

# 18. Traffic and transport

## 18.1 Introduction

Traffic and transport analysis of the South East Busway extension from Rochedale to Springwood is required to ensure that:

- the extension does not create adverse impacts on the operations of the wider road network in the area
- safe access to the busway station(s) is provided for
- the extension achieves shorter bus journey times between Underwood Road and Springwood bus station, and thereby facilitates a more efficient bus service and patronage growth
- measures are implemented to ensure that delays and disruptions to the public are minimised during the construction of the extension.

## 18.2 Methodology

In order to preserve a corridor for the busway extension and identify potential issues and opportunities, several elements of the traffic and transport network were analysed, including:

- Intersections within the study area that will be nearing or are at capacity. Oversaturated intersections are bottlenecks in the transport network that need to be managed to ensure that the preferred busway corridor can achieve an efficient transport network.
- Intersections within the study area that present safety concerns due to their proximity to other intersections. These intersections were reviewed to ensure that the preferred busway corridor achieves a safe transport network.
- Sections of roads within the study area that will be nearing or are at capacity. Oversaturated roads are bottlenecks in the transport network. The preferred busway corridor and its links to the existing network need to operate efficiently. Congested links lead to delays. This project aims to reduce delays for the busway network.
- Maintaining access levels. Any intersections or sections of road to be closed off will require the consideration of alternative access arrangements.
- Strategic modelling. Used to determine the likely patronage increase and travel time savings resulting from the South East Busway extension.
- Micro-simulation modelling around the Springwood busway station. This was carried out to assess the interaction of the busway extension and the local road network.

In addition to analyses of the above, a brief discussion on minimising impacts to the road and public transport networks during construction of the extension is also presented. The management of impacts will be investigated in further detail in future planning phases.

## 18.2.1 Previous investigations

### **Pacific Motorway Transit Project**

The Pacific Motorway Transit Project analysed the section of the Pacific Motorway between the Gateway and Logan motorways to identify ways to provide public transport facilities, provide additional capacity on the motorway and provide equal access opportunities to the motorway. To achieve these aims, the Pacific Motorway Transit Project recommended bus lanes on the outside lanes and transit lanes on the medians of both carriageways. Simulation analysis of the Pacific Motorway and possible options for improving the performance of the motorway was undertaken.

The Pacific Motorway Transit Project divided its study area into three sub-areas. Section A of the transit project (i.e. Gateway Motorway to South of Springwood) is relevant to the study area for the extension to Springwood. The bounds for the local road network for the model of Section A extended from Springwood Road in the north and Compton and Baker roads in the south. The results of the modelling of the existing network in Section A from the Pacific Motorway Transit Project provide a guide to the performance of the current network.

For Section A, the Pacific Motorway Transit Project recommends some changes to the northbound ramps of the Pacific Motorway at Springwood. While these changes do not affect the operations of the proposed busway extension directly, they will affect the performance of the surrounding road network. The performance of the surrounding road network affects the busway operations as it determines the ability for feeder buses and bus patrons to access the busway.

This study also looked at the extension of the existing South East Busway from Eight Mile Plains to Underwood Road, Rochedale. The results of these analyses are of importance as the South East Busway extension from Rochedale to Springwood builds on the Stage 1 works. The performance and configuration of the South East Busway extension from Eight Mile Plains to Rochedale will affect the ability of buses to enter and exit the South East Busway extension from Rochedale to Springwood.

### **South East Transit Project**

The South East Transit Project conducted in 1997 was the planning phase for the current South East Busway between the Brisbane central business district and Eight Mile Plains. It also included transit lanes between Mains/Klumpp Road and the Gateway Motorway. This project resulted in the construction of the Springwood off-ramp opposite Vanessa Boulevard, in order to reduce the load on the Rochedale Road off-ramp. Mid-block and ramp capacity analyses were carried out; however, as the study was carried out over 10 years ago, the results of the analyses only provide background information to this Concept Design Study for the South East Busway extension from Rochedale to Springwood. The traffic volumes and travel patterns are likely to have changed appreciably during the past decade.

### **Greater Springwood Master Plan**

The master plan studies currently underway are investigating the Springwood area to determine the preferred pattern of development as Springwood becomes a principal activity centre, as required by the South East Queensland Regional Plan 2009–2031. The traffic, transport and car park analysis carried out for the master planning work highlight areas that present challenges or opportunities within the road and public transport network for the creation of a principal activity centre in Springwood. Some of these findings are of relevance to the Concept Design Study.

## 18.2.2 Additional investigations

While several previous studies investigated the transport network and more specifically the public transport facilities in the area between the Gateway Motorway and Springwood bus station (such as the Pacific Motorway Transit Project), these studies are either out of date or proposed a different method for catering for public transport services. The Concept Design Study focuses on a busway alignment for the South East Busway extension from Rochedale to Springwood and the required changes to the road network to accommodate the extension.

Transport modelling allows for a more detailed analysis of the traffic-related opportunities and constraints in the study area. The existing network situation has been compared to the future scenario with both a busway extension and supporting road network in place. Both strategic modelling and micro-simulation analysis of the network has been undertaken to analyse these issues quantitatively.

This report describes the alignment for the busway extension in brief and elements that represent a change in traffic operations from the current scenario are discussed to highlight potential challenges or opportunities. The supporting analysis includes an assessment of the operation of key intersections, access to the extension and likely construction effects.

## 18.3 Preliminary analysis

### 18.3.1 Existing situation — public transport

#### Operations

The existing South East Busway generally runs alongside the southbound carriageway of the Pacific Motorway from the Brisbane central business district and terminates at the Eight Mile Plains busway station just north of the Gateway Motorway connection. Buses travelling further south to Springwood (and beyond) join the Pacific Motorway at this point.

In addition to the delays faced on the congested Pacific Motorway, buses also face delays at various intersections on their way to Springwood bus station. Buses use one of two ways in which to access Springwood bus station at present:

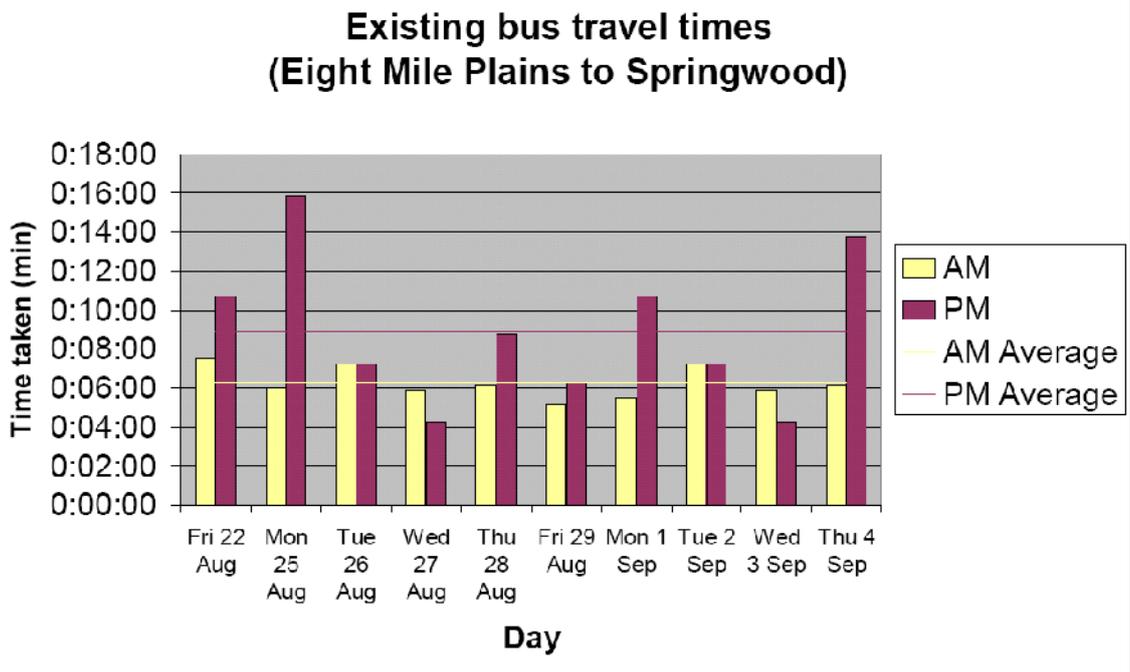
- Routes 573 and 575 — exit the Pacific Motorway at the Rochedale Road off-ramp (Exit 19). Buses then continue along Rochedale Road. This includes traversing four sets of traffic signals and executing a turnaround movement to reach the station platforms.
- Routes 551, 555, 556, 561 and 581 — exit the Pacific Motorway at the Fitzgerald Avenue off-ramp (Exit 20). Buses then access Springwood bus station directly by turning left at the traffic lights at the off-ramp intersection with Rochedale Road.

Buses heading north from Springwood bus station access the Pacific Motorway via the Logan Road on-ramp. This involves traversing a set of traffic signals with a dedicated bus phase before joining the general purpose traffic on the motorway. From here buses travel another 3.5 kilometres further north and then take the off-ramp at the Gateway merge before accessing a bus-only ramp that leads onto the existing South East Busway at Eight Mile Plains station.

Occasionally, due to severe congestion or incidents on the Pacific Motorway, bus routes are diverted from the Pacific Motorway and on to surface streets. In such cases, northbound routes are diverted along Logan Road and southbound routes are diverted through Rochedale South between the Eight Mile Plains and Springwood stations.

In 2007, ticketing information showed that the existing South East Busway catered for 44.7 million trips. Bus ticketing data indicates an average annual growth rate of 22% per annum on the current South East Busway between 2005 and 2007. Given the current trends increased bus numbers will be required and are planned on the South East Busway to cater for these growth rates. See chapter 20 (Network integration) for a preliminary investigation regarding future bus requirements.

A survey carried out in August 2008 showed that currently journey times between the Eight Mile Plains and Springwood stations are on average in excess of 6 minutes in the morning peak (northbound) and approximately 9 minutes in the evening peak (southbound). Figure 18-1 shows the journey times recorded during the survey.



**Figure 18-1: Existing bus travel times — Eight Mile Plains to Springwood via the Pacific Motorway**

**Patronage**

Tables 18-1 to 18-3 show the existing boarding and alighting numbers at each of the busway stations in 2007 for the morning peak period, evening peak period and an average weekday. While the Eight Mile Plains station is the seventh busiest station when daily volumes are considered, it is the second busiest station for boarding in the morning peak and the second busiest station for alighting in the evening peak.

**Table 18-1: 2007 morning peak hour boarding and alighting numbers**

Station	Inbound		Outbound		Total
	Boarding	Alighting	Boarding	Alighting	
Cultural Centre	640	1370	620	310	2940
Southbank	120	870	290	140	1420
Mater Hill	210	180	350	130	870
Woolloongabba	210	180	120	210	720
Buranda	260	300	110	20	690
Greenslopes	230	20	40	10	300
Holland Park	430	50	40	50	570
Griffith University	240	540	90	140	1010
Upper Mt Gravatt	1230	670	70	210	2180
Eight Mile Plains	810	70	10	50	940
<b>Total</b>	<b>4380</b>	<b>4250</b>	<b>1740</b>	<b>1270</b>	<b>11640</b>

Source: South East Busway Assessment Project Draft Stage 2 Report, 2008

**Table 18-2: 2007 evening peak hour boarding and alighting numbers**

Station	Inbound		Outbound		Total
	Boarding	Alighting	Boarding	Alighting	
Cultural Centre	480	630	1070	420	2600
Southbank	130	270	430	130	960
Mater Hill	250	120	460	150	980
Woolloongabba	210	120	170	140	640
Buranda	130	250	180	170	730
Greenslopes	50	50	20	160	280
Holland Park	20	40	20	330	410
Griffith University	170	170	350	150	840
Upper Mt Gravatt	270	80	400	1010	1760
Eight Mile Plains	80	20	40	580	720
<b>Total</b>	<b>1790</b>	<b>1750</b>	<b>3140</b>	<b>3240</b>	<b>9920</b>

Source: South East Busway Assessment Project Draft Stage 2 Report, 2008

**Table 18-3: 2007 average weekday boarding and alighting numbers**

Station	Inbound		Outbound		Total
	Boarding	Alighting	Boarding	Alighting	
Cultural Centre	2850	4900	4550	1890	14190
Southbank	1090	2370	2520	760	6740
Mater Hill	890	2680	2920	710	7200
Woolloongabba	960	920	1040	870	3790
Buranda	500	580	550	360	1990
Greenslopes	430	110	110	350	1000
Holland Park	720	150	150	660	1680
Griffith University	880	1190	1210	650	3930
Upper Mt Gravatt	3090	1230	1320	2880	8520
Eight Mile Plains	1290	150	90	1040	2570
<b>Total</b>	<b>12700</b>	<b>14280</b>	<b>14460</b>	<b>10170</b>	<b>51610</b>

Source: South East Busway Assessment Project Draft Stage 2 Report, 2008

Both the Eight Mile Plains and Springwood stations are already well patronised and the patronage numbers at these stations are likely to grow even more rapidly once the development of Springwood as a Principal Activity Centre occurs over time. Increased patronage will require more bus services, which, without the busway extension, will add to the already congested Pacific Motorway as shown in Figure 18-2.

### 18.3.2 Existing situation — road network

A travel survey conducted by the Department of Transport and Main Roads on the Pacific Motorway in 2006 recorded an average traffic speed of 66 kilometres per hour in the section between the Gateway Motorway and Underwood Road (the posted speed limits are 100 kilometres per hour). The Department of Transport and Main Roads' traffic counts along the Pacific Motorway at the Underwood Road Bridge recorded an average growth rate of 3% per year during the peak periods between 2004 and 2007.

Figure 18-2 shows the existing (2007) traffic volumes and resulting levels of service along the Pacific Motorway at Underwood Road.

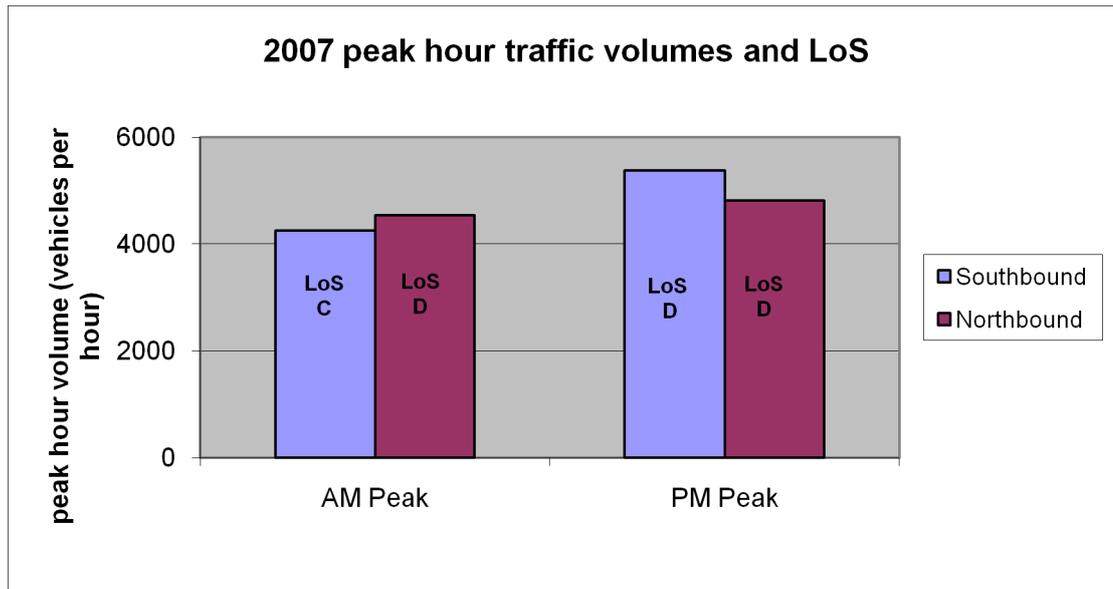


Figure 18-2: Peak hour traffic volumes and estimated levels of service (LoS) on the Pacific Motorway (at Underwood Road Bridge)

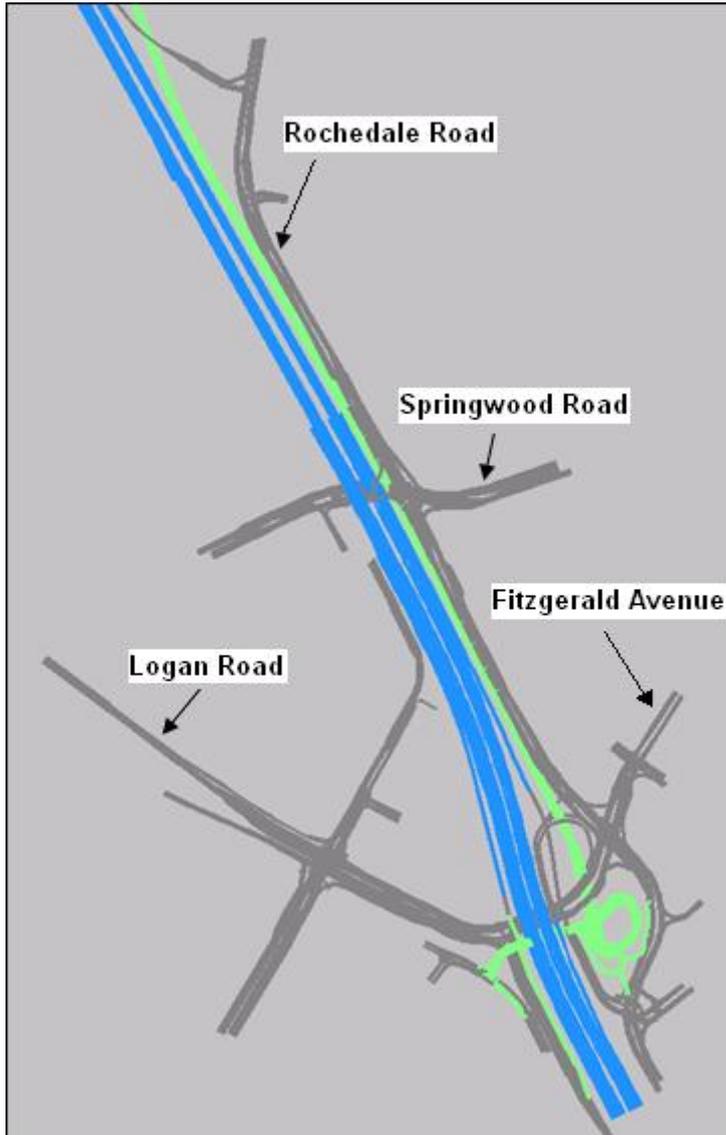
### 18.3.3 Traffic modelling

#### Background

Strategic modelling was used to determine the likely patronage increase and travel time savings resulting from the South East Busway extension. Strategic modelling was carried out using the Brisbane Strategic Transport Model — Multi Modal version 1. The multi modal-model was devised to incorporate a fully functional ‘mode choice model’ into the existing Brisbane Strategic Transport Model and was developed by the Transport Portfolio Transport Modelling Team at the Department of Transport and Main Roads. The proposed changes for the South East Busway extension between Rochedale and Springwood were incorporated into this multi-modal model.

The ‘do-nothing’ case consisted of the aforementioned model as-is, which included planning undertaken as part of the Pacific Motorway Transit Project. The ‘with busway extension’ scenarios involved the full busway extension between the existing Eight Mile Plains busway station and the proposed Springwood busway station, including the proposed park ‘n’ ride busway station at Rochedale.

For the micro-simulation modelling a custom VISSIM model was built for the project to assess the interaction of the busway extension and the local road network. The VISSIM model investigated the area around the Springwood busway station as shown in Figure 18-3. The VISSIM model was based on 2021 volumes. The 2021 volumes were developed by interpolating between 2016 and 2026 cordon volumes from the BSTM.



**Figure 18-3: VISSIM model study area**

### Scope

The aim of the modelling was to:

- determine the likely patronage at the Eight Miles Plains, Springwood and Rochedale busway stations
- determine travel time savings due to the busway extension
- analyse the performance of the road network around the Springwood busway station.

Points 1 and 2 were addressed through the strategic modelling exercise while the road network performance is addressed through the micro-simulation modelling exercise. The strategic modelling exercise is able to look at the large-scale effects of the busway extension on mode share for example, while the VISSIM model is able to model the operation of the a road network in detail. The VISSIM network did not investigate the performance of the Pacific Motorway and instead focused on the road network immediately surrounding the Springwood Busway station which is directly affected by the changes proposed as part of the busway extension.

## Findings

### ***Patronage***

The strategic modelling results indicate that the busway extension will increase the combined daily patronage at the three stations (i.e. Eight Mile Plains, Springwood and Rochedale busway stations) by approximately 5% by 2026. The combined patronage has been used for the comparison rather than the individual patronage as the results indicate a shift in patronage from the existing stations (Eight Mile Plains and Springwood) to the new busway station at Rochedale.

The strategic modelling results indicate that north of Eight Mile Plains, passenger volumes along the busway in the peak directions could increase by about 13% in 2026 (i.e. this is approximately 1,700 extra passengers northbound in the AM peak and 1,000 extra passengers southbound in the PM peak).

### ***Travel time savings***

The strategic modelling results indicate that in 2026, the busway extension would account for the following travel time savings:

- heading northbound in the AM peak, bus passengers could experience travel time savings of just under 3 minutes (i.e. approximately a 40% decrease in travel time between Springwood and Eight Miles Plains)
- heading southbound in the PM peak, bus passengers could experience travel time savings of just under 7 minutes (i.e. approximately a 60% decrease in travel time between Eight Miles Plains and Springwood).

## **18.3.4 Managing issues and opportunities**

### **Issues**

The issues surrounding the busway extension are discussed below and include:

- bus access points and implications on nearby intersections
- changes to local traffic routes
- parking associated with the busway
- implications on local traffic and bus operations during construction
- maintaining access to properties.

### **Busway access points**

While the extension will allow buses to travel independently of the general traffic between Rochedale and Springwood, buses are required to interact with general traffic at the surface street entry and exit points to the busway. Busway access points are located at Rotheron Drive and around the new Springwood bus station along Rochedale Road and Fitzgerald Avenue.

In addition, an emergency/service access is provided at the new signalised intersection at Rochedale Road with Kumbari Street.

The VISSIM modelling included the following intersections:

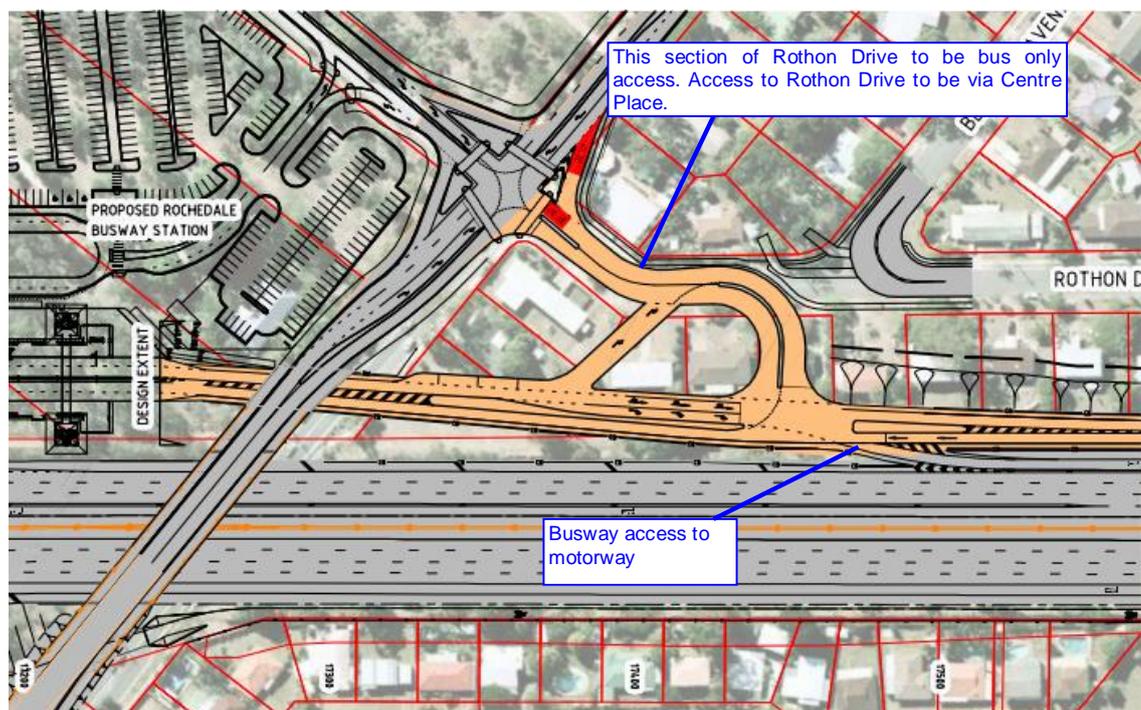
- Logan Road/Lexington Road
- Pacific Motorway northbound off-ramp/Logan Road
- Logan Road/Fitzgerald Avenue/Rochedale Road
- Rochedale Road/Vanessa Boulevard
- Springwood Road/Rochedale Road
- Pacific Motorway southbound off-ramp/Rochedale Road

Observations from the VISSIM modelling indicate that the busway traffic will have minimal impact on the local road network in 2021. Where queuing at intersections was observed the traffic did not extend to the upstream intersection. In addition, these vehicles were only delayed for a maximum of one cycle.

There is potential for traffic on the eastern approach of the intersection of the Pacific Motorway off ramp with Logan Road to queue back towards the Logan Road/Fitzgerald Avenue/Rochedale Road intersection. However, through the use signal of coordination between these two intersections, the queuing can be managed.

### ***Rothon Drive access point***

From Underwood Road the busway extension runs parallel to the southbound carriageway of the Pacific Motorway. Rothon Drive between Underwood Road and Beverley Avenue will be closed to general traffic (i.e. bus only access) and realigned so that it connects to the busway. This will allow buses to enter and exit the busway at this point. The new road alignment in this area is shown in Figure 18-4. Future access to properties that currently have driveway access along this section of Rothon Drive will be from Beverley Street via Centre Place. The design has been updated from the previous planning work undertaken in Stage 1 of the South East Busway extension (between Eight Mile Plains and Underwood Road, Rochedale) as a response to community feedback.

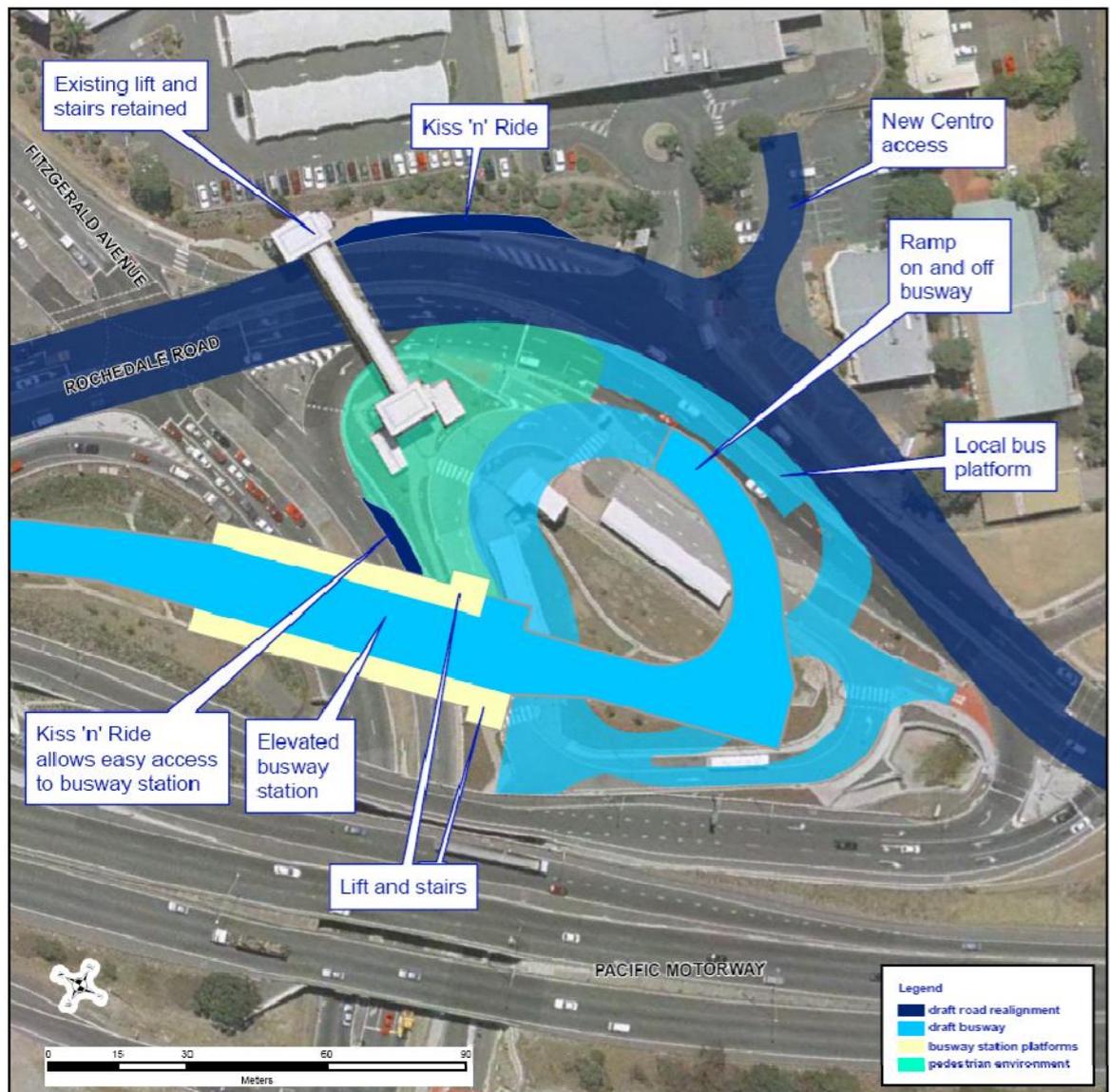


**Figure 18-4: Rothon Drive/Underwood Road intersection and Rothon Drive/busway access intersection**

Intersection analysis, using the SIDRA software package, was carried out to analyse the operation of the intersection of Underwood Road with Centre Place in 2026 with the increased turning movements resulting from the closure of the Rothern Drive intersection with Underwood Road to general traffic. The SIDRA results indicate that this intersection should be able to perform without significant queues (less than 20 metres) or delays (less than 30 seconds).

**Springwood access point**

The busway extension continues parallel to the Pacific Motorway to access the new elevated platforms at the Springwood busway station above Logan Road. Two access points onto the busway are provided and is similar to the existing situation — one off Rochedale Road at the intersection with Vanessa Boulevard and another from the West (two-way, underneath the motorway). A two-way ramp will lead buses on and off the busway. Buses leaving the busway are able to either continue to the West (via the two-way access underneath the motorway) or exit onto Rochedale Road at a new signalised intersection. Figure 18-5 shows the new Springwood bus station layout.



**Figure 18-5: Springwood bus station layout**

The VISSIM modelling indicates that in the AM peak the intersection of Logan Road, Fitzgerald Avenue and Rochedale Road will have heavy traffic from all directions, but with little queuing (for the year 2021). There is also interaction between this intersection and the signalised southbound right turn pocket to the north along Rochedale Road. Through optimising the signal coordination between these two intersections, the delays to traffic on Rochedale Road have been minimised. There is little delay at the intersection in the PM peak based on the VISSIM modelling observations.

Traffic at the intersection of Rochedale Road and Vanessa Boulevard will experience little delay based on the VISSIM modelling observations. There are a number of pedestrian movements along this section. However they have little interaction with traffic as no traffic movements filter through any pedestrian movements.

### ***On-road feeder routes***

There are a number of key feeder routes which allow buses to access the local interchange and busway station at Springwood. From the east, Fitzgerald Avenue and Vanessa Boulevard provide access via intersections with Rochedale Road. From the west, buses approach the Springwood bus station using Logan Road, the Western Service Road, or the Pacific Motorway off-ramp and travel on the bus lanes underneath the Pacific Motorway.

Future detailed investigation will determine the extent of bus operations in these access routes and any impacts to local traffic and intersection capacity. More detail on these feeder routes and potential locations for bus priority measures is provided in Chapter 20, Network integration.

### **Changes to local traffic routes — new Rochedale Road off-ramp**

The existing Rochedale Road off-ramp is to be realigned and will intersect Rochedale Road to the north of Pindari Street. This new configuration creates a 90-degree intersection between the ramp and Rochedale Road, which is a safer intersection configuration than the angled intersection created by the existing ramp and Rochedale Road. The busway extension travels underneath the new Rochedale Road off-ramp to emerge alongside the southern carriageway south of the Rochedale Road ramp. Rochedale Road is shifted to the east of its current alignment in order to create a corridor for the busway to travel adjacent to the southbound carriageway of the Pacific Motorway.

To accommodate the intersection between the new off-ramp and Rochedale Road, the intersection between Pindari Street and Rochedale Road will be closed. Access between Rochedale Road and Pindari Street will be provided through a new signalised intersection at Kumbari Street. This intersection will function as a full T-intersection with left and right in/out movements as well as a U-turn movement for southbound traffic along Rochedale Road to allow access to the commercial properties and church to the south of the new off-ramp. An emergency/service access point to the busway is also provided in this location. In addition, Moffit Court will also be closed off at its intersection with Rochedale Road. The western end of Moffit Court is to be connected to Karoonda Crescent in order to maintain access to the properties at this location. The closure of Moffit Court and Pindari Street and connecting Kumbari Street to Rochedale Road avoids potential safety issues due to the proximity of the new off-ramp and its intersection with Rochedale Road.

The operation of the intersection of Rochedale Road and the Rochedale off-ramp during the peak periods in 2026 was analysed using SIDRA. The SIDRA results indicate that the intersection will operate at Level of Service B during both peaks. In the PM peak the SIDRA results indicate that the northern approach experiences the longest 95th-percentile queues (approximately 100 metres) and the off-ramp will experience delays of about one and half minutes. In the AM peak the results indicate that the southern approach experiences 95th

percentile queues of just under 80 metres and the off-ramp experiences delays of about 25 seconds. These queues lengths will not interfere with southbound vehicles ability to U-turn at the Kumbari street intersection.

### **Access to properties**

During community consultation on the draft Concept Design Study, issues were raised regarding the need to maintain adequate access to properties which are in close proximity to the new Rochedale Road off-ramp intersection. The project team has been investigating alterations to the proposed concept design in this location in consultation with the property owners. The final design will be determined during the detailed design phase of the project and will ensure access is maintained to these properties.

### **Busway parking**

There are no plans to increase the park 'n' ride facilities at Springwood bus station. There are only seven kiss 'n' ride spaces provided at the station currently. These spaces are well used, especially during the evening peak period due to the longer dwell times for pick-up during this time. Springwood bus station is likely to attract an increased number of commuters once the busway extension is complete. As such an increased number of kiss 'n' ride spaces will be required.

The traffic arrangements within this area and the number of kiss 'n' ride spaces required will be investigated in more detail in the next stage of the Concept Design Study. In addition, a parking management strategy needs to be undertaken in future planning phases to manage any parking impacts. See Chapter 20 (Network integration) for more detail on parking.

### **Busway construction**

The construction of the busway extension will in the short term increase heavy vehicle movements, which are required to carry construction materials to and from the site. Delays may occur due to detours, drivers adjusting to new road alignments as well as possible lane or road closures during construction. However, measures can be implemented to mitigate the construction effects. These include:

- restricting the movements of at least some heavy vehicles to periods of lower demand on the motorway
- rationalising the routes taken by heavy vehicles to and from the construction sites
- carrying out lane or road closures where necessary during days and/or time periods with lower traffic volumes
- ensuring that the construction works and all changes associated with the busway (such as road realignments and intersection changes) occur within the same time period so that the period of disruption to motorists is reduced.

Since construction of the Pacific Motorway Upgrade may happen before that of the busway extension, an opportunity exists to coordinate the motorway works with early works for the busway extension. By coordinating the construction works of the two projects, the construction impacts of the projects can be minimised.

Bus routes using Rochedale Road and the Rochedale Road off-ramp may also face disruptions during construction. Diversions will have to be provided for these routes during the construction of the extension. If bus stops are affected during the construction then alternative stops should be provided. The public should be given sufficient warning and information about the new routes and stop locations before the routes are implemented.

## Opportunities

The opportunities surrounding the South East Busway extension from Rochedale to Springwood are discussed below and include:

- improving the reliability of bus travel times between Eight Mile Plains and Springwood
- improving the bus service to Springwood, and connections to the wider public transport network, to cater for predicted growth in the area.

### ***Reliable travel times***

Buses travelling along the busway extension will be independent of the general traffic on the Pacific Motorway. Buses will no longer be required to use the Rochedale Road and Fitzgerald Avenue off-ramps to access Springwood bus station. Consequently this will allow for faster journey times. In addition, with the transfer of the buses away from the motorway network, their impact on other traffic will also be removed.

Based on calculations using the average bus speed, length of the extension and one stop at Rochedale busway station, the extension is likely to result in journey times of just over 4 minutes between the Eight Mile Plains and Springwood stations. Express buses (not stopping at Rochedale) would experience journey times of less than 4 minutes. From these calculations it is therefore evident that the busway extension will result in significantly shorter journey times between the Eight Mile Plains and Springwood stations, when compared to travel on the Pacific Motorway.

The travel time savings as a result of the busway extension will be investigated in more detail in the next stage of the Concept Design Study.

### ***Improving the bus network for future growth***

Providing a quality bus service to the Springwood town centre from the wider areas will be vital to the success of the Springwood town centre as a principal activity centre. A fast and efficient public transport service at the centre will enable commercial premises and retail outlets within the centre to attract staff and shoppers from the wider Brisbane and Logan areas. The integration of bus services with the wider public transport network is investigated in Chapter 20 (Network integration).

## 18.4 Future investigations

The operation of the new intersections and the general road network arrangements and staging with the extension in place will be analysed in the next stage of the Concept Design Study by using a micro-simulation model. This model will be used to inform the operation and suitable arrangements for the road links and intersections affected by the busway extension.

Given the extended timeframe for the delivery of busway extension, the modelling work will need to be revised with updated traffic volumes and public transport patronage and route information closer to the construction date. This is necessary in order to confirm whether the proposed alignment and network configurations will be able to cater for the traffic and transport needs at the time of construction.

It is anticipated that when the construction of the extension proceeds, Springwood will have already been developed into a principal activity centre and new opportunities and challenges are likely to have emerged. Any new traffic related opportunities and challenges should also be assessed at that time.

When the construction staging is known, traffic management analysis should be undertaken to determine what, and when, lane or road closures are to be implemented during construction. To reduce driver confusion, the construction stages should be designed in a manner that minimises the changes motorists experience for the duration of the construction. These analyses should take into account the traffic environment present at that time. Alternative routes for bus routes affected by construction works will also need to be detailed and the public advised of these changes in advance.

## 18.5 References

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