CrossRiver*Rail*

23. Cumulative Impacts

Cross River Rail

CHAPTER 23
CUMULATIVE IMPACTS

JULY 2011

Contents

23 Cumulative impacts

23.1 Introduction

This chapter addresses Part B, Section 7 of the Terms of Reference. Cumulative impacts are generally associated with the compounding interactions on the environment arising from a number of developments or actions, occurring in the same area and over similar timeframes to the Project. An assessment of cumulative impacts considers the whole Project in isolation and in the context of other current or planned infrastructure and development.

This chapter identifies and assesses cumulative impacts and the following sections summarise cumulative impacts in terms of:

- potential cumulative impacts of the whole Project across the study corridor and broader areas
- potential cumulative impacts of the Project and other projects in particular geographic areas.

Impacts in relation to specific environmental values, including cumulative impacts, have been discussed in detail in their respective chapters.

23.2 Methodology

Potential cumulative impacts associated with the Project have been assessed in relation to geographic areas and environmental values. Where relevant, the relationships between individual components or environmental aspects of the Project and current or near future projects of similar geographic location were assessed to determine the cumulative impacts on the local environment. A review of each environmental aspect has been carried out and an assessment of the interactions undertaken to determine the overall Project impacts.

In assessing the cumulative impacts of the Project with respect to other current or planned infrastructure or development, a range of plans have been considered, including the *South East Queensland Regional Plan 2009-2031* (SEQ Regional Plan), *South East Queensland Infrastructure Plan and Program 2010-2031* (SEQIPP), draft *Connecting SEQ 2031: An Integrated Regional Transport Plan for South East Queensland* (Connecting SEQ 2031), Brisbane City Plan 2000 (City Plan), development applications, master plans. The activities of a number of planning agencies have also been considered, eg the Urban Land Development Authority (ULDA), Department of Public Works, the Department Local Government and Planning (formerly the Department of Infrastructure and Planning) and Transport and Main Roads.

Transport modelling has been undertaken to assess the likely patronage and capacity for the Project and to test the cumulative land use development implications. The modelling adopts a land use scenario agreed with the relevant agencies to forecast the likely changes in transport demand.

An assessment of the Project's likely cumulative impacts on the labour market has also been undertaken. The assessment has involved a review of a number of relevant factors, including demand on labour and materials during construction and operation, economic benefits as a result of improvements to the transport network and economic impacts as a result of direct loss of businesses.

23.3 Cumulative impacts across the Project

Overall impacts of the Project and a discussion of the interrelationships of these impacts are provided within this section. The cumulative impacts of the Project as they relate to particular issues are addressed in the relevant chapters of the EIS.

The potential for interaction between environmental aspects of the Project is identified in **Table 23-1**. The potential for cumulative impacts associated with the interaction between these aspects includes the potential mitigation measures, identified to manage individual impacts, having cumulative impacts on other aspects of the Project.

Table 23-1 Environmental impacts interaction matrix

	Transport	Topography, geology, soils	Nature conservation	Water Resources	Air Quality	Greenhouse Gas Emissions	Noise and Vibrations	Waste	Social	Economic	Land Use	Cultural heritage	Visual Amenity	Hazard and Risk
Transport														
Topography, geology, soils														
Nature conservation														
Water Resources														
Air Quality														
Greenhouse Gas Emissions														
Noise and Vibrations														
Waste														
Social														
Economic														
Land Use														
Cultural Heritage														
Visual Amenity														
Hazard and Risk														

Direct interaction Indirect interaction

23.3.1 Transport

Cumulative impacts in relation to rail construction and operation of the Project have been identified in **Chapter 5 Transport**. The rail transport issues associated with the Project have been a key determinant of the reference design and operation, which in turn interact with the full range of issues and impacts addressed through other sections of this EIS. Important considerations are the transport goals of the Project:

- increased service provision to the CBD (efficiency)
- improved CBD public transport accessibility
- improved access to the rail network for freight (economy).

Internal relationships between transport and traffic are assessed in **Chapter 5 Transport** and include:

- the forecast patronage and its impact on the rail network with the operating Project
- changes to rail station activity, eg passenger demand, and interchange in the study corridor
- the impact of the Project on bus and ferry operations in the region and with a focus on the study corridor
- the impact of the Project on the pedestrian and cycle infrastructure in the study corridor
- the performance of the regional, arterial and local road network with the Project
- the impacts of the Project on rail freight and rail maintenance.

The design of the Project balances a range of specific requirements including design requirements, standards and statutory criteria for rail infrastructure, fire and life safety, tunnel ventilation and minimising environmental and community consequences of developing new transport infrastructure within an urban environment.

In general operation, the Project would provide significant positive cumulative impacts in relation to public transport and city building in accordance with State, regional and local plans. The reference design entails new underground stations and surface stations at key locations identified through various planning processes as either Urban Development Areas (UDAs) – Bowen Hills, Woolloongabba, Transit Oriented Developments (TODs) – Yeerongpilly, and urban villages (Boggo Road). The CBD stations would ensure the revitalisation of the city centre, and particularly the southern precincts characterised by the parliament/QUT precinct and the residential precincts based around Albert Street.

Chapter 5 Transport also addresses the cumulative impacts of construction traffic generated from multiple Cross River Rail construction worksites, on the metropolitan road network. Several worksites rely upon common access routes. For example, the southern worksites at Rocklea, Yeerongpilly, Boggo Road and Woolloongabba rely upon sections of Ipswich Road for their principal access. Each of them relies upon the Ipswich Motorway and Cunningham Highway to access the spoil placement site at Swanbank.

The conclusion drawn from **Chapter 5 Transport** is that the capacity and function of each of these roads is sufficient for and appropriate to the haulage tasks required for construction of the Project.

23.3.2 Topography, geology, geomorphology and soils

Potential impacts with respect to topography, geology, geomorphology and soils, including erosion risks, acid sulfate soils (ASS) and impacts due to settlement resulting from tunnel excavation and construction have been addressed in this EIS in **Chapter 7 Topography, Geology, Geomorphology and Soils**.

Topography, geology, geomorphology and soils are largely addressed through the reference design, in that these elements influence the overall design of the Project and the method of construction proposed. The reference design provides for the mainline tunnels to be constructed at depths, in competent rock, which allow safe and operationally consistent design gradients, as well as accommodating the varying topography and geomorphology of the study corridor. Weathered rock and surface soils would be encountered only at the portals to the rail tunnels, at the shafts for the underground stations and the emergency access and ventilation shaft.

Each construction worksite is proposed to be established with site drainage and stormwater management measures to address the potential risks of erosion and sedimentation.

Potential cumulative impacts from soils, including sedimentation, erosion, runoff and ASS from construction worksites across the study corridor are considered to be negligible with the application of mitigation measures.

23.3.3 Water quality

Groundwater

Groundwater impacts are closely interrelated to impacts associated with topography, geology, geomorphology and soils (refer to **Chapter 7 Topography, Geology, Geomorphology and Soils**). As described in **Chapter 12 Groundwater**, the relevant environmental values for groundwater relate to aquatic ecosystems and the potential implications for drinking water and irrigation.

The Project has the potential to affect groundwater resources in those parts of the study corridor in which underground works would occur, ie the mainline rail tunnels, underground stations and the ventilation and emergency access building. Groundwater resources elsewhere are not expected to be affected. The reference design incorporates mitigation measures to intercept and cut-off the groundwater contained in the shallow aquifers which are likely to have a hydraulic connection with the Brisbane River. These mitigation measures are outlined in **Chapter 12 Groundwater**.

Groundwater quality in the potential impact areas is likely to be 'non pristine' due to the level of anthropogenic development and associated recharge zones. Furthermore, the area has been significantly disturbed as a result of surface development. Considering the saline to brackish nature of groundwater, which is influenced by tidal creeks and rivers, any aquatic ecosystems that may exist are considered to be salt tolerant. Based on this, groundwater quality as a function of aquatic ecosystem health is considered negligible.

The cumulative extent of groundwater drawdown across the study area is considered to be minor and would be mitigated effectively by the proposed design features for the Project, eg fully undrained or tanked mainline tunnels, waterproof membranes in the cross-passages, cut-off walls seated in bedrock combined with waterproof membranes for the underground stations and emergency access shaft. These design and mitigation measures would be further considered in the detailed design phase. Potentially contaminated land parcels exist within the study area and there is the potential for contamination at the areas of groundwater migration. This risk would be managed through a regime of water quality testing and measures, including treatment of groundwater prior to discharge, to manage any contaminated groundwater received during construction and operation.

Surface water

As discussed in **Chapter 13 Surface Water Quality**, environmental values for waterways describe the key qualities that are important for the health of an ecosystem and for safe human use. Waterways specifically addressed in relation to the Project are Enoggera Creek/Breakfast Creek, York's Hollow, a freshwater pond in Roma Street Parklands, ornamental ponds in the City Botanic Gardens, Brisbane River, Norman Creek, Moolabin Creek, Rocky Waterholes Creek, Stable Swamp Creek, Oxley Creek, and Bundamba Creek.

Receiving waters such as Enoggera Creek/Breakfast Creek are already subject to runoff from extensive urban areas and other developments in their catchments. Drainage and stormwater from the proposed worksite in Mayne Rail Yard is proposed to manage, avoid, or minimise and mitigate adverse effects from erosion and sedimentation. Any contribution of run-off from the worksite to Enoggera Creek/Breakfast Creek would be negligible against the background of flows in any rainfall event. Similar conclusions have been drawn with regards to the major surface worksite at Yeerongpilly and runoff to Moolabin Creek.

The worksites at Woolloongabba and Boggo Road would discharge drainage or run-off to an approved point within the urban drainage system. All discharge waters would be required to achieve the approval conditions for discharge criteria.

As a result, the potential for cumulative impacts on surface waters is considered negligible in the context of existing water quality and the mitigation measures to be applied through the environmental management process during construction and operation (refer to **Chapter 24 Draft Outline EMP**).

Runoff as a result of soil contamination, eg ASS and contaminated sites has the potential to influence water quality in surface water bodies in the vicinity of the Project. Appropriate erosion and sediment controls and staging of site activities would minimise the extent of disturbed areas and the potential run-off of contaminated soils. Consequently, the contaminated land, soil and erosion management measures adopted would minimise any cumulative impacts on surface waters.

23.3.4 Land use

As much of the Project would be constructed in parallel tunnels beneath the Brisbane inner suburbs, direct impacts on surface land uses would be confined to a small number of locations across the study corridor. Some direct impacts would be experienced as a result of the Project's above ground infrastructure.

Most of the anticipated, direct residential and industrial impacts would occur at Yeerongpilly. These impacts would stem from the loss of a number of residential properties for the realignment of Wilkie Street, and the occupation of industrial uses along Wilkie Street and Lucy Street during the construction phase. While the Yeerongpilly worksite is designated in the City Plan for industrial purposes, the site's proximity to the new Yeerongpilly Station may result in the consideration of its redevelopment for higher order uses such as mixed use residential and commercial. This would require a change to the existing land use designation of this site and subsequent revision to the City Plan. This would be undertaken by either Brisbane City Council (BCC) or Queensland Government as part of a separate planning process to the Project.

It is understood preparatory construction works for the release of land for development in the Yeerongpilly TOD have been delayed as a consequence of the January 2011 flooding in the Brisbane River. However, due to the proposed duration of both the development of the TOD and the construction of the Cross River Rail, there is potential for some overlap. During this overlapping construction period, there would be the potential for some cumulative effects on the residential land to the west of Fairfield Road.

The extent of impacts on industrial and commercial land extends from Yeerongpilly to Salisbury. The implications of the loss of this industrial land have been assessed in **Chapter 9 Land Use and Tenure**.

Improved public transport connections, such as those provided by the Project, are likely to be a catalyst for interest in future urban development in the vicinity of the new stations. Planning processes are advancing for the development of higher density precincts, either as TOD or UDAs at Bowen Hills, Woolloongabba, Dutton Park and Yeerongpilly.

Planning for increased density and development at these locations is consistent with the SEQ Regional Plan and other strategic planning instruments. Present planning by the agencies responsible promotes increased residential, economic and knowledge generating land clusters in locations that would be served by Cross River Rail stations. These precincts would be supported by the enhanced accessibility to be introduced by the Project. The Project also may provide a catalyst to future development within these areas which, in turn, has positive implications for future city building and achieving the desired outcomes of the regional and local planning instruments.

The Project would support transport integration with the proposed development at Bowen Hills UDA through providing a catalyst for higher density development. The new Ekka Station would be developed as a permanently operating station, used for commuter services for the UDA and the Royal Brisbane Women's Hospital (RBWH). The increased function of Ekka Station would allow for intermodal transport connectivity for this precinct, as well as additional route choice for residents and workers. Further information on cumulative impacts associated with Project, the development Bowen Hills UDA and the RNA Showgrounds are provided in **Section 23.4.2**.

The development of the Gabba Station, in conjunction with the planning and development of Woolloongabba UDA allows for effective transport and land use integration, supporting the UDA as a future urban transit oriented precinct. The Gabba Station would maximise co-location opportunities with the existing Woolloongabba busway station and support intermodal connectivity at this location. Further information on cumulative impacts associated with Project and the development of the Woolloongabba UDA are provided in **Section 23.4.2**.

Boggo Road Urban Village would be supported by greatly enhanced transport connectivity arising from the integration of the busway, the Park Road Station, and the new Boggo Road Station as part of Cross River Rail. The planning intention is that Boggo Road Urban Village develop according to transit oriented principles to optimise the provision of high quality transport links. The new Boggo Road Station would provide opportunities for intermodal connectivity and would also strengthen physical linkages between key knowledge nodes of University of Queensland, Princess Alexandra Hospital and the Ecosciences Precinct.

The Project would directly support the transit oriented function of Yeerongpilly TOD through providing increased rail capacity at a new Yeerongpilly Station. The Project would also assist in achieving the transport objectives for Yeerongpilly TOD with new high-frequency commuter rail services and reduced journey times to the CBD, as well as improved bus and train integration through relocation of the bus stop on Fairfield Road.

Cross River Rail would support current and future land use intentions of State, regional and local planning instruments for precincts around the proposed station locations.

Chapter 9 Land Use and Tenure outlines the specific land use benefits and impacts of the Project.

23.3.5 Visual amenity

As described in **Chapter 10 Visual Amenity and Lighting**, the Project would be accommodated primarily within the existing urban visual environments occupied by transport infrastructure, industrial areas and areas of high density. As a result, the Project as a whole is considered to have a low cumulative impact in the context of these areas and may provide opportunities to improve the visual urban environment.

There is some potential for a cumulative visual effect with the viaduct through Mayne Rail Yard, immediately adjacent to the elevated Inner City Bypass (ICB) near Abbotsford Road. The significance of the effect is mitigated by the existing road structure, whereas the acoustic and lighting screen likely to be required on the viaduct would be likely to highlight the visual prominence of the combined structures. However, this combination of road and rail infrastructure would occur within and immediately adjacent to, the environs of the Mayne Rail Yard and the road infrastructure supporting the Clem Jones tunnel and Airport Link. While the existing infrastructure would mitigate the context and situation effects of the Project, there would be a further visual impact on this challenged locality.

Visual amenity would be improved for station facilities along the rail corridor through architecturally designed stations and related civic areas and streetscape treatments. This would improve local visual amenity, and complement the principal benefits provided by the Project through enhanced accessibility and connectivity in and around neighbourhoods, and in the station precincts.

Where surface works are undertaken as part of the Project, renewal through urban design and landscaping is proposed for new stations, new structures and renewed stations. Communities close to affected areas would experience changes to local amenity, visual changes to amenity and views due to new surface infrastructure.

Noise barriers are proposed at specific locations, eg Rocklea and Salisbury, along the rail corridor to manage noise. The design of these barriers would be consistent with existing Queensland Rail standards and would generally screen views of rail infrastructure. Design options will be investigated to improve the appearance of noise barriers, to reduce visual intrusion and to address CPTED issues.

23.3.6 Nature conservation

The impact of the Project on natural features is generally concentrated at the surface works which include areas of park land and areas of riparian vegetation, as identified in **Chapter 11 Nature Conservation**. These areas include two major waterways within the study corridor, the Brisbane River and Breakfast/Enoggera Creek.

Primarily, direct impacts would be experienced in Victoria Park where the construction of infrastructure is proposed and adjacent to the riparian corridor of Moolabin Creek, where the Yeerongpilly worksite would be established. Additionally, other isolated vegetation areas, including large figs located at the RNA Showgrounds and fig trees bordering the City Botanic Gardens may be directly affected.

In Victoria Park, the anticipated impacts include the removal of well-established fig trees. Worksite rehabilitation should include replanting with semi-mature fig trees and other species of fast growing trees and shrubs. The establishment and operation of the Yeerongpilly worksite must address site drainage and stormwater management to ensure there is no movement of contaminated waters from the worksite to Moolabin Creek.

Where the Project impacts on the existing nature conservation values, or potentially impacts on the surrounding or downstream environments, the potential impacts would be minimised and appropriately managed through site specific measures identified in **Chapter 11 Nature Conservation**.

Cumulative impacts on nature conservation values may arise from a combination of a diminution of surface water quality and groundwater drawdown. Mitigation measures during construction and operation are addressed in **Chapter 12 Groundwater** and **Chapter 13 Surface Water Quality** respectively. Through the mitigation measures identified, no significant cumulative impacts on flora and fauna are predicted.

23.3.7 Flooding and stormwater management

The study corridor crosses several significant waterways including the Brisbane River, Breakfast Creek, Enoggera Creek, Oxley Creek. There are also several smaller waterways crossing the study corridor, such as Moolabin Creek, Rocky Waterholes Creek and Stable Swamp Creek.

Existing flooding risk in the study corridor generally is due to regional flooding from the Brisbane River, once capacity of the underground pipe drainage system is exceeded and local drainage is via surface flow. Extreme flooding events in the Brisbane River may be of long duration, involving large volumes of water. Flooding events in Oxley Creek have the potential to inundate parts of the study corridor in Rocklea and Yeerongpilly. Moolabin Creek, Rocky Waterholes Creek and Stable Swamp Creek are tributaries to Oxley Creek and occasionally cause flooding in surrounding areas.

Specifically:

- peak flood levels in areas between Yeerongpilly and Moorooka stations result from short duration flood events in Moolabin Creek, with some coincident flooding in Oxley Creek
- peak flood levels between Moorooka and Rocklea stations result from short duration flood events in Rocky Waterholes Creek, with some coincident flooding in Oxley Creek
- peak flood levels near Salisbury Station result from the back-up of Brisbane River flood events in Oxley and Stable Swamp creeks, as well as local flood events for Stable Swamp Creek.

To protect Project worksites from flooding during construction, eg at Moolabin Creek, the use of bunds or raising of ground levels is proposed to protect the site from a 1 in 20 AEP event. This proposal may result in a temporary, minor loss of flood conveyance and floodplain storage during the construction phase.

Chapter 14 Flood Management reports the anticipated changes to flood levels in Moolabin Creek for a 1 in 5 AEP flood event to be negligible (less than 0.01 m). A 1 in 5 AEP flood event is likely to occur during the construction period given the duration of construction. In a 1 in 20 AEP flood event, changes in flood levels are expected to be in the order of 0.04 m, while potential changes to flood levels would be in the order of 0.09 m in a 1 in 100 AEP flood event. The probability of experiencing a 1 in 100 AEP flood event during the construction period is approximately 5.5 %.

There are no other, known committed, large-scale development projects in the Moolabin Creek floodplain which would lead to a cumulative increase in flooding levels during the construction phase of the Project. Detailed design measures for the Yeerongpilly worksite would be required to minimise the incursion of the bunded area into the Moolabin Creek floodplain.

Other possible developments within the study corridor that could change the flooding regime include the development of land within the Yeerongpilly TOD site, the bus depot now under construction on Sherwood Road near Oxley Creek, and possible future expansion of the Brisbane Markets at Rocklea. None of the on-going redevelopment of sites within the CBD would affect flooding levels in the Brisbane River. Any future work on the North Bank proposal would require further investigation by the BCC and other agencies once design details were settled.

The development of the Yeerongpilly TOD has been delayed as a result of the inundation of part of that site in the January 2011 flooding event in the Brisbane River. Similarly, the inundation of the Brisbane Markets and their environs in January 2011 as flooding backing up Oxley Creek from the Brisbane River, would require further, detailed hydraulic investigations before further development was approved to proceed.

The flooding assessment has determined that, once constructed, the Project would not be expected to significantly impact on the current flood behaviour of waterways in the study corridor. Changes in flood levels and velocities in waterways are predicted to be negligible. Consequently, no significant cumulative impacts on flooding are predicted.

23.3.8 Air quality

Potential air quality impacts are described in **Chapter 15 Air Quality and Greenhouse Gas Assessment**. In addition to assessing emissions from key Project activities, the chapter also examines the contribution of the Project to changes in local and regional air quality, based on existing and projected background levels.

During construction, the Project has the potential to impact on nearby sensitive receptors through the generation and emission of dust. This potential is proposed to be reduced and managed to achieve the environmental objectives for air quality, measured in relation to air quality goals.

Other development projects that could occur concurrently with Cross River Rail, and lead to a potential cumulative increase in dust entrained in local air movements include the redevelopment of the RNA Showgrounds and redevelopment of sites within the Brisbane CBD. Similar dust control measures as those for Cross River Rail would be required for these sites generally, to avoid or minimise the potential for a cumulative increase in dust nuisance.

Monitoring of dust emissions for Cross River Rail and each of these projects would be required, with regular reporting on changes in air quality at nearby sensitive receptors.

During operation, the change in air emissions from motor vehicles within the South East Queensland airshed is not predicted to be significant. That is, the reduction in the total number of daily trips made in motor vehicles in South East Queensland as a consequence of implementing Cross River Rail would be less than 1%. Similarly, the predicted changes to train movements with the Project are unlikely to affect regional air quality. Consequently, at the regional scale, no significant cumulative impacts on air quality are predicted with the Project.

23.3.9 Noise and vibration

A technical study addressing potential noise and vibration impacts is presented in **Chapter 16 Noise and Vibration**. Construction noise and vibration for the reference design is predicted to exceed the nominated goals for varying periods in a number of locations across the study corridor. The duration of the predicted exceedances varies considerably with each of the different construction activities.

Mitigation and management measures are required to minimise impacts to nearby sensitive receptors while allowing construction activities to proceed at a reasonable rate of progress. The environmental objectives seek to minimise disruption to normal urban activities by seeking to avoid sleep disturbance and maintaining reasonable acoustic conditions within buildings used for education, commerce, worship and community activities. Construction vibration is proposed to be managed to achieve similar environmental objectives. Goals for both construction noise and vibration are established to measure performance in relation to the environmental objectives.

During construction, exceedances of the goals for sleep disturbance with regards to construction vibration and regenerated noise are anticipated in sections along the main tunnel alignments where the tunnel is closest to the surface. Some locations between Roma Street and Albert Street, Woolloongabba and Boggo Road, south of Boggo Road are anticipated to be affected for short periods as the tunnel boring machines (TBMs) pass by beneath the surface. The duration of these predicted impacts mostly would be up to seven days, although periods of up to 10 days could be expected in the CBD, where the buildings have deep foundations into rock.

Advance consultation would be required in such circumstances, so that people potentially affected by construction could discuss possible mitigation measures to minimise potential impacts and the number of residents potentially impacted.

There are a number of locations where construction works for development projects could coincide with Project construction. The redevelopment of the RNA Showgrounds and sites in the Brisbane CBD would be subject to the requirements of *Environmental Protection (Noise) Policy 2008* and local laws pertaining to construction noise. In practice, construction in these locations would be limited to daytime hours (06:30 am to 6:30 pm Monday to Saturday). Any cumulative impacts arising from coincidental construction would occur during those hours. Monitoring of Cross River Rail works has the potential to be confused if excessive noise or vibration emissions arise from nearby construction activities.

Out of hours work for Cross River Rail would be managed to achieve the environmental objectives. There would be little potential for overlap, and therefore cumulative effects of construction works out of hours.

Potential exceedances of the operational noise criteria established in the Queensland Rail Code of Practice for noise have been identified at three locations in the southern end of the study corridor at Yeronga, Rocklea and Salisbury. The predicted changes in train traffic, including freight train traffic, on the surface tracks between the portals would not lead to exceedances of the Code of Practice requirements. Mitigation measures, such as acoustic barriers, are proposed to address operational noise impacts. Modelling indicates that such measures would be effective in reducing operational noise to satisfy the requirements of the Code of Practice. The modelling takes into account of noise sources in these locations, such as road traffic noise from Ipswich Road and Fairfield Road.

23.3.10 Social

As described in **Chapter 20 Social Impact Assessment**, social factors are predominantly addressed in terms of changes to amenity and liveability, specifically for communities near to construction works. These changes may result from construction or operational related noise increases, changed access to community facilities, traffic diversions and construction traffic that may affect overall quality of life for residents in a changing urban environment.

Potential cumulative social impacts have been identified for communities living and working in locations where the Project construction works would coincide with construction for development sites. Such communities would include:

- the community of Bowen Hills including the area within the Bowen Hills UDA and adjacent to the RNA Showgrounds
- the community working and residing along Albert Street and Roma Street in the CBD
- the community adjacent to the Boggo Road Station site
- the community adjacent to the Yeerongpilly TOD and Queensland Tennis Centre sites.

As a result of the January 2011 floods, it is noted that development of the Yeerongpilly TOD now is being revised. Consequently, the extent of overlap in construction is to be determined.

The construction nuisance impacts for these communities are addressed in **Chapter 20 Social Impact Assessment (Section 20.4)**.

Recommended mitigation to minimise social impacts arising from the Project includes:

- detailed discussion with the community at key sites of cumulative impact, to identify possible mitigation measures to alleviate impacts
- ongoing communication of construction activities and timeframes to impacted people
- where possible, construction staging to minimise impacts.

Once operational, the Project would provide significant opportunities for improvements in amenity and liveability through increased transport capacity and provision of city building opportunities along the study corridor. Connectivity to major public and private health facilities and access to inner city education, research and learning institutions is a key benefit for the Project.

The Project also would facilitate greater social interaction by enhancing accessibility for people to communities and activities. This would improve the overall scale of social activity that is accessible and less costly to travel.

The enhanced accessibility and mobility provided by Cross River Rail could be expected to stimulate increased activity, and development, in areas benefitting from the change. Planning by agencies such as the ULDA, Growth Management Queensland and the BCC is in hand to manage forecast population growth, and to ensure the transport benefits of Cross River Rail are optimised in an orderly and sustainable manner. The designated UDAs, TODs and master planned areas provide the evidence of this planning and growth management.

23.3.11 Economic

Chapter 21 Economic Assessment identifies that positive economic changes are anticipated with the Project, through benefits to public and private transport users. Benefits to the efficient movement of rail freight are also anticipated.

The Project would directly affect industrial and commercial premises from Yeerongpilly southwards to Salisbury. This area accommodates light and service industry businesses. These businesses would be assisted to find alternate locations and continue operating, reducing the overall impact of the Project. Businesses may also be impacted indirectly during construction in the Yeerongpilly area and in the CBD. Measures have been identified to minimise disturbance to business operations during the construction period.

City shaping and urban development benefits are anticipated for industries, communities and economic hubs closely linked to the study corridor. The Project connects several urban development areas, eg Yeerongpilly, Boggo Road, Woolloongabba, Bowen Hills, and would provide a key public transport link between these developments and the Brisbane CBD. The Project would support the economic focus of these areas through improved access and connectivity, resulting in savings in urban infrastructure provision as a result of a more consolidated urban form.

In addition, provision of new infrastructure is also projected to support and be a catalyst for planned increases in urban densities, not only within major development areas but also within areas located along the corridor which would benefit from increased frequencies for commuter services on the surface rail lines. This would ultimately improve property attractiveness and values in these local areas once the Project is operational.

The public transport links between major economic precincts and significant development areas would be strengthened by the Project. Benefits to rail freight due to facilitation of dedicated rail freight paths to areas such as the Port allow more intermodal freight to be transported by rail rather than by road resulting in increased road capacity. This is predicted to have positive freight market affects.

The Project is expected to have a positive cumulative economic impact through employment generation during construction and operation.

Transport improvements have the potential of impacting on the broader economy through a number of different mechanisms, including changes in prices, economic output, labour supply, imports and exports. It is projected that the Project would enhance the economic efficiency of rail through improved connectivity, alleviating existing capacity constraints across the rail network and allowing for increased rail access for commuters.

The wider economic benefits of the Project, assessed in **Chapter 21 Economic Assessment,** determined that agglomeration benefits have the greatest wider economic benefit for the Project. Agglomeration benefits would address the cumulative impact that transport has in bringing activities and people closer together, effectively raising the density of economic activity. Agglomeration allows labour markets to operate more efficiently, interactions in the economy are made easier or less costly, and the overall scale of activity accessible to local economies increases.

23.4 Cumulative construction impacts with other projects

This section discusses major infrastructure and urban development projects that are planned, or are currently being constructed in areas within and adjoining the study corridor. Significant urban development sites are described in **Chapter 9 Land Use and Tenure**.

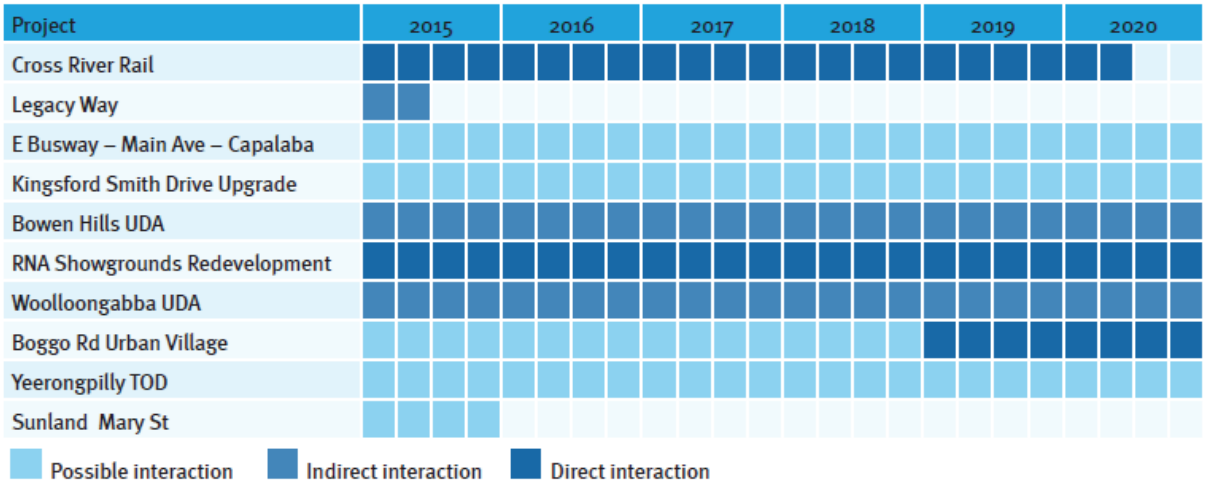
Major planning and development activities occurring within the same construction timeframe and corridor as the Project include the Bowen Hills (RNA Showgrounds Redevelopment) and Woolloongabba UDAs, the Boggo Road Urban Village, and the Yeerongpilly TOD. A number of isolated development proposals are also identified within the Brisbane CBD. Other infrastructure and planning projects may also emerge during the detailed design phase of this Project.

Construction associated with major development sites within the study corridor have the potential for cumulative impacts with the Project where construction timeframes occur concurrently. Specifically, spoil haulage and material delivery has the potential to share the same road network and spoil placement sites, resulting in potential noise and vibration impacts and changes to local traffic and access.

In addition, communities located adjacent to development sites such as Boggo Road, Bowen Hills and Yeerongpilly TOD have experienced significant growth and change. These communities may be particularly sensitive or vulnerable to Project related impacts.

Table 23-2 outlines the existing or proposed significant projects that have overlapping construction timeframes with the Project and are located in areas relevant to the study corridor.

Table 23-2 Construction timeframes and potential for cumulative effects



Consultation is required between the Cross River Rail and other construction projects to manage cumulative impacts of construction. This consultation process should be managed by the Coordinator-General, with direct support from Transport and Main Roads and the Departments of Public Works and Emergency Services. The BCC must be included in this consultative process.

23.4.1 Transport infrastructure projects

Legacy Way (Northern Link)

Legacy Way (formally known as Northern Link) is a 5 km tunnelled toll road connecting the Centenary Motorway at Toowong and the Inner City Bypass at Kelvin Grove. Construction commenced in April 2011, with the completion anticipated in December 2014/early 2015.

In conjunction with the construction of the northbound and southbound tunnels, Legacy Way would require worksites on and around the Centenary Motorway in Toowong and the Inner City Bypass in Kelvin Grove. The worksite at Victoria Park would be located in close proximity but on the southern side of the Exhibition and Normanby rail corridor, to the proposed Legacy Way Inner City Bypass worksite location.

There may be a small overlap from the commencement of construction activities for the Project and the completion of construction activities for Legacy Way in 2015 at Victoria Park. Whilst both projects would be located near to the Inner City Bypass, any cumulative impacts on nearby land uses, such as reduced amenity, are considered to be minimal.

In any case, to manage the construction impacts, detailed construction Environmental Management Plans (EMPs) for the Cross River Rail Victoria Park and Exhibition worksites would be prepared.

Eastern Busway

The Eastern Busway is a staged project that once complete, would provide a busway approximately 18 km in length from the Eleanor Schonell Bridge at Dutton Park to Capalaba.

The project is being constructed in several stages, with the first stage completed in August 2009, connecting Eleanor Schonell Bridge to the South East Busway. The second stage is currently under construction and is to connect the South East Busway to Main Avenue in Coorparoo. Construction of this stage is to be completed in late 2011. Future stages of the Busway would connect Main Avenue at Coorparoo to Capalaba. The timing for construction of this stage is uncertain, as it would be determined by future traffic demands and funding.

As the South East Busway to Coorparoo section is to be completed in late 2011, cumulative impacts with the Project are not anticipated.

SEQIPP identifies that further stages have a potential delivery timeframe between now and 2026. In the event that further stages are constructed during the Project's construction timeframe, such construction activities would be located at least 2 km east of the Project alignment and its nearest construction worksite at Boggo Road. As a result, the Eastern Busway development is unlikely to share construction areas or haul routes. Consequently, cumulative impacts from future stages of the Eastern Busway are unlikely to be experienced.

Kingsford Smith Drive Upgrade

Kingsford Smith Drive is undergoing a process of staged planning and upgrading to increase its overall road capacity. Stage one, from Harvey Street to Theodore Street, is currently being undertaken to widen Kingsford Smith Drive from four lanes to six lanes. Completion of stage one is anticipated by 2011, prior to the Project commencing.

Additional stages for the upgrade of Kingsford Smith Drive are currently in the investigation and planning phases. The proposed commencement of construction activities beyond the works being undertaken for stage one has yet to be determined.

Based on current information and given that the Project spoil is to be hauled to Swanbank, cumulative impacts relating to the upgrade of Kingsford Smith Drive are unlikely to be experienced.

23.4.2 Urban development projects

Bowen Hills Urban Development Area

Bowen Hills UDA is located approximately 3 km from Brisbane CBD. The UDA is sited on 108 ha of land and is bounded by Bowen Bridge Road and Enoggera Creek to the west, Mayne Rail Yards and Breakfast Creek to the north, Water Street and St Pauls Terrace to the south and Breakfast Creek, Cintra Road and Markwell Street to the east.

The UDA has been proposed as an inner city TOD. Development is likely to occur over a 10 to15 year development period, with some developments occurring within five years.

Development of the RNA Showground portion of the UDA (directly surrounding the new Ekka Station and associated worksite) commenced in 2011 with staged construction extending to 2020 (timeframes for each development stage are identified in **Chapter 9 Land Use and Tenure**). The RNA development application has been approved by the ULDA and provides overarching guidance to the development of the RNA Showgrounds. The actual timing, design and location of individual buildings will be determined through future negotiations between the developer and the ULDA.

The key cumulative issues relate to concurrent construction activities and impacts on heritage features.

Construction

The Bowen Hills Urban Development Scheme outlines the future pattern of development for the UDA, which is to provide for a range and mix of uses, including residential, commercial, retail, community and recreational uses. The approved RNA development application provided further direction for the RNA Showgrounds.

Cumulative impacts may be experienced at this site where construction works occur concurrently. As a result, cumulative impacts may be experienced with respect to vehicle, pedestrian and cycle access affecting the efficient operation of key facilities, including the RNA Showgrounds and the RBWH.

With regard to the RNA Showgrounds portion of the UDA, the construction timeframes for Ekka Station would overlap with construction at the RNA Showgrounds. Coordination with RNA and ULDA would be required with respect to construction timeframes, construction sites, demolition, spoil removal and construction material haulage in order to minimise potential cumulative impacts on parking, access, traffic, noise, dust and the effective management of operations at the RNA Showgrounds.

Construction activities would also need to be managed to minimise impacts on events, with closedown of construction activities during the Ekka anticipated. A process of ongoing consultation and coordination with RNA and ULDA is required to manage potential cumulative impacts.

Heritage

Both the RNA redevelopment and the Project would affect existing cultural heritage on the RNA Showgrounds. The RNA redevelopment would directly affect a significant proportion of the heritage listed places and buildings. A range of measures are proposed to mitigate the reduction of heritage values on the RNA Showgrounds. The RNA redevelopment seeks to retain or adapt the heritage, character, cultural features and history of the site and surrounding area.

The Cross River Rail would also affect heritage listed places and buildings. Some of the heritage impacts overlap with the approved RNA Master Plan heritage impact and are not additional. The Project would have additional impacts to heritage values that are also impacted by the RNA Showgrounds redevelopment, such as, Show Ring No. 2 and the heritage values associated with the rail corridor.

Cumulative impacts may be experienced on heritage buildings and features, including the loss of visual prominence or sight lines.

The RNA redevelopment application identifies 109 heritage elements out of 140 within the RNA Showgrounds that would be removed in full or in part. An additional seven heritage elements would be impacted by Cross River Rail (see **Table 23-3**). The additional impacts to heritage values are balanced by the significant transport and community benefits delivered by the Project and the RNA Master Plan.

Table 23-3 Additional heritage elements impacted by the Project

Heritage Value	Heritage elements	Description of Project impact
Heritage elements		
High	Show Ring Two	Small impact to south-eastern edge, including partial loss of trees. RNA development would also have some minor impacts. The function of Show Ring Two would be retained.
	Subway (south-west)	Access would be maintained. Existing form of the subway would be lost.
	Subway (north-east)	Access would be maintained. Existing form of the subway would be lost.
Medium	Sideshow Alley	Area abutting the existing rail corridor would be occupied by construction activities and part of the new rail corridor.
	Pedestrian Bridge	Would be removed for the Ekka Station plaza.
	Toilets (near O'Connell Terrace)	Would be removed for the Ekka Station plaza.
	Retaining Wall	Would be impacted by works for the Ekka Station and rail corridor.
	Toilets (near Show Ring Two	Would be impacted by works for the Ekka Station and rail corridor.

Source: The Royal National Agricultural and Industrial Association of Queensland and Lend Lease (2010), RNA Showgrounds Development Application, Volume 2

Woolloongabba Urban Development Area

Woolloongabba UDA is located approximately 2 km south-east of Brisbane CBD. The UDA is sited on approximately 10 ha of land bound by Vulture Street to the north, Stanley Street to the south, Allen Street to the west and Main Street to the east. The site currently contains the Queensland Government Landcentre and Goprint sites, Woolloongabba busway station, South Brisbane Dental Hospital and Morrison Hotel.

Woolloongabba UDA has been earmarked as a future urban transit oriented precinct, containing a range and mix of residential, community, recreation and commercial uses. Integration between existing and planned transport infrastructure and proposed development is a key aspect of the development intent. Gabba Station would be located within the heart of the UDA, surrounded by future high density mixed-use development and connected to the Gabba Stadium and surrounding uses.

Proposed construction of the underground station at Woolloongabba would occur in the UDA, occupying the existing Goprint site. Early development of the Woolloongabba UDA is proposed to commence in 2011 (western side of UDA) and could be ongoing for the duration of the Project construction period.

Potential cumulative impacts resulting from both projects being undertaken concurrently could include increased traffic on Stanley Street and Vulture Street and noise and dust concerns for nearby sensitive uses.

In addition to the integration of the proposed Gabba Station into the planning and design of Woolloongabba UDA, coordinated construction of the UDA and Gabba Station may present a number of benefits, such as:

- minimising future impacts to access and connectivity to Gabba Station as a result of future UDA construction activity
- achieving an overall shortened construction timeframe, therefore reducing the longevity of impacts on accessibility and amenity.

A coordinated approach to construction would be required across the UDA. The Project's draft outline EMP would manage the potential for cumulative construction impacts (refer to **Chapter 24 Draft Outline EMP**).

Transport and Main Roads is undertaking a Transport Study to address the transport issues surrounding Woolloongabba. This has been determined through an agreement between BCC, ULDA and Transport and Main Roads.

Boggo Road Urban Village

The Boggo Road Urban Village will provide an inner-urban precinct which is anchored by the State Government's Ecosciences Precinct. In addition to the Ecosciences Precinct, the Urban Village is planned to accommodate a mix of uses including residential, commercial, retail, cultural and open space areas.

The Boggo Road Station worksite would be located within Boggo Road Urban Village.

Development of the Boggo Road Urban Village was proposed to be completed by 2016, which may have resulted in some overlap of construction timeframes between site construction and construction of the Boggo Road Station. Currently, the timing of future development of the Boggo Road Urban Village is being determined. However, Cross River Rail and the Department of Public Works are coordinating to determine a delivery and staging strategy.

The Department of Health site is projected to be completed prior to construction of the Boggo Road Station. The building is to be located at the south-eastern corner of the site and may experience potential cumulative impacts, eg arising from noise and air emissions, from construction of both the Station and site.

The coordination of Boggo Road Urban Village and the Project may present a number of benefits. Allowing the Project and land parcels within the Boggo Road Urban Village to be developed during the same time period will allow for:

- the potential to avoid or minimise cumulative impacts arising from the more intense construction effects
- the potential to efficiently integrate the proposed Boggo Road Station into the detailed design of the Urban Village to ensure that all uses are appropriately accommodated.

Yeerongpilly Transit Oriented Development

Yeerongpilly TOD would involve the redevelopment of land situated to the east of the Queensland Tennis Centre and land currently occupied by the Animal Research Institute. The Department of Local Government and Planning are overseeing the development to provide a mix of housing options, employment opportunities and open space all within close proximity to the Yeerongpilly Station.

The first release of land has been released to the market for development and development applications lodged with BCC for several sites. It was anticipated that a portion of the site would be developed prior to construction of the Project. However, the effects of the January 2011 flooding in the Brisbane River have caused the development scope and programme to be revised.

Once operational, both projects could assist in providing a greater level of accessibility to public transport. The Yeerongpilly TOD would increase the density of residential and commercial development within close proximity to public transport networks, effectively supporting the role and function of the Yeerongpilly Station. Improved services at Yeerongpilly Station may encourage more people to use the services. Consequently, beneficial cumulative impacts are anticipated during the operational phase.

CBD development

A number of large scale developments are proposed for the Brisbane CBD, in close proximity to construction areas at lower Albert Street and Mary Street.

Carrington Towers is a 43 storey residential tower, proposed adjacent the Albert Street Station entrance on the corner of Alice Street and Albert Street. The new development would require demolition of the existing building and the redevelopment of 223 residential units.

Another development, located at 99-103 Mary Street is a 31 storey hotel with 216 hotel rooms and 15 serviced apartments. Demolition of this site has already been undertaken. Construction of the hotel is yet to commence.

Due to the likely construction timeframes of these developments, it is anticipated that these buildings would be fully developed prior to construction of the Project.

If construction of either of these developments is postponed, given the proximity of the two developments to the Albert Street Station, potential cumulative impacts may arise, particularly from increased construction traffic converging on Albert Street impacting on access, servicing and traffic movements. However, multiple developments occur within the CBD with construction traffic using CBD roads. The Project, as for any other CBD development, would need to ensure construction impacts are appropriately managed. Appropriate measures would be included within the draft outline EMP to manage the potential for cumulative construction impacts in the Brisbane CBD (refer to **Chapter 24 Draft Outline EMP**).

23.4.3 Community impacts

The Project worksites are located close to a number of development projects that are either already under construction, approved or proposed. In addition to sharing local construction areas with some projects, spoil haulage and material delivery for the Project has the potential to share the same road network. Specific impacts and mitigation measures relating to community impacts are addressed in **Chapter 20 Social Impact Assessment**.

Nearby projects that could potentially increase the construction impacts of the Project on the community are the construction at urban development areas such as Bowen Hills (including RNA Showgrounds) and Woolloongabba, Yeerongpilly TOD and Boggo Road Urban Village.

As discussed in **Section 23.4.1**, the overlap of construction activities for the Project and the completion of construction activities for Legacy Way in 2015 may result in minor cumulative impacts. The proposed activities for the two projects may result in changes to local accesses, loss of available open space in Victoria Park and a reduction in amenity due to increases in construction noise and dust.

Construction at Bowen Hills, Woolloongabba UDA, Boggo Road and Yeerongpilly may result in cumulative impacts on the community as a result of changes to local accesses, increased pressures on local parking and a reduction in amenity. Early consultation and coordination between the Project and the ULDA would be undertaken to mitigate impacts on the local communities.

Specific community implications at the RNA Showgrounds relate to cumulative impacts on heritage values at the site. Early consultation and coordination with RNA and ULDA would be carried out to mitigate cumulative impacts on the social and heritage values of the site. Also, the construction works for both the Project and redevelopment of the RNA Showgrounds would have the potential to impact on community housing located on Tufton Street, Bowen Hills. Pedestrian traffic through this area to the RBWH also would need to be managed to maintain an acceptable level of convenience and to provide a safe pedestrian environment.

The community located adjacent to the Boggo Road site, the community of Bowen Hills and the community adjacent to the Yeerongpilly TOD and Queensland Tennis Centre sites have already experienced significant growth, change and disruption. These communities may be particularly sensitive or vulnerable to Project related impacts. Accordingly, a range of mitigation measures have been developed, these would be refined during detailed design and construction planning. They include:

- provision of timely and clear information on the Project works and support to local residents
- a comprehensive suite of integrated mitigation measures within the draft outline EMP for both the construction and operational phases of the Project
- investigating the staging of construction works to minimise impacts
- investigating new initiatives, such as public art programs at the new stations and the involvement of bushland and park regeneration management groups in revegetation projects.

Once operational, the cumulative impact of Bowen Hills UDA (including RNA Showgrounds), Woolloongabba UDA, Boggo Road Urban Village and Yeerongpilly TOD and the Project would have a long term positive impact on the local and broader community, through provision of accessible and robust public transport systems that are integrated with urban development. The Project facilitates development in these locations and would help to deliver a planned and coordinated integrated transport framework.

23.4.4 Labour market impacts

The construction of the Project would generate additional demand and employment in the steel, concrete, tunnelling equipment, utilities, labour and contractor sectors. A number of significant infrastructure projects have been identified for completion in 2011 or 2012. As a result, it is likely that there will be an easing in the labour market that could be filled by the Project. Significant infrastructure projects that are scheduled to finish construction in 2012 include Kingsford Smith Drive – Stage One and Airport Link. However, as there would be a two to three year window between the completion of these projects and the commencement of the Cross River Rail construction, there is potential that some of these resources may be allocated to other projects.

Legacy Way is proposed to finish construction in December 2014/early 2015 and as a result, may enable a transition of labour resources to the Cross River Rail construction.

The Project also has long term positive implications beyond construction. The Project would provide critical enabling infrastructure to support an effective transport system that can help the regional economy better respond to the function of labour markets. Improvements to the transport system by way of the Project has the potential of impacting on the economy through a number of different mechanisms, including changes in prices, economic output, labour supply, imports and exports.

Improved public transport capacity, connectivity and accessibility would lead to broader benefits to the efficient functioning of the labour market and business productivity, including:

- increased efficiency in labour markets as a result of transport bringing activities and people closer together and effectively raising the density of economic activity
- companies using improved transport would experience lower costs, which in turn can be converted to increased turnover. These impacts have the potential to deliver significant time and cost savings to travellers in the course of work.
- additional labour supply, as a result of improved time and reduced cost in getting to a place of work, as an incentive to work. By reducing the cost of accessing jobs, improved accessibility can encourage non-participants, typically potential second-earners or family members with child care responsibilities, to take up employment.

- more productive jobs with better access to city centres and growth in employment in highly productive locations
- benefits to rail freight as a result of providing dedicated rail freight paths to the Port as well as to Acacia Ridge. This allows more intermodal freight to be transported by rail rather than by road.

Accordingly, positive cumulative impacts on the labour market are predicted during the construction and operational phases.

23.5 Future upgrade projects

A number of key future projects have been identified that will have an interaction with the Project. These include:

- Brisbane Subway (post 2031)
- North West Rail
- Salisbury to Beaudesert Rail Upgrade
- TransLink Station Upgrade Program
- Roma Street Station Redevelopment.

Brisbane Subway

Brisbane Subway is a key inner city rail proposal that would facilitate increased rail connectivity between Toowong and Newstead initially. The link would provide a high capacity, high-frequency, distributor system that would connect to Central Station in the Brisbane CBD. This project has not been identified for development within the construction timeframe of the Project and therefore, would not have a cumulative impact with the Project during construction. However, Brisbane subway would improve the public transport network within the CBD and would complement the transport function performed by the Project.

North West Rail

North West Rail line is another key strategy of draft Connecting SEQ 2031. The North West Rail project would involve the construction of additional rail lines from Strathpine to Alderley, servicing communities in Brisbane's north-west. This would form part of the wider North West Transport Corridor Strategy that is currently being developed.

North West Rail has not been identified for development within the construction timeframe of the Project and therefore, no cumulative impacts are anticipated during construction. However, it is anticipated that the North West Rail corridor would be in operation before 2031. The patronage and rail system benefits have been reported in **Chapter 5 Transport**.

Salisbury to Beaudesert Rail Upgrade

The Salisbury to Beaudesert Rail Upgrade project would involve the construction of a 53 km double-track passenger rail connecting the existing City train network near the junction at Salisbury and Beaudesert. New stations would be provided along the rail corridor.

The Salisbury to Beaudesert Rail Upgrade is not proposed to commence construction until after 2026. As a result, cumulative impacts from construction would not be experienced. It is anticipated that Salisbury Station would be redeveloped as part of this project.

Once operational, this project would provide positive rail network and patronage benefits.

TransLink Station Upgrade Program

The TransLink Train Upgrade Program manages the upgrade of train stations throughout South East Queensland, with approximately one-third of all stations receiving upgrades to facilities. Station upgrades would include new and improved station facilities, including improvements to access (lifts, escalators and upgrades to meet disability standards), expansion of car parking, upgrades to information infrastructure, new ticket offices and platform refurbishments.

Stations selected for upgrades as part of the Program are selected on a range of factors, including patronage, current condition and station accessibility.

Upgrades for identified stations would be completed or commenced within the next 12 months. As a result, no cumulative impacts are predicted with the Project.

Roma Street Station Redevelopment

Through the *City West Strategy* and *City Centre Master Plan*, both the State and local governments have identified the future need to develop Roma Street Rail Yards and the surrounding land to ensure that it remains the primary transit hub for Brisbane. In particular, it has been identified that an intensification of uses, such as new residential or commercial developments within the rail yards or around the existing transit centre, is required for the area.

No timeframes have been established for the commencement of new developments at the Roma Street Rail Yard or the transit centre. Should new development occur within the same timeframe as the Project, cumulative impacts are likely to arise.

Cumulative impacts on the parkland adjacent to Roma Street Station may be experienced due to an increase in haulage vehicles on Roma Street and surrounding roads, changes to access and impact on amenity, such as noise and dust. Further impacts on the social values of Emma Miller Place may occur due to continued significant construction occupying the site. This is further examined in **Chapter 20 Social Impact Assessment**.

23.6 Key findings

The key findings for the cumulative impact assessment are:

- Potential interaction with Legacy Way construction may occur should there be an overlap of construction timeframes. However, any cumulative impacts generated are expected to be minimal.
- Development construction at RNA Showgrounds, Woolloongabba, Yeerongpilly TOD and Boggo Road may result in cumulative impacts on traffic, parking, access, noise and dust. A coordinated approach to construction management would be required to minimise cumulative impacts. Once operational, positive cumulative impacts are anticipated through integration of land use and transport infrastructure.
- The combined developments at the RNA Showgrounds would have a cumulative impact on heritage values of the RNA Showgrounds. On-going coordination during planning and construction with the RNA would be required to minimise impacts to heritage where possible. Cumulative impacts on heritage would be balanced by the significant transport and community benefits provided by the Project for South East Queensland.
- Potential for several construction projects in the Brisbane CBD to be underway at the same time as construction of the Cross River Rail stations, creating the potential for construction noise and dust impacts during daytime construction periods. Environmental objectives for the Project would be comprehensive and extend to all aspects of the works, whereas the effective controls on other projects would be limited to construction hours.

- Flooding in the southern portion of the corridor due to minor loss of flood conveyance and floodplain storage for Moolabin Creek and Rocky Waterholes Creek. This would be further investigated and mitigated through the detailed design phase. Further information on flooding is provided in **Chapter 14 Flood Management**.
- Changes to social and community values due to positive and negative changes to amenity and liveability. Impacts may be realised due to construction or operational impacts. Positive changes are anticipated through improvements to amenity and liveability as a result of increased accessibility and connectivity, specifically to major health and education facilities and economic centres.

23.7 Summary

Cumulative impacts from the Project have been addressed with respect to potential interactions between the environmental aspects of the Project, as identified within the individual chapters of this EIS and impacts in combination with current or planned developments.

The residual impacts described as follows are those impacts remaining after mitigation measures have been implemented.

23.7.1 Construction

Cumulative interactions between different environmental aspects are predicted during construction, particularly at the worksites. The majority of cumulative interactions generated by the Project arise from combinations of noise, dust, visual intrusion, traffic, parking and access issues. Through adoption and implementation of the measures proposed in draft Outline Construction EMP (refer to **Chapter 24 Draft Outline EMP**), a reasonable environment for living and working in the corridor would be achieved, while permitting the Project to be constructed efficiently and economically.

Other nearby projects also may also have overlapping construction timeframes with the Project and are located in, or adjacent to, the study corridor. There would be varying potential for adverse cumulative construction impacts to arise with some of these projects.

In order to minimise disturbance at sensitive locations in the vicinity from construction activities, a variety of control measures would be implemented for the Project (refer to **Chapter 24 Draft Outline EMP**). Construction programmes, traffic management measures and EMPs prepared for other nearby projects would be subject to careful consultation and coordination to ensure impacts are minimised on nearby sensitive receptors.

Impact interactions during construction would be local to neighbourhood in extent and either short or medium term in nature.

Beneficial direct and indirect cumulative impacts are predicted from employment opportunities generated during construction.

Residual impacts of the Project during construction would be moderate or low over the short or medium term, depending on the location of construction activities and separation distances from sensitive receptors.

23.7.2 Operation

Beneficial residual impacts are anticipated to accrue for the wider economy once the Project is operational, arising from improved public transport capacity, connectivity and accessibility. Such benefits would provide the long-term off-set for the temporary nature of construction impacts in some locations. Unlike some other major infrastructure projects, Cross River Rail would deliver significant and enduring transport and amenity benefits to those communities potentially impacted during its construction. The provision of access to new Cross River Rail stations and enhanced frequency of services for the existing surface stations along the study corridor would extend Project benefits equitably.

Long term beneficial social and community impacts would be realised through increased accessibility and connectivity, specifically to major health and education facilities and economic centres.

The integration of land use and transport infrastructure from planned developments would also have beneficial, long term impacts on the local and broader community, through the provision of accessible and robust public transport systems that are integrated with urban development and planned sustainable population growth.

Overall, the cumulative residual impacts of the Project during operation are predicted to be beneficial at the local, neighbourhood and metropolitan levels and South East Queensland over the long term.