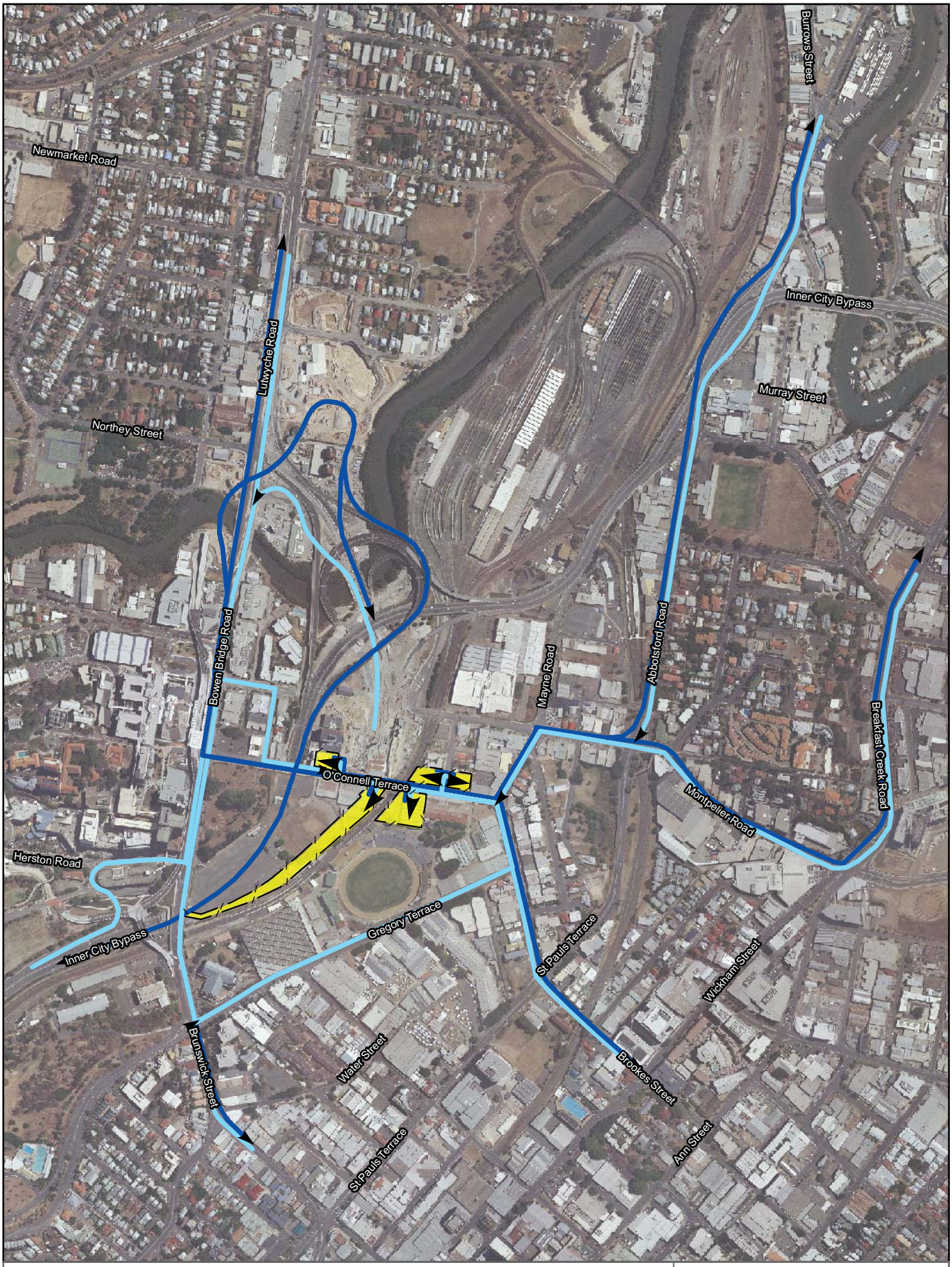
The heavy vehicle access routes to this worksite for delivery vehicles are shown in **Figure 5-57**. These routes represent the main routes used for major, potential delivery vehicles.

There would be no traffic or network changes required for the Ekka Station construction worksite, as it would be off-road.

The O'Connell Terrace construction worksite would require a staged construction approach. A detailed traffic management scenario would be determined by the contractor and documented in the CTMP developed for this construction worksite.

A temporary bridge would be required to maintain access to and from Lanham Street to Mayne Rail Yard. This temporary bridge would be accessed from Tufton Street with all movements permitted at the intersection of Tufton Street and O'Connell Terrace. The Lanham Street signalised intersection would be temporarily closed and signals decommissioned during construction. Sneyd Street would also be temporarily closed north of O'Connell Terrace during some elements of the construction staging, with traffic detoured via Wren Street.

Local access within O'Connell Terrace would be maintained. Detours would be advised to all road users including emergency service providers, with a communications plan to be developed.



LEGEND

- Inbound Haulage Routes
- Alternate Inbound Haulage Routes
- Outbound Haulage Routes
- Potential Material Delivery Inbound Routes
- Potential Material Delivery Outbound Routes
- Worksite Extent
- Worksites

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-57

Ekka Station and O'Connell Terrace Construction Site and Haulage Routes

0 100 200 300 400 m N

1:10,000 at A4

CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G0168_CRR_Haulage_Routes_Exhibition_A4.mxd 07/07/2011 15:43

Network operation – impact on traffic conditions

Additional construction traffic resulting from the Ekka Station construction worksite on both Bowen Bridge Road and O'Connell Terrace is not anticipated to have any significant impact on existing traffic conditions. A total of 13 truck movement per hour at peak times is expected to be generated by the two worksites which would result in around one truck movement every five minutes on average.

Staged construction traffic management arrangements put into place at the intersections of Lanham and Sneyd streets with O'Connell Terrace may result in delays for vehicles at these intersections, as well as increased volumes of traffic in Wren and Tufton streets during some stages of construction.

Pedestrian and cycle access along O'Connell Terrace would generally be maintained during construction as alternative routes would create a significant detour. There may be the occasional need for short term closures such as at night time. A communication strategy would be implemented to advise pedestrians of the alternative arrangements.

Buses

There would be no impact on buses except for any temporary short term closure of O'Connell Terrace.

Parking

The Ekka Station construction worksite would occupy spaces currently used as all day parking within the RNA Showgrounds. Detailed assessment of the construction worksite boundaries and comparison with current marked public car parking spaces has not been undertaken. However, site observations suggest that the available all day parking within the site is not fully utilised, so loss of some spaces due to construction worksite occupation may be able to be accommodated on-site.

Workforce parking would be provided within the Ekka Station construction worksite with a capacity of 15 vehicles, and a second car parking area would be provided on land located on the north east corner of Tufton Street and O'Connell Terrace, comprising some 30 spaces. Construction worksite parking demand for both the Mayne Rail Yard and O'Connell Terrace/Ekka Station construction worksites is described in the previous section (ie Mayne Rail Yard construction worksite). This concludes that overall parking numbers across these and the northern portal construction worksites would accommodate projected demand with limited on-street parking impacts due to on-street parking restricted to two hours through the Brisbane Central Traffic Area.

The existing layout of parking within the RNA Showgrounds may require modification to ensure construction vehicle access to and from the construction worksite can be achieved without construction vehicles having to travel down rows of parked vehicles, which may otherwise present a safety hazard.

There is limited on-street parking currently provided in O'Connell Terrace east of Tufton Street. Dependant on the scope of reconstruction work, this parking may need to be suspended during construction activity.

Access, servicing and provision for adjacent development

Local access within and from O'Connell Terrace would be maintained, including to Lanham Street which provides access to the Queensland Rail Mayne Rail Yard. There is anticipated to be no change to existing access to RNA Showgrounds. However, driveway access points directly onto O'Connell Terrace, particularly east of the rail overbridge, are likely to be closed during construction. The main access west of Sneyd Street would not be impacted.

Emergency services

Two-way access for emergency service vehicles would be maintained on O'Connell Terrace as this is a key access route for the Queensland Ambulance Service to the RBWH. Access to the Clem Jones tunnel emergency vehicle access points would also be maintained at all times.

Northern portal construction worksite

Construction worksite location and proposed truck access

The northern portal worksite would be located on land bounded by the Exhibition railway line and ICB in the north and the Victoria Park Land Bridge to the west.

Haulage routes for major construction vehicles, including spoil haulage, include the Centenary Motorway from the south-west, to the ICB from Milton Road (or Legacy Way), the Herston Road off ramp onto Bowen Bridge Road, and a right turn into Gregory Terrace. Access to the construction worksite driveway would be via a direct right turn into the construction worksite from Gregory Terrace. Egress from the site would follow the same route, with a left turn into Gregory Terrace. An existing driveway onto Bowen Bridge Road would also allow left in and out turn movements from Bowen Bridge Road (northbound), immediately south of the Northern Busway access point. The proposed spoil haulage routes and delivery vehicle routes are shown in **Figure 5-58**. These routes represent the key routes for major haulage vehicles. In addition to haulage, potential delivery vehicle routes are also shown.

Traffic staging and network changes

The current intersection of the access driveway and Gregory Terrace would be maintained. The internal access road would need to be upgraded to allow for heavy vehicle access, principally through road widening and suspension of existing parking activity within the road width. A direct right turn into the worksite driveway is proposed. Other treatments proposed to facilitate the right turn would include the provision of a passing lane in the kerb side lane of Gregory Terrace through suspension of kerbside parking and Keep Clear markings in the northbound lanes of Gregory Terrace.

Queensland Rail access roads currently provides access for maintenance to both sides of the rail track, including one from the ICB westbound and one under Bowen Bridge Road to the southern side of the railway from the east. Construction works would require the underpass to be closed (to accommodate additional railway tracks). However, alternative access could be provided via the construction worksite itself.

Network operation – impact on traffic conditions

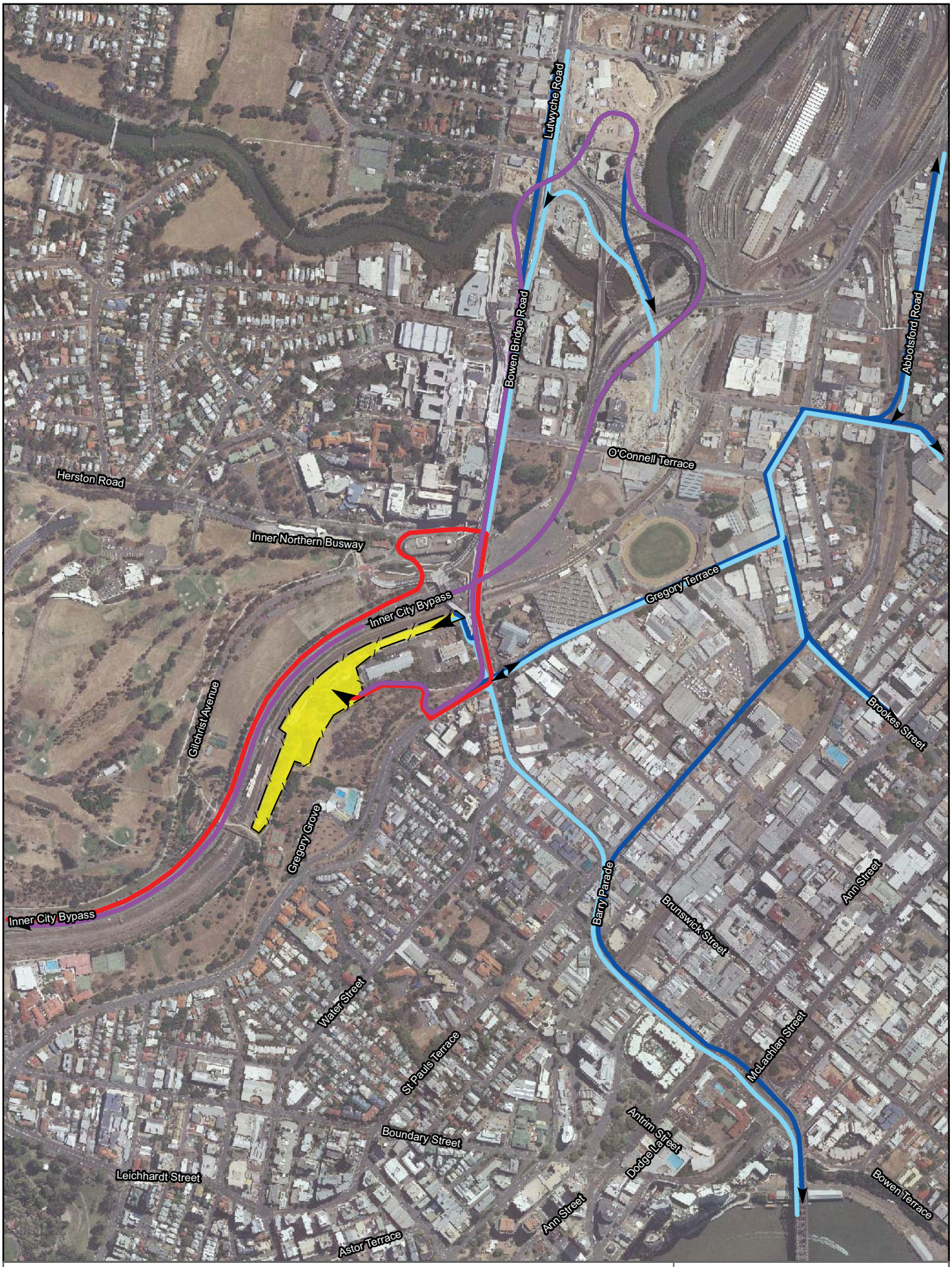
At the peak of construction, 95 truck movements per day or around eight per hour could be expected. In addition up to 80 private vehicle movements could be expected during the AM peak hour as a result of workers arriving by car.

Overall, the operation of the northern portal construction worksite is likely to result in a negligible increase in Gregory Terrace/Bowen Bridge Road traffic including heavy vehicle traffic.

When construction vehicles right turn into the driveway from Gregory Terrace, some minor delay could be experienced by westbound motorists on Gregory Terrace itself however one through-lane would be maintained at all times to match existing capacity.

Pedestrians and cyclists

As the northern portal construction worksite would occupy land which has an existing pedestrian and cyclist shared path, north of the land bridge, an alternative off-road shared pedestrian and cyclist path would be provided to travel on the eastern side of the current tennis courts, linking to the existing shared path on the eastern side of the proposed site access driveway to Gregory Terrace. A suitable crossing facility including drop kerbs would be provided at the shared path intersection with the driveway access point.



LEGEND

- Inbound Haulage Routes
- Outbound Haulage Routes
- Potential Material Delivery Inbound Routes
- Potential Material Delivery Outbound Routes
- Worksite Extent
- Worksites

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-58

Northern Portal Haulage Routes

0 100 200 300 400 m

1:11,000 at A4

N

CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G0169_CRR_Haulage_Routes_Northern_P_A4.mxd 07/07/2011 15:45

Buses

Bus stops exist on both sides of Gregory Terrace further to the south of the worksite driveway access point that is used by a number of services. No impact to existing bus operations is anticipated to result from the proposed construction activity.

Parking

The existing car park related to the Centenary Aquatic Centre would not be impacted by the Project and would continue to be available for its users.

The car park in the vicinity of the electrical substation currently provides approximate 200 spaces that are used by Energex and BCC staff. This car parking would be predominantly maintained for its current use. It is proposed that some car parking spaces adjacent to the driveway entrance would be removed to facilitate two way truck movements along the driveway. The southern section of parking associated with a BCC facility would be removed. However, this is not expected to result in any impact as the area currently occupied by the depot would be occupied by the Project, with BCC uses being transferred to an alternative location.

Controlled (resident only or time limited) on-street parking is currently available on the southern side of Gregory Terrace adjacent to an existing residential unit development, as well as being available on the northern side of Gregory Terrace and in adjacent side streets. It is proposed to temporarily suspend four car parking spaces on the southern side of Gregory Terrace adjacent to the driveway entrance. This would allow southbound vehicles on Gregory Terrace to pass a stationary right turning construction vehicle, helping to minimise the impact of construction vehicles on traffic using Gregory Terrace.

The northern portal construction worksite would be located in the Brisbane Central Traffic Area. Within this traffic area, on-street parking is generally limited with a two-hour period (with some exceptions). Parking restrictions apply Monday to Friday 7.00 am to 6.00 pm and Saturday 7.00 am to 12.00 pm.

Workforce parking for Cross River Rail is proposed within the construction worksite, with 40 spaces being provided in the former BCC facility and another 40 spaces being provided within the Project construction worksite adjacent to the Energex building.

The peak workforce demand at this construction worksite is estimated to total 39 people. As such the proposed 80 car parking spaces is more than double peak worker numbers and excess capacity could be used to accommodate any overspill from the nearby Ekka Station and O'Connell Terrace construction worksites. Given the presence of on-street parking restrictions on the surrounding streets and over-supply of workforce parking provision, no parking overspill to surrounding residential streets is envisaged.

The traffic movements resulting from this workforce parking are expected to be of similar magnitude to the existing parking movements associated with the current use of the land that the construction worksite would be located on.

Access, servicing and provision for adjacent development

The construction worksite would not impact on access to any adjacent development. This includes the Centenary Swimming Pool complex, schools at the western end of Gregory Terrace and residential property.

Emergency services

The worksite associated with construction of the northern portal is not anticipated to have any impact on emergency service access to adjacent land uses.

Special events

This construction worksite would not have an impact on transport arrangements associated with special events.

Roma Street Station construction worksite

The construction worksite for Roma Street Station would consist of three separate work areas, one at each end of the proposed new station and one to construct a subway connection within the existing Roma Street Station. A fourth area for materials set-down, workforce parking and site offices would also be required.

For the purposes of this assessment, it is assumed that the final precinct road network changes including widening of footways in Roma Street, and changes to bus access at the intersection of George and Herschel streets would not be completed until the main station construction and fit out has been completed. The construction of these final surface works would result in minor impacts over a short period of time, which would be addressed through a separate CTMP. Such impacts would include lane closures, temporary traffic and pedestrian diversions and minor, temporary changes to on street parking and loading.

Worksite location and proposed truck access

Construction vehicle access routes and access to the construction worksite is shown in **Figure 5-59** and access points would be located as follows:

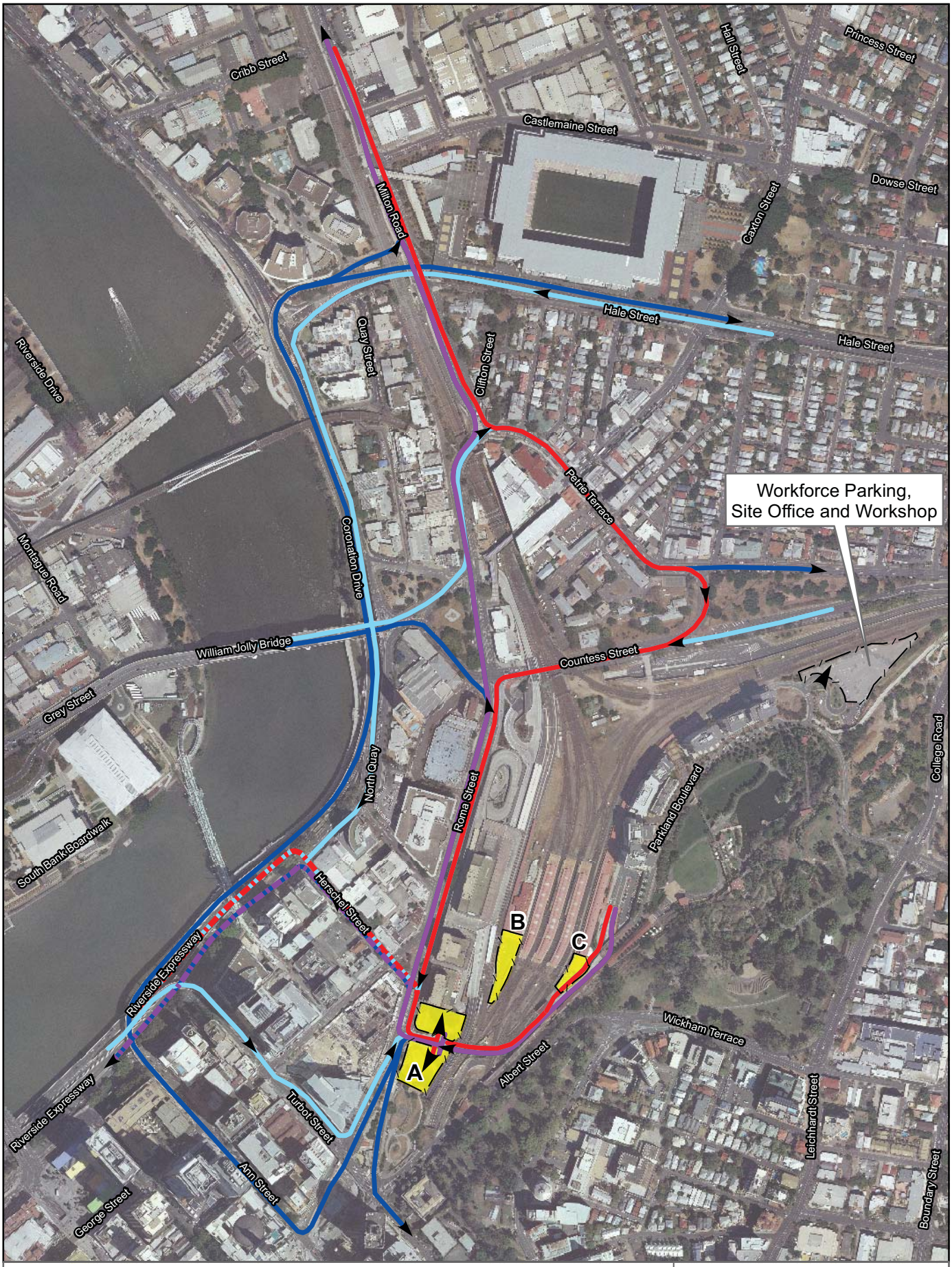
- Construction worksite A (Roma Street south) – in parkland adjacent to the intersection of Roma Street and Parklands Boulevard (Emma Miller Place). Access to this construction worksite would be directly from Parklands Boulevard.
- Construction worksite B (Roma Street central) – in an existing car park that serves the Station Masters building between Platforms 7 and 8 of Roma Street Station. Access to this construction worksite would be from Parklands Boulevard.
- Construction worksite C (Roma Street north) – adjacent to the long distance Platform 10 and station luggage storage area on Parklands Crescent. Access would be via Parklands Crescent.

In addition an area would be provided for workforce parking, site offices and workshops. This area would be located in an existing car park at the north western corner of Roma Street Parkland and accessed from College Close. Access to College Close is via Parkland Crescent and Parkland Boulevard.

Traffic staging and network changes

The construction of Roma Street Station would occur predominantly off-road but would require two network changes:

- The closure of the existing roundabout located in Parkland Boulevard, north of Roma Street. This closure is identified as permanent change, which is brought forward to the construction stage. Suitable alternative routes are via Parklands Crescent from the intersection of College Road and Gregory Terrace.
- The location of the worksite adjacent to the long distance Platform 10 requires occupation of the westbound lane of Parkland Crescent, between the long distance platform and the Parkland Boulevard intersection. It is proposed to manage this closure by utilising the eastbound lane in a contra-flow traffic arrangement. This would result in minor delays in accessing and egressing the station.
- Access to all properties and facilities on Parklands Boulevard and Parklands Crescent would be maintained, albeit with possible minor diversions (and traffic control where required) in place at times.



LEGEND

- Inbound Haulage Routes
- Alternate Inbound Haulage Routes
- Outbound Haulage Routes
- Alternate Outbound Haulage Routes
- Potential Material Delivery Inbound Routes
- Potential Material Delivery Outbound Routes
- Worksite Extent
- Worksites

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-59

Truck Access Routes to Roma Street Construction Site

0 50 100 150 200 250 m

1:7,000 at A4

CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G0170_CRR_Haulage_Routes_Roma_St_A4.mxd 07/07/2011 15:46

Network operation – impact on traffic conditions

The following network impacts on existing traffic conditions are anticipated:

- minor increase in heavy vehicle flows on the adjacent arterial and local road network (around 10 vehicles per hour at peak times)
- increase in traffic in Parkland Crescent
- increase in traffic in Parkland Boulevard, between Parkland Crescent and Roma Street
- potential for minor delays in Parkland Boulevard/Parkland Crescent depending on traffic control method adopted.

Pedestrians and cyclists

The Roma Street construction worksites are located in areas used by pedestrians and cyclists. During the construction period a number of amendments would be necessary to maintain pedestrian and cycle connectivity. None would have significant impacts on pedestrian and cycle movement and the Parklands Boulevard cycle route would remain open.

Buses

The following bus impacts have been identified:

- coach access and egress from the long distance platform would be required to follow detours put in place for all vehicles
- there would be no change to bus access to the Quality Inn on Roma Street
- a bus shelter on Roma Street east of Parklands Boulevard would be removed
- bus u-turn via College Crescent would be maintained.

Parking

On-site workforce parking totalling 45 spaces is proposed at the Roma Street construction worksites. Five of these would be provided at construction worksite A with the majority provided at the proposed workforce car parking area at College Close. At the peak of construction, an estimated 137 workers would be on-site at any one time. On-site parking provision would accommodate around one third of this number.

Given the site's location in the CBD, a proportion of the workforce would be expected to use the many public transport services at Roma Street Station. Alternatively the workforce could make use of nearby public car parks such as those located within the Roma Street Transit Centre as a suitable alternative close to the construction worksites.

The Roma Street construction worksites would be located in the Brisbane Central Traffic Area. As such, on-street parking on surrounding street is restricted with a two-hour time limit across the traffic area unless signed otherwise. Parking restrictions apply Monday to Friday 7.00 am to 6.00 pm and Saturday 7.00 am to 12.00 pm such that the workforce would not be able park on the streets in the vicinity of the construction worksite.

The existing Station Masters car park between platforms 7 and 8 would be removed for the duration of work.

The car park adjacent to the long distance Platform 10 would be retained. However, the existing kerb uses such as taxi rank and pick up/set-down areas may require modification, particularly on the eastern end. The extent of change required at this location would become known during the detailed design stages of the project, and documented in the CTMP developed for this construction worksite.

Some temporary loss of existing timed parking may occur as a result of any reconfiguration of kerb uses.

Access, servicing and provision for adjacent development

No change to access to or from the Quality Inn hotel on Roma Street is anticipated.

All existing access to the Station Masters car park located adjacent to Platform 7 and 8 would be removed. Staff and visitors to the Roma Street Station would be required to utilise alternative access and parking areas. These potential alternate access areas include the car park adjacent to Platform 10, which has lift access to the station concourse.

Access along Parkland Crescent to the car parking and pick up/set-down area adjacent to the long distance Platform 10 would be retained.

The removal of the roundabout on Parklands Boulevard may require vehicles which service the Parklands Crescent apartments and the Roma Street Park area to use alternative approach routes to access their destination. This would be a permanent change and would need to be communicated to building users and their suppliers in advance of the roundabout closure.

Emergency services

The worksite associated with construction of Roma Street Station is not anticipated to have any adverse impact on emergency service access to adjacent land uses.

Special events

Roma Street Station is often impacted by special events, predominantly sporting events held at Suncorp Stadium. These events often require traffic control measures to provide for additional pedestrian capacity and bus activity on Roma Street between Suncorp Stadium and Roma Street Station. These activities would not be impacted by construction activity.

Construction activities occurring in the concourse level of the Roma Street Station would be behind a protective site hoarding however consideration of temporarily moving this to achieve maximum station capacity during special events would be considered in the detailed construction management plans.

Albert Street Station construction worksite

The construction worksite for Albert Street Station would be located within the constrained urban environment in the heart of the Brisbane CBD.

Construction worksite location and proposed truck access routes

There are two construction worksites required in order to construct the Albert Street Station. The northern construction worksite would be located on the eastern side of Albert Street, to the north of Mary Street. A second, larger construction worksite would be located to the south, occupying the space currently utilised by the Royal on the Park hotel, and bounded by Alice Street to the south, Albert Street to the west and Margaret Street to the north.

The construction worksites and proposed heavy vehicle access routes are shown on **Figure 5-60**.

LEGEND

- Inbound Haulage Routes
- Alternate Inbound Haulage Routes
- Outbound Haulage Routes
- Alternate Outbound Haulage Routes
- Potential Material Delivery Inbound Routes
- Potential Material Delivery Outbound Routes
- Worksite Extent
- Worksites

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-60

Albert Street Construction Site and Access Routes

0 50 100 150 200 250 m

1:7,000 at A4

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CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G0171_CRR_Haulage_Routes_Albert_St_A4.mxd 07/07/2011 15:47

Traffic staging and network changes

Construction activity would take place predominantly off-road behind hoardings at the back of current footways. The key exception is the construction of a pedestrian underpass under Alice Street which would be undertaken through a series of lane closures and possible diversions in a staged manner. Access for vehicles and pedestrians on Alice Street would be maintained and it is expected that at least two traffic lanes would remain open on Alice Street during peak times. Temporary lane closures and suspension of parking and loading in the vicinity of the underpass would be inevitable to construct this major new piece of pedestrian infrastructure.

Network operation – impact on traffic conditions

The northern Albert Street worksite is forecast to generate only two heavy vehicle trips per hour at peak times, and as such is unlikely to create any negative traffic impact on or near the adjacent signalised intersection of Mary and Albert streets.

The southern Albert Street worksite is forecast to generate up to six heavy vehicle trips per hour in peak times. Likewise this is unlikely to generate any negative traffic impacts on adjacent intersections including Albert and Margaret streets or Albert and Alice streets.

The closure of a lane on Alice Street will lead to some delays for traffic including buses on Alice Street for a temporary period, possible a couple of months. Detailed traffic management strategies including signing of alternative routes would form part of the CTMP for this site.

Pedestrians and cyclists

There is anticipated to be a minor impact to pedestrians due to the temporary occupation of footpaths for construction activities such as demolition and site clearance for example. However establishment of the worksite is likely to involve site hoardings at or near the back of footway allowing pedestrian access to be maintained along frontage footways. However, some disruption will be caused by construction vehicles crossing footpaths to access worksites. This would be most noticeable at Albert Street north where haulage vehicles may need to traverse the western footway of Albert Street however this would be only two vehicles per hour.

Businesses that are within the proposed worksite would not be trading, and any changes to footways such as temporary narrowing or short term closure would not impact on those businesses.

No significant impact to cyclists or cycle facilities is expected. The CityCycle station in Margaret Street would continue to operate as existing. Some cycle parking and other street furniture however would be removed in Albert Street north of Mary Street.

Buses

There are existing bus routes and bus stops in Margaret and Alice streets. Bus loading in Alice Street would need to be relocated permanently as construction of the pedestrian underpass would require the permanent closure of the kerbside lane for a new station entrance. However alternative bus loading bays could be provided in Albert Street (east side) between Alice and Margaret streets following demolition of the Royal on the Park hotel and establishment of the worksite behind a hoarding. While the construction of the underpass could impact on bus routes operating along Alice Street for a period of a few months, alternative route strategies would be investigated in the detailed CTMP to mitigate these impacts.

Parking

The Albert Street construction worksite would be located in the BCTA. As such, on-street parking on surrounding street is restricted to a two hour time limit across the traffic area unless signed otherwise. Parking restrictions apply Monday to Friday 7.00 am to 6.00 pm and Saturday 7.00 am to 12.00 pm. As such, impacts of workforce car parking on surrounding streets are expected to be negligible.

On-site car parking for 12 cars would be provided for the Cross River Rail workforce at the southern construction worksite accessed from Margaret Street. Peak workforce numbers are expected to total 137 people. As such, excess staff parking demands would need to be accommodated within the many existing CBD public parking facilities nearby.

Given the site's location in the CBD, a proportion of the workforce would be expected to use the many public transport services that serve the CBD with rail services at Central Station and bus services at the Queen Street bus station and many on-street bus stops.

The impacts of workforce parking on surrounding streets, given the presence of the BCTA and the good provision of public transport, are expected to be negligible.

A number of other, more permanent changes to parking and loading changes would also be required to facilitate construction of the reference design outlined as follows:

- The existing taxi rank in Alice Street, on the eastern side of Albert Street, would require relocation or removal given the need to provide a construction driveway entrance/exit into Alice Street. It may be possible to consolidate the existing hotel driveways into an area of kerb suitable for this need without loss of taxi spaces. However it is noted that with the removal of the Royal in the Park hotel, demand for the taxi rank would reduce.
- Existing on-street car parking spaces on the southern side of Margaret Street, east of Albert Street, would require suspension during construction activity, in order to provide for a construction driveway crossing. It is estimated that approximately three spaces would be suspended for the duration of construction.
- Existing on-street car parking spaces on the northern side of Mary Street, east of Albert Street, would also require suspension to provide for turning movements into the construction worksite and for materials set-down/works zone in Mary Street. It is estimated that approximately four spaces would removable suspended for the duration of construction.

Access, servicing and provision for adjacent development

No impact to the operation of these driveways is anticipated.

Emergency services

Emergency services would not be directly impacted by the proposed construction activity.

Special events

Special events such as Riverfire, New Year's Eve fireworks, or other major special events in the City Botanic Gardens. can result in an increased pedestrian movement along Albert Street. These and other major events within the CBD may impact on the construction worksite or the truck routes identified to serve the construction worksites. In such cases, short term management strategies would be developed for the site under processes identified in the Framework Traffic Management Plan.

Gabba Station construction worksite

The Woolloongabba construction worksite would be the launch site for two TBMs towards the north and the extraction point for two TBMs arriving from the south, as well as associated tunnel fit-out and construction of the Gabba Station.

Construction worksite location and proposed truck access

The construction worksite would be located on the existing Goprint site between Leopard Street, Eastern Busway, Vulture Street and the Vulture Street exit ramp. The construction worksite and proposed heavy vehicle access routes are shown in **Figure 5-61**. These routes represent the main routes used for major haulage. In addition to haulage, potential delivery vehicle routes are also shown in **Figure 5-61**. Heavy vehicles access would approach the worksite from various directions, predominantly from Ipswich Road and when directly accessing the worksites via Main Street and Vulture Street.

Ipswich Road is the preferred haul route as it avoids sections of the Pacific Motorway, which experience congestion in the peak periods and provides the most direct access to and from the spoil disposal site at Swanbank via the Ipswich Motorway. Detailed haul routes would be determined by the contractor during the development of CTMP for this construction worksite, and would be subject to further review by relevant stakeholders.

Traffic staging and network changes

Construction of the station is anticipated to be undertaken in a number of stages, to provide a minimum disruption to the existing road and bus network.

Network operation – impact on traffic conditions

Heavy vehicle movements to and from the Woolloongabba worksite are anticipated to total around 14 vehicles per hour at peak times. Furthermore, workers arriving on site could mean a further 70 vehicles movements in the morning, but generally arriving on site before 6.30 am and therefore prior to the AM peak hour.

Given that the worksite replaces the current Goprint site and the majority of traffic movements would occur outside peak hours, the total traffic generated by the site is expected to be minimal with no discernible impacts on surrounding traffic conditions.

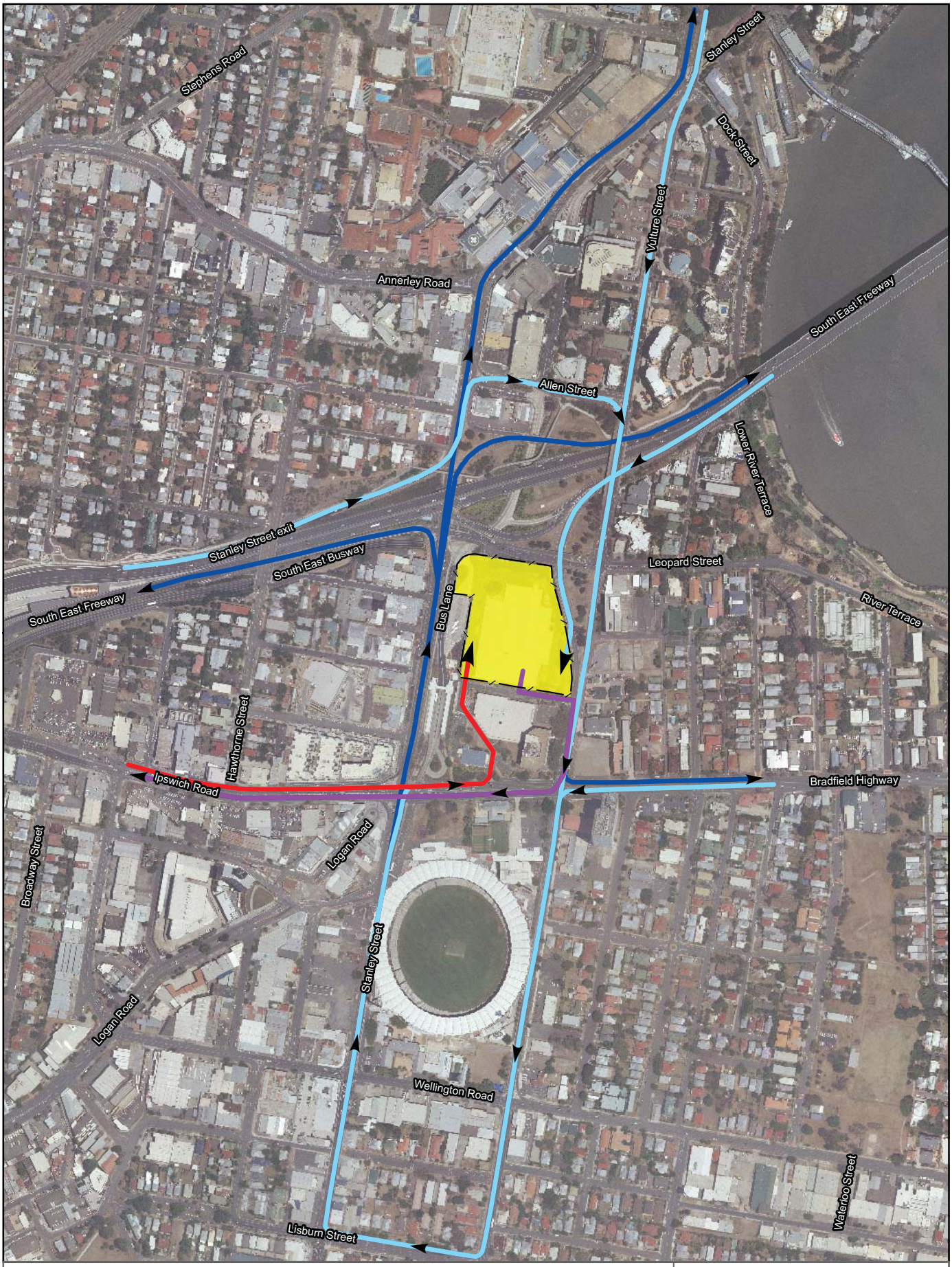
Pedestrians and cyclists

The construction works at Woolloongabba would not likely impact on the pedestrian and cycle network with the site to be relatively self contained within the Goprint site and setback from surrounding footways and pedestrian crossings.

Buses

Construction works would be undertaken in stages to ensure busway operations are maintained and to limit the impacts on buses. However it is anticipated that some impact to bus operation would occur at certain stages of construction. These impacts are anticipated only to occur for short durations such as traffic switches or for concrete pours adjacent to or above the busway, and would be timed to occur during off-peak periods, weekends or night time. Such closures or diversions would avoid coinciding with events at the Gabba stadium.

It is anticipated that buses on the busway could experience a minor increase in running time due to the temporary diversion and speed restrictions imposed during the staged construction across the busway. This stage of construction would be relatively short compared to the overall construction program.



LEGEND

- Inbound Haulage Routes
- Outbound Haulage Routes
- Potential Material Delivery Inbound Routes
- Potential Material Delivery Outbound Routes
- Worksite Extent
- Worksites

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-61

Woolloongabba Construction Site and Access Routes

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1:7,000 at A4

CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G0172_CRR_Haulage_Routes_Gabba_A4.mxd 07/07/2011 15:48

Parking

The Woolloongabba worksite would be located in the Gabba Traffic Area. As such, on-street parking on surrounding streets is limited to two hours across the precinct (with some exceptions). Parking restrictions apply Monday to Friday 7.00 am to 7.00 pm and on days when events are held at the adjacent Gabba stadium with on-street parking limited to 15 minutes from 7.00 am to 10.00 pm.

There is no on-street car parking available on Leopard, Vulture, Stanley or Main streets adjacent to the site. In addition there are no park and ride car spaces provided at Woolloongabba Busway Station. No change to existing on-street parking is proposed.

Parking within the existing Goprint site would be removed as a result of construction works on the site. Project workforce parking would be provided within the Woolloongabba construction worksite with the provision of 72 car parking spaces. Workforce access to the car parks would be from the Vulture Street off-ramp and from northbound Main Street site access points.

Peak workforce estimates at the Woolloongabba construction worksite total 137 workers. The construction worksite parking would be able to accommodate over half of the peak workforce. Given the site's location adjacent to the Woolloongabba busway station, a proportion of the workforce would be expected to use bus services to access the construction worksite. Other workforce personnel could car pool or park in nearby off-street parking stations, or be bussed from the Yeerongpilly worksite.

Given the presence of on-street parking controls Monday to Friday, the impact of workforce parking on the surrounding streets on these days is expected to be small. However, with no parking controls on weekends (except when events are on at the Gabba), overspill parking is likely to occur on Saturdays (and potentially also Sundays when some work would occur within an acoustic shed) and as such amendments to the Gabba Traffic Area to include additional controls at least on Saturdays would be recommended to mitigate the impact. Overall however, the impact of workforce parking on the surrounding community is expected to be minimal.

Access, servicing and provision for adjacent development

The construction worksite associated with construction of the Gabba Station would not alter existing property access point or restrict access to any adjacent developments except for a minor amendment to the Dental Hospital and Land Centre.

Emergency services

The construction worksite for the Gabba Station is not anticipated to have an impact on emergency service vehicles.

Special events

The Gabba stadium is located to the east of the construction worksite. During an event, traffic control measures are required to provide for additional pedestrian and bus capacity in the surrounding streets. During the event mode for events at the Gabba stadium, short term management strategies would be developed for the site under processes identified in the Framework Traffic Management Plan. Strategies may include a short term stop to trucking activities at the site or additional traffic control measures. Specific processes would be developed in the CTMP for the Woolloongabba construction worksite. Pedestrian access between the Gabba stadium and the Woolloongabba Busway Station would not be impacted by the location or extent of the Woolloongabba construction worksite.

Boggo Road Station

Construction worksite location and proposed truck access

The construction worksite would consist of two separate work areas, one at each end of the station. The northern work area would be located on undeveloped land to the south of the integrated Boggo Road Busway Station and Park Road Station. It would be bounded by Dutton Park Primary School to the west and the Boggo Road to the south. The southern work area would be located in the south adjacent to the Boggo Road Gaol.

The location of the construction worksite and proposed haul routes is shown in **Figure 5-62**.

Heavy vehicles would approach the construction worksite from various directions, predominantly from the south due to height restrictions imposed by the rail bridge crossing Annerley Road immediately north of Dutton Park State School. The use of Annerley Road between Ipswich Road and Rusk Street to the south-east of the worksite would be avoided in order to minimise impacts on residential and other sensitive receivers along that route. The preferred heavy vehicle access from the south is via Cornwall Street as it provides the most direct link to Ipswich Road, the proposed combined haul route for all construction worksite south of the river.

Traffic staging and network changes

During construction, temporary possession of Boggo Road would be required for the construction of excavation underneath Boggo Road. Traffic in Boggo Road would be diverted onto a side track to the north of the existing Boggo Road alignment.

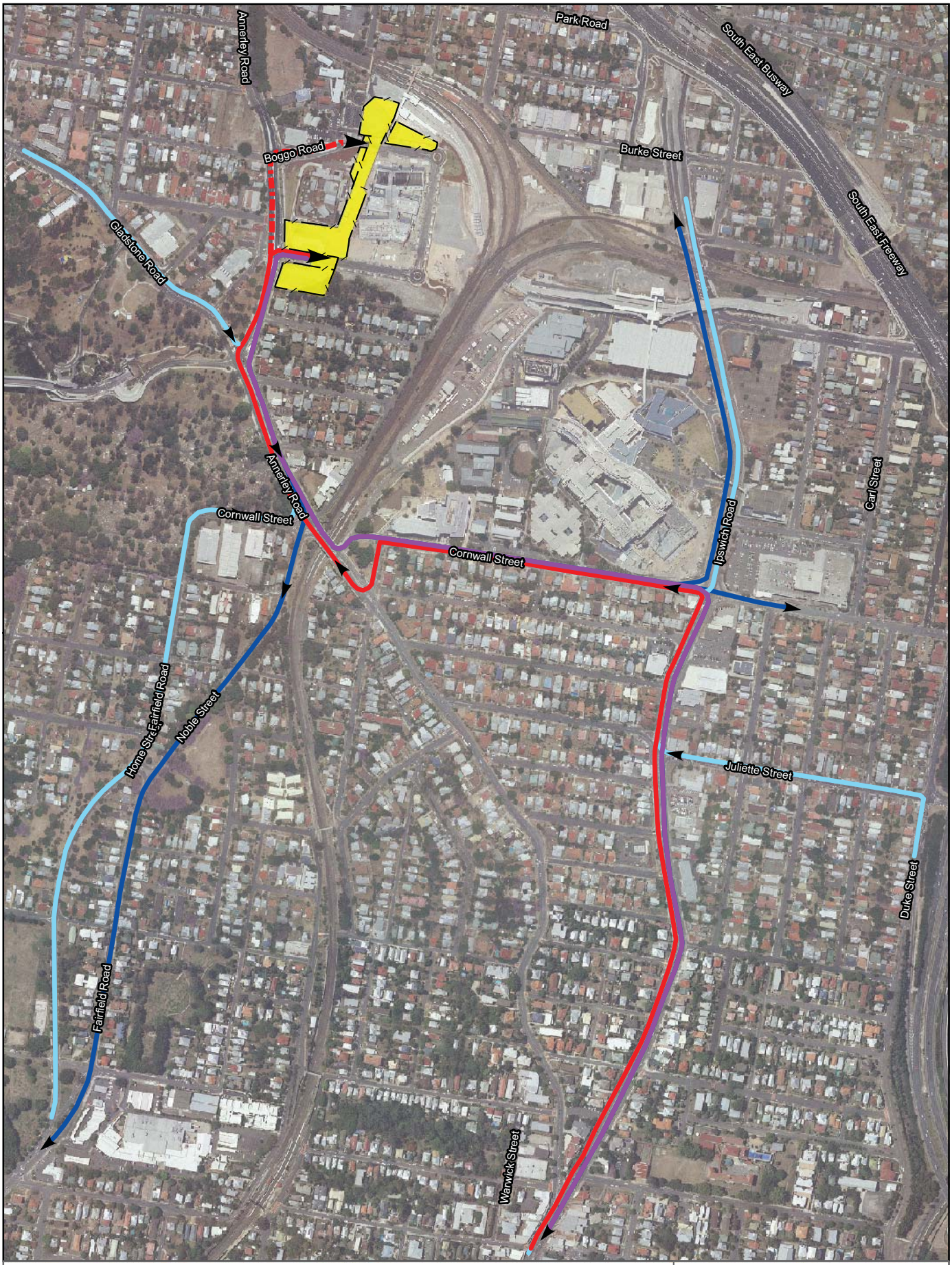
Peter Doherty Street will be closed to through access for the duration of construction. During this time, all non-construction vehicles in the precinct will be required to detour via Boggo Road, as the Project construction worksite boundaries will effectively close Peter Doherty Street to through access.

A new right turn bay is proposed for the intersection of Annerley Road and Peter Doherty Street for the period of construction. This new right turn phase would run at the same time as the northbound right turn phase at the intersection of Annerley and Boggo roads, minimising any impact on network operation. The right turn would allow access to the gated construction worksite, although space would be available for a non-construction vehicle to turn around prior to reaching the gate if it accidently turned into Peter Doherty Street.

Network operation – impact on traffic conditions

The staged construction of the Boggo Road Station would primarily affect local traffic within the Boggo Road Urban Village. With the exception of a proposed new (temporary) construction vehicle only right turn from Annerley Road into Peter Doherty Street, the construction worksite is not expected to impact on the existing road network beyond the intersection of Boggo and Annerley roads.

Overall only nine truck movements per hour are expected at peak times to service the delivery and spoil haulage requirements of the site. With approximately half this number using the signalised intersectin at Boggo and Annerley roads, then this is not expected to result in any worsening of traffic conditions. Given the relatively small scale of this construction worksite facility it is anticipated that there would be spare capacity at the intersection of Boggo and Annerley roads and that the intersection would not be unduly impacted.



LEGEND

- Inbound Haulage Routes
- Alternate Inbound Haulage Routes
- Outbound Haulage Routes
- Potential Material Delivery Inbound Routes
- Potential Material Delivery Outbound Routes
- Worksite Extent
- Worksites

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-62

Truck Access Routes to Boggo Road Construction Site

0 50 100 150 200 250 m

1:8,500 at A4

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CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G0173_CRR_Haulage_Routes_Boggo_A4.mxd 07/07/2011 15:49

It is expected that the proposed construction-vehicle-only right turn from Annerley Road into Peter Doherty Street would operate at the same time as the right turn into Boggo Road, thus causing a negligible impact on overall network performance. A temporary closure of Peter Doherty Street would require vehicles egressing the Boggo Road Urban Village to use Boggo Road instead. Minor delays may be experienced however detailed mitigation strategies would be investigated in the detailed CTMP and may include potential changes to traffic signal timings, lengthening of a second storage lane in Boggo Road or amendments to worksite configurations to maintain access in Peter Doherty Street.

Pedestrians and cyclists

The Park Road Station and Boggo Road Busway station are located to the north of the construction worksite. There is currently pedestrian access between the busway and rail station and the Boggo Road Urban Village provision via a footpath along Boggo Road to gain access to the stations. A common over bridge and station access point is provided linking Boggo Road with Quarry Street on the other side of the railway line. During construction, the pedestrian footpath linking to Boggo Road would be diverted to the east of the worksite with temporary access around the worksite.

The existing pedestrian area between Boggo Road Gaol and the recently completed EcoSciences Precinct would be closed during construction. Alternative access for pedestrians within the centre would be managed for pedestrians to move between the southern areas of the building and Boggo Road.

Peter Doherty Street would be temporarily closed and form part of the southern construction site and as such pedestrians would need to use Boggo Road to access or cross Annerley Road. Alternatively they could use Railway Terrace (via an existing pedestrian link at the eastern end of Peter Doherty Street) to travel south. The existing bicycle lanes in Annerley Road would be maintained.

Buses

Some minor impact could be expected during the construction of the ventilation outlet into the busway area. Such construction should be undertaken at night time where possible or alternatively during bus operational hours with buses operating under stop-go or signal control around a hoarded off work area. Such disruption would be short term and minor in impact.

Parking

On-street parking bays exist along both sides of Peter Doherty Street and East Street near the construction worksite. An uncovered car parking area (under construction) is also provided to the east of the Boggo Road Urban Village Building off East Street.

The streets adjacent to the construction worksite on the south side of the railway line are within Dutton Park Traffic Area which operates between 7.00 am to 7.00 pm, Monday to Friday (excluding public holidays) as follows:

- a two-hour parking limit applies to all unsigned roads within the area
- a four-hour parking limit applies to disability parking bays
- loading bays and 30 minute parking zones are provided near business precincts.

A 28 bay park ‘n’ ride facility currently exists at Park Road Station and no park ‘n’ ride facility is provided at Dutton Park Station.

There is expected to be suspension of existing on-street car parking in Peter Doherty Street, estimated at seven spaces, as well as suspension of all loading and short term parking pick up/set-down areas in existing lay-bys in Boggo Road. These loading and short term pickup/set-down areas may be relocated to the southern side of EcoSciences Precinct, with a corresponding reduction in time restricted parking spaces.

Workforce parking for 30 cars would be provided within the boundaries of the proposed construction worksite in Peter Doherty Street. At the peak of construction, a workforce of up to 137 workers would be expected on-site at any one time. The proposed on-site car parking provision would not be able to cater for the total parking demand. Given the site's location adjacent to the Boggo Road Busway Station and Park Road Station, a proportion of the workforce would be expected to use bus and rail services to access the construction worksite.

Furthermore, given the presence of surrounding on-street parking controls and limited off-street commercial parking options, overspill workforce parking would need to occur at the Yeerongpilly construction worksite (approximately 4 km to the south) where sufficient additional off-street workforce parking is proposed. A shuttle bus connection from Yeerongpilly is recommended to mitigate the under-supply of workforce parking on site.

Given the presence of on-street parking controls Monday to Friday, the impact of workforce parking on the surrounding streets on these days is expected to be small. However, with no parking controls on Saturday, overspill parking is likely to occur and as such amendments to the Dutton Park Traffic Area to include additional controls on Saturday would be recommended to mitigate the impact.

Access, servicing and provision for adjacent development

Access to all adjacent developments, including the school, police station and the EcoSciences Precinct would be maintained during the works.

Emergency services

The construction worksites associated with construction of Boggo Road Station are not anticipated to have any impacts on emergency service vehicles, which includes the police station located on Boggo Road at the intersection with Annerley Road.

Special events

No special events are known to occur in the area adjoining the worksite.

Ventilation and emergency access building construction worksite

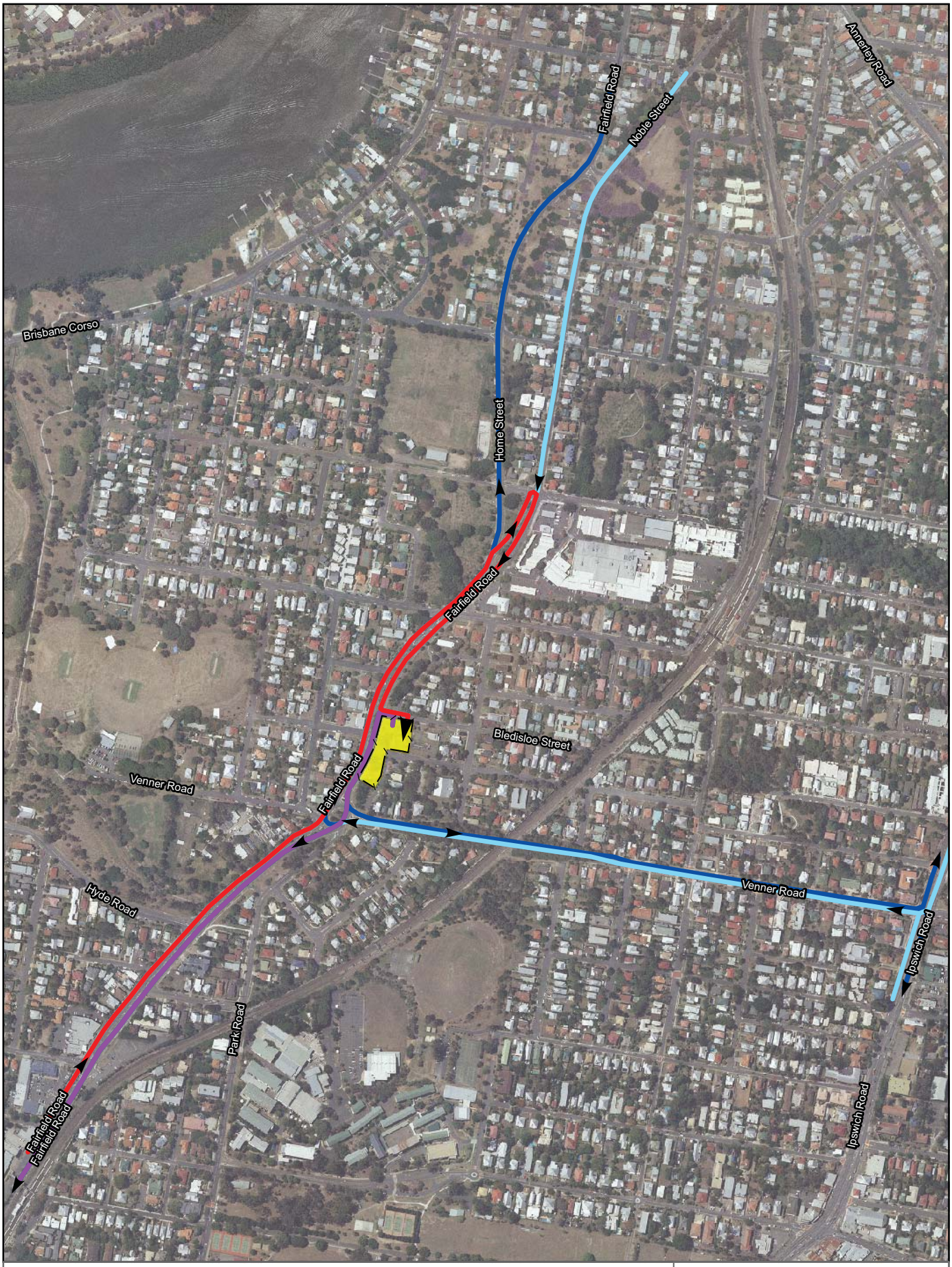
This construction worksite is located adjacent to the southbound side of Fairfield Road, north of Venner Road, in existing road verge and landscaped areas. The construction worksite is required to construct an emergency access stairwell, ventilation equipment and associated surface works to provide for emergency egress from the running tunnels.

Construction worksite location and proposed truck access

The construction worksite is located on the eastern side of Fairfield Road, in a landscaped area between Fairfield Road and Railway Road, south of Bledisloe Street. Access to the site will be to and from Bledisloe Street from a left in/left out arrangement onto Fairfield Road.

The location of the construction worksite requires a permanent adjustment to the alignment of Railway Road, which will be diverted approximately 10 m to the east between Bledisloe and Sunbeam streets.

Heavy vehicle access would be from Fairfield Road, with northbound vehicles undertaking a U-turn at a modified Brougham Street intersection, in order to access Bledisloe Street from the southbound carriageway of Fairfield Road. This modified intersection results in a minimum of construction impacts onto local residents by removing the need for heavy vehicles to traverse local roads. The proposed heavy vehicle haul routes and location of the construction worksites are shown in **Figure 5-63**.



LEGEND

- Inbound Haulage Routes
- Outbound Haulage Routes
- Potential Material Delivery Inbound Routes
- Potential Material Delivery Outbound Routes
- Worksite Extent
- Worksites

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-63

Southern Ventilation Shaft Construction Site and Haul Routes

0 50 100 150 200 250 m

1:8,000 at A4

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CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G0174_CRR_Haulage_Routes_Fairfield_A4.mxd 07/07/2011 16:00

Traffic staging and network changes

A temporary new right turn would be provided from the one way northbound section of Fairfield Road adjacent to Brougham Street. This right turn function is to enable vehicles to effectively U-turn without using residential streets and to overcome the geometric constraints at the existing signalised intersection at Fairfield Road/Brougham Street. U-turns are currently banned for northbound Fairfield Road traffic due to geometry and signal phasing conflicts. This median adjustment would be installed only for construction and would be removed at the completion of works.

This new right turn would require a minor adjustment to the existing median island configuration to provide a short slip lane, with a stop line in Brougham Street. This layout would be adopted in order to maintain the existing restriction to straight ahead movements from Brougham Street across Fairfield Road northbound and to minimise the impact on the existing turning head function of Brougham Street between the north and southbound directions of Fairfield Road.

The location of the construction worksite on the eastern side of Fairfield Road will require the closure of through vehicle access along Railway Road during construction. Upon completion of construction, Railway Road would be re-opened but would be permanently realigned to the east and offset to the existing alignment north of Bledisloe Street and south of Sunbeam Street.

The temporary closure of through access along Railway Road will require vehicles with a destination in Sunbeam Street and Railway Road south of Sunbeam Street to travel via Bledisloe Street to Cross Street, and then via Sunbeam Street to reach their destination. This change is expected to impact five residences.

Network operation – impact on traffic conditions

Construction traffic volumes generated by the construction worksite are not expected to be significant, with potentially only minor increase over the existing traffic volumes and additional traffic movements at the intersection of Brougham Street and Fairfield Road, ie around three trucks per hour at peak times.

Pedestrians and cyclists

Pedestrian footpaths are provided on both sides of Fairfield Road. The location of the construction worksite on the southbound side of Fairfield Road will require this footpath to be closed for the duration of construction activity. Pedestrian detour routes would be implemented via Bledisloe Street, Cross Street and Railway Road, with advance warning provided at the intersections of Fairfield Road and Venner Road and Ashby Street.

No changes to cycle facilities in the area are proposed.

Buses

The location of the construction worksite on the eastern side of Fairfield Road will require space currently occupied by an indented bus bay. It is proposed that the bus stop will be relocated approximately 150 m to the north, to the northern side of Bledisloe Street, for the duration of construction. Given the temporary nature of the relocation, a bus bay facility is not proposed at the relocated stopping point. Bus patrons accessing the relocated bus stop would be required to travel via the pedestrian detour in Bledisloe, Cross and Sunbeam streets and Railway Roads when accessing the bus stop from Venner Road.

Parking

Provision for 14 parking spaces for the workforce would be made within the construction worksite boundary adjacent to Fairfield Road. At the peak of construction, a workforce of 39 would be expected on site. Assuming each member of the workforce drove, some 25 cars could be expected to overspill onto surrounding streets at the height of construction. There are no on-street parking controls in the vicinity of the proposed construction worksite with the workforce able to park legally on-street without any restriction. In order to minimise impact on the surrounding community, the workforce could be required to park at the nearby Yeerongpilly construction worksite (where sufficient additional off-street parking is proposed) with a shuttle bus transfer provided. In any case given that workforce parking overflow onto the streets would be short term, and with no existing on street parking capacity problems observed, the overall impact is not expected to be significant.

The proposed adjustment to the traffic island at the northern corner of Brougham Street and Fairfield Road intersection, may impact on informal parking related to the Iglesia Evangelica Pentecostal Church. Any informal parking which currently exists between the north and southbound lanes of Fairfield Road would be suspended during construction in order to facilitate the U-turn movement.

Access, servicing and provision for adjacent development

The proposed temporary closure and permanent alignment adjustment to Railway Road will have an impact on approximately five residences located in Sunbeam Street and Railway Road south of Sunbeam Street. This will require a short diversion for these properties to use Bledisloe, Cross and Sunbeam streets instead of Railway Road. No other changes to access are anticipated. The worksites associated with construction of the ventilation and emergency access building are not anticipated to have adverse impacts on emergency service vehicles.

Special events

Sporting games are generally held in Fairfield Park and Yeronga Park to the west of the proposed worksites. The construction vehicles would have minimal impact to this as the construction work would only operate from Monday to Friday.

Yeerongpilly Station/southern portal construction worksite

The Yeerongpilly construction worksite occurs primarily at surface level, and would require the re-alignment of Wilkie Street. The existing Yeerongpilly Station would remain operational throughout the construction period with some modifications to station access as the new YeerongpillyS would be built off-line.

Construction worksite location and proposed truck access

The tunnel construction worksite would be located between the existing Queensland Rail Beenleigh Rail line, Wilkie Street, Cardross Street and Station Street. As the southern portal construction worksite will be occupying the majority of industrial land currently accessed via Lucy Street, as well as closing through vehicle access between Fairfield and Ipswich roads, the volume and composition of traffic using Lucy Street will be significantly different, potentially somewhat less, than that which currently occurs. There is scope to modify the Lucy Street approach geometry of the intersection to better accommodate construction traffic, including consideration of provision of a wide single approach lane should this be required. These adjustments would only be considered following further detailed design and examination of turning movements at the intersection. **Figure 5-64** shows the location of the construction worksites and heavy vehicle access routes.

LEGEND

- Inbound Haulage Routes
- Outbound Haulage Routes
- Potential Material Delivery Inbound Routes
- Potential Material Delivery Outbound Routes
- Worksite Extent
- Worksites

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-64

Southern Portal Construction Site
Location and Heavy Vehicle Haul Routes

0 50 100 150 200 250 m

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CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G0175_CRR_Haulage_Routes_Southern_P_A4.mxd 07/07/2011 15:51

Traffic staging and network changes

Road and construction works at the Yeerongpilly construction worksite would be undertaken in a number of stages, to minimise disruption to the existing road network and to maintain access to adjacent land uses. The following traffic stages are anticipated:

- construction of new Wilkie Street approximately 50 m to the east of its current alignment, with new intersections being created with Crichton Street, Stamford Street, Green Street and Livingstone Street. New Wilkie Street would contain a new rail parking area adjacent to the existing station. Construction of a new pedestrian overbridge between new Wilkie Street and the Yeerongpilly Station would occur.
- diversion of traffic off old Wilkie Street onto new Wilkie Street, and closure of access from Wilkie Street to Station Street and Lucy Street south of Livingstone Street to general traffic. The existing Wilkie Street would become part of the construction worksite. The main period of portal and tunnel construction would then follow.
- re-opening of Lucy Street connection to new Wilkie Street, following completion of all main tunnelling construction and fit out activities.

Due to the location of the construction worksite, Lucy Street would be closed to through-traffic for the duration of construction preventing direct access between Fairfield and Ipswich roads. During this time, general traffic would be required to divert to the south, via Fairfield Road/Muriel Avenue intersection to Ipswich Road.

Network operation – impact on traffic conditions

Given that the industrial area south of Livingstone Street to Lucy Road is proposed to be occupied by the Project, the impact of closure of this link to non-construction traffic is expected to be minor. It may result in additional traffic using School Road to travel between Fairfield and Ipswich roads. School Road is traffic calmed, and if a weight limit is not currently in place this may be an option for consideration by the road authority to limit the impact of any diverted traffic on this route.

Traffic generated by the southern portal worksite is expected to peak at 14 heavy vehicle movements per hour. Traffic movements associated with worker parking could exceed 400 vehicles. However the majority of these would be expected to arrive before 6.30 am, and therefore not coincide with peak hour traffic. The impact on traffic operations is considered negligible.

Pedestrians and cyclists

Pedestrian access between Wilkie and Lucy streets would be closed by the Project, with pedestrians and cyclists required to use alternative routes including Green and Gow streets.

Pedestrian access along the realigned Wilkie Street between Yeerongpilly Station and Cardross Street would be maintained, and access to the station from the realigned Wilkie Street would be maintained through provision of a new pedestrian footbridge. There may be the need for pedestrian diversions during the construction phase of the realigned Wilkie Street. These would be signposted locally with appropriate diversion routes put into place.

Buses

Five bus stops have been identified to be impacted by the proposed re-alignment of Wilkie Street. Due to the staged construction bus stops would not be closed until the re-aligned Wilkie Street is open and new (temporary) bus stops installed limiting impacts on bus patrons.

Buses operating to and from Yeerongpilly Station operate via Livingstone Street and Wilkie Street. Closure of Wilkie Street to non-construction traffic south of Livingstone Street would not impact any current bus route.

Parking

On-street parking currently exists on both sides of all streets near the construction worksite. The permanent parking arrangements for the realigned Wilkie Street would be installed prior to the diversion of traffic onto this route. There may be adjustments between the existing and proposed provision of parking and kerb space utilisation. However, the impacts are not considered to be construction related.

Workforce parking would be accommodated on-site, with up to 500 spaces to be provided during the tunnel fit-out stage. During other stages of work, approximately 420 spaces would be available. At the peak of construction, a workforce of 118 people would be working at the Yeerongpilly worksites at any one time. As such, the parking provision is generous and the site could function as a central parking area for several construction worksites, including those at Fairfield and Boggo Road as well as Woolloongabba, Albert Street and Roma Street. A dedicated workforce shuttle bus services would be required to link the Yeerongpilly parking area with these worksites.

The Yeerongpilly construction worksite is not located in a controlled parking area however a resident parking zone is proposed by Cross River Rail to be implemented prior to the start of rail operations associated with the Project in order to control commuter parking. This scheme could be introduced prior to construction commencing to further mitigate any potential workforce parking impacts on surrounding residential streets and enforce worker parking within the designated off street area.

Access, servicing and provision for adjacent development

Construction of the realigned Wilkie Street involves demolition of the existing adjoining residential properties. As the properties would be removed prior to the construction of the new street, the impact on adjacent land users would be minimised. However, some local diversions may be required during the construction process. Access to Yeerongpilly Station would remain open at all times.

Emergency services

The Yeerongpilly construction worksite is not anticipated to have significant impacts on emergency service vehicles. When local detours are put into place for all traffic, this would apply to emergency services as well.

Special events

The Queensland Tennis Centre is located to the west of the construction worksite. During an event, spectators arriving by public transport, exit Yeerongpilly Station via the pedestrian overbridge and travel towards the west. Strategies would be included within the CTMP for the Yeerongpilly construction worksite to address this and may include a short term stop to haulage activities at the site or additional traffic control measures. Any such conflict is likely to be contained to Saturdays (when surface works would be occurring). Spectators leaving a weeknight event at the Queensland Tennis Centre are not likely to conflict with construction activities which would generally cease at 6.30 pm.

Clapham Rail Yard construction worksite

Construction worksite location and proposed truck access

The construction worksite at the Clapham Rail Yard would be located between Ipswich and Fairfield roads, with access for construction traffic required from both arterial roads. An additional site access point is proposed to the western side of Clapham Rail Yard construction worksite via Chale Street. Chale Street has a seagull intersection type treatment with Fairfield Road, with a dedicated right turn bay to provide access from Fairfield Road. The Chale Street/Fairfield Road intersection currently provides for a high percentage of heavy vehicle turning movements due to the industrial nature of the surrounding land use, and this utilisation would be continued by the Project.

A diagram showing the location of the worksites and heavy vehicle access routes is shown in **Figure 5-65**.

Traffic staging and network changes

As the majority of construction work in the Clapham Rail Yard construction worksite would occur off road, there would be only one traffic stage. No network changes are proposed for this construction worksite.

Network operation – impact on traffic conditions

A period of higher construction traffic would be expected during earthworks towards the start of the program, and this would reduce as the program proceeded when only track works would be performed. Due to the nature of the track work activity, most of this work would take place at night or during periods of rail shutdowns, and as such construction traffic trip generation would mostly occur outside of peak traffic periods.

In any case a maximum of nine truck movements per hour at peak times is expected which would not impact significantly on the surrounding road network and traffic conditions.

Pedestrians and cyclists

No impact to pedestrians or cyclists is anticipated.

Buses

No bus operations are anticipated to be impacted as a result of the Clapham Rail Yard worksite.

Parking

The construction worksite at the Clapham Rail Yard would provide 50 car parking spaces for the workforce. The peak workforce for the southern surface construction worksites would total around 156 workers. This includes the workforce that would be located at the Clapham Rail Yard, Moorooka viaduct, Ipswich Motorway, Rocklea Station, and Salisbury construction worksites.

With 50 workforce car park spaces at the Clapham Rail Yard construction worksite and a further 40 spaces at Salisbury, the majority of peak workforce car parking demands would be accommodated off-street. Furthermore, there are a range of options for additional off-street car parking as demand warrants, particularly at the Clapham Rail Yard, due to the large site area.

Alternatively, shuttle buses from Yeerongpilly could be used to supplement on-site parking provision. While there is no timed parking controls around Clapham Rail Yard, parking options are very limited with no parking on Fairfield Road and limited parking on Chale Street, the only two likely surrounding streets to potentially attract overspill workforce parking. As such the likelihood of overspill parking from Clapham Rail Yard is low and in any case the impact of any overspill is likely to be minimal.

No change to existing on-street parking as a result of the Clapham Rail Yard construction worksite would be required.

Access, servicing and provision for adjacent development

Given that the project intends to purchase and occupy the majority of the adjacent land between the Clapham Rail Yard and the Ipswich and Fairfield road corridors, the impact on adjacent development would be limited. No significant adverse impacts are anticipated.

Emergency services

The Clapham Rail Yard construction worksite is not anticipated to have any impact on emergency service vehicles.

LEGEND

- Potential Material Delivery Inbound Routes
- Potential Material Delivery Outbound Routes
- Worksite Extent
- Worksites

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-65

Clapham Rail Yard Construction Site Location and Heavy Vehicle Haul Routes

0 50 100 150 200 250 m

1:10,000 at A4

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CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G0176_CRR_Haulage_Routes_Clapham_A4.mxd 07/07/2011 15:53

Other southern surface worksites

Construction worksites would be required at Moorooka, Rocklea and Salisbury to support the southern surface works that include works to road and rail infrastructure.

The Moorooka construction worksite would be located between Ipswich Road and the railway line south of Moorooka Station. This construction worksite would support construction of a range of bridges and viaducts south of Clapham Rail Yard. The Rocklea construction worksite would support the construction of a new Ipswich Motorway on ramp. A second construction worksite at Rocklea would support track widening and Rocklea Station upgrade works, while a major construction worksite at Salisbury would be the main southern rail upgrade construction worksite.

The Salisbury construction worksite is expected to function as the main material construction worksite for these separate satellite construction worksites, south of Clapham Rail Yard. As such, the remainder of this section addresses this main construction worksite only.

Construction worksite location and proposed truck access

The construction worksite would be located less than 50 m east of Beaudesert Road via Lillian Avenue. The intersection of Lillian Avenue and Beaudesert Road would be signalised as part of the Project. Such signalisation should occur at the start of the construction program to allow safe access for construction vehicles to/from the construction worksite from the north and south. The proposed truck access and routes are shown in **Figure 5-66**.

Traffic staging and network changes

The Salisbury construction worksite would be located off-road. Upon completion of track works and decommissioning of the construction worksite permanent road realignment works to Beaudesert Road service road would commence within the construction worksite.

Network operation – impact on traffic conditions

The volume of construction traffic accessing the construction worksite would vary throughout construction. Due to the nature of the track work activity, most of this work would take place at night or during periods of rail shutdowns, and as such construction traffic trip generation would mostly occur outside of peak traffic periods.

Pedestrians and cyclists

As the works would occur mainly off-road, no impact to pedestrians or cyclists is anticipated. Appropriate pedestrian accessibility would be incorporated into the Lillian Avenue/Beaudesert Road signalised intersection, as agreed with BCC. Heavy vehicle use of the driveway from Lillian Avenue would be expected to be similar to the existing depot use, and as such no pedestrian management measures are proposed.

Buses

Bus operations would not be impacted as a result of this construction worksite.

LEGEND

- Potential Material Delivery Inbound Routes
- Potential Material Delivery Outbound Routes
- Worksite Extent
- Worksites

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-66

Salisbury Construction Worksite Location and Heavy Vehicle Haul Routes

0 50 100 150 200 250 m

1:8,000 at A4

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CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G0177_CRR_Haulage_Routes_Salisbury_A4.mxd 07/07/2011 15:55

Parking

The Salisbury construction worksite would have capacity for 40 cars. As outlined in the previous section on the Clapham Rail Yard construction worksite, an estimate of workforce numbers has been provided for all southern surface construction worksites, with an approximate peak workforce of 156 workers. This includes construction worksites at Clapham Rail Yard, Moorooka, Ipswich Motorway, Rocklea Station, and Salisbury.

With 50 spaces at Clapham Rail Yard and a further 40 at Salisbury, the majority of workforce car parking can be accommodated off-site. Furthermore, there are a range of options for additional off-site car parking as demand warrants, including along the western periphery of the Salisbury construction worksite, which due to the absence of adjacent businesses or residences. Furthermore, parking was not observed to be oversubscribed in the vicinity of the proposed worksite and as such the impact of any overspill parking at Salisbury is likely to be minimal. No change to existing on-street parking would be required as a result of the Salisbury construction worksite.

Access, servicing and provision for adjacent development

The impact on adjacent development would be limited as the site already contains a depot use requiring parking, loading and servicing. No significant adverse impacts are anticipated.

Emergency services

The Salisbury construction worksite is not anticipated to have any impacts on emergency service vehicles.

5.10.6. Construction workforce parking

This section provides a summary of workforce parking requirements. A more detailed assessment of the impacts of parking and potential mitigation at each construction worksite is provided in **Section 5.11.5**.

The identified construction workforce is expected to generate a peak parking demand of approximately 1,050 vehicles across all construction worksites based on a conservative assumption that each worker would drive. A total of 858 parking spaces are to be provided across the construction worksites catering for the majority of the peak workforce.

Overall the level of car parking provided is expected to be sufficient to cater for overall workforce parking demands across the construction programme with additional certainty to be provided through selected mitigation measures including:

- providing a dedicated bus option for workers at Woolloongabba, Boggo Road and Fairfield, from the major car park at Yeerongpilly
- seeking changes to the operational dates of existing Traffic Areas including Dutton Park Traffic Area and Gabba Traffic Area to include Saturdays
- seeking to extend and make permanent the current event-only Traffic Area around the Queensland Tennis Centre, to cover potential commuter parking streets around Yeerongpilly
- encourage workers to car pool or catch public transport where possible, particularly to Roma Street and Albert Street worksites (note this will be somewhat self enforcing given lack of available on street all day parking and cost of commercial off street parking).
- manage on-site parking at Roma Street and Albert Street in particular to prioritise workers with no other option (due to equipment or work type etc).

The contractor would be responsible for the management of car parking as specified within their CTMP. On-street car parking conditions should be monitored on the streets surrounding all worksites, with additional mitigation measures to be investigated if required.

Workforce parking and associated management for surrounding residential or commercial areas, addressing issues such as safety, access and amenity, will be fully addressed in the CTMPs prepared by the construction contractor. Overall car parking numbers are summarised in **Table 5-40**.

Table 5-40 Construction workforce parking

Site	Peak number of vehicles	Proposed workforce car parking arrangements	Comment/ assessment
Surface works north	156	Provision for 45 car parks at O'Connell Terrace and 50 at Mayne Rail Yard worksites	Majority of workforce parking demands catered for. Excess workforce to use public transport, carpool or use off street parking. On street car parking discouraged through Brisbane Central traffic area Monday to Saturday
Northern portal site	39	80 car park accessible from Gregory Terrace and Bowen Bridge Road	Workforce parking provision well in excess of peak demands. Site could cater for overspill parking from other northern surface worksites as required
Roma Street Station	137	45 car parks on site	Excess workforce to use off-street public car parks or carpool or public transport On street car parking discouraged through Brisbane Central traffic area Monday to Saturday
Albert Street Station	137	Minor number (12) of car parks on site	Majority of the workforce to use off-street public car parks or carpool or public transport On street car parking discouraged through Brisbane Central traffic area Monday to Saturday
Gabba Station	137	Worksite – 72 car parks	Excess workforce would use a shuttle bus from the Yeerongpilly worksite or off street public car parks or carpool or public transport On-street car parking discouraged due to Gabba traffic area Monday to Friday (and on game days) Extend Gabba traffic area to Saturdays
Boggo Road Station	137	Worksite – 30 car parks	The majority of the workforce would use a shuttle bus from the Yeerongpilly worksite or carpool or public transport On street car parking discouraged due to Dutton Park traffic area Monday to Friday Extend Dutton Park traffic area to Saturday

Site	Peak number of vehicles	Proposed workforce car parking arrangements	Comment/ assessment
Construction worksite at Fairfield	39	Worksite – 14 car parks	Excess workforce could use a shuttle bus from the Yeerongpilly worksite This is a minor worksite with any parking overspill onto surrounding streets to be short term and minor.
Yeerongpilly construction worksite	118	Yeerongpilly worksite (capacity for over 420 vehicles) with access from Ipswich Road to Lucy Street	Extend existing Queensland Tennis Centre traffic area in Yeerongpilly to prevent workforce on-street parking and make operational Monday to Saturday
Surface works south	156	Clapham Yard (west of Fairfield Road) – 50 car parks Salisbury (Lillian Avenue/Beaudesert Road) – 40 car parks	Majority of workforce parking demand catered for on-site. Opportunity for additional parking at minor (satellite) sites to manage impact around those sites.
Total	1,056	858	

Note:
1. *Assumes all of the workforce drive to worksite. Workforce source: AECOM 2011a*
2. *In addition to provision for the workforce, each worksite car park would also provide a small number of parking spaces for visitors and deliveries.*

5.10.7. Construction traffic trip generation and traffic operation assessment

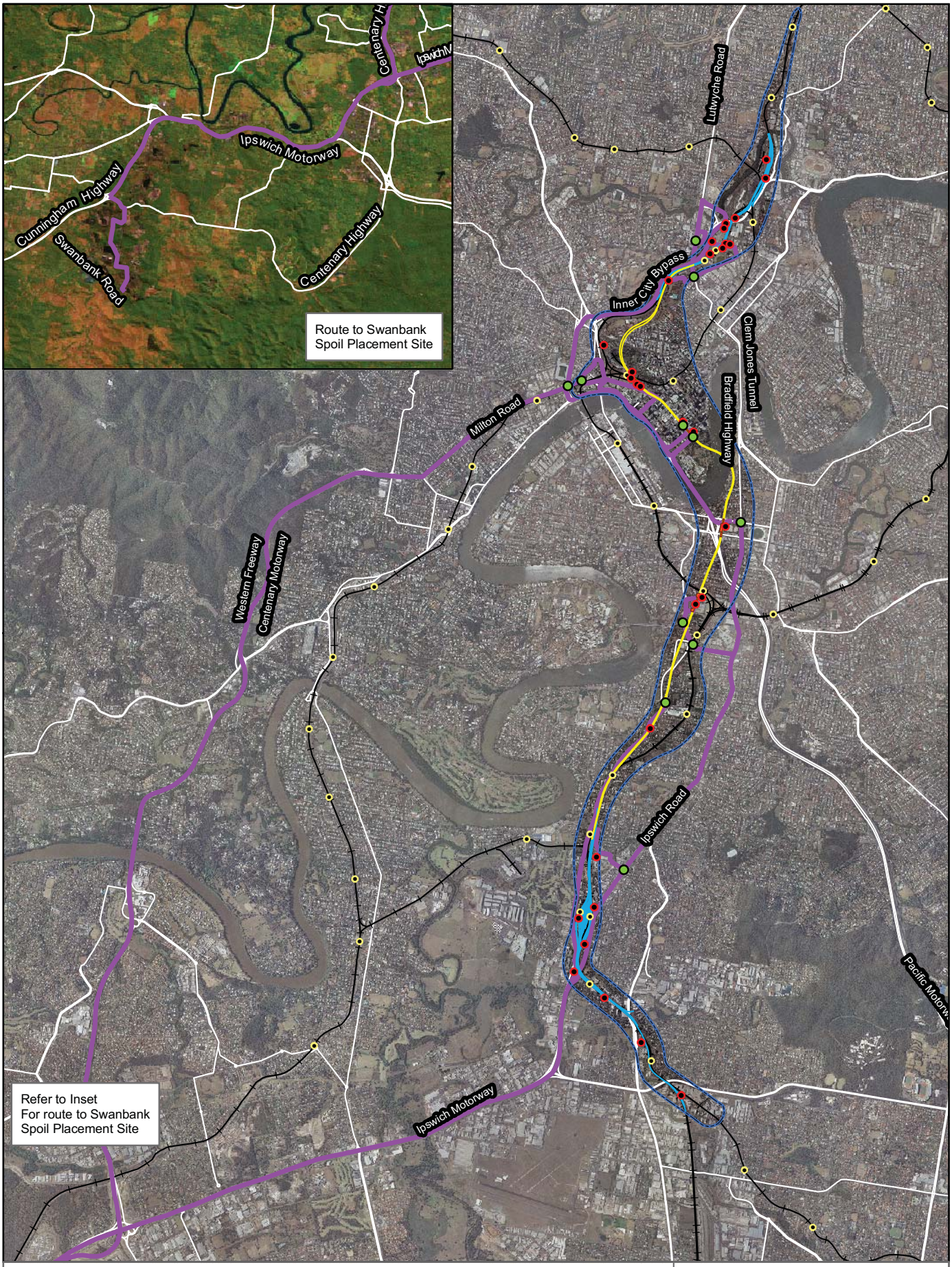
Construction of the Project is expected to result in impacts to existing traffic conditions resulting from construction vehicles using the road network, and from adjustments to road layouts resulting in changed traffic conditions/detours or local diversions for general motorists.

Key intersections on the road network where the impact of spoil haulage and delivery vehicles is expected to be greatest have been assessed. For this worst case scenario assessment, the peak rate of generated haulage movements has been used, and all worksites have assumed to be operating at full capacity concurrently. **Table 5-41** presents the combined peak spoil movements and delivery for each construction worksite.

Table 5-41 Peak daily and peak hourly trip generation from each worksite

Construction worksites		Peak spoil movements (daily)	Peak delivery (daily)	Peak total (daily)	Peak total (hourly)	Sum of each construction worksite
Core (tunnel worksites)						
Northern Portal		75	20	95	8	8
Roma Street	North	23	6	29	2	10
	Central	23	6	29	2	
	South	57	15	72	6	
Albert Street	North	23	6	29	2	8
	South	57	15	72	6	
Woolloongabba		214	57	271	14	14
Boggo Road		89	24	113	9	9
Southern Ventilation and Emergency Access Building		29	8	37	3	3
Southern Portal		214	57	271	14	15
Non-core (surface worksites)						
O'Connell Terrace		-	-	60	4	4
Mayne Rail Yard		-	-	143	9	9
Clapham Rail Yard		-	-	143	9	9

The construction heavy vehicle traffic has been distributed to the proposed haulage route to spoil disposal site at Swanbank as shown in **Figure 5-67**. The spoil haulage routes have been designed to minimise impacts to the flows of other traffic and following further necessary discussions with the relevant approval agencies they should be re-assessed.



LEGEND

- Study Corridor
- Station
- Track
- Underground Station

Alignment

- Above Ground
- Underground

- Haul Route
- Modelled Intersections
- Worksite

0 1 2 3 4 Km

1:75,000 at A4

N

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-67

Combined Haulage Routes

CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G0114_CRR_Haulage_Routes_A4_Trans.mxd 07/07/2011 15:57

Intersection analysis

All intersection along the haul routes were examined to determine which of those were critical and hence warranted detailed SIDRA analysis, with twelve intersections being selected. The modelled intersections have been indicated in the haulage route diagram **Figure 5-67** and are listed in **Table 5-42**.

Peak hour modelling revealed minor increases in queuing and delay at most of the critical network intersections modelled. Only the intersection of Lucy Street and Ipswich Road may require further specific modelling or potentially mitigation works to minimise delays to Ipswich Road traffic.

Despite a relatively minor increase in peak period delays and queuing at the intersections modelled, suspension of peak period trucking activity may be considered during the development of detailed CTMPs due to the current level of congestion and delays within the inner city area, particularly around Woolloongabba, Albert Street and Roma Street. Analysis results are detailed in *Technical Report No. 1 – Transport*.

Table 5-42 Intersections assessed and summary of results

Intersection	Increase in average intersection delay value (SIDRA calculated)	Conclusion
Bowen Bridge/O'Connell Terrace	No change	Acceptable
Bowen Bridge/Gregory Terrace	Less than five seconds	Minor increase in delay (within acceptable range)
Albert Street/Mary Street	No change	Acceptable
Albert Street/Alice Street	No change	Acceptable
Main Street/Hale Street	Less than five seconds	Minor increase in delay (within acceptable range)
Milton Road/Castlemaine Street	Less than five seconds	Minor increase in delay (within acceptable range)
Milton Road/Vulture Street	Less than five seconds	Acceptable
Milton Road/Upper Roma/Petrie Terrace	No change	Acceptable
Annerley Road/Fairfield Road	Less than five seconds	Minor increase in delay (within acceptable range)
Annerley Road/Gladstone Road	Less than five seconds	Minor increase in delay (within acceptable range)
Fairfield Road/Brougham Street	No change	Acceptable
Ipswich Road/Lucy Street	10 seconds	Slightly higher than acceptable, however the modelling does not take traffic reduction into account from changing land use. Signal timings can be adjusted to quarantine delay to side road approach.

5.10.8. Pavement assessment

An assessment has been undertaken to analyse the pavement impacts of the heavy vehicle movements to and from the proposed worksites in accordance with TMR's Guidelines for Assessment of Road Impacts of Development.

The assessment indicates most of the road links would have an increase of Equivalent Standard Axles (ESA) of less than 5% over the construction period, with only three links having slightly higher increases of up to 8%. Lucy Street would have an increase of around 20%. Therefore, with the exception of Lucy Street that would be within a construction worksite, only minor deterioration in pavement condition could be expected for these road links, and given the relatively short duration of construction in the context of pavement design lifespan. This level of impact is acceptable. Due allowance would need to be made by the contractor to repair any road surface impact due to wear and tear during construction.

5.10.9. Mitigation measures

Mitigation measures for construction works within the rail corridor

Construction works in the rail corridor would need to be staged into manageable, safe and reliable increments acceptable to Queensland Rail and so Queensland Rail must be part of the process to plan and agree the many operational interfaces between the new and existing rail infrastructure during the planning, demolition and construction phases. Much of the surface rail works would be carried out through rail shutdowns and track possessions conforming to Queensland Rail policy.

Specific rail passenger and operational mitigations measures would include:

- Rail network shutdowns are to be agreed with Queensland Rail through the Scheduled Closure Access System, prior to the commencement of works within the rail corridor, to minimise disruption to the rail network.
- Early and on-going notification is to be provided to Queensland Rail, rail passengers, rail freight operators and local communities of the timing and duration of rail shutdowns, likely disruptions to rail services and alternative arrangements to be implemented.
- Bus replacement services are to be provided where passenger rail operations are interrupted, such as during rail network shutdown periods or temporary closures of Exhibition, Yeerongpilly, Moorooka, Rocklea and Salisbury stations.
- Disruption to rail passenger services is to be avoided to the extent reasonable and practicable during major events, such as the Ekka (Exhibition Station), the Brisbane International tennis tournament (Yeerongpilly Station) and at Suncorp Stadium (Roma Street Station). Where disruptions are unavoidable, bus shuttle services are provided between appropriate stations to the major event venues, or to bypass the disrupted section in the network.
- Pedestrian access for Queensland Rail staff between Mayne Rail Yard and Bowen Hills Station is to be maintained.
- Road access to and within Mayne Rail Yard is maintained during construction works.
- To the extent reasonable and practicable, existing access to the rail corridor for maintenance and emergency service vehicles is to be maintained. Where necessary, alternative access arrangements are to be provided in consultation with Queensland Rail and other rail operators.
- Provision of temporary alternative passenger facilities including toilets at Roma Street and baggage handling facility at Roma Street where disrupted for the duration of construction works.

Mitigation measures for construction works effects on the road network

Each construction worksite would have a CTMP prepared to implement measures that avoid where practicable, or minimise and mitigate, traffic problems arising during the construction phase. Prior to implementation of the CTMP they would be subject to a review by the relevant agencies (BCC and TMR) followed by any necessary amendment by the contractor with final approval given by BCC, TMR and the police. Road and traffic related mitigation measures that should be addressed in these plans include:

- Local communities and road users are to be notified of proposed changes to local traffic access arising from Project works. This includes, but is not limited to, the provision of clear signage identifying changed traffic conditions, and public advertisements (local and regional newspapers, Project website) describing the proposed changes, the duration of the changes, and possible alternative routes to avoid the impacts of the proposed changes.
- Project works in or near road corridors are to be screened with solid barriers to minimise distractions for motorists.
- Access to properties adjoining or near to Project works, is maintained. Where changes to property access are required, alternative access arrangements are to be identified in consultation with property owners and occupants.
- Access for delivery vehicles to local businesses near Project works is to be maintained. Where changes to access for delivery vehicles are required, alternative access arrangements are to be identified in consultation with local businesses. In particular, access for delivery vehicles is to be maintained to businesses
  - at O'Connell Terrace, Bowen Hills
  - at Roma, Albert, Alice and Mary streets in the Brisbane CBD
  - at Allen, Stanley and Vulture streets at Woolloongabba
  - at Boggo Road Urban Village off Annerley Road, Dutton Park
  - in the industrial area between Ipswich Road and Moolabin Creek at Moorooka
  - in the area between Fairfield Road and Clapham Rail Yard, Yeerongpilly
- Two lanes of traffic are to be retained in each direction on Fairfield Road during peak periods.
- Access for emergency services vehicles is to be maintained for the duration of construction works to
  - RBWH via O'Connell Terrace
  - PA Hospital, via Cornwall Street
  - Mater Hospital, via Stanley Street.

Public and active transport mitigation measures proposed include:

- Traffic management measures are to be implemented near to Project works to minimise disruption and delays to bus services.
- Safe and functional access for pedestrians and cyclists is to be maintained near Project works, including for the elderly, children and people with mobility difficulties including vision and hearing impairments. This measure is to consider relevant Crime Prevention through Environmental Design (CPTED) principles.
- Safe and functional pedestrian and cycle access is to be maintained to public transport facilities near Project works. This measure would address the needs of children, elderly and people with mobility difficulties including vision and hearing impairments. In particular, access is to be maintained to
  - Exhibition Station, during Ekka events
  - Bowen Hills Station, including along O'Connell Terrace from the RBWH

  - Roma Street Station from Roma Street and from the Roma Street Parkland
  - Botanic Gardens, QUT and the parliamentary precinct
  - CBD streets including Albert, Mary, Margaret and Alice streets
  - Woolloongabba busway station
  - Park Road Station and Boggo Road Busway Station, particularly to/from the Boggo Road Urban Village
  - Yeerongpilly Station
  - Moorooka, Rocklea and Salisbury stations.
- Bus replacement services are to be provided when passenger rail operations are interrupted, eg during rail network shutdown periods or temporary closures of Exhibition, Yeerongpilly, Moorooka, Rocklea and Salisbury stations.
- Safe pedestrian and cycle access is to be maintained near construction works to community facilities, such as schools, child care facilities, churches, aged care accommodation, open space, sport and recreation, health care and shopping facilities. This is to consider the particular needs of children, elderly and people with mobility difficulties, including vision and hearing impairments. In particular, access is to be maintained to
  - RNA Showgrounds
  - RBWH
  - open space areas, such as Victoria Park, Roma Street Parkland, Botanic Gardens and Robinson Park
  - schools near to Project works, such as Brisbane Girls Grammar School, St Josephs College, Brisbane Grammar School, Dutton Park State School, Nyanda State High School
  - Grosvenor Hall Child Care centre
  - churches such as St Fabians Church at Yeerongpilly.
- In areas of high pedestrian and cycle activity such as Roma Street and Albert Street worksites, articulated or dog trailer vehicles could present a hazard to road users, due to the swept paths and vehicles tracking across kerbs at intersections, as well as road users failing to observe the trailer component of the vehicle when crossing the road. CTMPs for these location should limit use of dog trailers.
- The design of driveways for the Project would take into consideration the potential for truck/pedestrian conflicts and the design of road narrowing would take into consideration cycle safety.
- Where pedestrian and cycle access to community facilities is changed, local access strategies are to be developed in consultation with local communities, community facility managers and relevant stakeholder groups, including Vision Australia.
- Safe, alternative access is to be provided for bikeways disturbed by construction works, including but not limited to
  - the bikeway in Victoria Park
  - the bikeway through Roma Street Parkland
  - off-road bikeway in Robinson Park at Fairfield.
- Local communities, including but not limited to, residents, businesses, users of community facilities and public transport passengers, are to be notified about changes to pedestrian and cycle access near construction works, and public advertisements (local and regional newspapers, Project website) describing the proposed changes, the duration of the changes and possible alternative routes to avoid the impacts of the proposed changes.