CHAPTER 4
PROBLEM DEFINITION
CHAPTER SUMMARY AND RECOMMENDATIONS:

- Identifying problems is critical to understanding the scope of issues that a project can address. Developing a sound understanding of the extent, scale, root cause and effect of problems provides a strong evidence-based foundation for developing a project solution. Failure to do this may result in mismatching problems and solutions and/or developing solutions that don’t adequately or effectively alleviate the problem in the long term.

- Problems to be addressed by the Brisbane Metro have been identified within the context of forecast population, economic and employment growth in Brisbane and the wider South East Queensland (SEQ) region.

- Guided by the strategic objectives, problems have been investigated at four levels, specifically:
  - Strategic problems facing Brisbane and the SEQ region, considering the interrelationships between transport, land use and economic productivity and prosperity
  - Transport problems facing Brisbane and SEQ as a region, including car dependency, congestion and the impact of Brisbane’s topography on the efficiency of the transport network
  - Bus problems experienced on the Brisbane network, particularly around increasing demand, capacity constraints and reducing reliability
  - Rail problems experienced on the SEQ network, including its limited footprint across the region that restricts the ability of rail to cater for travel demands from demographic growth areas.

- These problems have been prioritised in order to understand the outcomes sought and service needs from an investment in transport infrastructure. The priority problems to be addressed are:
  - Strategic – limited accessibility and connectivity
  - Strategic – economic growth and productivity
  - Transport network – inadequate ability to meet future public transport demand without infrastructure intervention and/or service redesign
  - Bus network – capacity constraints limit potential growth of bus services
  - Bus network – degrading journey times and reliability
  - Bus network – worsening amenity in the inner-city.

- A ‘without project’ case has been established to determine the benefits of a project solution, as well as understand the impact on the strategic objectives without intervention.

4.1 Purpose and Overview of this Chapter

The purpose of this chapter is to identify and articulate the priority problems the Brisbane Metro will aim to address. At the end of this chapter, the service needs for the Brisbane
Metro will be clearly articulated to support the options analysis presented in Chapter 5, and the Project solution presented in Chapter 6.

The findings of this chapter will ultimately justify the Brisbane Metro’s customer and product benefits presented in Chapter 7, and city and place benefits presented in Chapter 8.

This chapter outlines:

- The strategic context driving the need for a step-change in public transport capacity through Brisbane’s inner-city and the Central Business District (CBD) to improve access to inner-city jobs and facilitate economic growth.
- The current and future transport network issues that are causing network congestion, overcrowding and reduced efficiency.
- The critical bus network problems, including capacity constraints, reducing reliability, increasing operational inefficiencies and impacts to CBD congestion and amenity.
- The key rail issues that are contributing to the wider strategic and transport network problems, including the network’s limited coverage and CBD accessibility as well as capacity, frequency and reliability constraints.
- The outcomes sought for a new transport initiative that will address the identified problems.
- The prioritisation of the identified problems and derivation of service needs to provide focus for the development of an optimal solution for the Brisbane Metro.
- A definition of the ‘without project’ case, highlighting the current and future implications of changes for transport demand in Brisbane.

4.2  Context for Problem Definition

As discussed in Chapter 3, Brisbane is an economic powerhouse for Queensland and is its gateway to the global economy. The prosperity of Brisbane’s economy is critical to the prosperity of industries and sectors across Queensland and Australia. Given the significance of Brisbane’s economy, the structure and functionality of the city has implications for all levels of government, industry and the community.

In increasing the capacity of cities, consideration must be given to the role that transport infrastructure can play in shaping their development. With the changing spatial distribution of employment, many jobs (in particular, higher-skill, higher-paying jobs) are centralising in Australia’s major cities.

At the same time, much of the population growth across Australian cities continues to occur on the urban fringes. The result is that an increasing number of people are living further away from city centres and the jobs they provide, leading to a growing need to effectively connect homes and workplaces.

Transport is an enabler of economic activity, through providing access for workers to jobs and for goods and services to markets. Ineffective movement of people and goods to and within inner cities has the potential to reduce productivity and impact economic growth at the local, state and national levels.

A well-planned transport initiative, coupled with appropriate land use policies and interventions such as investment attraction, can make the transport system a catalyst for a wider site and city transformation.
The Australian Government’s Smart Cities Plan indicates that most world-class cities have invested in fast, efficient public transport systems to provide viable alternatives to private vehicles\(^1\). These cities have used transport investments to reduce congestion, and its associated costs, and enable economic opportunity and growth.

### 4.3 Approach to Problem Definition

Identifying problems is critical to understanding the scope of issues that a project can address. Developing a sound understanding of the extent, scale, cause and effect of problems provides a strong evidence-based foundation for developing a project solution. Failure to do this may result in a mismatch of problems and solutions and/or solutions that do not adequately or effectively alleviate the problem in the long term.

Limited funding and competing transport system needs and trade-offs mean that governments and society generally cannot afford to address all identified problems. This means that setting priorities is an important element in identifying and assessing the problems.

The identification, assessment and prioritisation of the problems outlined in this chapter have been developed through the consideration of the strategic objectives, as well as the numerous studies, strategies and proposals developed by the Australian Government, Queensland Government and Council. The long term demographic forecasts and strategic challenges also provide context for the problem analysis.

These outcomes were used as a basis to develop an initial list of problems associated with Brisbane’s growing transit system, falling within the following categories:

- Strategic problems
- Transport network problems
- Bus network problems
- Rail network problems

A problem identification workshop was held with internal stakeholders and key advisors to agree the problems and identify potential root causes and the effects of the problems. A broad range of problems were identified to ensure an integrated approach to the project options analysis process and identified problems were prioritised to enable effective decision making and direction.

The project outcomes sought were then identified, ensuring strategic alignment with the State Infrastructure Plan and draft South East Queensland Regional Plan (ShapingSEQ). The outcomes sought for the problems which were noted as priority problems became the service needs for the Brisbane Metro.

Figure 4.1 provides a summary of the process used to complete the problem analysis.

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\(^1\) Department of the Prime Minister and Cabinet. (2016). Smart Cities Plan.
4.4 Strategic Problems

Cities are the principal drivers of the nation’s economic growth. The four largest capital cities in Australia – Sydney, Melbourne, Brisbane and Perth contribute nearly 60 per cent of Australia’s Gross Domestic Product \(^2\) (GDP).

CBDs and inner-city locations provide highly concentrated centres for employment (particularly in knowledge-intensive activities and specialised services) and therefore generally experience higher levels of productivity than rural and regional towns and cities. Transport improvements can increase the strength of agglomeration (the critical mass and concentration of activities) to the extent that they increase connectivity within the spatial economy of a city. By changing the way people and firms have access to economic activity, transport increases the potential realisation of agglomeration externalities and the productivity effects derived from it. The concentration of jobs in these centres allow businesses access to a large pool of skilled workers, and provides the opportunity to obtain the benefit from proximity to suppliers and customers, driving efficiencies and generating further opportunities.

Inner-city businesses generally provide jobs that are more export focused and contribute more to the growth of the economy, as compared to jobs in outer areas of the city which generally serve the domestic market.

Chapter 3 provided detail on the forecast growth for Brisbane over the next 25 years and the impact this growth will have on demand for infrastructure and services in SEQ. This includes transport infrastructure, which is vital to support growth as it provides the means for people to access jobs and services. As such, demand for travel is expected to grow in response to population growth and the associated increase in economic activity.

Table 4.1 provides an overview of the identified strategic problems (including some additional context for each identified problem), root causes and effects for the SEQ region and the inner-city of Brisbane.

### Strategic Problems

<table>
<thead>
<tr>
<th>STRATEGIC PROBLEMS</th>
<th>CONTEXT FOR STRATEGIC PROBLEMS</th>
<th>ROOT CAUSES</th>
<th>EFFECTS</th>
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</table>
| **Accessibility and connectivity**      | • Rapid economic growth and sustained population growth has led to increased demand for public transport services.  
   • Population growth is largely occurring in the west and to the north, while the main employment centre remains the Brisbane CBD. Other key employment nodes are also focused around principal activity centres in Brisbane City such as Indooropilly, Garden City, Chermside and Garindale as well as other key activity centres such as major hospitals and tertiary institutions.  
   • These demographic growth patterns result in increasing commute times and the need for new and augmented public transport services in those areas.  
   • There is significant current and forecast congestion on the public transport system.  
   • Travel times are increasing and the reliability of the network (particularly the bus network) is reducing. | • Spatial distribution and the rate of population and employment growth impacts accessibility and connectivity. | • Transport network capacity is exceeded in peak travel periods.  
   • Population growth in outer areas, with fewer jobs, has resulted in higher growth in demand for travel to jobs centres.  
   • Congestion impacts travel times for journeys to work and efficiency of freight movements, impacting productivity.  
   • Increased journey times reduces effective accessibility and labour market pool. |
| **Economic growth and productivity**    | • Failing to efficiently connect people, jobs and firms closer together will hold back productivity growth by restricting both the development and the sharing of knowledge and skills.  
   • Lost agglomeration opportunities in inner-city Brisbane.  
   • Supporting urbanisation with efficient transport infrastructure can drive the realisation of economic growth and improve industry and business productivity. | • Under investment in transport infrastructure limits potential for economic growth.  
   • Increasing travel times affect productivity. | • Infrastructure investment has failed to keep pace with past strong population and employment growth.  
   • Increased travel time to access work reduces available productive time.  
   • Future economic growth potential is at risk if the efficiency and effectiveness of urbanisation is impacted by poor transport accessibility. |

Table 4.1 – Strategic problems for SEQ and Brisbane

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3 Grattan Institute, Productive Cities - Opportunity in a changing economy, May 2013, p28
4.4.1 Strategic Problem 1: Accessibility and Connectivity

The Australian Government’s Smart Cities Plan states that in the 21st century, cities need to be productive and accessible⁴. The productivity of the economy, and its capacity to generate and distribute opportunities to all, depends on how well cities link workers with employers and businesses. Improving these linkages has the potential to increase productivity and national prosperity, and make Australia a more attractive destination for global talent and leading international firms⁵.

As Brisbane and the wider region continues to grow, transport to and around the city will become increasingly challenging. Chapter 3 identifies that population growth will occur in areas outside of the inner suburbs of Brisbane, while the main employment centre will remain the Brisbane CBD. Other key employment nodes are also focused around principal activity centres in Brisbane City such as Indooroopilly, Garden City, Chermside and Carindale as well as other key activity centres such as major hospitals and tertiary institutions.

Figure 4.2 demonstrates this, showing the vast majority of the region’s residential growth to 2041 is forecast to be outside of the Brisbane City area, while much of the employment growth remains in Brisbane. This presents a considerable transport challenge for the region.

![Bar chart showing population and employment growth in Brisbane and the rest of the region.]

*Figure 4.2 – Forecast Brisbane share of population and employment growth (2016 to 2041)*⁶

Growing demand for mobility and connectivity is placing pressure on Brisbane’s existing transport networks, resulting in longer and more variable travel times, crowding on public transport services and significant peak period congestion on the arterial road network. This is driving the need for new and additional public transport services.

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⁴ Department of Prime Minister and Cabinet, Smart Cities Plan, Commonwealth of Australia, 2016, p2
⁵ Grattan Institute, Productive cities - Opportunity in a changing economy, Jane-Frances Kelly and Peter Mares, May 2013, p4-5
⁶ Data supplied by Transport and Main Roads in November 2016
Poor land use outcomes, such as unstructured growth in the form of urban sprawl, can also erode regional accessibility and connectivity. Areas with primarily homogenous land uses force residents to commute to areas of employment. With housing policies aimed at boosting construction of new houses, significant development continues to take place in greenfield sites on the city’s fringes, where public transport accessibility is limited and of a lower level of service than inner areas, resulting in higher levels of car dependency. Inner area residential densification within Brisbane City is also growing, placing higher demands on public transport and active transport networks in these areas where car-ownership and residential parking provision is lower than in fringe areas.

As demonstrated in Figure 4.3, the percentage of jobs that can be accessed within a half hour public transport trip declines rapidly with distance from the city centre, and will decline significantly over the next 25 years in the absence of significant investment in public transport.

The maps above indicate limitations on access to employment for people living in the outer areas of Brisbane. For the majority of people more than a 10 kilometre straight line distance from the General Post Office (GPO), less than 20 per cent of jobs can be reached within 30 minutes on public transport; dropping to less than 10 per cent by 2041.

Without good transport accessibility, residents of outer areas have access to fewer jobs than inner-city residents, particularly to the high value jobs located in city centres, and are therefore more vulnerable to fluctuations in the economy.

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7 Brisbane Metro Transport Model (2017)
Transport infrastructure that can effectively integrate into the existing networks as well as overcome the issues of land use segregation and transport related social disadvantages will significantly improve accessibility and connectivity in SEQ.

### 4.4.2 Strategic Problem 2: Economic Growth and Productivity

Without an effective transport network, population increases (and therefore travel demand) will increase travel times (particularly for commuting journeys), increase the variability in travel times and increase congestion, as discussed in Section 4.5.1 below. This negatively impacts the economy, reducing productivity and increasing transport costs for freight. As such, transport connectivity is important in supporting both high-productivity agglomerations and labour market participation.

Agglomeration is when people and businesses co-locate because they draw benefit from being in close proximity to each other. A key factor to improving productivity is through agglomeration benefits, with labour mobility critical to achieving this. Highly skilled and educated people tend to congregate in areas such as cities, which provide high value jobs. This collective pooling of skills has synergistic effects on productivity, fostering the growth and spread of knowledge, encouraging innovation, attracting other talented people and boosting labour participation.

Agglomeration benefits employers, employees and the wider economy. Employers have access to a greater pool of skilled workers and can better match these workers to knowledge-intensive jobs. Workers have access to higher value jobs and a more resilient job market, which provides alternative opportunities in the event that an individual firm or a market sector experiences a downturn. Agglomeration also assists with the spread of knowledge throughout the economy, both between firms and from worker to worker.

The benefits of agglomeration are best achieved by investment in public transport infrastructure to efficiently link workers with the knowledge-intensive jobs that drive economic activity. Both Sydney and Melbourne are investing heavily in urban public transport to improve accessibility, productivity and enable greater economic opportunity. Without similar investment in strategic public transport infrastructure, Brisbane’s economic strength will be weakened and the broader SEQ region will lag behind Melbourne and Sydney in urban competitiveness.

Poor accessibility and connectivity limits potential productivity improvements by limiting the ability of businesses and people to connect and share opportunities, skills and knowledge. Connecting residential areas in the greater urban area with employment is essential to maintaining a productive city. Longer and more variable commute times, crowding and congestion are detrimental to meeting this fundamental need.

Improvements to the public transport network that increase the efficiency of commuting, serve the increasingly urbanised jobs market and support the transition to knowledge and service industries, are crucial to achieving sustainable and diverse economic growth in Brisbane.

### 4.5 Transport Problems

As outlined in Chapter 3, significant population growth in the SEQ region will mostly occur outside of the Brisbane Local Government Area (LGA). However, Brisbane’s CBD and inner-
City precincts will remain the focus of jobs growth for the region, coupled with accommodating increased residential densification. To ensure that inner Brisbane can realise this potential for economic growth, it will be necessary to ensure that the road, public transport and freight networks are equal to the task through timely and judicious investment in urban transport infrastructure.

With population growth in the wider region and employment opportunities in inner-city precincts, there will be greater demand for people to travel in Brisbane on all transport modes. Public transport trips to and within inner Brisbane are projected to grow from 260,000 in 2016 to 550,000 trips per day in 2041. This is an increase of more than 110 percent in public transport demand\(^\text{10}\).

While demand for car travel will also increase, the limitations of road capacity will result in increasing congestion and the spreading of travel demand and congestion through longer periods of the day. As roads become more congested, bus services will also be affected, particularly in the dense inner-city precincts, which are most reliant on transit. The city centre will continue to be the main attractor, but around 60 per cent of total trips will be to other inner-city destinations.

Existing transport operations will be unable to support this growth in population and economic activity. New transport options will be essential to better connect growing suburbs, key economic and education precincts and the city centre.

Table 4.2 provides an overview of the identified transport problems for the SEQ region and the inner-city of Brisbane.

\(^{10}\) Brisbane Metro Transport Model (2017)
<table>
<thead>
<tr>
<th>TRANSPORT PROBLEMS</th>
<th>ROOT CAUSES</th>
<th>EFFECTS</th>
</tr>
</thead>
</table>
| Car dependency and road congestion     | • Historical development of Brisbane’s strong radial transport network inclusive of motorway standard connections directly serving the CBD, particularly from the south.  
• Historical development of Brisbane’s transport network during the rise in car-ownership as the city was rapidly growing during the 1960s and 1970s.  
• Topographical constraints related to the Brisbane River crossing on the public transport network, particularly from the south, leads to challenges to providing ‘direct routes’ for public transport.  
• The high cost of infrastructure to cross the river has been a barrier to good network integration.  
• As travel demand grows and capacity is exceeded in peaks, congestion will spread to longer periods of the day.  
• Unplanned incidents worsen existing peak congestion and increase the potential for gridlock.  
• Unreliable travel times for road based public transport make it a less attractive alternative to car use.  
• Low density development in outer areas is challenging to service well and efficiently by public transport.  
• Lack of affordable housing and rising house prices in inner-city areas.  
• Inadequate public transport service provision to residential growth areas leads to car dependency or social isolation. | • Continued reliance on private vehicles for commuter trips to Brisbane CBD will occur unless public transport provides an attractive alternative.  
• Increasing road congestion will impact on road based public transport, further reducing travel time reliability.  
• Continuing development in outer areas will increase road congestion on radial routes in Brisbane. |
| Inadequate capacity to meet future public transport demand | • Increasing travel demand due to sustained population growth and increased economic activity will place pressure on all elements of the transport network.  
• Employment growth in inner-city areas is driving increases in work related travel demand from both inner urban growth areas and outer suburbs.  
• Low density development in outer areas is inefficient to service well by public transport.  
• Parts of the existing network are approaching capacity limits, which increases the likelihood of network failure and causes longer, less reliable bus and rail trips.  
• Limited crossings of the Brisbane River impact CBD accessibility for public transport.  
• Historical lack of investment in new public transport assets due previous land use and transport policies. | • As travel demand grows and public transport network capacity is exceeded in peaks, congestion will increase.  
• Transport networks need to cater for more complex travel patterns to match residential and employment growth patterns.  
• Current capacity constraints on key links in the transport network, at key public transport nodes and stations constrain throughput and impact travel time reliability. |
| Brisbane’s topography                  | • The high cost of infrastructure to cross the river has been a barrier to good network integration.                                                                                                      | • Limited crossings of the Brisbane River.                                                                                     |
## TRANSPORT PROBLEMS

<table>
<thead>
<tr>
<th>PROBLEMS</th>
<th>ROOT CAUSES</th>
<th>EFFECTS</th>
</tr>
</thead>
</table>
| and historic pattern of development impacts on network efficiency | Integration.  
- Public resistance to implementing travel demand management measures. | Impact on CBD connectivity for all modes. |
| | Previous choices to limit capital costs during rail network construction have left legacy issues for capacity.  
- Historical development of Brisbane’s transport network. | Historical development and alignment of the rail network results in indirect access to the CBD for southside commuters. |
| Inefficient supply chains for freight | Challenges for public transport to present a more attractive alternative to car-use for commuters from outer urban areas travelling to Brisbane’s significant CBD and inner-city employment nodes. | High car dependency and resulting congestion on the major road network impacts freight movement. |
| | Duplication and network complexity for buses within CBD.  
- High number of bus stops in Brisbane’s CBD. | Kerbside commercial vehicle servicing needs for business within Brisbane CBD conflict with kerbside needs for buses. |
| | Unreliable travel times for road based public transport and transport network congestion impact productivity. | Increased journey times for workers impacts productivity and affects supply chains. |

*Table 4.2 – Transport problems for SEQ and Brisbane*
4.5.1 Transport Problem 1: Car dependency and road congestion

Cars currently dominate the way people generally move around Brisbane, with more than 80 per cent of all trips by private vehicle\(^\text{11}\). During the peak periods, public transport mode share to Brisbane’s CBD is strong at around 60 per cent, demonstrating that integrated public transport focused on major employment and activity centres can play a significant role in implementing a sustainable land-use transport strategy.

The spatial distribution of population growth across Brisbane is polarised, with low density growth on the city’s outskirts and high density growth increasing in the inner suburbs. Between 2001 and 2011, 53 per cent of population growth in the Brisbane Statistical Division\(^\text{12}\) was located in the outer areas, growing at an average rate of 2.6 per cent per annum, as shown in Table 4.3.

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>SYDNEY SD</th>
<th>MELB. SD</th>
<th>BRISBANE SD</th>
<th>PERTH SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population change, 2001 to 2011</td>
<td>477,641</td>
<td>636,320</td>
<td>408,905</td>
<td>351,527</td>
</tr>
<tr>
<td><strong>Average annual rates of growth, 2001 to 2011 %</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population of CBD</td>
<td>3.5</td>
<td>6.5</td>
<td>12.7</td>
<td>9.2</td>
</tr>
<tr>
<td>Population of inner sector (excluding CBD)</td>
<td>0.8</td>
<td>1.6</td>
<td>3.4</td>
<td>1.4</td>
</tr>
<tr>
<td>Population of Middle sector</td>
<td>1.3</td>
<td>0.9</td>
<td>1.8</td>
<td>1.4</td>
</tr>
<tr>
<td>Population of Outer sector</td>
<td>0.9</td>
<td>2.4</td>
<td>2.6</td>
<td>2.9</td>
</tr>
<tr>
<td>Total population</td>
<td>1.1</td>
<td>1.7</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td><strong>Spatial distribution of growth, 2001 to 2011 %</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion of population growth in Inner sector</td>
<td>21.7</td>
<td>12.2</td>
<td>8.0</td>
<td>12.3</td>
</tr>
<tr>
<td>Proportion of population growth in Middle sector</td>
<td>32.8</td>
<td>25.7</td>
<td>39.3</td>
<td>19.3</td>
</tr>
<tr>
<td>Proportion of population growth in Outer sector</td>
<td>45.5</td>
<td>62.1</td>
<td>52.8</td>
<td>68.4</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4.3 – Population growth by sector for four capital city statistical divisions (2001 to 2011)\(^\text{13}\)

The largest proportion of forecast growth will be in low density areas 30-40 kilometres from the Brisbane CBD, as shown in Figure 4.4, where more affordable housing is available. This leads to more services being spread out, resulting in low occupancy per kilometre travelled and increasing the need for government subsidies for services.

Furthermore, these new outer suburbs have less public transport access and remain heavily reliant on private car use to access jobs, education and other goods and services. If these are not available locally, people will have to travel further to meet their needs, commuting journeys are longer both in distance and time, and traffic congestion will worsen.

Brisbane’s road network is operating at or close to capacity during peak periods in most of the key commuter arterials serving the CBD, resulting in congestion for all road users including commercial vehicles. This is most apparent in the inner-city.

\(^{11}\) The State of Queensland, Department of Infrastructure, Local Government and Planning, Shaping SEQ - Draft South East Queensland Regional Plan, October 2016, p133

\(^{12}\) Brisbane Statistical Division comprises the area from the border of the Gold Coast north to the border of the Sunshine Coast and west to the eastern border of the Lockyer Valley Regional Council area. It also includes most of the Bribie Island, Moreton Island and North Stradbroke Island.

\(^{13}\) Ibid, p35
Continued growth in car travel will increase congestion and impact on freight and commercial movements. Across the entire transport network, total trips are forecast to increase significantly by almost 40 per cent from 2012 to 2041 to a total of almost 9.3 million trips per day, with the forecast growth in total private vehicle kilometres increasing significantly by 60 per cent. The increase in the total private vehicle kilometres travelled between 2012 and 2041 will place significant pressure on an already congested road network during peak periods, with increased travel times.

The Bureau of Infrastructure, Transport and Regional Economics (BITRE) estimated that the avoidable cost of congestion to the Brisbane economy was roughly $1,000 per person in 2015 or $2.3 billion in total in 2010 dollars. Current and projected costs of congestion to 2030 are shown in Figure 4.5.

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14 Brisbane Metro Transport Model (2017)
15 Department of Transport and Main Roads, Bus and Train Project Business Case, Queensland Government and Brisbane City Council, Sep 2014, p.4 to 6
16 Bureau of Infrastructure, Transport and Regional Economics (BITRE), 2015, Traffic and congestion cost trends for Australian capital cities, Information Sheet 74, BITRE, Canberra
Another measure of congestion is the increasing time taken to travel the same distance (i.e. reduced accessibility). Figure 4.6 shows a comparison of time taken to drive to the Brisbane CBD in the morning peak in 2016 and 2041. The time contours are closer together in the 2041 plot, indicating that only shorter distances can be traversed for the same time period in 2041 than in 2016, i.e. travel time is increasing. This will affect not only car trips, it will also slow road based public transport, such as buses, and freight vehicles.

17 BITRE, 2015, Traffic and congestion cost trends for Australian capital cities, Information Sheet 74, BITRE, Canberra
Figure 4.6 – Comparison of morning peak road travel times to the CBD (2016 to 2041)\textsuperscript{18}

Transport modelling assessed changes in network performance between 2016 and 2041. The modelling identified the following for the Brisbane Statistical Division:

- A forecast 46 per cent increase in total person trips each weekday from 7.77 million each weekday in 2016 to 11.38 million in 2041 in line with projected increases in population.

- By 2041 cars will remain the predominant travel mode accounting for 78 per cent of all travel in the Brisbane Statistical Division (BSD), increasing 40 per cent from 6.3 million in 2016 to 8.8 million in 2041.

- By 2041, vehicle kilometres travelled (VKT) by car are forecast to increase by 68 per cent, due to longer trip lengths, however, vehicle hours travelled (VHT) is forecast to increase by 138 per cent, as a result of delays from increasing congestion on the road network.

- As a result, average travel speeds across the region’s road network are forecast to reduce from 54 kilometres per hour (km/h) in 2016 to 39 km/h in 2041.

- Commercial vehicle trips are forecast to increase by 67 per cent.

- Average commercial vehicle speeds are forecast to reduce from 65 km/h in 2016 to 46 km/h in 2041.

- The proportion of public transport trips will be higher, with mode share rising from 7.3 per cent in 2016 to 11.5 per cent in 2041.

Transport modelling plots of volume to capacity for the morning peak in 2016 and 2041 show how congested Brisbane’s transport networks will become over time, with network performance deteriorating significantly by 2041. Congested corridors, where demand is in

\textsuperscript{18} Brisbane Metro Transport Model (2017)
excess of capacity, are indicated by red in the plots. The 2041 plot shows that the motorways and most of the arterial road network will be over capacity in the morning peak in 2041 without intervention.

Figure 4.7 shows increasing congestion on the road network.

![Figure 4.7 – Comparison of morning peak road network volume to capacity ratios (2016 to 2041)](image)

Overall, congestion in Brisbane and SEQ is resulting in increased travel times which in turn is directly impacting on business and leisure time, with flow-on adverse impacts on the region's economy and lifestyle.

High levels of road congestion are predicted to play a significant future role in mode share shifts moving forward. With Figure 4.8 showing the Brisbane City core, Figure 4.9, Figure 4.10 and Figure 4.11 presents mode share for modelled trips crossing into and with a destination within a cordon surrounding the Brisbane City core for the morning peak hour.

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19 Brisbane Metro Transport Model (2017)
Figure 4.8 – Brisbane City Core

Figure 4.9 – People movement and mode share into City Core during the morning peak (2016 to 2041)\textsuperscript{20}

\textsuperscript{20} Brisbane Metro Transport Model (2017)
Based on this data, it can be seen that:

- The forecast number of car based trips crossing into the cordon decreases slightly, with a significant drop in mode share of 20 per cent. Reasons for this include:
Population and employment growth within the City Core results in less road capacity available for vehicles travelling from outside into the cordon.

High levels of congestion for long lengths of road network result in substantially longer travel times, making transit that is dedicated and segregated highly attractive in comparison.

- Transit based trips and mode share are forecast to increase significantly, specifically:
  - Bus travel into the cordon is forecast to increase from 16,000 trips to 24,000. While this growth is not insubstantial, bus travel time is also impacted greatly by road congestion, limiting its potential without the provision of more segregated busway infrastructure, within the CBD and between the existing busways.
  - Rail travel into the cordon is forecast to increase from 21,000 trips to almost 65,000 trips; largely driven by rail being the only mode that provides a segregated service unaffected by road congestion between the CBD and high population growth outer areas. This is reflected in the mode share shifts of the Ipswich, Logan and Moreton Bay LGAs.

### 4.5.2 Transport Problem 2: Inadequate capacity to meet future public transport demand

Travel demand increases with growth in economic activity and population growth. Employment growth in Brisbane will be concentrated around the CBD and inner suburbs, resulting in a work-related increase in travel demand on the most congested sections of the transport network during peak periods.

Recent population growth has been greatest in the outer sector of Brisbane, where housing is comparatively more affordable. These new suburbs, however are essentially dormitory suburbs and have low self-sufficiency for employment and services, increasing the need to travel, particularly for access to employment opportunities.

Trips across the transport network are forecast to significantly increase into the future. The demand for travel is expected to exceed the rate of national population growth and the rate of economic growth\(^\text{21}\). As presented in Section 4.5.1 above, with a transport system that continues to be heavily dominated by car travel, congestion on the road network will continue to increase, consequently impacting travel times and travel time reliability for road based public transport such as buses. Further impacts for bus based travel are due to traffic congestion caused by unplanned incidents. Overall, these problems result in a higher direct economic contribution of bus congestion, in Brisbane, where bus patronage is double that of rail\(^\text{22}\).

Congestion will be further exacerbated by forecast increases in public transport trips. These are forecast to increase at a faster rate, almost doubling between 2016 and 2041 to 1.3 million trips per day with public transport passenger kilometres predicted to increase to over 20 million kilometres per day\(^\text{23}\).

Also, as employment growth in inner areas spreads beyond the CBD, the radial nature of the existing public transport network will add further complexity to trips, involving one or more transfers between services for the same mode or between modes. This increasing

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\(^{21}\) ACIL Allen Consulting (2014), Urban Transport Infrastructure: National Economic Analysis, p379

\(^{22}\) ACIL Allen Consulting (2014), Urban Transport Infrastructure: National Economic Analysis, p107

\(^{23}\) ACIL Allen Consulting (2014), Urban Transport Infrastructure: National Economic Analysis, p4-6
complexity of trips will further degrade travel time and travel time reliability for public transport journeys, impacting the level of service of trips to locations outside of the CBD.

Impacts of increasing congestion on the bus network and rail network are shown in Figure 4.12 and Figure 4.13 respectively. These are plots of passenger demand compared to seated capacity for the morning peak periods in 2016 and 2041.

Figure 4.12 – Comparison of weekday morning peak passenger demand relative to seated capacity on Brisbane’s bus network (2016 to 2041)\textsuperscript{24}

\textsuperscript{24} Brisbane Metro Transport Model (2017)
As the maps above show, there are key sections of Brisbane’s existing public transport network that are already at or near seated capacity in peak periods. They include:

- **Rail network key capacity constraints:**
  - the capacity of the Merivale Bridge
  - flat junctions at Park Road, Roma Street, Roma Street West and South Brisbane
  - speed restrictions and platform capacity at Central station
  - capacity of central city rail tracks
  - dated signalling technology.

- **Bus network key capacity constraints:**
  - high bus volumes on the South East Busway at Woolloongabba Junction
  - platform capacity and customer boarding inefficiencies at all inner busway stations, particularly at Mater Hill, South Bank and Cultural Centre busway stations
  - capacity and safety issues at the busway portal to Melbourne Street
  - intersection capacity at North Quay/Victoria Bridge; Melbourne Street/Grey Street and the Allen Street South East Busway exit to Stanley Street
  - kerb space constraints and congestion on core CBD streets such as Adelaide and Elizabeth Streets

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25 Brisbane Metro Transport Model (2017)
These constraints cause delays and congestion on the rail and bus networks, increasing the likelihood of network failure and resulting in longer, less reliable bus and rail trips. These problems are further presented and discussed in Section 4.6 and Section 4.7 respectively.

Without investment in transport infrastructure, there will be insufficient capacity to meet the projected growth in population and employment. This will have economic ramifications for Brisbane with greater congestion, impacting workers accessing jobs and increasing transport costs for freight and eroding labour productivity.

4.5.3 Transport Problem 3: Brisbane’s topography and historic pattern of development impacts on network efficiency

Brisbane’s public transport network is a radial network focused on the CBD. The busway component of the public transport network also directly services some of Brisbane’s key economic activity centres such as the University of Queensland (via the dedicated Eleanor Schonell bus and active transport bridge), the Mater Hill hospital precinct, the Royal Brisbane and Women’s Hospital precinct, tertiary education/research precincts at Boggo Road, South Bank and Kelvin Grove and the Garden City principal activity centre.

While there are road alternatives for cross-city trips that bypass the CBD, most of the public transport routes converge in the inner-city. This means that services on these routes are required to travel on the most congested sections of the network, impacting on travel time and travel time reliability.

Figure 4.14 shows the impact of the Brisbane River on the trunk transport network (rail and busways), particularly when accessing the city from the south and east.

![Figure 4.14 – Inner section of Brisbane’s trunk public transport network](image)
Historic development of the transport network over the last 45 years between areas south of the Brisbane River and the Brisbane CBD (located on the north side of the river) has provided improved accessibility for growth areas to the south and south-east of Brisbane. Key initiatives such as the opening of the Captain Cook Bridge in 1972 and the Merivale Bridge (opened in 1978) have improved cross-river bus and rail travel. Prior to these bridges all train services terminated at South Brisbane while all buses used the Victoria or Story Bridges.

The South East Busway, opened and progressively developed since 2000, including its dedicated use of part of the Victoria Bridge, has significantly increased bus connectivity from the south-east and facilitated strong patronage growth. However, the barrier effect of the Brisbane River and limited crossings to the CBD results in inherent indirectness in public transport routing, and also presents operational efficiency constraints for public transport services. Currently for buses, the majority of services accessing the city from the south and southeast must use either the Captain Cook Bridge, which is subject to increasing traffic congestion, or for busway services, the Victoria Bridge. All rail services need to travel via the Merivale Bridge to cross the river.

These infrastructure constraints for public transport and the flexibility and convenience offered by private car travel can make the latter a more attractive option for access to the CBD and increase the challenges in providing growth in public transport service levels to cater for sustained growth in travel demand to the CBD from the south.

4.5.4 Transport Problem 4: Inefficient supply chains for freight

Commercial vehicle trips for the Brisbane Statistical Division are forecast to increase by 67 per cent, with average commercial vehicle speeds forecast to reduce from 65 km/h in 2016 to 46 km/h in 2041\(^{26}\).

The forecast reduction in vehicle speeds demonstrates the impact of growing congestion on the region’s transport network, with impacts for freight vehicles exacerbated on road corridors and cross-river linkages serving the CBD if public transport does not provide a viable travel mode for commuters. This will further result in increased operating costs for freight vehicles as well as reduced productivity. Commercial vehicle impacts will also be felt in the CBD where physical road network constraints mean that there is conflict for kerbside allocation between buses and space allocated for deliveries to businesses.

Supply chains are also impacted by reduced labour productivity. As previously discussed under the strategic problems above, achieving the benefits of agglomeration relies on good accessibility and connectivity, especially for commuting journeys. With the highest population growth occurring in the outer suburbs and increasing congestion, commuting journeys are becoming longer in both distance and time and are also becoming less reliable.

\(^{26}\) Brisbane Metro Transport Model (2017)
4.6 Bus Problems

The Brisbane bus network is an important component of SEQ’s public transport system. Two-thirds of public transport users are bus users with more than 76 million passenger trips in 2015-2016. Brisbane’s bus network moves 24 million more customers each year than the entire rail network in SEQ.

Brisbane’s busway network spans 25 kilometres of segregated busway and provides 20 high-frequency routes which operate on 15 minute frequencies or better from 6.00am to 11.30pm (7 days a week), with minimum 10 minute frequencies during peak times (7 to 9am and 4 to 6pm), transporting customers throughout the major metropolitan area surrounding Brisbane. In peak hour, 372 buses per hour (one every 10 seconds) pass the busway network’s busiest point at Woolloongabba.

Since the opening of the South East Busway to Eight Mile Plains in 2001, busway projects in SEQ over the past 15 years have focused on linking key destinations such as UQ St Lucia campus and the RBWH at Herston, and serving corridors that are not well serviced by rail, such as the Old Cleveland Road and Lutwyche/Gympie Road corridors, thereby increasing public transport accessibility. Consequently, the success in patronage confirms the busway network as a prime example of best practice in Bus Rapid Transit (BRT).

In a high level benchmarking exercise using the database of the BRT Centre of Excellence in 2015, Brisbane’s South East Busway was ranked eighth in the world in terms of vehicle frequency (buses per hour in the peak direction) and the highest frequency segregated busway in the world. It was ranked 20th in the world for peak hour peak direction passenger volumes.

Table 4.4 provides an overview of the identified bus problems, root causes and effects for the SEQ region and the inner-city of Brisbane.

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27 Bus Rapid Transit Centre of Excellence is a Centre of Excellence for Bus Rapid Transit Studies implemented in Santiago, Chile, and financed by the Volvo Research and Educational Foundations.
### BUS PROBLEMS

<table>
<thead>
<tr>
<th>ROLE OF BUS IS UNDERSTATED AND MULTI-FACETED</th>
<th>EFFECTS</th>
</tr>
</thead>
</table>
| • Historical development of Brisbane’s public transport network as a combination of radial rail and dedicated busway.  
• Land-use changes including densification within the inner suburbs.  
• Growth in the inner-city distribution role of bus due to expanding footprint of CBD and city frame.  
• Patterns of travel, demand and mode share in Brisbane are different to other capital cities.  
Elements of the bus network (particularly post Busway construction) provide a high order transport function within the integrated multi-modal public transport network.  
• Buses must serve some very significant travel generators and economic activity centres which are not directly served by rail (e.g. principal activity centres - Garden City, Chermside, Carindale; University of Queensland; Royal Brisbane Hospital). | • Buses perform a complex and understated function within Brisbane’s public transport network serving many needs including direct suburban commuting, feeder role to rail nodes and inner-city distribution functions. |

<table>
<thead>
<tr>
<th>SUSTAINED GROWTH AND DEMAND</th>
<th>EFFECTS</th>
</tr>
</thead>
</table>
| • Need to meet community service obligations.  
• Social inclusion and equity of access considerations.  
• Obligations of government. | • Bus network design includes coverage services to address social inclusion and equity of access for all members of the community. |

<table>
<thead>
<tr>
<th>CAPACITY CONSTRAINTS LIMIT POTENTIAL GROWTH OF BUS SERVICES</th>
<th>EFFECTS</th>
</tr>
</thead>
</table>
| • Lack of understanding of differences between Brisbane’s rail and bus markets.  
• Perception that bus competes with rail:  
  o Buses feeding to rail philosophy is often adopted elsewhere, but not directly transferable to Brisbane due to strength of busway backbone in the integrated network  
  o Practicalities of implementing a ’hard’ bus feeding rail philosophy have not been considered  
  o Limited opportunities for good integration without infrastructure. | • Integrated public transport system development can at times be overshadowed by the perception that buses compete with rail. |

<table>
<thead>
<tr>
<th>SUSTAINED GROWTH AND DEMAND</th>
<th>EFFECTS</th>
</tr>
</thead>
</table>
| • Increased pressure to serve public transport future demand for CBD access from growth in outer suburbs of Brisbane, to offer sustainable alternative to car travel.  
• Rapidly growing need to serve future demand for inner-city distribution and business to business trips within the inner suburbs where car ownership is lower, parking constraints exist etc. | • Population growth in outer areas with limited employment self-sufficiency.  
• Population and employment growth in higher density inner areas. |

<table>
<thead>
<tr>
<th>CAPACITY CONSTRAINTS LIMIT POTENTIAL GROWTH OF BUS SERVICES</th>
<th>EFFECTS</th>
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</thead>
</table>
| • Connections to and from the Victoria Bridge, Melbourne Street Portal, Allen Street and access to the Pacific Motorway constrained.  
• Pragmatic limitations of investing in future proofing during busway construction have left legacy issues for capacity.  
• River crossing capacity is a critical constraint.  
• Public resistance to implementing travel demand management measures.  
• One-way street system within CBD and inner-city limits available kerb space for bus stops and impacts legibility. | • Infrastructure bottlenecks constrain growth.  
• Station capacity, in terms of platform lengths, operations and people movement, constrains growth. |
### BUS PROBLEMS

<table>
<thead>
<tr>
<th>PROBLEM AREA</th>
<th>ROOT CAUSES</th>
<th>EFFECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Significant role of Adelaide Street and Elizabeth Street for bus movements.</strong></td>
<td></td>
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<tr>
<td><strong>Competition for kerbside space with delivery vehicles.</strong></td>
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<tr>
<td><strong>One-way street system limits available kerb space for bus stops.</strong></td>
<td></td>
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<tr>
<td><strong>As travel demand grows and capacity is exceeded in peaks, congestion will increase.</strong></td>
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<tr>
<td><strong>Unplanned incidents worsen existing peak congestion.</strong></td>
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<tr>
<td><strong>Buses must mix with general traffic on roads and at intersections with the busway.</strong></td>
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<tr>
<td><strong>Congestion results in bus bunching and late running buses for the start of services.</strong></td>
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<tr>
<td><strong>With predicted population and employment growth, congestion on the road network will continue to increase.</strong></td>
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<tr>
<td><strong>Unreliable travel times for road based public transport and transport network congestion impact productivity with flow-on effects to the region’s economy.</strong></td>
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<td></td>
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<tr>
<td><strong>Increasing travel time impacts leisure time and lifestyle.</strong></td>
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<tr>
<td><strong>Customer demands occur via the CBD due to limited cross-town suburban connectivity.</strong></td>
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<tr>
<td><strong>Duplication and network complexity result in operational inefficiencies.</strong></td>
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<td></td>
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<tr>
<td><strong>Inadequate space for bus depots and lack of inner-city layover results in inefficient route operations.</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>Interaction of drivers with customers for fare collection and revenue protection and responding to customer enquiries.</strong></td>
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<tr>
<td><strong>Inefficient dwell times due to single-door boarding and on bus payment and validation.</strong></td>
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<tr>
<td><strong>Drivers wait for straggling customers.</strong></td>
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<td></td>
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<tr>
<td><strong>Insufficient public transport information is available or it is not user-friendly.</strong></td>
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<tr>
<td><strong>Lead stop arrangements create congestion for customers on station platforms and delays to buses accessing stops.</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Employment and population growth continues to drive demand for travel through and within the CBD and inner Brisbane.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Competing role of local streets to service transport demand and provide a pedestrian and public space function.</strong></td>
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<td></td>
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<tr>
<td><strong>Large number of service stops in CBD, particularly along Adelaide and Elizabeth Streets.</strong></td>
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</tbody>
</table>

Table 4.4 – Bus problems for SEQ and Brisbane
4.6.1 Bus Problem 1: Role of bus is understated and multi-faceted

The Brisbane public transport market is different to Sydney and Melbourne. The rail networks in both these cities have greater geographical coverage than the rail network in Brisbane, where the busway network, progressively developed since 2000, has supplemented the traditional radial line haul role of rail within the public transport network. Therefore, bus has a more significant role in the public transport network in Brisbane than in other major cities.

National census statistics for the 15 year period (from 1996 to 2011) for the Greater Brisbane Area (and extrapolation to 2016 using ticketing data) show that the volume of people commuting by public transport has increased on average by 4.1 per cent per annum (82 per cent over 15 years), with bus patronage increasing more rapidly than rail since 2001 (6.2 per cent per annum for bus compared to 4.0 per cent per annum for rail).

Employment increased by 55 per cent over the same 15 year period, which accounts for a large part of the growth in public transport trips. Other factors supporting this period of public transport growth include increasing road congestion and parking charges, the new ticketing and fare system introduced in the mid-2000s, improvements to public transport services and changing trip patterns (i.e. longer peak period trips) associated with the growing metropolitan fringe areas.

Figure 4.15 summarises the comparison in mode growth from 1996 to 2016.

![Figure 4.15](image)

**Figure 4.15 – Observed growth in Greater Brisbane public transport use, 1996 to 2016**

The bus network is vital for serving areas that do not have good access to rail, and the busway offers a high-quality customer experience with dedicated public transport infrastructure. Figure 4.16 shows the rail and bus catchments for journeys to work in Brisbane. Rail trips are highly concentrated in a narrow band along the rail corridors. Rail

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28 1996 to 2011, Australian Census; 2011 to 2016 – TransLink GoCard ticket data
provides good service to the outer northern suburbs, the middle north-eastern and north-western suburbs, the eastern and south-western suburbs. The bus network coverage is extensive, particularly in corridors with high-frequency routes such as to Chermside in the middle northern suburbs, The Gap in the western suburbs and the substantial catchment served by the South East Busway services. Bus patronage is also high in the inner-city suburbs. Some very significant travel generators and economic activity centres in Brisbane are not directly served by rail but very well served directly by bus (e.g. principal activity centres - Garden City, Chermside, Carindale, University of Queensland, Royal Brisbane Hospital etc.).

Figure 4.16 – Journey to work trips for bus and rail in 2011

The mode share for journeys to work by public transport is higher for people who live in inner Brisbane with bus being the predominant mode for these residents. This is not surprising as rail coverage in the CBD is limited to Central and Roma Street stations and rail access to the CBD from the south is indirect due to the topographic constraints of the Brisbane River and its limited crossings.

There is also a community service obligation element to bus network design to ensure provision of a wider coverage for social inclusion and equity of access to all members of the community. This can result in low patronage services, aiding the perception that bus capacity exceeds demand.

However, these coverage services are important in helping to address transport related social disadvantage as discussed in the Strategic Problems (Section 4.4). This community

29 Brisbane Metro Transport Model (2017)
service obligation comes at a cost. Low density development in much of suburban Brisbane also leads to poor operating cost recovery for public transport due to low occupancy per kilometre travelled, increasing the need for government subsidies for coverage services, which, by their nature, provide at best an ‘adequate’ level of service.

Therefore, in Brisbane, bus transit performs a multi-faceted role within an integrated public transport system. Key elements of this role include offering an inner-city distribution function supplementing the active transport networks; performing a radial line haul role filling gaps in the region’s public transport network for corridors that are not well served by rail, and also in several key locations providing feeder service to rail from key economic activity centres not located directly on the rail network (for example, University of Queensland to Indooroopilly and Toowong rail stations).

4.6.2 Bus Problem 2: Sustained growth and demand

Increasing population growth and demand in Brisbane will require high-capacity public transport. Due to the forecast increases in travel demand from population and employment growth, the demand for bus travel is anticipated to grow. Table 4.5 shows the forecast growth in bus patronage total boardings for the Brisbane Statistical Division.

<table>
<thead>
<tr>
<th>TIME PERIOD</th>
<th>2016</th>
<th>2031</th>
<th>2041</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bus Users</td>
<td>Bus Users</td>
<td>Growth (from 2016)</td>
</tr>
<tr>
<td>Morning 2 hour peak</td>
<td>90,900</td>
<td>143,000</td>
<td>57%</td>
</tr>
<tr>
<td>(7.00am-9.00am)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morning 2 hour peak</td>
<td>75,700</td>
<td>116,200</td>
<td>54%</td>
</tr>
<tr>
<td>(4.00pm-6.00pm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily</td>
<td>368,200</td>
<td>580,800</td>
<td>58%</td>
</tr>
</tbody>
</table>

Table 4.5 – Growth in bus travel demand in the Brisbane Statistical Division

This shows forecast bus patronage doubling from 2016 to 2041, growing to over 730,000 bus customers per day in 2041.

Many sections of the busway network are currently operating at capacity with access to the inner-city restricted by bus station and kerbside capacity. Inner-city streets used by buses are also congested during peak periods. These constraints are discussed in more detail in the next section.

The anticipated growth in demand for bus transit cannot be accommodated without further investment in the bus network such as:

- Additional and/or larger bus fleet to meet the demand without serious overcrowding. Any increase in peak period fleet use would also require more drivers and additional depot space for stabling and maintenance.
- Additional bus station and inner-city stop capacity where issues already exist.
- Additional cross-river capacity to access the CBD from the south and east due to existing constraints.

Travel demand management and operational efficiency measures may provide short term relief; however, the tipping point will soon be reached where the current system will not be

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30 Brisbane Metro Transport Model (2017)
able to accommodate any more buses. Therefore, without infrastructure and fleet investment, it would be very challenging to meet the future bus demand.

4.6.3 Bus Problem 3: Capacity constraints limit potential growth of bus services

Infrastructure constraints on critical sections of the busway and road network limit throughput and control capacity. The majority of services from the south-east are required to pass through the Woolloongabba merge and then cross the river for access to the CBD with the majority of these services using the Victoria and Captain Cook Bridges.

Already the South East Busway at the Woolloongabba junction is carrying around 12,000 customers inbound per hour in the morning peak in 2016. This compares to around 6,500 on the rail lines approaching from the south (namely Cleveland, Beenleigh and Gold Coast lines), highlighting the critical line haul role that bus plays in this part of the public transport network in particular. Figure 4.17 provides a graphical summary of the inbound customer numbers on the critical bus and rail network lines.

![Figure 4.17 – Inbound morning peak passenger volumes on key rail and bus routes](image)

However, bus movements via Victoria Bridge are already constrained by the intersection capacity at each end of the bridge (with North Quay and Grey Street), and by the capacity of Cultural Centre station, while bus movements on the Captain Cook bridge are impacted by general traffic congestion, in particular on the off ramps leading into the CBD itself.

Furthermore, inner sections of the South East Busway are constrained by station capacity at peak times, which is influenced by bus dwell times, platform lengths and stopping arrangements. Station capacity constraints are emerging at key busway stations such as...
Cultural Centre, Mater Hill and South Bank stations. This causes undesirable bus queuing on station approaches in the busway network and on the Victoria Bridge as buses wait for platform space.

The Cultural Centre busway station, a key determinant of capacity across Victoria Bridge, already operates over capacity in peak periods as shown in Figure 4.18 and Figure 4.19.

![Inbound (Northbound) timetabled services at Cultural Centre](image)

*Figure 4.18 – Northbound daily bus volumes/capacity at Cultural Centre Busway Station*
Figure 4.19 – Southbound daily bus volumes/capacity at Cultural Centre Busway Station

Overall, the approach to the CBD for buses from the south along with river crossing capacity present as the most critical areas of constraint.

The Captain Cook Bridge is predominantly used by peak period services. However, since the Victoria Bridge reached capacity around 2008, all bus service growth from the southern and eastern suburbs has been accommodated on the Captain Cook Bridge, which is heavily congested with car traffic.

Table 4.6 shows the volume of buses already exceeds capacity on key links in the morning peak period which results in queueing and delays.

<table>
<thead>
<tr>
<th>LINK</th>
<th>VOLUME (BUSES/HOUR)* 2016</th>
<th>CAPACITY**</th>
<th>VOLUME/CAPACITY RATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>South East Busway (between Woolloongabba junction and Allen Street exit)</td>
<td>375</td>
<td>300</td>
<td>125%</td>
</tr>
<tr>
<td>Captain Cook Bridge</td>
<td>220</td>
<td>250</td>
<td>88%</td>
</tr>
<tr>
<td>Elizabeth Street</td>
<td>220</td>
<td>120</td>
<td>183%</td>
</tr>
<tr>
<td>Victoria Bridge</td>
<td>225</td>
<td>180</td>
<td>125%</td>
</tr>
<tr>
<td>Adelaide Street (northbound)</td>
<td>155</td>
<td>120</td>
<td>128%</td>
</tr>
</tbody>
</table>

* All buses that have their final stop in CBD between 7.30am and 8.30am
** Per lane including capacity of stations/stops on corridors

Table 4.6 – Bus volume/capacity ratios on key links – AM peak one hour bus volumes in 2016

There are also significant issues, in terms of both space and congestion, on core CBD streets such as Elizabeth streets, and new platform constraints are emerging at King George Square and Roma Street busway stations.
Images of current bus congestion at Cultural Centre station and queuing in the busway are shown in Figure 4.20 and Figure 4.21. A plan of the current bus network constraints is shown in Figure 4.22.
Figure 4.20 – Bus congestion at Cultural Centre busway station

Figure 4.21 – Buses queuing at the Melbourne Street busway portal
Figure 4.22 – Current bus network constraints
4.6.4 **Bus Problem 4: Degrading journey times and reliability**

Traffic congestion caused by unplanned incidents or by excessive demand relative to road capacity is increasing, affecting bus reliability and travel time performance. With predicted population and employment growth, congestion on the road network will continue to increase, impacting on travel time for business and leisure time for residents and visitors, with flow-on to the region's economy and lifestyle.

Variability in travel times is an indication of reducing reliability. A comparison of actual boarding and alighting times from go card data and scheduled travel times for a key journey between Buranda and King George Square busway stations for morning and evening peak periods shows how highly variable actual travel times are. Figure 4.23 and Figure 4.24 provides a graphical summary of this comparison.

![Figure 4.23](image1.png)
*Figure 4.23 – 2016 Travel time between Buranda Busway Station and King George Square (peak direction)*

![Figure 4.24](image2.png)
*Figure 4.24 – 2016 travel time between Buranda busway station and King George Square (peak direction) – peak 2 hour period*
A range of detrimental outcomes are anticipated to result from these forecast deteriorating operating conditions, including:

- Uneven loading of services and inefficient use of capacity as a result of ‘bus bunching’, where services catch up to each other with the first bus overcrowded and following buses under-utilised.
- Cumulative flow-through impacts for operations, such as buses being late for the start of their next service.
- An increase in the relative cost of operating bus services. Degrading travel times mean more fleet and driver hours will be required to maintain the same service frequencies over time.
- Degradation of customer experience, especially for standing customers in stop/start conditions.

4.6.5 Bus Problem 5: Network and operational inefficiencies impact capacity and dwell times

Some aspects of current network planning and operations have an impact on the efficient running of the network.

The current single-seat network planning philosophy, coupled with the need to provide coverage services to meet community service obligations, duplication of services using the constrained inner parts of the busway network in peak hours add to congestion and contribute to delays for all services.

Furthermore, the current complex arrangement of bus routes and stopping patterns including multiple overlapping peak rocket and all day routes on the one corridor can result in uneven loadings between services. This is particularly evident in the evening peak where different bus services to the same corridor often leave from different CBD stops or stations.

Limited frequent and attractive cross-town connectivity can also result in increased reliance on the CBD and the inner-city for transfers that might otherwise be possible at suburban or regional centres. This impacts on the number of customers using critical and congested inner-city corridors and stations contributing to capacity constraints.

Within the CBD, one-way streets also present challenges to efficient bus operations since they preclude access to that part of the city from both directions, eliminate large sections of kerb space from potential use as bus stops, and require return services to operate from different streets, reducing legibility. Furthermore, a lack of inner-city layover is also contributing to inefficient bus operations, resulting in increased dead running.

Lastly, at key stations such as Cultural Centre, a range of boarding and ticketing practices impact on dwell times and ultimately the operational efficiency and hence capacity of the bus network. For example, bus drivers are often involved in fare collection and revenue protection and responding to customer enquiries, resulting in delays and reducing bus throughput at stops. In addition, customers are generally required to board from one door only, due to current revenue protection requirements, increasing the time taken to load a bus. Lastly, buses stop at different points on the platform or kerb, requiring customers to negotiate past other waiting or boarding customers, creating platform congestion and reducing the capacity of stations.
4.6.6 Bus Problem 6: Worsening amenity in the inner-city

Bus services can face severe congestion in the inner-city, which not only impacts on travel times and reliability (as discussed in Section 4.6.4) but also detracts from the amenity of the CBD streets. Buses are not only impacted by this congestion, but due to their size and need to service surface bus stops, are also major contributors to the congestion. In particular, bus congestion is very evident along Adelaide and Elizabeth Streets in the morning peak period, due to the high volumes of services travelling from northern and western suburbs, and over Captain Cook Bridge.

Due to the high volume of buses along the busways, there are also substantial amenity impacts at Cultural Centre, along Victoria Bridge and along Melbourne Street. The movement of buses from the South East busway portal on Melbourne Street to and from the station severely constrains pedestrian movement in the precinct, and detracts from the important east-west connection between the CBD and West End.

As employment and population continues to grow within inner Brisbane, the demand for travel through and within the CBD and inner Brisbane will increase, leading to increased vehicular congestion and further impacts on amenity. However, as population and employment density increases in the inner-city neighbourhoods, the importance of public space and amenity also rises. Local streets need to serve both transport and public space functions. Residents and workers will increasingly shop, walk, meet and relax in local streets and spaces.

Widening roads and increasing traffic volumes will not be compatible with these aspirations for vibrant neighbourhoods. New public transport infrastructure will need to integrate well with surrounding streets and public spaces and respect the increasing importance of their place functions.
4.7 Rail Problems

The SEQ rail network spans almost 810 kilometres of track, through 11 lines and over 150 stations that transport customers and freight traffic throughout the major metropolitan area surrounding Brisbane. With the opening of the Redcliffe Peninsula line in 2016, a further six stations have been added to the network.

Even with operational efficiencies such as timetable improvements and signalling upgrades, and the introduction of New Generation Rollingstock, the current inner rail network is approaching capacity for service volumes.

Rail projects in SEQ over the past 15 years have focused on extensions or modifications to the network outside of the inner-city including the Redcliffe Peninsula Line, Keperra to Ferny Grove duplication, Corinda to Darra upgrade, Caboolture to Beerburrum duplication, the new Darra to Springfield line and the extension of the Gold Coast line from Robina to Varsity Lakes, thereby increasing usage of the passenger rail network and adding more pressure to the congested inner-city network including stations.

As discussed in Chapter 2, the proposed Cross River Rail (CRR) Project is being developed by the Queensland Government to improve the capacity of the rail network.

Table 4.7 provides an overview of the identified rail problems, root causes and effects for the SEQ region and the inner-city of Brisbane. Note that the analysis describes the rail network problems as they exist today, without the implementation of Queensland Government planned initiatives such as CRR and ETCS – Inner City.
<table>
<thead>
<tr>
<th>RAIL PROBLEMS</th>
<th>ROOT CAUSES</th>
<th>EFFECTS</th>
</tr>
</thead>
</table>
| Limited footprint of rail     | • Large areas of the SEQ region are not served by rail, placing greater pressure on the bus and road network.  
                                   • Rail service to the CBD from south of the Brisbane River is less direct in some areas. Furthermore, services are not sufficiently frequent to make rail more attractive than other modes.  
                                   • Limited rail and bus service integration has led to rail and bus competing within similar corridors.  
                                   • Inner-city growth areas such as Woolloongabba, southern CBD, Newstead and West End are not served by existing rail corridors.                      | • Aspects of the current rail network are undermining the strength of the desired function of rail                                                                                                      |
| Sustained growth and demand   | • Inability to serve future demand for CBD access from growth areas along rail corridors within Brisbane and emerging greenfield development sites, such as Flagstone and Yarrabilga.  
                                   • Rail services to and through Brisbane’s inner core continue to grow as more people access services and jobs in the Brisbane CBD.  
                                   • Increasing growth and demand will continue to add significant pressure to the rail network.                                             | • Population growth in outer areas, with limited employment self-sufficiency and self-containment of commuter travel demand, places pressures on the rail network                                                                 |
| Limited capacity              | • Rail junction conflicts at Roma Street and Park Road.  
                                   • Track merge at Milton and Park Road causes operational conflicts for southern and western services.  
                                   • All passenger rail services merge into one corridor through the CBD, with every service across SEQ stopping at all four inner-city stations from Roma Street to Bowen Hills.  
                                   • There are only two CBD rail stations, with capacity constraints limiting their ability to cater for growth in customer throughput.  
                                   • Increasing demand from the north and south is approaching or exceeding the capacity of the rail network in peak travel times.  
                                   • Rail passenger and freight conflicts.  
                                   • Outdated signalling technology.                                                                                                                                                                         | • Infrastructure constrains capacity of key sections of the network                                                                                                                                    |
| Poor CBD accessibility         | • Rail services need to travel via the Merivale Bridge to cross the river imposing both a distance and travel time penalty on rail commuters accessing the CBD from the south and east.  
                                   • Many areas of the city are outside the limit of the generally accepted walkable catchments for the CBD rail stations.                                                                | • Brisbane’s topography impacts rail network efficiency                                                                                                                                                 |
| Limited frequency             | • Rail junction conflicts occur at Roma Street and Park Road.  
                                   • Track merges at Milton and Park Road (Boggo Road) causes operational conflicts for southern and western services respectively.  
                                   • Rail services merge into one corridor through the CBD, with every service across SEQ stopping at all four inner-city stations from Roma Street to Bowen Hills.  
                                   • Outdated signalling technology.                                                                                                                                                                         | • Infrastructure constraints limit frequency and train throughput                                                                                                                                    |
<table>
<thead>
<tr>
<th>RAIL PROBLEMS</th>
<th>ROOT CAUSES</th>
<th>EFFECTS</th>
</tr>
</thead>
</table>
| Reduced reliability          | • Despite mitigation measures (such as timetable refinement and dwell time management initiatives), as available capacity is utilised reliability will deteriorate, with minor delays, such as the increased dwell times required for boarding and alighting in overcrowded conditions having the potential to cumulatively escalate into significant network-wide impacts (i.e. limited and decreasing network resilience).  
  • Without an infrastructure or rail systems solution (such as CRR or ETCS Level 2) to increase line capacity to allow higher frequency services, peak period service performance on the passenger rail network is forecast to decline, resulting in significant reductions in service reliability and increased overcrowding.  
  • Network reliability is impacted by both planned and unplanned events, planned being scheduled track closures, and unplanned including adverse weather conditions such as storms and flooding. | • Increasing service demand limits capacity with flow-on effects for reliability of services and resilience                                                                                                                                                                                                                                           |
| and resilience                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Journey times and cost       | • Rail services into the Brisbane CBD from the east and south are indirect, due to routing via the Merivale Bridge to cross the river resulting in a distance and time disadvantage for rail commuters accessing the CBD.  
  • Brisbane’s existing rail network does not fulfil a strong inner-city distributor function and must rely on transfers to bus or active modes to reach many inner-city areas and travel generators not served directly by existing rail stations. | • Rail does not offer a competitive travel time alternative to road travel due to indirect CBD access from the south and east                                                                                                                                                                                                                   |

Table 4.7 – Rail problems for SEQ and Brisbane
4.7.1 Rail Problem 1: Limited footprint of rail

Compared to other major Australian cities, Brisbane’s rail network has limited capacity and coverage, particularly within the Brisbane CBD. In part, this is due to limited river crossings and limited number of inner-city stations. Figure 4.25 compares the SEQ rail network to the Melbourne and Sydney networks.

Figure 4.25 – SEQ Rail Network compared to Melbourne and Sydney

The fixed nature of the current rail network limits its ability to serve growth catchments for public transport. Key growth areas not directly served by rail include densification in the southern CBD, West End, Newstead/Teneriffe and Northshore Hamilton Priority Development Area (PDA) as well as outer suburban growth such as at Flagstone and Yarrabilba. This growth will place greater pressure on the bus and road network. Furthermore, rail services to and from south of the Brisbane River offer a somewhat indirect line of travel to the CBD via the Merivale Bridge.

4.7.2 Rail Problem 2: Sustained growth and demand

Despite densification within the inner-city, significant population growth is expected to occur outside Brisbane’s inner-city, which, coupled with substantial growth in employment in the inner-city and CBD is set to grow the transport task substantially. Public transport enables economic growth by getting people to their place of employment, education or other activity centres (as discussed in Section 4.4.2). Increasing growth and demand will continue to add significant pressure to the rail network, and without major investment in the inner-city, there will not be room for more trains and current trains will become increasingly crowded\(^\text{31}\).

Rail services to and through Brisbane’s inner core continue to grow as more people across the region access services and jobs in the region’s primary activity centre. Based on current forecasts, future demand for CBD access for rail from growth areas along rail corridors within Brisbane and emerging greenfield development sites, such as Flagstone and Yarrabilba, will be unable to be met.

4.7.3 Rail Problem 3: Limited capacity

Around 80 per cent of morning peak trips to work in the Brisbane CBD are made by public transport\(^\text{32}\). Rail boardings occur on 36 per cent of the total 558,000 average weekday public

\(^{31}\) South East Queensland’s Rail Horizon, 2016
\(^{32}\) Household Travel Survey 2009-2011
transport trips in Greater Brisbane. The Gold Coast – Brisbane corridor is Australia’s busiest inter-city rail commuter corridor. Long-distance trains from the Gold Coast all use a single inbound line across the Merivale Bridge and through the CBD to Bowen Hills, which is shared with suburban services from the Beenleigh and Cleveland lines.

The South East Queensland’s Rail Horizon report, released by the Queensland Government in 2016, states that rail junction conflicts at Roma Street and Park Road and a track merge at Milton and Park Road add extra constraints for southern and western services by causing operational conflicts. Through the CBD, all rail services merge into one corridor, with every service across SEQ stopping at all four inner-city stations from Roma Street to Bowen Hills. The city centre is the most popular commuter destination on the regional public transport network yet there are only two CBD rail stations. Figure 4.26 shows the key inner-city capacity constraints inhibiting the rail network’s ability to meet the need for CBD access.

Figure 4.26 – Existing inner-city rail network constraints

4.7.4 Rail Problem 4: Poor CBD accessibility

Beyond having an appropriate level of capacity (and other critical factors in meeting the needs of the customer), rail stations need to be adequately located to ensure destinations are easily accessible. Generally, a walking catchment of 400 metres around a quality public transport station or stop is considered attractive for customers. Although customers’ preparedness to walk this distance may increase with the quality of the service (for example, express rail) the walking distances start to become a limiting factor beyond 800 metres and by one kilometre the service may be considered only marginally attractive. For Brisbane’s CBD, the topography and the historical development of the public transport system results in many areas of the city being outside the limit of the generally accepted walkable catchments.

33 Brisbane Metro Transport Model (2017)
34 The Gold Coast’s seductive lifestyle underpins rise of extreme commuting, KPMG 2013
35 South East Queensland’s Rail Horizon, 2016
The Brisbane rail network passes across the northern end of the CBD, providing good access to the northern areas, but there are considerable walking distances from major activity centres such as the City Botanic Gardens, River Stage, and Queensland University of Technology (Gardens Point campus) as well as new growth areas (1 William Street and Queen’s Wharf Brisbane) in the southern areas of the CBD. Brisbane rail customers wishing to travel to and from the southern end of the CBD must walk from either Central station (up to 1.2 kilometres), or from South Brisbane or South Bank stations across the river.

4.7.5 Rail Problem 5: Limited frequency

The ability to improve rail service frequency levels is currently limited due to a range of infrastructure constraints. As a result, the rail network cannot offer a true ‘turn-up-and-go’ level of service. Capacity assessments suggest the number of paths available during peak times is limited to 20 trains per hour (tph) per direction on the main line (Caboolture–Ipswich sector) and 24 tph per direction for suburban lines (Merivale Bridge sector). It is forecast that by around 2021 demand for rail services in the peak periods will be at or beyond the capacity of the existing key inner-city corridors.

As noted under the Capacity problem (Section 4.7.3), the rail system is also increasingly constrained by inner-city track and platform capacity issues with continuing growth in travel to the CBD.

4.7.6 Rail Problem 6: Reduced reliability and resilience

The complex nature of rail network operations causes rail network operators to consider the concept of reliability when defining the capacity of the system. That is, once the minimum acceptable level of reliability is defined, there will be a flow-on impact on the operational capacity of the system under that adopted standard. This may be less than the absolute capacity of the system that can be achieved when all factors are working towards an optimal outcome for rail operations.

Once the reliability requirements are factored in, the number of services that can be operated under that regime, during a defined period, will define rail track capacity. As such, the key issues with future rail network capacity are as follows:

- As service frequency increases towards maximum capacity, the reliability of services can deteriorate rapidly across the whole network, due to the way rail operations need to be managed. As the capacity is utilised, despite mitigation measures, reliability is expected to continue to deteriorate, with minor delays, such as the increased dwell times required for boarding and alighting in overcrowded conditions having the potential to cumulatively escalate into significant impacts.

- Without an infrastructure or rail systems solution boosting line capacity to allow higher frequency services, peak period service performance on the passenger rail network is forecast to decline, resulting in significant reductions in service reliability and increased overcrowding.

Closely linked to network reliability is the concept of resilience – that is, the ability of the rail system to maintain acceptable operational performance in the face of planned or unplanned faults and challenges. It describes the adaptability of the network and its ability to recover from an incident within a reasonable timeframe. For SEQ, it also relates to the resilience of the system to adverse weather conditions such as storms and flooding.

Currently, all passenger rail services on the SEQ network are funnelled through four stations in the inner-city namely Roma Street, Central, Fortitude Valley and Bowen Hills stations. As such, incidents on this part of the network or at one of these four stations can have serious
flow-on impacts for the entire SEQ rail network. Because of the cascading effect across the network, it can take significant time to recover to normal operations.

### 4.7.7 Rail Problem 7: Uncompetitive journey times and cost

As noted previously, the current rail network does not have good coverage over many areas in Brisbane and beyond and is relatively indirect in many corridors. The overall impact of the functional deficiencies and constraints in the SEQ rail network is that rail travel caters for only around one third of morning peak transit travel into the CBD\(^{36}\). This is low compared to Sydney and Melbourne, where rail accounts for around 50 per cent.

Given the deficiencies in the rail network in terms of geographic coverage, travel times, service frequency, and potential for overcrowding, the relative ‘perceived cost’ of a journey using the rail network in many areas is greater than that of private vehicle and bus travel. This issue has likely been further exacerbated by increases in public transport fares (and reductions in fuel price) in recent years.

### 4.8 Outcomes Sought

The previous sections outlined a number of key strategic, transport, bus and rail specific problems for SEQ both in the short and longer term. To ensure that the outcomes sought for the Brisbane Metro reflect the objectives of key strategic government plans and policies, each problem was aligned to objectives and desired outcomes discussed in the Queensland Government State Infrastructure Plan (SIP) and draft South East Queensland Regional Plan (ShapingSEQ).

The SIP outlines the following four objectives to guide infrastructure priorities\(^{37}\):

- Improving prosperity and liveability
- Infrastructure that leads and supports growth and productivity
- Infrastructure that connects communities and markets
- Improving sustainability and resilience.

Specific to the transport infrastructure requirements in Queensland, the SIP outlines the strategic responses and priorities to the key objectives. This is to enable Queensland Government departments and industry to align their activities in response to these priorities.

The responses include the following\(^{38}\):

- Focusing on maintenance and rehabilitation of existing infrastructure to reduce the long-term cost of repair and improve network resilience
- Unlocking the potential of critical supply chains by identifying and improving the freight network
- Seeking innovation and technology solutions to create a better performing and lower emissions transport system
- Seeking public transport solutions, including demand management, to address the strong growth of SEQ.
- Digitally connected smart infrastructure to improve capacity, safety and security
- Connecting regional communities with access to essential services and opportunities.

\(^{36}\) South East Queensland’s Rail Horizon, 2016  
\(^{37}\) Objectives are presented in the State Infrastructure Plan (Part A), p29  
\(^{38}\) Transport outcomes are presented in the State Infrastructure Plan (Part B), p34
ShapingSEQ provides a framework for managing the region's growth over the next 25 years and sets a vision for the next 50 years. Five key goals underpin the 50-year vision for SEQ’s future: Grow, Prosper, Connect, Sustain, and Live. The goals are the strategic outcomes sought to pursue the 50-year vision for SEQ. Each goal is supported by several elements which provide more specific outcomes to achieve the goal. The elements under each goal include:

- **Grow**:  
  - Efficient land use – Urban development uses land and infrastructure efficiently.
  - Focusing density – Higher density development is located in areas with good access to high-frequency public transport, and employment and services.
  - New communities – New communities support a consolidated urban settlement pattern, maximise the use of existing infrastructure and deliver high-quality communities.
  - Housing diversity – Housing diversity meets the changing make-up of our regional population, community needs and lifestyle pursuits, and provides housing choice and affordability.
  - Growing rural towns and villages – Rural towns and villages provide for growth and community development in a way that reinforces local identity.

- **Prosper**:  
  - High-performing outward focused economy – SEQ responds to its transitioning economy by increasing focus on facilitating export-oriented and business-to-business related transactions that drive productive and economy growth, while also continuing to enhance economic activities that support the needs of growing communities.
  - Areas of regional economic significance – Economic opportunities and synergies within and between SEQ’s areas of regional economic significance are accelerated.
  - Regional activity centres network – The regional activity centres network adapts to the demands of a transitioning economy, serves the current and future economic and social needs of the community and business, and drives productivity and economic growth.
  - Knowledge and technology precincts – Knowledge and technology precincts are globally and nationally connected vibrant, collaborative places that drive innovation and creativity in the market, attract investment and enhance human capital.
  - Major enterprise and industrial areas – Major enterprise and industrial areas, including their supply chain networks, grow and enhance national and global trade.
  - Special uses – SEQ accommodates a range of special uses, including activities that are difficult to locate, and that support regional needs and economic growth.
  - Rural prosperity – Rural areas leverage traditional primary industry strengths to expand, diversify and introduce value-adding activities which

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39 ShapingSEQ (Draft South East Queensland Regional Plan) 2016, Queensland Government, p33  
40 ShapingSEQ (Draft South East Queensland Regional Plan) 2016, Queensland Government, p43
enhance productivity, resilience and competitiveness in domestic and global markets.

- Connect\(^{41}\):
  - **An efficient movement system** – People and freight move efficiently around the region, maximising community and economic benefits.
  - **Integrated planning** – Infrastructure and land use planning and delivery are integrated.
  - **Active transport** – Active transport is a favoured, practical option for a range of trips.
  - **Prioritised infrastructure investment** – Investment in the regional infrastructure network is prioritised to service social and economic needs in a way that integrates with the desired growth pattern.
  - **Regional infrastructure networks** – Regional infrastructure networks are maintained and enhanced to support the region’s growth and needs sustainably, cost-effectively and in a timely manner.
  - **Digital infrastructure** – SEQ has a robust digital infrastructure network to service business and social interaction.

- Sustain\(^{42}\):
  - **Traditional Owners** – Traditional Owners are engaged and their culture is respected in planning for the region.
  - **Biodiversity** – The regional biodiversity network is protected and enhanced to support the natural environment and contribute to a sustainable region.
  - **Regional landscapes** – Regional landscape values and functions are sustainably managed and provide social, environmental, cultural and economic benefits to the region.
  - **Natural resources** – The region’s natural resources are managed sustainably and efficiently to meet the needs of the existing and future communities.
  - **Health and wellbeing** – Communities are designed and supported by social infrastructure and natural assets to provide healthy, liveable places that promote mental and physical wellbeing.
  - **Fair** – Communities are places where people can access transport, education, jobs, services, green space, and family and friends in a way that is fair and equitable to all.
  - **Climate change** – The effects of climate change are managed to optimise safety and resilience both for communities and the natural environment.
  - **Safe** – Communities are designed and equipped to be safe, hazard-resilient places.
  - **Affordable living** – Communities have access to a choice of housing types, locations and affordability.

- Live\(^{43}\):
  - **Valuing good design** – Great subtropical design underpins SEQ urban places.

\(^{41}\) ShapingSEQ (Draft South East Queensland Regional Plan) 2016, Queensland Government, p57
\(^{42}\) ShapingSEQ (Draft South East Queensland Regional Plan) 2016, Queensland Government, p67
\(^{43}\) ShapingSEQ (Draft South East Queensland Regional Plan) 2016, Queensland Government, p77
o **Working with the weather** – SEQ’s climate-derived character delivers new models of subtropical, energy-efficient living.

o **Inspiration from local character** – The communities of SEQ demonstrate a strong respect for their heritage, distinct context and local character.

o **Working with natural systems** – Urban environments integrate urban greening networks to reshape our urban environments.

o **Great places** – Great place-making in SEQ creates and improves urban places and rural towns that successfully reinforce local and regional identity and create social and economic dividends for our communities.

Table 4.8 summarises all the problems presented in this chapter and links them to the relevant objectives and outcomes from the State Infrastructure Plan and ShapingSEQ as listed above. Based on these strategic objectives, a specific list of outcomes sought for each problem is noted.
## Identified Problems

<table>
<thead>
<tr>
<th>Identified Problem</th>
<th>SIP Objectives Alignment</th>
<th>SIP Transport Outcomes Alignment</th>
<th>Shaping SEQ Goal and Elements Alignment</th>
<th>Outcomes Sought</th>
</tr>
</thead>
</table>
| **Accessibility and Connectivity** | • Infrastructure that leads and supports growth and productivity  
  • Infrastructure that connects communities and markets | • Seek public transport solutions including demand management to address the strong growth of SEQ  
  • Digitally connected smart infrastructure to improve capacity, safety and security  
  • Connect regional communities with access to essential services and opportunities | • Grow:  
  o Focusing density  
  o Prosper:  
  o High performing outward focused economy  
  o Knowledge and technology precincts  
  • Sustain:  
  o Fair  
  • Connect:  
  o An efficient movement system  
  o Integrated planning | • Greater capacity and improved quality of service from Brisbane's transport network to:  
  o provide connections between key areas  
  o support the transformation of the city to support agglomeration opportunities  
  o increase capacity during peak periods to service access to the job market  
  • Provide efficient and effective connections to the surrounding region  
  • Ensure residential growth areas are well connected with employment centres through efficient high-capacity transport modes  
  • Provide better multimodal connectivity and interchange opportunities |
| **Economic Growth and Productivity** | • Infrastructure that leads and supports growth and productivity  
  • Infrastructure that connects communities and markets  
  • Improving sustainability and resilience | • Seek public transport solutions including demand management to address the strong growth of SEQ  
  • Connect regional communities with access to essential services and opportunities | • Grow:  
  o Efficient land use  
  o Focusing density  
  o Prosper:  
  o High performing outward focused economy  
  o Areas of regional economic significance  
  o Regional activity centres network  
  o Knowledge and technology precincts  
  • Connect:  
  o Integrated planning  
  • Live:  
  o Great places | • Greater capacity and improved quality of service from the transport system to:  
  o ensure sustainable outcomes for the transport system by providing the right choice of mode for each transport task  
  o increase capacity and reduce travel times during peak periods to service access to the job market  
  o support new urban development opportunities  
  o manage urban growth in a sustainable manner  
  o support city building outcomes  
  o support economic growth opportunities and provide connections between market hub areas |
| **Transport Problems** | • Improving prosperity and liveability  
  • Infrastructure that leads and supports growth and productivity  
  • Infrastructure that connects communities and markets | • Focus on maintenance and rehabilitation of existing infrastructure to reduce the long term cost of repair and improve network resilience  
  • Seek innovation and technology solutions to create a better performing and lower emissions transport system  
  • Seek public transport solutions including demand management to address the strong growth of SEQ | • Grow:  
  o Focusing density  
  o Prosper:  
  o An efficient movement system  
  • Connect:  
  o Integrated planning | • More (increased capacity and frequency) inner-city public transport provision to support improved access to jobs and services.  
  • Reduce reliance on private vehicle access to the CBD and other major activity centres |
| **Car Dependency and Road Congestion** | • Improving prosperity and liveability  
  • Infrastructure that leads and supports growth and productivity  
  • Infrastructure that connects communities and markets | • Seek public transport solutions including demand management to address the strong growth of SEQ  
  • Digitally connected smart infrastructure to improve capacity, safety and security | • Grow:  
  o Focusing density  
  o Prosper:  
  o An efficient movement system  
  • Connect:  
  o Integrated planning | • More (increased capacity and frequency) public transport services to support improved access to jobs and services into and within the inner-city.  
  • Enhanced integration between bus and rail network |
| **Inadequate Capacity to Meet Future Public Transport Demand** | • Improving prosperity and liveability  
  • Infrastructure that leads and supports growth and productivity | • Seek public transport solutions including demand management to address the strong growth of SEQ  
  • Digitally connected smart infrastructure to improve capacity, safety and security | • Grow:  
  o Efficient land use  
  o Focusing density  
  o Prosper:  
  o Regional activity centres network  
  • Connect:  
  o An efficient movement system  
  o Prioritised infrastructure investment | • Improve efficiency and capacity of current river crossings between the CBD and the south-east  
  • Provide more direct and timely access to the CBD by public transport from the south-east to provide attractive alternative to private vehicle travel  
  • Encourage travel by the most sustainable and efficient modes |
| **Brisbane’s Topography and Historic Pattern of Development Impacts on Network Efficiency** | • Improving prosperity and liveability  
  • Infrastructure that connects communities and markets | • Focus on maintenance and rehabilitation of existing infrastructure to reduce the long term cost of repair and improve network resilience  
  • Seek public transport solutions including demand management to address the strong growth of SEQ  
  • Digitally connected smart infrastructure to improve capacity, safety and security | • Grow:  
  o Efficient land use  
  o Focusing density  
  o Prosper:  
  o Regional activity centres network  
  • Connect:  
  o An efficient movement system  
  o Prioritised infrastructure investment | • Improve efficiency and capacity of current river crossings between the CBD and the south-east  
  • Provide more direct and timely access to the CBD by public transport from the south-east to provide attractive alternative to private vehicle travel  
  • Encourage travel by the most sustainable and efficient modes |
<table>
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<tr>
<th>IDENTIFIED PROBLEM</th>
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<th>SIP TRANSPORT OUTCOMES ALIGNMENT</th>
<th>SHAPING SEQ GOAL AND ELEMENTS ALIGNMENT</th>
<th>OUTCOMES SOUGHT</th>
</tr>
</thead>
</table>
| Inefficient supply chains for freight | • Infrastructure that leads and supports growth and productivity | • Unlock the potential of critical supply chains by identifying and improving the freight network | • Proposer:  
  o High-performing outward focused economy  
  Connect:  
  o An efficient movement system | • Improved road conditions with reduced congestion  
  • Reduced travel time for freight by road  
  • Preserve sufficient freight capacity to meet projected freight task |
| Role of bus is understated and multi-faceted | • Improving prosperity and liveability  
  • Infrastructure that leads and supports growth and productivity  
  • Infrastructure that connects communities and markets | • Focus on maintenance and rehabilitation of existing infrastructure to reduce the long term cost of repair and improve network resilience  
  • Seek public transport solutions including demand management to address the strong growth of SEQ  
  • Digitally connected smart infrastructure to improve capacity, safety and security | • Grow:  
  o Focusing density  
  Connect:  
  o An efficient movement system  
  o Integrated planning | • Integrated transport network where bus and rail are not seen as competing but are complementary and connected  
  • Faster and more reliable trip times for public transport customers |
| Sustained growth and demand | • Improving prosperity and liveability  
  • Infrastructure that leads and supports growth and productivity | • Seek public transport solutions including demand management to address the strong growth of SEQ  
  • Digitally connected smart infrastructure to improve capacity, safety and security  
  • Connect regional communities with access to essential services and opportunities | • Grow:  
  o Focusing density  
  Prosper:  
  o Regional activity centres network  
  Connect:  
  o An efficient movement system  
  Sustain:  
  o Fair | • Alleviate inner-city bus network constraints to unlock capacity  
  • Provide public transport in outer growth areas |
| Capacity constraints limit potential growth of bus services | • Improving prosperity and liveability  
  • Improving sustainability and resilience | • Focus on maintenance and rehabilitation of existing infrastructure to reduce the long term cost of repair and improve network resilience  
  • Seek public transport solutions including demand management to address the strong growth of SEQ  
  • Digitally connected smart infrastructure to improve capacity, safety and security | • Grow:  
  o Focusing density  
  Connect:  
  o An efficient movement system | • Bus route simplification and improved legibility  
  • Improved travel times and capacity across key bottlenecks |
| Degrading journey times and reliability | • Improving prosperity and liveability  
  • Infrastructure that connects communities and markets  
  • Improving sustainability and resilience | • Seek innovation and technology solutions to create a better performing and lower emissions transport system  
  • Seek public transport solutions including demand management to address the strong growth of SEQ  
  • Digitally connected smart infrastructure to improve capacity, safety and security | • Grow:  
  o Focusing density  
  Connect:  
  o An efficient movement system | • Improved connectivity and capacity between north and south of the river  
  • Greater resilience within the public transport network due to unplanned disruptions and incidents |
| Network and operational inefficiencies impact capacity and dwell times | • Improving prosperity and liveability  
  • Infrastructure that leads and supports growth and productivity  
  • Infrastructure that connects communities and markets | • Focus on maintenance and rehabilitation of existing infrastructure to reduce the long term cost of repair and improve network resilience  
  • Seek innovation and technology solutions to create a better performing and lower emissions transport system  
  • Seek public transport solutions including demand management to address the strong growth of SEQ  
  • Digitally connected smart infrastructure to improve capacity, safety and security | • Grow:  
  o Focusing density  
  Prosper:  
  o Regional activity centres network  
  Connect:  
  o An efficient movement system  
  o Integrated planning | • Optimised bus network and more efficient busway operations  
  • Improved connectivity |
| Worsening amenity in the inner-city | • Improving prosperity and liveability  
  • Improving sustainability and resilience | • Focusing on maintenance and rehabilitation of existing infrastructure to reduce the long-term cost of repair and improve network resilience.  
  • Seeking public transport solutions, including demand management, to address the strong growth of SEQ.  
  • Digitally connected smart infrastructure to improve capacity, safety and security. | • Prosper:  
  o Regional activity centres network  
  Connect:  
  o An efficient movement system  
  Live:  
  o Great places | • Reduction of buses stopping on CBD streets  
  • Reduced traffic congestion within inner-city due to buses |
<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>SIP OBJECTIVES ALIGNMENT</th>
<th>SIP TRANSPORT OUTCOMES ALIGNMENT</th>
<th>SHAPINGSEQ GOAL AND ELEMENTS ALIGNMENT</th>
<th>OUTCOMES SOUGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail Problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited footprint of rail</td>
<td>• Improving prosperity and liveability</td>
<td>• Connect regional communities with access to essential services and opportunities</td>
<td>• Grow: o Focusing density</td>
<td>• Integrated transport network where bus and rail are not seen as competing but are complementary</td>
</tr>
<tr>
<td></td>
<td>• Infrastructure that connects communities and markets</td>
<td></td>
<td>• Prosper: o Regional activity centres network</td>
<td>• Faster and more efficient trip times for public transport customers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Connect: o An efficient movement system</td>
<td>• Sustained limited footprint</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Integrated planning</td>
<td></td>
</tr>
<tr>
<td>Sustained growth and demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Improving prosperity and liveability</td>
<td>• Connect regional communities with access to essential services and opportunities</td>
<td>• Grow: o Focusing density</td>
<td>• Improve transport network coverage</td>
</tr>
<tr>
<td></td>
<td>• Infrastructure that leads and supports growth and productivity</td>
<td></td>
<td>• Prosper: o Regional activity centres network</td>
<td>• Improve transport network ability to disperse customers to key employment areas, not just the CBD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Connect: o An efficient movement system</td>
<td>• Alleviate inner-city public transport network capacity constraints</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Sustain: o Fair</td>
<td>• Match expected rail network demand with capacity</td>
</tr>
<tr>
<td>Limited capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Improving prosperity and liveability</td>
<td>• Digitally connected smart infrastructure to improve capacity, safety and security</td>
<td>• Grow: o Focusing density</td>
<td>• Enhanced access to employment growth centres</td>
</tr>
<tr>
<td></td>
<td>• Infrastructure that leads and supports growth and productivity</td>
<td></td>
<td>• Connect: o An efficient movement system</td>
<td>• Public transport is so frequent that you can just ‘turn-up-and-go’</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Alleviate inner-city public transport network capacity constraints</td>
</tr>
<tr>
<td>Poor CBD accessibility</td>
<td>• Improving prosperity and liveability</td>
<td>• Seek public transport solutions including demand management to address the strong growth of SEQ</td>
<td>• Grow: o Focusing density</td>
<td>• Greater resilience within the public transport network to unplanned disruptions and incidents</td>
</tr>
<tr>
<td></td>
<td>• Infrastructure that leads and supports growth and productivity</td>
<td>• Digitally connected smart infrastructure to improve capacity, safety and security</td>
<td>• Prosper: o Areas of regional economic significance</td>
<td>• Match expected rail network demand with capacity</td>
</tr>
<tr>
<td></td>
<td>• Infrastructure that connects communities and markets</td>
<td></td>
<td>• Regional activity centres network</td>
<td>• Sustained limited footprint</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Connect: o An efficient movement system</td>
<td>• Sustained limited footprint</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Sustain: o Fair</td>
<td>• Sustained limited footprint</td>
</tr>
<tr>
<td>Limited frequency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Improving prosperity and liveability</td>
<td>• Seek public transport solutions including demand management to address the strong growth of SEQ</td>
<td>• Grow: o Focusing density</td>
<td>• Sustainable journey times and cost</td>
</tr>
<tr>
<td></td>
<td>• Infrastructure that leads and supports growth and productivity</td>
<td>• Digitally connected smart infrastructure to improve capacity, safety and security</td>
<td>• Prosper: o Regional activity centres network</td>
<td>• Integrated bus and train network with enhanced opportunity for interchange</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Connect: o An efficient movement system</td>
<td>• Integrated bus and train network with enhanced opportunity for interchange</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Sustain: o Affordable living</td>
<td>• Integrated bus and train network with enhanced opportunity for interchange</td>
</tr>
<tr>
<td>Reduced reliability and resilience</td>
<td>• Improving sustainability and resilience</td>
<td>• Focus on maintenance and rehabilitation of existing infrastructure to reduce the long term cost of repair and improve network resilience</td>
<td>• Grow: o Focusing density</td>
<td>• Enhanced access to employment growth centres</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Seek innovation and technology solutions to create a better performing and lower emissions transport system</td>
<td>• Prosper: o Regional activity centres network</td>
<td>• Public transport is so frequent that you can just ‘turn-up-and-go’</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Connect: o An efficient movement system</td>
<td>• Alleviate inner-city public transport network capacity constraints</td>
</tr>
<tr>
<td>Journey times and cost</td>
<td>• Improving prosperity and liveability</td>
<td>• Focus on maintenance and rehabilitation of existing infrastructure to reduce the long term cost of repair and improve network resilience</td>
<td>• Grow: o Focusing density</td>
<td>• Greater resilience within the public transport network to unplanned disruptions and incidents</td>
</tr>
<tr>
<td></td>
<td>• Infrastructure that leads and supports growth and productivity</td>
<td>• Seek public transport solutions including demand management to address the strong growth of SEQ</td>
<td>• Prosper: o Regional activity centres network</td>
<td>• Integrated bus and train network with enhanced opportunity for interchange</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Connect: o An efficient movement system</td>
<td>• Integrated bus and train network with enhanced opportunity for interchange</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Sustain: o Affordable living</td>
<td>• Integrated bus and train network with enhanced opportunity for interchange</td>
</tr>
</tbody>
</table>

Table 4.8 – Strategic alignment of identified problems to SIP, ShapingSEQ and outcomes sought
4.9 Priority Problems and Service Needs

Using the findings from the problem identification process, each problem was assessed to determine the highest priority problems, within the context of the capacity for Council to influence.

Table 4.9 summarises the outcomes of this process.

<table>
<thead>
<tr>
<th>IDENTIFIED PROBLEMS</th>
<th>PRIORITY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategic Problems</strong></td>
<td></td>
</tr>
<tr>
<td>Accessibility and connectivity</td>
<td>High</td>
</tr>
<tr>
<td>Economic growth and productivity</td>
<td>High</td>
</tr>
<tr>
<td><strong>Transport Problems</strong></td>
<td></td>
</tr>
<tr>
<td>Car dependency and road congestion</td>
<td>Medium - High</td>
</tr>
<tr>
<td>Inadequate ability to meet public transport demand</td>
<td>High</td>
</tr>
<tr>
<td>Brisbane’s topography and historic pattern of development impacts on network efficiency</td>
<td>Medium - High</td>
</tr>
<tr>
<td>Inefficient supply chains for freight</td>
<td>Low - Medium</td>
</tr>
<tr>
<td><strong>Bus Problems</strong></td>
<td></td>
</tr>
<tr>
<td>Role of bus is understated and multi-faceted</td>
<td>Medium - High</td>
</tr>
<tr>
<td>Sustained growth and demand</td>
<td>Medium - High</td>
</tr>
<tr>
<td>Capacity constraints limit potential growth of bus services</td>
<td>High</td>
</tr>
<tr>
<td>Degrading journey times and reliability</td>
<td>High</td>
</tr>
<tr>
<td>Operational inefficiencies impact capacity and dwell times</td>
<td>Medium</td>
</tr>
<tr>
<td>Worsening amenity in the inner-city</td>
<td>High</td>
</tr>
<tr>
<td><strong>Rail Problems</strong></td>
<td></td>
</tr>
<tr>
<td>Limited footprint of rail</td>
<td>Medium - High</td>
</tr>
<tr>
<td>Sustained growth and demand</td>
<td>Medium - High</td>
</tr>
<tr>
<td>Limited capacity</td>
<td>Medium - High</td>
</tr>
<tr>
<td>Poor CBD accessibility</td>
<td>Medium - High</td>
</tr>
<tr>
<td>Limited frequency</td>
<td>Medium - High</td>
</tr>
<tr>
<td>Reduced reliability and resilience</td>
<td>Medium - High</td>
</tr>
<tr>
<td>Uncompetitive journey times and cost</td>
<td>Medium - High</td>
</tr>
</tbody>
</table>

Table 4.9 – Identified problems and their priority

The priority problems to be addressed by the Brisbane Metro are:

- **Strategic:**
  - limited accessibility and connectivity
  - economic growth and productivity.

- **Transport network:** inability to meet future public transport demand without infrastructure intervention and/or service redesign.

- **Bus network:**
  - capacity constraints limit potential growth of bus services
  - degrading journey times and reliability
  - worsening amenity in the inner-city.
As noted in Section 4.7 above, a number of projects are under development by the Queensland Government to address the identified rail problems.

Through this process outlined above, the following service needs for the Brisbane Metro have been identified:

- **Strategic focus**: Provide greater capacity and improved quality of service from Brisbane’s transport network to:
  - provide enhanced connections between key areas
  - support the transformation of the city to support agglomeration opportunities
  - increase capacity during peak periods to service access to employment, education and other opportunities
  - provide efficient and effective connections to the surrounding region
  - ensure residential growth areas are well connected with employment centres through efficient high-capacity transport modes
  - provide better multimodal connectivity and interchange opportunities.

- **Transport focus**: Deliver higher capacity and frequency public transport services to support improved access to jobs and services into and within the inner-city and other major activity centres. This includes delivering enhanced integration between the bus and rail network, where bus and rail are not seen as competing but are complementary components of a connected network.

- **Bus network focus**: Deliver improved travel times, capacity and connectivity across the bus network. Key focus areas include:
  - simplification and rationalisation of bus routes to improve legibility and connectivity
  - improving capacity and reliability across key network constraints
  - ensuring greater resilience within the public transport network to unplanned disruptions and incidents
  - reducing congestion within the inner-city by minimising the number of buses stopping on CBD streets.

These service needs will provide focus for the development and detailed analysis of the Brisbane Metro to ensure the ultimate project solution addresses all of the priority problems and supports all service needs.
4.10 Definition of the ‘Without Project’ Case

Drawing from the service needs outlined in the previous section, a project solution (through options analysis, design analysis and operations planning) can be developed to address the priority problems. In order to assess how well the project solution addresses the needs, it is necessary to establish a ‘without project’ case to determine the impact on the strategic project objectives without intervention.

The ‘without project’ case is forecast out to 2041, and there are a number of inputs (including their specific forecast changes) that inform the development of ‘without project’ case, including:

- Changes in demographics inputs to 2041
- Changes in transport infrastructure provisions to 2041 (inclusive of rail, bus and road infrastructure)
- Changes in public transport service provisions to 2041 (inclusive of rail, bus and ferry)
- Economic and pricing changes

The ‘without project’ case will also inform the customer and product analysis presented in Chapter 7 to understand the impacts of the introduction of the Brisbane Metro to the Brisbane transport network.

4.10.1 ‘Without Project’ Case inputs

4.10.1.1 Changes in demographic inputs to 2041

A set of common demographic input assumptions are used in the forecasting of future transport conditions as well as forecasting the performance of any project solution.

Population, employment and education enrolment data by zone are the most influential factors driving forecast travel demand. The forecasts for these key statistics were provided by the Department of Transport and Main Roads (TMR) at the transport zone level for use in the Brisbane Metro Project Model (supplied in November 2016).

For the Brisbane Statistical Division, the population is forecast to reach 3.4 million by 2041, which equates to 1.7 per cent growth per annum. By 2041, total employment for the study area is forecast to reach 1.8 million (1.7 per cent growth per annum) and total education enrolments for the study area are forecast to reach 0.7 million (1.3 per cent growth per annum).

These forecasts are disaggregated for inner Brisbane. Both population and employment in inner Brisbane are forecast to grow at a faster rate than the entire region as a whole. Employment growth in inner Brisbane is forecast at 2.0 per cent per annum between 2016 and 2021, 1.9 per cent per annum between 2021 and 2031 and 1.9 per cent per annum between 2031 and 2041.

4.10.1.2 Changes in transport infrastructure provisions to 2041

The assumed changes in the rail, bus and road networks across the study area for future years are based on current Council, TMR and local government project commitments and were informed by documents including the Queensland Transport and Roads Investment Program (QTRIP) 2015-16 to 2018-19.

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44 Education enrolments encompass pre-primary, primary secondary and tertiary enrolments
Key changes to rail infrastructure assumed between 2016 and 2041 include:

- Redcliffe Peninsula Line by 2016 (Queensland Government)
- ETCS Level 2 on the core rail network from Northgate to Milton by 2031 (Queensland Government)
- CRR tunnel and five new stations (Boggo Road, Woolloongabba, Albert Street, Roma Street and Exhibition) by 2031 (Queensland Government)\(^{45}\).

Key proposed changes to infrastructure that impact on bus operations assumed between 2016 and 2041 include:

- Widening of the Inner City Bypass (ICB) from Bowen Bridge Road to Legacy Way, as well as west facing ramps at Bowen Bridge Road to allow Legacy Way buses to access the Inner Northern Busway in both directions by 2021 (Council).
- Northern Busway/Gympie Road:
  - interim High Occupancy Vehicle (HOV) Lanes (Kedron to Chermside) by 2021 (Queensland Government)
  - Gympie Road Bus Lanes (Chermside to Aspley) by 2021 (Queensland Government)
  - Lutwyche Rd Bus Lanes (Federation Street to Truro Street) by 2031 (Queensland Government)
- South East Busway - extension to Springwood by 2021 (Queensland Government)
- Eastern Busway - bus lanes along Old Cleveland Road from Main Avenue to Carindale Shopping Centre by 2031 (Queensland Government)
- Deebing Creek Connection - bus lanes (Kerners Road to Lakeview Drive) by 2031 (Queensland Government)
- South Deebing Creek Road – bus lanes (Lakeview Drive to Centenary Highway) by 2031 (Queensland Government).

Widening of the ICB is included as per the announced project. The remaining changes are projects that are assumed for CRR and other studies for the purposes of strategic transport modelling.

4.10.1.3 Changes in public transport service provisions to 2041

While the infrastructure changes outlined above are a pre-agreed fixed modelling input, public transport service changes are based on an initial set of service assumptions amended where necessary to ensure capacity meets demand. Service changes are summarised below for rail, bus and ferry.

**Rail Service Changes**

The most fundamental change to rail services between 2016 and 2041 is in relation to the introduction of CRR and a new rail operating service pattern.

Both 2016 and 2041 morning peak hour inbound train frequencies are shown in Table 4.10. This shows a significant change in services from the south (Gold Coast/Beenleigh corridors) with more modest changes in the number of services from the north and west.

\(^{45}\) Note that 2031 is the first transport model in which CRR appears. The date of operations commencing is 2023, as indicated by Queensland Government materials.
### Table 4.10 – Changes in rail service provision between 2016 and 2041 (morning peak hour inbound trains per hour)

<table>
<thead>
<tr>
<th>CORRIDOR</th>
<th>2016</th>
<th>2041 BASE</th>
<th>INCREASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold Coast</td>
<td>5</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>Beenleigh/Kuraby/Loganlea (and Salisbury)</td>
<td>5</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Cleveland (and Manly)</td>
<td>8</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Shorncliffe (and Northgate)</td>
<td>4</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Doomben</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Airport</td>
<td>3</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Ferny Grove</td>
<td>8</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Kippa-Ring/Petrie</td>
<td>8</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>Caboolture (and Sunshine Coast)</td>
<td>9</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>Ipswich (and Rosewood)</td>
<td>9</td>
<td>13</td>
<td>4</td>
</tr>
<tr>
<td>Springfield</td>
<td>8</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>69</td>
<td>99</td>
<td>30</td>
</tr>
</tbody>
</table>

**Bus Service Changes**

Despite a major increase in rail services and rail patronage, changes to the bus network are still required to meet a forecast doubling of bus users over the same period, from around 370,000 customers per weekday in 2016 to almost 740,000 per weekday in 2041. Changes to the bus network and services (note these are not approved Council policy) are presented for 2021, 2031 and 2041.

#### 2021 bus service changes

The proposed network changes between 2016 and 2021 for the ‘without project’ case have been informed by Council’s 10 Point Public Transport Plan. These changes are intended to serve key residential, employment and education growth including:

- Connections to new inner suburban growth – increased services to Hamilton Northshore, Coorparoo and UQ for example
- Suburban commuting growth – increased services on radial corridors including Old Northern Road, Legacy Way, Old Cleveland Road, Sandgate Road,
- Connections to new greenfield growth areas – serving new development in Upper Kedron, Pallara/ Doolandella and Belmont/ Gumdale.

#### 2031 and 2041 Bus service changes

Due to critical network constraints in the inner-city it has been assumed that no new bus routes will be implemented within Brisbane between 2021 and 2041. However changes to fleet mix and modest increases in frequency have been assumed to provide additional capacity for growth where possible.

Outside of Brisbane, major new development areas will require investment in additional transport capacity. As such the following corridors have been assumed will require new or additional services to connect development areas to key destinations including high-capacity rail or bus nodes (note these are not approved TransLink policy):
• Springfield to Browns Plains
• Ripley to Springfield
• Deebing Heights to University of Southern Queensland (Ipswich)
• Swanbank to Redbank Plains and Springfield Rail.

Ferry Service Changes
Very minor changes to ferry services in Brisbane between 2016 and 2041 have been modelled. The one change of note is a proposed new Davies Park CityCat terminal which requires a minor diversion to existing CityCat services (note these are not approved Council policy).

4.10.1.4 Pricing changes
The ‘without project’ case also requires assumptions relating to economic and pricing changes. The increase in the cost of travel and user’s sensitivity to costs are important drivers in travel behaviour. Compared to the base year (2016) prices, the ‘without project’ case assumes the following:

- **Inflation** – to grow at 2.5 per cent per annum.
- **CBD parking charges** – to grow at 2.88 per cent per annum above the rate of inflation (based on historical trends) (note these are not approved Council policy).
- **Toll road charges** – to grow in line with the rate of inflation and escalation specified in the relevant concession deeds.
- **Public transport fares** – ‘fairer fares’ implemented across the network with price and zone changes as per the publicly available information from 1 January 2017 and then to grow in line with the rate of inflation.
- **Vehicle operating costs (fuel)** – to grow in line with the rate of inflation.
- **Value of time** – to grow at 1.5 per cent per annum above the rate of inflation (in line with assumed average weekly earnings growth of 4.0 per cent per annum).

4.10.2 Implications of changes for transport demand
Future transport demand will be influenced by demographic changes as well as the anticipated changes in both transport infrastructure provision and transport service provision. The forecast changes in daily transport demand between 2016 and 2041 across the Brisbane Statistical Division are shown in Table 4.11.

<table>
<thead>
<tr>
<th>MODE</th>
<th>2016</th>
<th>2041 BASE</th>
<th>Growth (from 2016 to 2041)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Trips ('000)</td>
<td>Trips ('000)</td>
<td></td>
</tr>
<tr>
<td>Car driver</td>
<td>4,588</td>
<td>6,584</td>
<td>44%</td>
</tr>
<tr>
<td>Car passenger</td>
<td>1,712</td>
<td>2,251</td>
<td>31%</td>
</tr>
<tr>
<td>Public transport</td>
<td>567</td>
<td>1,024</td>
<td>131%</td>
</tr>
<tr>
<td>Walk and cycle</td>
<td>900</td>
<td>1,053</td>
<td>37%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7,767</strong></td>
<td><strong>11,375</strong></td>
<td><strong>46%</strong></td>
</tr>
</tbody>
</table>

*Table 4.11 – Overall changes in transport trips across the Brisbane Statistical Division*

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46 Brisbane Metro Transport Model (2017)
Overall daily public transport mode share is expected to increase from 7.3 per cent of all daily trips across the study area to 11.5 per cent.

4.10.3 Key changes in public transport network performance

As outlined in Section 4.9 above, the priority problems for the bus network as a result of growth and in the absence of any intervention or solution are:

- Capacity constraints caused by physical bottlenecks on the busway network, including stations and intersections will lead to further worsening of travel times and increasingly mean more variable (less reliable) journey times.
- The overall efficiency of the bus network will continue to deteriorate, and more drivers will be needed just to maintain current frequencies due to slower journey times.
- The continuation of the 'single-seat to the city' network operating paradigm particularly for low patronage coverage services, coupled with complex route structure, stopping patterns and overlapping peak and all day services will mean increasing numbers of buses on CBD streets, affecting the amenity and liveability of the inner-city.

4.11 Summary

Brisbane’s transport network is now at a critical juncture in its evolution as emerging issues challenge the region’s growth aspirations. Promoting public transport as the preferred mode for accessing Brisbane’s CBD and inner-city, especially during peak hours, will be essential to addressing these issues.

Strong growth in private car use can incur significant infrastructure costs and restrict economic activity. Continued growth in car travel will increase congestion and impact on freight and commercial movements, increasing the cost of conducting business and transporting goods.

Serving the anticipated growth in public transport demand across the region, particularly for travel to and within Brisbane’s inner-city, will be impossible without additional infrastructure, due to critical network constraints.

Based on the current operating profile, existing bus infrastructure is reaching capacity and cannot accommodate significant growth. The reliability and operational efficiency of the bus network is also reducing due to the constraints of the network, particularly within the CBD.

Brisbane’s rail network has limited capacity and coverage compared with other major Australian cities, particularly across Brisbane’s inner-city and CBD. This is due, in part, to limited Brisbane River crossings and the location of inner-city stations in relation to commercial precincts. Rail services to and through Brisbane’s inner core also continue to experience growth as people across SEQ seek to access services and jobs in the region’s primary activity centre. However, the existing inner-city rail system has insufficient capacity to serve the forecast demand for CBD access.

A solution is required to address the priority problems identified in this chapter. Future investment should not only benefit the bus and wider transport network but also provide a platform to ultimately secure Brisbane’s long term liveability and economic prosperity.