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20. **Cumulative impact assessment**

This chapter assesses potential cumulative impacts on environmental values resulting from the construction and operation of Brisbane Metro, including the combined impacts of the individual elements of Brisbane Metro in isolation and in the context of other infrastructure projects and development current under construction, planned or proposed in the study area.

20.1 **Assessment methodology**

The study area for this assessment includes the Brisbane Metro alignment with a 250 metre buffer on either side of the alignment. The assessment also considered potential for cumulative impacts outside the study area, where relevant.

Cumulative impacts are generally associated with compounding interactions arising from a number of actions occurring in the same area and over similar timeframes as Brisbane Metro. This assessment considers potential impacts associated with:

- the interaction of various environmental aspects of Brisbane Metro over time during construction and operation
- the combined effect on environmental values arising from the interaction of Brisbane Metro’s construction and operation with other current or planned infrastructure and urban development projects occurring within the study area and over similar timeframes.

The assessment involved:

- reviewing environmental aspects of Brisbane Metro and consideration of potential interactions to determine the overall impact of Brisbane Metro
- identifying other current or planned infrastructure or developments expected to occur within the study area or timeframe as Brisbane Metro, through the review of relevant Queensland Government and Council policies, land use plans, and project databases
- identifying and evaluating the interactions between each of the environmental aspects of Brisbane Metro and other projects and developments to determine the potential for such interactions to change the overall impact of Brisbane Metro
- identifying mitigation measures to avoid, minimise or mitigate adverse cumulative impacts and maximise beneficial cumulative impacts resulting from Brisbane Metro.

20.2 **Cumulative impacts across Brisbane Metro**

Brisbane Metro will result in both beneficial and adverse impacts in relation to environmental, social and economic values within the study corridor. As impacts are expected to vary in location, magnitude, duration and timing, the overall cumulative impact of Brisbane Metro needs to be considered in relation to the whole of project life.

Impacts have been summarised separately for the design, construction and operational phases of Brisbane Metro as the nature and scale of the impacts differ between these phases. The nature and scale of potential impacts also differs between underground and surface components of Brisbane Metro and in relation to the local and regional environmental communities. Where appropriate, the differentiation has been described in the following sections.
20.2.1 Design phase

Overarching beneficial impacts relevant to the design of Brisbane Metro include:

- changes to bus routes, the cycle network and pedestrian networks to improve safety and functionality of all networks at South Brisbane and the CBD
- interchanges at various station locations between the proposed CRR project, the existing bus and passenger rail networks and Brisbane Metro to increase the functionality of the entire public transport network
- Brisbane Metro station locations to support and enhance the functionality of TODs and PDAs at various locations, including Buranda and Herston
- opportunity to redesign Victoria Bridge as a ‘green bridge’
- removing the Melbourne Street busway portal and associated traffic and pedestrian conflicts
- re-use of existing busway infrastructure to promote cost-effective delivery of Brisbane Metro
- Simplify the Grey Street and Melbourne Street intersection, significantly improving safety by the removal of certain traffic movements.

Broadly, the adverse impacts associated with the design of Brisbane Metro include:

- potential changes to the Queensland Cultural Centre, in particular the QPAC Green
- potential changes to pedestrian and cyclist access to Victoria Bridge at North Quay
- traffic constraints at locations in the CBD and South Brisbane as a consequence of removing of general traffic from Victoria Bridge.

20.2.2 Construction phase

Beneficial cumulative impacts of the construction phase include:

- direct and indirect economic benefits resulting from expenditure on materials and labour required for construction and on goods and services surrounding construction worksites
- the generation of a range of indirect jobs, such as in the construction, financial and business services, government services and road transport sectors.

During the construction phase, local communities near key construction worksites may experience a number of adverse impacts that are individually manageable, but combined could potentially cause moderate to high levels of temporary disruption and reduced amenity.

As Brisbane Metro proposes using the existing busway network, there are expected to be a number of disruptions to the operation of existing bus services during construction. For the majority of the network, some level of impact is expected to occur throughout the construction phase, although the occurrence and intensity will fluctuate depending on the nature of construction activities at a particular time and the effectiveness of the proposed mitigation measures.

Within the CBD and Cultural Centre precinct, construction works will be more extensive and are expected to result in disruption to existing bus services using the busway and surface streets. Temporary rerouting of these services will be required throughout the construction phase to minimise impacts on public transport customers. The rerouting of bus services and changes to the CBD street network may result in additional congestion around these sites for the duration of construction.

Without the implementation of appropriate environmental mitigation and management measures, temporary decreases in local amenity may be experienced during construction due to:

- increased duration or intensity of noise and vibration
- increased quantity of dust
increase in construction traffic
- disruption to bus stop locations
- temporary road closures.

20.2.3 Operational phase

The combination of all elements of Brisbane Metro provide a high-quality 'turn-up-and-go' mass-transit system.

Key operational benefits of Brisbane Metro include:
- improved access and connectivity at regional and local levels
- increased capacity of existing busway infrastructure, removing a number of existing bottlenecks between the Melbourne Street busway portal and North Quay
- improved journey times and reliability of the system
- improved overall customer experience
- better use of existing infrastructure
- better land use outcomes as a result of improved connectivity between the city’s key precincts.

The combination of bus movements, service requirements and workshop activities at the new Brisbane Metro depot may change the duration and intensity of noise in the surrounding areas.

20.3 Cumulative impacts with other projects

This section discusses infrastructure and urban development projects under construction, planned or proposed, that could result in cumulative impacts with Brisbane Metro. Major infrastructure and urban development activities that have potential to result in cumulative impacts with Brisbane Metro’s construction and/or operation are shown in Figure 20.1. They include:

- transport infrastructure projects such as:
  - the proposed CRR project at Boggo Road, Woolloongabba, the CBD and Herston
  - Pacific Motorway upgrade: M1/M3/Gateway merge at Rochedale
- urban development projects such as:
  - Queen’s Wharf Brisbane
  - Buranda TOD
  - Herston Quarter PDA.

In addition, there are a large number of residential and commercial development projects of varying scale currently planned or under construction at locations near to Brisbane Metro, including Rochedale, Eight Mile Plains, Woolloongabba, Dutton Park, Kangaroo Point, South Brisbane, West End, the CBD and Bowen Hills.

The greatest potential for cumulative impacts with other infrastructure and development projects will generally occur during the construction phase, particularly where construction timeframes occur concurrently. Construction associated with these infrastructure and urban development projects have the potential to contribute to cumulative impacts, particularly in relation to traffic and transport, including construction haulage and material and equipment deliveries that will share the same roadways during construction periods. Other infrastructure and development projects having potential interaction with Brisbane Metro may also emerge during the detailed design and early construction phase. An analysis has been conducted for Brisbane Metro that shows a range of smaller projects on the short- to medium-term horizon within and adjacent to the study area. It is assumed however that due to the scale and nature of these projects and the uncertainty around construction time and duration, if impacts arise they will be mitigated through the CEMP and are not expected to significantly add to the cumulative impacts of Brisbane Metro.
Figure 20.1: Major infrastructure and urban development near Brisbane Metro

Key
- Study area
- Transport infrastructure project
- Urban development project
- Proposed Cross River Rail station
Minor infrastructure works undertaken by public utility providers in proximity to construction worksites throughout the construction phase of Brisbane Metro will also be managed through appropriate consultation and coordination with the proponent.

Figure 20.2 outlines the proposed construction time frames for known major infrastructure and urban development projects within and adjacent to the study area that have potential for cumulative impacts with Brisbane Metro.

### Figure 20.2: Construction timeframes

<table>
<thead>
<tr>
<th>Project</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brisbane Metro*</td>
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<tr>
<td>Transport infrastructure projects</td>
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<tr>
<td>Cross River Rail</td>
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<tr>
<td>M1/M3 Upgrade</td>
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<tr>
<td>Urban development projects</td>
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<tr>
<td>Queen’s Wharf Brisbane</td>
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<td>Buranda TOD</td>
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<tr>
<td>Woolloongabba PDA</td>
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<tr>
<td>Herston Quarter</td>
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</tbody>
</table>

*Subject to government approvals and funding

#### 20.3.1 Cross River Rail

The proposed CRR project provides a new north-south passenger rail line in Brisbane’s inner city, extending from Bowen Hills in the north to Dutton Park in the south via the CBD. The aim is to address capacity constraints in the inner city rail network which impact the operation of the broader network, and to support growth in public transport usage. The proposed CRR project involves:

- approximately 10.2 kilometres of rail line between Dutton Park and Bowen Hills, including approximately 5.9 kilometres of tunnel under the Brisbane River and CBD
- new stations at Boggo Road, Woolloongabba, Albert Street, Roma Street and Exhibition Showgrounds.

The tunnels between Woolloongabba station and Boggo Road station are proposed to be mined. North of Woolloongabba, the tunnels are proposed to be constructed by tunnel boring machine. Tunnelling operations are proposed to commence from the worksite at Woolloongabba, with the bulk of spoil removal and materials delivery occurring at this site. The underground stations are proposed to be constructed in a combination of top-down excavations and mined caverns. Construction of the proposed CRR project’s Roma Street station requires the demolition of the Brisbane Transit Centre (west tower). Preliminary works have commenced and have a five-year construction time frame.

The proposed CRR project has an overlapping construction timeframe with Brisbane Metro and there is potential for overlapping construction impacts, particularly at Woolloongabba, Dutton Park and in the CBD. The proposed CRR project will produce large quantities of spoil to be disposed at five separate locations. The majority of the spoil will be removed from the Woolloongabba construction site, however significant volumes of spoil will be removed via all station and tunnel portal locations. While Brisbane Metro requires the removal of a much smaller quantity of spoil than the proposed CRR project, haulage routes for Brisbane Metro to the disposal sites south and west may interact with the proposed CRR project resulting in additional construction traffic and congestion at these locations.
Proposed CRR project station works at Boggo Road and Woolloongabba involve temporary disruption to existing busway operations, including temporary closure of the busway and stations and disruptions to services. Planning of Brisbane Metro works at these locations should be coordinated with the proposed CRR project to minimise disruption to bus customers.

Construction of the proposed CRR project’s Roma Street station, including demolition of the Brisbane Transit Centre (west tower) has potential to impact the operation of the existing busway. Management measures will be required to ensure ongoing operation of the busway during construction. Construction of the proposed CRR project station has significant overlap with the required station improvements for Brisbane Metro. Detailed planning for Brisbane Metro, the proposed CRR project and any redevelopment of the Brisbane Transit Centre should be integrated to minimise potential for additional extended periods of disruption.

Once operational, the proposed CRR project will have synergistic benefits with Brisbane Metro. The combined projects will form a complementary network of high-capacity and high-frequency public transport serving the inner city and improving access throughout the region. Combined, the two projects will result in improved transfer opportunities between bus, rail and Brisbane Metro at a number of locations; including Roma Street, South Brisbane, Buranda and Boggo Road.

Council has commenced discussions with the CRR Delivery Authority about both projects, potential impacts and opportunities for integration. The CRR Delivery Authority is also represented on the Government Reference Group established for Brisbane Metro. Consultation will be ongoing through the detailed design and construction phases to assist in managing potential cumulative impacts and maximise the benefits of both Brisbane Metro and the proposed CRR project.

### 20.3.2 Pacific Motorway upgrade M1/M3/Gateway merge

The Pacific Motorway M1/M3/Gateway merge at Eight Mile Plains/Rochedale is planned to be upgraded to reduce congestion and to address significant delays and unreliable travel times. The upgrade includes:

- additional southbound lanes on the Pacific Motorway between Eight Mile Plains and Rochedale
- construction of a new four-lane overpass on Underwood Road north of the existing bridge
- realignment of the bus entry from Eight Mile Plains station to the Pacific Motorway.

Construction of the upgrade is planned to start in early 2018, with works expected to overlap with the construction timeframes for Brisbane Metro for up to two years. Potential overlaps are expected to occur at the depot site and along the planned routes for construction haulage. Cumulative impacts during the overlap period may include increased construction traffic, potentially resulting in increased delays and disruptions for transport users. The upgrade may also involve minor disruptions to existing busway operations during construction.

Ongoing engagement with TMR will be required to ensure Brisbane Metro and M1/M3 merge design and construction works are coordinated.

### 20.3.3 Queen’s Wharf Brisbane

Queen’s Wharf Brisbane is located between the Brisbane River, George Street, Alice Street and Queen Street in the CBD. The project involves a significant redevelopment of State land in the CBD for a mix of hotels, retail, restaurants, entertainment and open space uses. The area contains a number of significant heritage places and open spaces, existing buildings to be demolished and riverfront land under the Riverside Expressway. A new pedestrian bridge linking Queen’s Wharf Brisbane to South Bank is also proposed as part of the development. Construction of early works have commenced with main construction works expected to begin in 2018, with the initial development due to open in 2022.

Haulage access to Queen’s Wharf Brisbane is provided at William Street and Queens Wharf Road via North Quay. Construction activities and infrastructure for Brisbane Metro within North Quay and Adelaide Street will restrict access to North Quay, which has the potential to limit construction access to Queen’s Wharf Brisbane. Construction traffic impacts for Brisbane Metro are expected to also overlap with Queen’s Wharf Brisbane in the CBD, particularly haulage routes, general construction traffic, changes to local traffic access, changes to bus...
stops and bus services, resulting in increased impacts for road users, including public transport users, pedestrians and cyclists. Council has commenced discussions with the Department of State Development, Manufacturing, Infrastructure and Planning and the Destination Brisbane Consortium about Brisbane Metro and potential impacts of both projects. Ongoing engagement will be undertaken through the detailed design and construction phases to assist with mitigating potential impacts of both projects on transport users. This will include consideration of each projects’ construction and haulage activities in the planning and scheduling of key construction activities and development of a combined construction traffic management plan.

In the longer term, Queen’s Wharf Brisbane is expected to result in improved pedestrian amenity and movement along and between William and George Streets with new open spaces and pedestrian links providing improved permeability throughout the precinct. The improved connectivity and pedestrian bridge to South Bank will complement improved public transport accessibility throughout the CBD supported by Brisbane Metro.

20.3.4 Buranda transit oriented development

The Buranda TOD is a 1.7-hectare private development adjacent to the Buranda busway and railway stations. Stage one of the development is located between the railway line and busway station and includes two mixed-use towers comprising 1160 student accommodation apartments and retail outlets. This stage is currently under construction and is due to be completed in late 2017. Two further stages of the development are expected to follow.

Depending on the timing of construction for stage two and stage three, there is potential for construction to occur concurrently with Brisbane Metro. Potential cumulative impacts may relate to construction traffic access and local access changes for road users, including pedestrians and cyclists, and possible impacts associated with increased noise, vibration and dust impacts. These impacts are not expected to significantly change the TOD construction impacts and will be managed through engagement with the developers of the Buranda TOD.

20.3.5 Herston Quarter PDA

Herston Quarter PDA is an approximately six-hectare site located at Herston, approximately two kilometres north of the CBD. The site is located north of Herston station and adjacent to UQ’s School of Public Health and School of Dentistry buildings and is being redeveloped as a mixed-use precinct with a strong emphasis on health-related uses.

Stage one of the redevelopment has commenced and is due to be completed in 2020. It includes initial site preparation, demolition of existing buildings, upgrades to Herston Road and internal roads and refurbishment of existing buildings. Stage two has also commenced and is proposed to be completed over the next 10 years. It involves construction of new health care buildings, car parking and residential development.

Brisbane Metro requires minor works only in this location and is not expected to result in any cumulative impacts during the construction phase. In the longer term, Brisbane Metro will support future residential and worker populations within the Herston Quarter redevelopment. Improvements to the public realm within the PDA site will seek to improve connections between and through the precinct. In particular, the ‘Spanish Steps’ to be developed as part of the precinct links to Herston Road and Herston station, allowing enhanced connectivity between Brisbane Metro and the Herston Quarter redevelopment.

Council has commenced discussions with the developers of the Herston Quarter redevelopment through the River North reference group and will continue to engage with stakeholders as Brisbane Metro develops.

20.3.6 Surrounding urban developments

As previously indicated, a number of residential and commercial development projects are currently planned or under construction at areas near Brisbane Metro. Construction activities for these projects are likely to overlap with construction for Brisbane Metro.

Works for Brisbane Metro near many of these developments (e.g. Boggo Road Urban Village, Woolloongabba PDA, RNA Showgrounds redevelopment) will involve minor upgrades to existing busway stations, layover and turnaround areas only. As such, cumulative construction impacts are expected to be minor at most. However,
there is potential for construction traffic for Brisbane Metro to interact with construction traffic for these other projects. This may exacerbate potential impacts for transport users, particularly in the inner city. Engagement with major developers near Brisbane Metro and the community more generally about the timing of key Brisbane Metro construction activities will assist in helping to manage potential impacts. Traffic management plans for Brisbane Metro will also consider other construction projects occurring in near the alignment and measures to mitigate potential cumulative impacts.

Construction of the proposed metro depot has potential to interact with urban developments planned at Rochedale. Depending on the timing of individual developments, potential cumulative impacts may relate to increased noise, dust and construction traffic.

### 20.4 Management of cumulative impacts

Construction of multiple major projects at the same time and within similar geographic areas has the potential to increase cumulative impacts relating to disruption, nuisance and loss of amenity. However, construction of multiple major projects is not uncommon, particularly within the inner city.

Council has commenced discussions with various Queensland Government agencies and proponents of projects near Brisbane Metro and consultation will continue through the detailed design phase to better integrate connectivity and functionality between these developments and to fully realise their significant economic and social benefits.

In particular, ongoing consultation will be conducted with entities responsible for other projects having overlapping construction periods with Brisbane Metro to coordinate construction activities as far as practicable through an integrated approach to reduce cumulative impacts. This includes working with the CRR Delivery Authority, Destination Brisbane Consortium, TMR and other relevant stakeholders to develop a CBD construction traffic management plan to manage overlapping construction traffic impacts of Brisbane Metro, Queen’s Wharf Brisbane and proposed CRR project.

Council will also consider, where relevant, construction programs, traffic management measures including pedestrian and cycle movements, and environmental management plans for other nearby projects as part of construction planning for Brisbane Metro. Procedures will also be established to ensure regular review throughout the construction process to identify new major projects with potential to exacerbate construction impacts associated with Brisbane Metro.

Specific measures to manage the cumulative impacts associated with interaction of Brisbane Metro with other major developments within the study corridor are outlined in Table 20.1.

### Table 20.1: Proposed mitigation measures

<table>
<thead>
<tr>
<th>Project</th>
<th>Potential cumulative impact</th>
<th>Phase</th>
<th>Management measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pacific Motorway upgrade M1/M3/Gateway merge</td>
<td>• Increased construction traffic at Rochedale and Eight Mile Plains</td>
<td>Construction</td>
<td>• Early and ongoing engagement with TMR about timing of key construction and haulage activities</td>
</tr>
<tr>
<td>Rochedale urban development</td>
<td>• Increased noise, dust and construction traffic for sensitive receivers</td>
<td>Construction</td>
<td>• Engagement with proponents of urban development, as required</td>
</tr>
<tr>
<td>Proposed CRR project</td>
<td>• Integration of construction activities for Brisbane Metro and proposed CRR project at Roma Street station</td>
<td>Detailed design</td>
<td>• Ongoing engagement with CRR Delivery Authority about potential opportunities</td>
</tr>
<tr>
<td></td>
<td>• Increased construction traffic and local access changes associated with works at Bogo Road, Woolloongabba and in the CBD resulting in traffic congestion and</td>
<td>Construction</td>
<td>• Early and ongoing engagement with the CRR Delivery Authority about potential timing of major construction and haulage activities • Consideration of proposed CRR project haulage routes in planning for haulage activities</td>
</tr>
</tbody>
</table>
### 20.5 Summary

Cumulative impacts from Brisbane Metro have been assessed with respect to the potential interactions between aspects of Brisbane Metro, as identified within the individual chapters of this draft Design Report, and impacts in combination with current or planned developments.

Cumulative interactions between different environmental aspects are predicted during construction, particularly at the construction worksites. The majority of cumulative impacts arise from combinations of noise, dust, visual intrusion, traffic, parking and access issues. With the implementation of environmental management measures proposed in the environmental management and mitigation plan (Chapter 23), a reasonable environment for living and working in the corridor is expected to be achieved, while permitting Brisbane Metro to be constructed efficiently and economically.

Other projects are expected to have overlapping construction timeframes with Brisbane Metro and are located in, or adjacent to, the study corridor. There will be varying potential for adverse cumulative construction impacts to arise with some of these projects. Council will continue to consultation with relevant agencies and proponents of those projects to ensure potential cumulative impacts are managed.

In the long-term, cumulative impacts of changes to the traffic and transport networks are predicted to be beneficial with the provision of integrated, high-frequency, mass-transit public transport networks. Furthermore, the integration of land use and high-frequency public transport will also have long-term beneficial cumulative impacts on the local and broader community through the delivery of planned sustainable growth.

<table>
<thead>
<tr>
<th>Project</th>
<th>Potential cumulative impact</th>
<th>Phase</th>
<th>Management measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>delays</td>
<td>• Disruptions to bus services due to impacts on the busway and Adelaide Street</td>
<td>Operation</td>
<td>• Engagement with CRR Delivery Authority and TransLink about timing of proposed changes to bus network operations in the CBD</td>
</tr>
<tr>
<td>• Integration of Brisbane Metro and proposed CRR project</td>
<td></td>
<td></td>
<td>• Ongoing engagement with the CRR Delivery Authority on the integration of the Brisbane Metro and proposed CRR project</td>
</tr>
<tr>
<td>Queen’s Wharf Brisbane</td>
<td>• Increased construction traffic and local access changes associated with works at North Quay and Adelaide Street resulting in traffic congestion and delays</td>
<td>Construction</td>
<td>• Early and ongoing engagement with the Department of State Development and Destination Brisbane Consortium about potential timing of major construction and haulage activities</td>
</tr>
<tr>
<td></td>
<td>• Disruptions to bus services due to impacts on CBD streets</td>
<td></td>
<td>• Consideration of Queen’s Wharf Brisbane routes in planning for haulage activities</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Engagement with Destination Brisbane Consortium and TransLink about timing of proposed changes to bus network operations in the CBD</td>
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