

Kingston City Council
Moorabbin Structure Plan
Transport Study

001

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1 Introduction

Kingston City Council commissioned Arup in November 2010 to assess alternative road networks for the Moorabbin area in response to comments made by VicRoads and the local community on the Draft Moorabbin Structure Plan. This document is intended to be read in conjunction with the Strategic Transport Plan and Data Summary Report previously prepared by Arup.

During this study, Arup has taken into account the needs for future service provision to motorists, pedestrians, cyclists and public transport to ensure the road options and land development is undertaken in a planned and integrated manner.

The remainder of this report is structured as follows:

- Section 2 – VicRoads strategic plans;
- Section 3.1 – Background transport concept;
- Section 3.2– Swept path analysis (new road into Safeway)
- Section 3.3 – Transport modelling;
- Section 3.4 – Alternate concept

2 Background

The VicRoads Principal Bicycle Network (PBN) and Network Operating Plan are strategic plans of metropolitan Melbourne which have recently been released and were not included in the previous transport study for Moorabbin. These plans are intended as a supplement to our evaluation process.

2.1 Bicycle Network

The redefined (December 2009 draft) VicRoads Principal Bicycle Network (PBN) is a strategic network of existing and proposed bicycle routes that guides investment in cycling infrastructure and seeks to provide access for cyclists along significant corridors and to key destinations. It includes both on-road and off-road bicycle facilities. The PBN in the vicinity of Moorabbin is shown in Figure 1 and outlined as follows:

- Nepean Highway – PBN Priority Route
- South Road – PBN Priority Route;
- Along Rail line – PBN Priority Route; and
- Jasper Road – PBN Support Route.

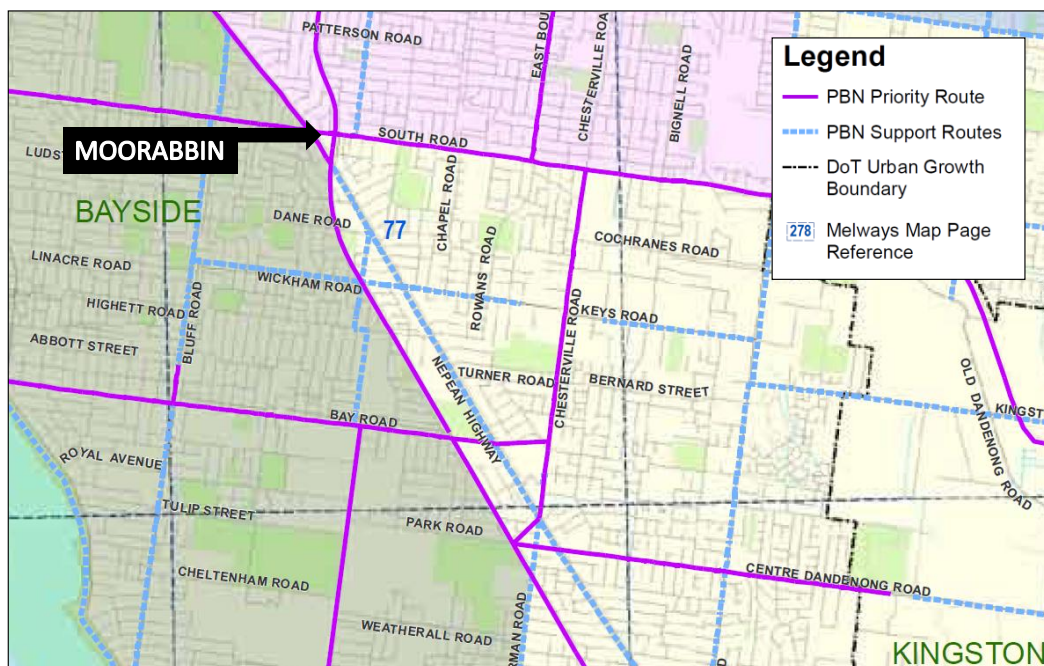


Figure 1 VicRoads PBN in vicinity of Moorabbin

2.2 VicRoads Network Operating Plan

VicRoads has recently released Network Operating Plans for the key parts of the road network in Metropolitan Melbourne (refer Figure 2). The Network Operating Plans are part of the SmartRoads program which seeks to manage competing interests for limited road space by giving priority use of the road to different transport modes at particular times of the day.

The VicRoads Network Operation Plan manual indicates road networks need to:

- Support activity centres as places to live and work.
- Improve the operation of buses and trams.
- Encourage more cycling and walking.
- Facilitate appropriate freight access and mobility.
- Better manage access to the road network.
- Provide reliable journeys.

The Network Operating Plans present a strategic tool and an intent to prioritise certain road users dependent on traffic, public transport, bicycle networks together with the pedestrian environment and urban context.

Some of the key interfaces of the VicRoads Network Operating Plans for Moorabbin Activity Centre are shown in Figure 2 and outlined as follows:

- Station Street – Bus Priority Route / Bicycle Priority Route;
- South Road – Preferred Traffic Route / Bicycle Priority Route / Bus Priority Route / Pedestrian Priority (section of South Road); and
- Nepean Highway – Preferred Traffic Route / Bicycle Priority Route / Bus Priority Route

The key interfaces and priorities from the Network Operating Plans for Moorabbin were important considerations in the concept design development.

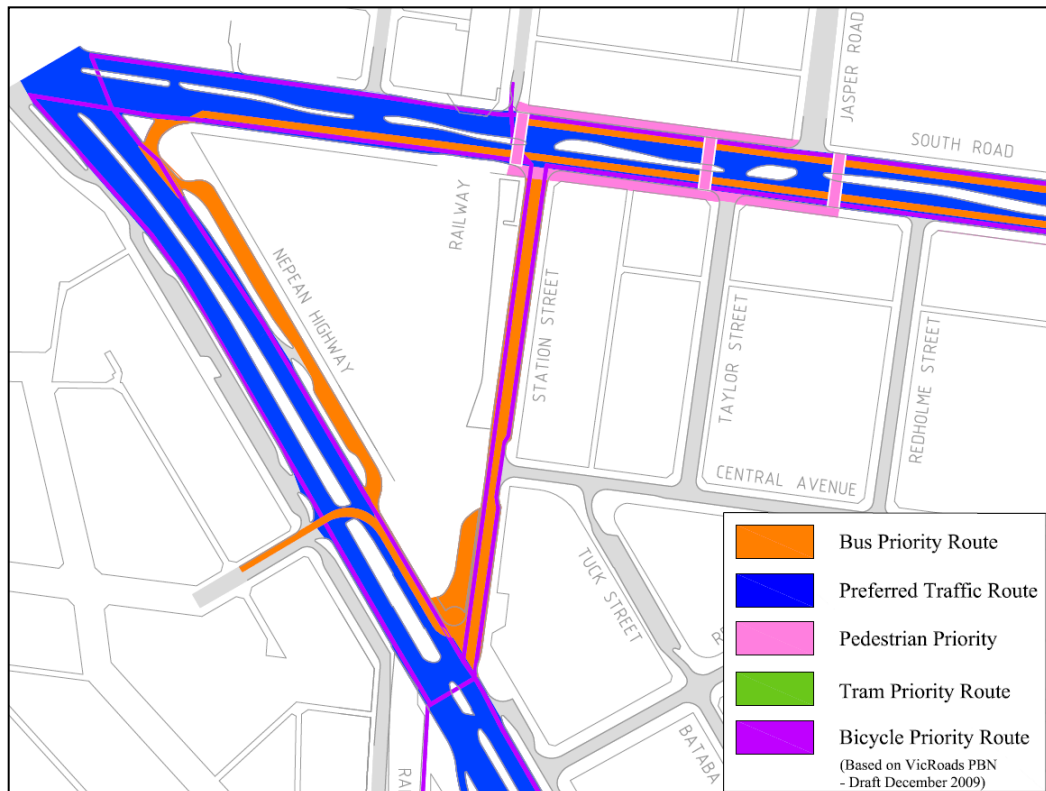


Figure 2 VicRoads Network Operating Plan for Moorabbin

3 Transport Network Option

3.1 Background

The transport concept for Moorabbin shown in Figure 3 involves changing Station Street from a two-way street to a one-way street with three northbound lanes. The eastern two lanes are open to all traffic, with short term parking available along the eastern kerb. The western lane is a bus-only lane, which has a clearway in peak periods and short term parking in off-peak periods. The bus-only lane also accommodates a left-turn slip lane open to all vehicles at the north end of Station Street near South Road.

The area adjacent Station Street to the west will accommodate a new development area over Moorabbin Station, including approximately 220-270 car spaces provided between the train network and ground level. The majority of these car spaces would be commuter parking with some retail parking.

Central Avenue would be changed to a one-way (eastbound) road with a change in road surface to create an improved urban quality and pedestrian amenity while ensuring private motorists can access Safeway coming from the south on Nepean Highway.

The central median on South Road adjacent Taylor Street would be closed at Taylor Street and Jasper Road would be extended south, providing access directly into Safeway from South Road. A one-way (westbound) road would also be provided off the Jasper Road extension to improve access to South Road for residents to the east.



Figure 3 Proposed transport concept for Moorabbin

3.2 Jasper Road / South Road / Safeway

The new intersection at Jasper Road / South Road includes an approach from Safeway, changing the intersection from a staggered configuration to a standard four-arm configuration. This new access to Safeway runs through the existing car park at 382 South Road.

The intersection and road has been designed to allow a 19.0 metre semi-trailer to access the current loading dock at Safeway shown in Figure 4. Detailed drawings of semi-trailer swept paths are shown in Appendix B.

Key design considerations are described as follows:

- Access provided from Redholme Street and from Safeway;
- Access to the allotment north of the new east/west road changed from Redholme Street to the east/west road;
- Access to Safeway from Taylor Street reduced to one location to prevent rat-running. This would require parking design changes at Safeway.
- Formalising the new road to include footpaths on either side;

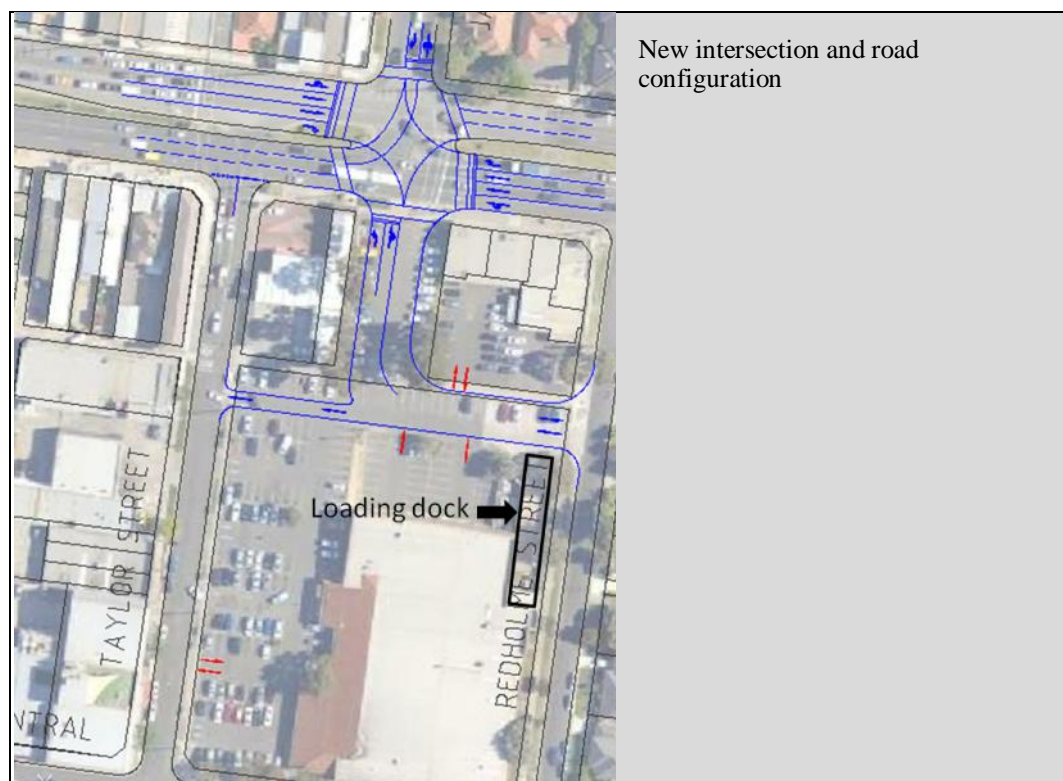


Figure 4 Intersection and road configuration at Jasper Road / South Road near Safeway

3.3 Transport Modelling

In the original Strategic Transport Plan document for Moorabbin Arup described the expected qualitative impacts of changing Station Street and Central Avenue to one-way streets. The purpose of the following investigation is to understand in greater detail the differences in traffic capacity and network performance of such a change in configuration.

Portions of South Road have been modelling using VISSIM micro-simulation software, including Stations Street, Taylor Street and the new intersection at Safeway. Three scenarios were analysed as part of this study:

- Existing Scenario (2009 traffic volumes with existing roadway network);
- “No-build” Scenario (2031 traffic volumes with existing roadway network)
- Transport Concept (2031 traffic volumes with proposed roadway network)

For all three scenarios above, the PM peak hour (5pm to 6pm) has been modelled only as it has been considered the critical period. Total traffic demand entering South Road via Station Street, Taylor Street and Jasper Road is approximately 25% greater in this period than the AM peak hour. Total bi-directional traffic volumes on South Road are similar in both AM and PM peak periods.

Prior to modelling the future year models, the model demand was compared against existing turning movement volumes and VicRoads SCATS data to produce calibrated turning movement volumes in the PM peak hour. The queues observed in the model were also calibrated against observed site visit queues.

3.3.1 Existing Scenario

Network

The existing road configuration was modelled with three lanes in each direction on South Road on the approach to intersections. Because there are no clearway parking restrictions along South Road during the PM peak period, cars often park on street during this time. This effectively reduced South Road to two through lanes; therefore the following sections of South Road were modelled with two lanes of traffic in each direction:

- South Road (north side) – Between Corbie Street and Railway Crescent;
- South Road (both sides) – Between Station Street and Taylor Street;
- South Road (both sides) – Between Redholme Street and end of model;

Phasing

The intersections at South Road / Station Street and South Road / Jasper Road are co-ordinated signalised intersections with the same cycle time. Both intersections were modelled with a 140s cycle time with South Road / Jasper Road intersection off-set by five seconds (based on observed signal settings in November 2010 on a weekday in the PM peak hour). The phasing is shown in Figure 5.



Figure 5 Existing signal phasing along South Road

Traffic Volumes and Movements

Existing turning movement volumes have been sourced from VicRoads SCATS data during October 2009 for signalised intersections along Nepean Highway and South Road. A turning movement survey during the PM peak hour in November 2010 was undertaken to understand the turning movement volumes along Station Street, Central Avenue, Taylor Street and at Safeway.

Existing traffic volumes are shown in Figure 6.

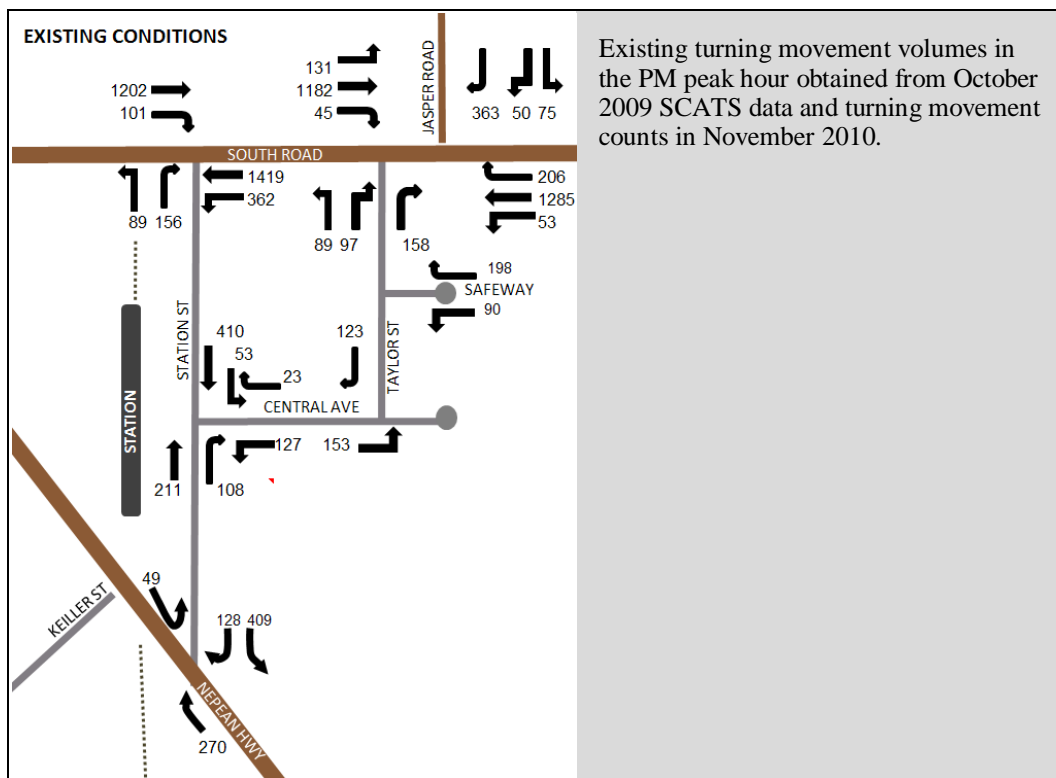


Figure 6 Existing traffic volumes for the PM peak hour in Moorabbin.

Calibration

Prior to modelling future year scenarios, the existing conditions model was calibrated against observed volumes obtained during the turning movement surveys and SCATS data. Once the model was determined to produce a suitable representation of observed existing conditions, the model was carried forward and adjusted to compare proposed scenarios.

The Existing Scenario outputs are shown in section 3.3.4.

3.3.2 2031 No Build Scenario

The No-Build Scenario is used as a comparison against the Concept Scenario to understand the expected delays and queues in 2031 if no changes are made to the current road network. The No-Build Scenario includes the existing network configuration with additional traffic demand to account for anticipated future growth. This growth factor was determined by examining the MITM model as described below.

Network

The No-Build Scenario includes the same network as in the Existing Scenario.

Phasing

The No Build Scenario has the same phasing as in the Existing Scenario. Several signal co-ordination settings were tested between South Road / Station Street and South Road / Jasper Road intersections. However, the existing signal co-ordination setting showed most favourable results.

The 2031 No Build Scenario outputs are shown in section 3.3.4

Traffic Volumes and Movements

Traffic growth forecasts for the road network around Moorabbin were obtained from the Melbourne Integrated Transport Model (MITM). Estimates for traffic volumes were obtained for 2008 (base) and 2031 scenarios years.

The future MITM network was modified from the base year to include the completion of the proposed extension of the Dingley Arterial Road for the 2031 model and the associated changes in travel patterns.

The results of the MITM model showed a 13.5% growth in traffic volumes to 2031 when compared to base (2008) traffic volumes. This 13.5% growth was based on the total traffic that approached South Road / Jasper Road intersection.

Based on MITM results, all existing traffic volumes shown in Figure 6 were increased by 13.5% to obtain the traffic volumes for the No-Build Scenario as shown in Figure 9.

The number of bus services has been modelled as per existing as the major concern is between the No-Build and Concept Scenarios and how bus services operate if the current network is in operation.

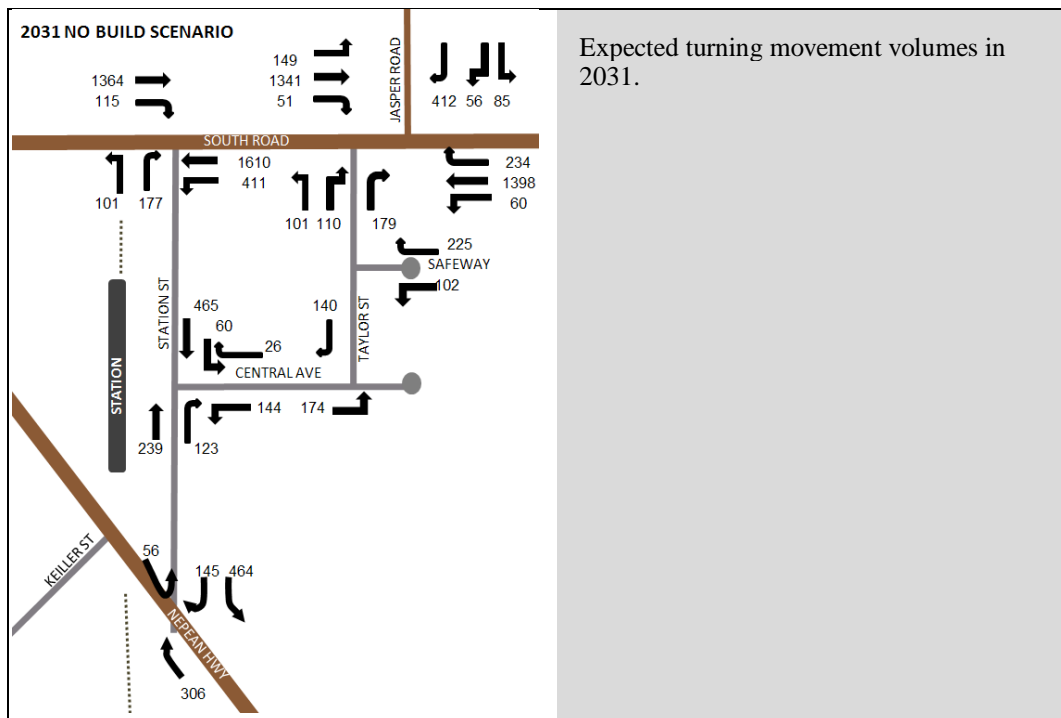


Figure 7 2031 traffic volumes for the No Build Scenario in Moorabbin.

3.3.3 2031 Transport Concept Scenario

Network

- Station Street changes to a one-way road (northbound) with two lanes of traffic and a bus lane.
- Left turn from Station Street to South Road becomes a slip lane.
- Central Avenue is changed to a one-way road (eastbound).
- A parking clearway on South Road (north side) during the PM peak period is implemented in the Transport Concept to allow a follow-up lane for bus services. Therefore, South Road was modelled with three lanes of traffic in the eastbound direction on the northern side between Station Street and Taylor Street. Although a follow up lane and hence clearway is preferred, it is not necessary for this concept, however, it is acknowledged that this will need further consultation between VicRoads and Glen Eira City Council as this is likely to affect the retail premises in the City of Glen Eira, north of South Road.

Phasing

Station Street reconfigured network as one-way northbound only removes the right turn from South Road into Station Street. Therefore, additional green time can be allocated to South Road through movements increasing the time for this phase by more than 10%, from 103 seconds to 115 seconds.

Dedicated right turns are introduced at South Road / Jasper Road intersection removing the filtered right turn that exists currently at Taylor Street. Due to more traffic turning right into Jasper Road than the right turn into the new road, the right turn into Jasper Road is extended prior to the main east / west movement on South Road.

Since the intersection has changed from a staggered intersection with Taylor Street to a standard four-arm intersection, the time required for vehicles to clear the intersection between phases is reduced. Therefore the long all-red phase (approximately six seconds) can be reduced for both the Jasper Road and Safeway road approaches allowing more green time for other phases.

The signal phasing used in the Transport Concept Scenario is shown in Figure 8.

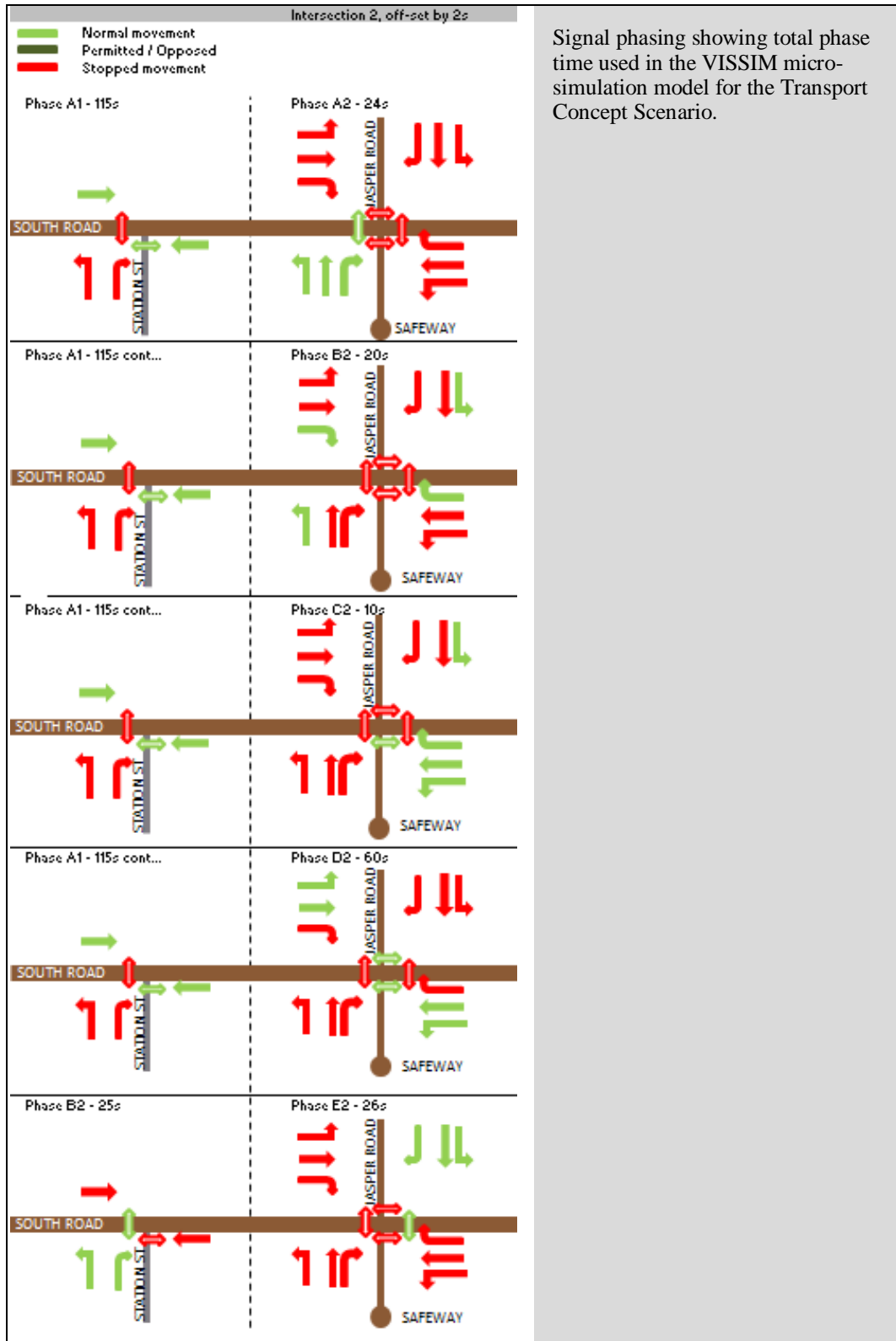


Figure 8 Signal phasing along South Road for the Transport Concept Scenario

Traffic Volumes and Movements

The introduction of a new road to access Safeway as shown in Figure 4 in conjunction with the modifications of Station Street and Central Avenue to one-way streets changes the expected local traffic patterns for the Concept Scenario. The major components of this change are:

- Southbound traffic on Station Street (609 vehicles) are expected to re-route along South Road approaching Nepean Highway; and
- Northbound vehicles on Station Street increased (~160 vehicles) as a result of the one-way road design eliminating the rat-run along Taylor Street.

The number of bus services has not changed from the 2031 No-Build Scenario.

The expected traffic volumes for the Concept scenario in 2031 are shown in Figure 9.

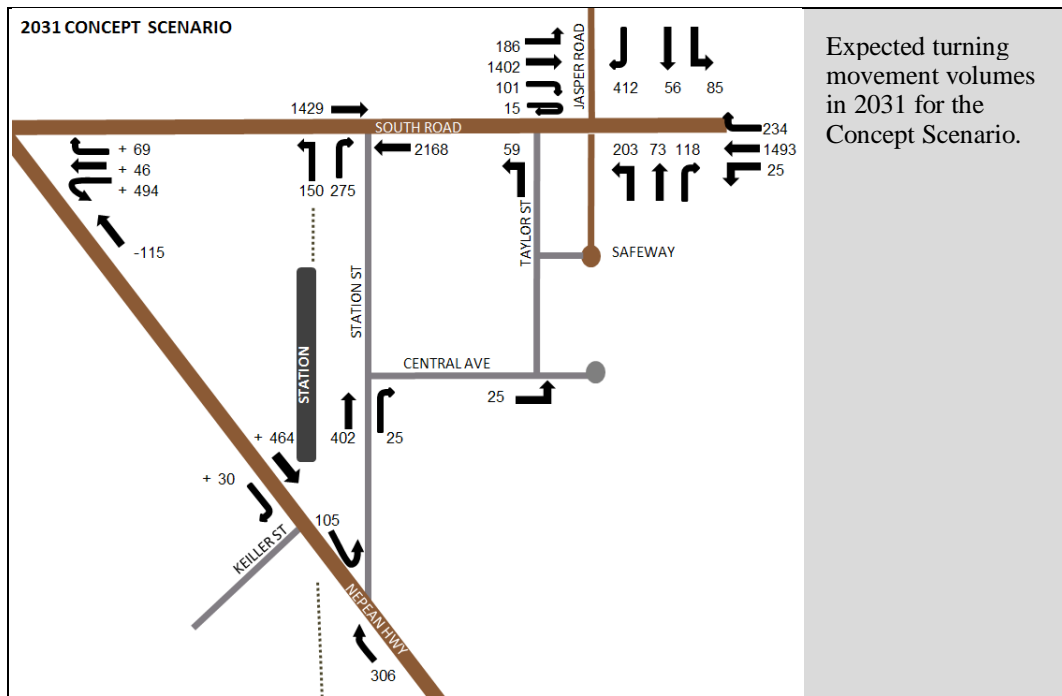


Figure 9 2031 traffic volumes for the Transport Concept Scenario in Moorabbin.

3.3.4 Modelling Outputs

Figure 10 to Figure 12 show the VISSIM results in terms of average queues for all scenarios – existing conditions, 2031 No Build and 2031 Concept. Appendix A shows detailed results including average vehicle delay for all movements.

The comparison between the existing conditions and the 2031 No-Build Scenario represents the expected change in the performance of the traffic network in the absence of any changes. In general, this includes increases to queue lengths and average vehicle delays across the local network. Other key results include:

- Large increase in delays for the eastbound movement on South Road (109 seconds to 143 seconds) with queues reaching back to Nepean Highway. This also increases delays and queues through Nepean Highway / South Road intersection for vehicles approaching Nepean Highway from the west on South Road as well as vehicles approaching South Road from the north on Nepean Highway; and
- Large increase in delays on Taylor Street (98 seconds to 131 seconds) with queuing continued along Central Avenue. Major delays for right turning vehicles from Safeway onto Taylor Street are expected due to long queues on Taylor Street. VISSIM results showed less than half of the demand will be able to exit Safeway, building large internal queues in the Safeway car park. It is likely traffic will re-route to Station Street, especially traffic that is currently rat-running via Taylor Street.

The comparison between the 2031 No-Build Scenario and the 2031 Concept Scenario represents the expected changes to traffic operations as a result of implementing the proposed network improvements. The key results in this comparison are described as follows:

Positive Impacts

- Large reduction in average delay and queues for eastbound movements on South Road. Average delay reduced from 143 seconds to 18 seconds and average queues reduced from 196 metres to 11 metres. This is as result of longer phase times allocated to South Road movements made possible by the consolidated configuration of the intersection at Jasper Road. This change removes the current staggered intersection which has large all red times, and replaces it with a straight configuration requiring less all-red time.
- Reduction in average delay for westbound movements on South Road. Average delay reduced from 58 seconds to 41 seconds despite more ‘through’ movement traffic due to road configuration changes and a dedicated right turn movement into the new road. This is a result of shifting the westbound movement at Station Street 12 seconds earlier in the phase. This is possible because changing Station Street to a one-way northbound only allows a reduction in the number of phases at South Road / Station Street to two per cycle. This improves the signal co-ordination for westbound traffic.
- Large reduction in average delay and queues for vehicles on Taylor Street / new road. Average delay reduced by more than one minute and average queues reduced from 217 metres to 26 metres. This reduces congestion along Central Avenue and improves the experience for customers who are exiting Safeway.

- Station Street left turn slip lane to South Road improves average delay for left turn movements.

Negative Impacts

- With the phase times allocated, vehicles on Jasper Road will be delayed by more than 100 seconds on average, more than 40 seconds more than the No Build Scenario. However, most vehicles do not wait at these signals for more than one cycle. This delay change could be optimised by operational changes to the signal settings.
- The right turn is changed from a filtered phase to a dedicated phase movement, resulting in better performance for most vehicles but an increase in average vehicle delay by approximately 25 seconds over than the No-Build Scenario.

Bus lane and queue jump facility results in minimal improvement in terms of delay for the Concept Scenario when comparing to general traffic on average (63 second compared with 64 second average delay respectively). Due to fluctuations in traffic demand per cycle, it is likely larger delays would occur to buses if no bus lane was provided in some periods of high demand. The bus lane provides for consistent delays to buses improving the reliability of bus services arriving at bus stops on time.



Figure 10 Average existing queues



Figure 11 Average queues in the No Build Scenario in 2031



Figure 12 Average queues in the Concept Scenario in 2031

It is acknowledged that modelling has not been undertaken for the additional 494 vehicles expected to re-route to turn left through the slip lane from South Road to Nepean Highway. Based on preliminary analysis the queue length for vehicles turning left should be approximately 140 metres in length with traffic demand reaching saturation in 2031. This is based on the assumptions below:

- Free flow capacity of South Road is 1,800 vehicles per hour per lane;
- Cycle time of Nepean Highway / South Road intersection is approximately 140 seconds in the PM peak hour (same as South Road / Station Street) with 26 cycles per hour;
- With 26 cycles per hour and a capacity of 1800/veh/lane, the left turn capacity is approximately 70 vehicles (free flow) per cycle;
- Considering there are three phases per cycle and free flow can only occur during one phase – South Road through movements, which is likely to consist of approximately one third of the cycle time (minimum), the left turn capacity is reduced to approximately 23 vehicles;

- An additional 494 vehicles is expected to re-route and turn left onto Nepean Highway. The existing left turn traffic demand is unknown, however, is unlikely to be significant since it is currently quicker to turn left at Station Street to get to Nepean Highway as observed on site. For purpose of analysis, it is assumed the 494 rerouted vehicles are only 75% of the total left turn demand. Approximately 660 vehicles per hour make the left movement in 2031.
- Approximately 25 vehicles per cycle turn left;
- 20% of the 25 vehicles turn left outside of the South Road through movement phase during intergreen and other phase times – 20 vehicles turn left during South Road phase;
- Assuming a seven metre queue length per vehicle (as per Sidra), the queue length will reach approximately 140m before the left turn traffic flows through the intersection; and
- With left turn demand of 20 vehicles and a capacity of 23 vehicles, the movement is reaching saturation with a degree of saturation of approximately 87%.

The concept described in this document frees up traffic on Station Street and as a consequence traffic remains on the major arterial network. This aligns with VicRoads network operating plan with South Road and Nepean Highway being preferred traffic routes. The left turn movement is also a bus priority route and as described above, the majority of vehicles including bus services is likely to be able to turn left within one cycle, however, due to fluctuations in traffic demand per cycle, in some periods of high demand traffic may have to queue for one cycle before turning left.

To further improve efficiency of traffic flow it is recommended to:

- Increase the left turn slip lane from one to two lanes as recommended by VicRoads in the meeting 23rd March 2011; and
- Ban on street parking on the south side of South Road between Nepean Highway and Station Street;



Figure 13 Approximate impact at Nepean Highway / South Road intersection

3.4 Alternative Concept

An alternative concept was developed by VicRoads in October, 2010. Arup was advised by VicRoads that this plan is not a long term VicRoads vision for Moorabbin but was produced to consider alternative ideas for Moorabbin. It was provided to Arup by Kingston City Council for review and comment.

This alternative concept is shown in Figure 14. The central idea in this scheme is extending Jasper Road to Nepean Highway through Redholme Street. This new facility would be a two-way road with a central median.

By extending Jasper Road through to Nepean Highway, it is likely Station Street access would be changed to a left-in, left-out operation on Nepean Highway with the median closed on Nepean Highway. This would allow Nepean Highway / Jasper Road intersection to be the main intersection.

It is expected access to the new road would be provided from Central Avenue, Tuck Street, and Batara Street with Redholme Street truncated south of Central Avenue. Central Avenue would either need to retain its two-way function or become westbound only to access shops off Central Avenue and Station Street for vehicles arriving from the south on Nepean Highway.

The existing intersection at South Road / Taylor Street would turn into a left in, left out operation as shown in Figure 4.

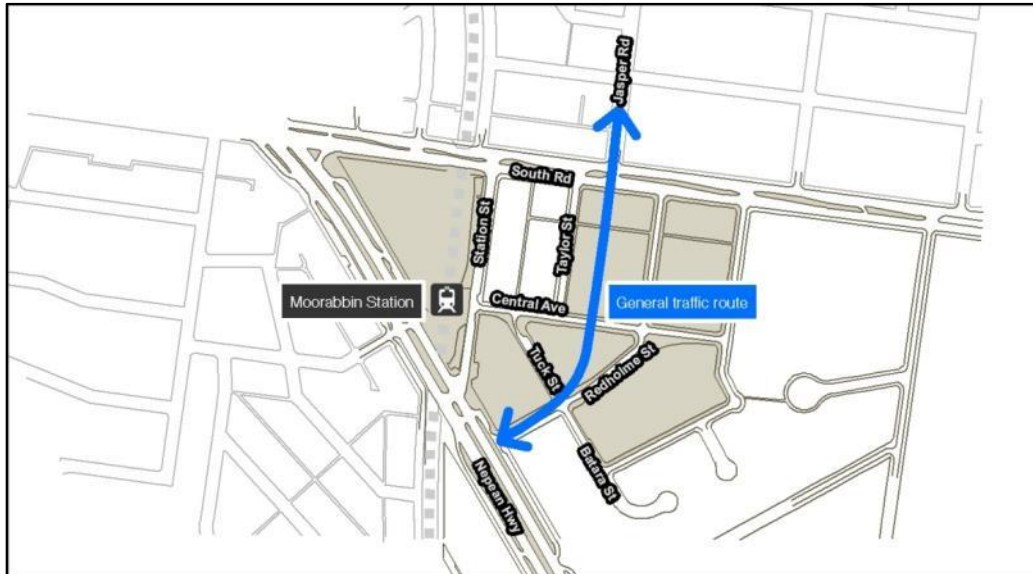


Figure 14 Alternative concept for Moorabbin

The positive and negative impacts to the alternate concept are described as follows:

Positive Impacts

Traffic flow and circulation

- General traffic flow and circulation would likely improve by extending Jasper Road to Nepean Highway. The connectivity between Jasper Road and Nepean Highway is improved for traffic by adding a more direct route in place of the current staggered configuration.
- A large reduction in traffic would be expected along Station Street.
- The direct route via the new road eliminates the existing rat-run occurring along Taylor Street by formalising this movement along the new roadway.
- Residential areas from the east can more easily access South Road and Nepean Highway.

Urban Quality

- Traffic is rerouted away from the town centre and onto the new peripheral road. Station Street can become a pedestrian and bicycle-friendly environment as a result of reduced vehicle speeds and less overall traffic.
- Could have major development and revitalisation implications for Moorabbin Activity Centre due to the scope of the changes and the new road potentially providing a gateway from the north.

Bicycle Connectivity

- Jasper Road is part of the Principal Bicycle Network as identified in Section 2.1. The bicycle connection for cyclists from the north is improved by allowing cyclists to use the new road to enter Moorabbin town centre via Central Avenue.

Public Transport Integration and Accessibility

- Significant reduction in bus delay is likely along Station Street, as competing traffic shifts to the new roadway. This aligns with the goal in VicRoads Network Operating Plan of prioritising buses on Station Street.

Negative Impacts

Pedestrian Connectivity

- South Road and Nepean Highway are existing physical barriers to Moorabbin town centre from a pedestrian perspective. The additional new road will exacerbate this issue, effectively isolating Moorabbin town centre between three arterial roads. The new road limits the connectivity to residential areas and Moorabbin Reserve to the east.

Built Environment

- Requires substantial land acquisition and reconfiguration of potential development parcels. The size and shape of some of these new parcels may not provide optimal flexibility of use for development.
- Requires removal or replacement of the Safeway supermarket which is a major traffic generator to the precinct, as the new roadway alignment runs through the area currently occupied by this building.

Urban Quality

- New arterial road likely to increase noise and emissions for the residents currently east of Redholme Street.
- Careful consideration is required in terms of staging of construction and new developments near the road off Taylor Street and Redholme Street to ensure Moorabbin doesn't become a 'dead zone'.

Parking

- New route runs through existing parking at Safeway supermarket. It is likely many retail outlets in Moorabbin currently rely on Safeway parking, which will need to be removed, reconfigured, or replaced in this scenario.

Public Transport Integration and Accessibility

- Bus route 823 turns right at Station Street from Nepean Highway. This may need to be re-routed via the new road with a new bus stop. It is desirable to keep bus services at a single interchange point close to the train station to promote intuitive way-finding and maintain short interchange times between the rail and bus.

Although this concept has potential transport benefits, the concept is likely to add to the existing issues of lack of urban quality and major roads segregating local residents to the activity centre. This concept is not recommended by Arup.

4 Conclusions

This study has looked at a transport concept for Moorabbin involving changes that include a new intersection at South Road / Jasper Road intersection, reconfiguring Station Street and Central Avenue to one-way streets, and the addition of a new bus-only lane along Station Street.

These changes were modelled using VISSIM micro-simulation software to compare against the existing conditions, “No-build”, and concept scenario for a design year of 2031. These quantitative results supplement the qualitative benefits and trade-offs included in the original Strategic Transport Plan prepared by Arup.

The VISSIM results from the comparison of existing conditions with the “No-build” option indicated major increases in congestion if no infrastructure changes are made by 2031. The result has the potential to reduce the amount of people coming to Moorabbin and therefore a reduction of customers for the Moorabbin traders:

- Large increase in delays and queues for the eastbound movement on South Road causing disruptions to the intersection at Nepean Highway.
- Large queues on Taylor Street with queuing continued along Central Avenue. These queues block vehicles exiting Safeway supermarket.
- Less than half of the demand will be able to exit Safeway supermarket, resulting in large internal queues and delays in the Safeway car park.

The model results from the comparison of the 2031 “No-Build” scenario with the proposed Transport Concept showed several improvements to expected future traffic conditions as a result of implementing the proposed changes to the roadway network. These improvements help reinforce the qualitative improvements discussed in the previous report:

- Large improvements in average vehicle delay and queue lengths for eastbound and westbound traffic along South Road;
- Large improvements for customers exiting Safeway; and
- Reduced congestion along Central Avenue.

Although the addition of a bus-only lane and queue jump facility showed small improvement for buses in terms of average delay, this facility is still expected to improve the consistency and reliability of service during fluctuating traffic conditions during peak times.

5 Recommendations and Next Steps

This study has looked at a transport concept for Moorabbin involving several changes to the activity centre. It is important that construction scheduling is coordinated with other projects to ensure these changes do not create larger issues for the activity centre.

Arup recommends that projects that are not dependant on other projects and will improve upon the urban quality of the activity centre be implemented first. Recommended construction scheduling is described below in implementation order:

- Road surface changes to Central Avenue – Not dependant on other projects.
- Bus interchange upgrade – Not dependant on other projects.
- Central Avenue eastbound only – Not dependant on other projects.
- Nepean Highway / South Road – Increasing left turn slip lane from one to two lanes. Early construction can mean Station Street can change to a northbound only road.
- Station Street northbound only with a bus lane – Dependant on improvements to Nepean Highway / South Road intersection, however, early implementation will improve the reliability of bus services and reduce bus delay in peak periods.
- Parking clearway on Station Street (west side) and South Road (north side) in peak periods – Implemented once Station Street becomes northbound only with a dedicated bus lane and a bus queue jump facility is implemented at Station Street / South Road intersection.
- Jasper Road extension to Safeway – Dependant on Safeway and issues with exiting customers. This project will improve general traffic flow for the precinct.
- Close median adjacent Taylor Street on South Road – To ensure Safeway exiting customers can travel north along Jasper Road or east along South Road, it is recommended to close the median at the same time as Jasper Road is extended to Safeway.
- Area above rail line – Not dependant on other projects and can be implemented once funding is sourced.


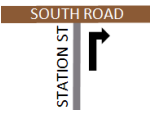
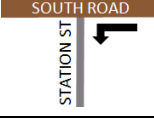
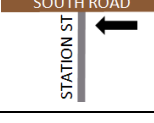


Although, Arup does not recommend the alternative concept for this structure plan, if the City of Kingston wishes to advance the alternate concept further, the next steps would be to conduct a more detailed investigation traffic operations, urban design, and development viability. This could include:

- Adding this scenario to the VISSIM analysis to further understand the traffic and transport implications, as well as additional coordination with VicRoads.
- Conducting a best-practice case study assessment to provide examples of arterials and through streets that provide high pedestrian amenity while acting as gateways rather than barriers to improve urban quality in the area.
- Examining the effects of a realigned Jasper Road on buildable area, access to individual parcels, and the feasibility of different land uses.

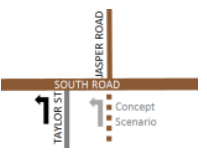
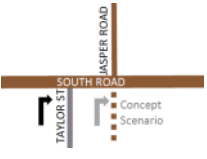
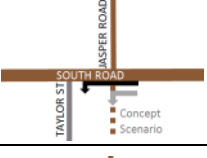
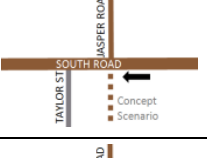
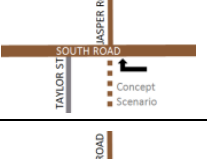
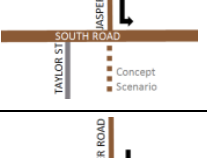
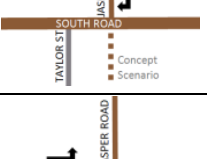
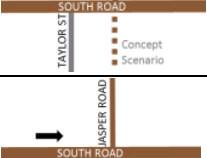
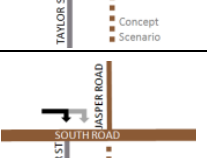
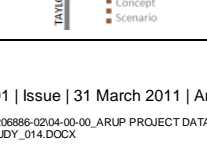
Appendix A

VISSIM Micro-simulation Results


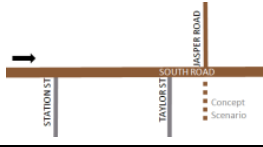
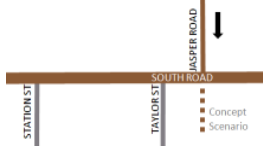

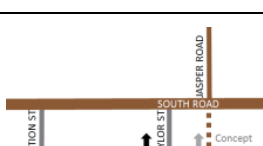
A1 Average Vehicle Delay - South Road / Station Street intersection

Turning Movement	User Group	Existing Conditions (s)	2031 No Build Scenario (s)	2031 Concept Scenario (s)	Delay Change (2031 Scenarios) (s)
	General traffic	54	67	18	49
	Public transport	57	62	18	44
	General traffic	52	67	64	3
	Public transport	46	64	63	1
	General traffic	13	13	-	-
	General traffic	5	6	4	3
	Public transport	7	7	4	3
	General traffic	109	143	18	125
	General traffic	84	120	-	-

A2 Average Vehicle Delay – South Road / Jasper Road intersection

Turning Movement	User Group	Existing Conditions (s)	2031 No Build Scenario (s)	2031 Concept Scenario (s)	Delay Change (2031 Scenarios) (s)
	General traffic	107	134	49	85
	General traffic	98	131	77	53
	General traffic	24	30	29	1
	General traffic	38	58	41	17
	General traffic	91	124	73	52
	General traffic	62	60	109	-49
	General traffic	54	59	101	-42
	General traffic	61	60	49	10
	General traffic	31	31	33	-2
	General traffic	44	47	72	-25

A3 Average Queues

Road Section	Queue	Existing Conditions (m)	2031 No Build Scenario (m)	2031 Concept Scenario (m)	Queue Change (2031 Scenarios) (m)
	Average	12	18	26	-8
	Average	128	196	11	186
	Average	26	31	62	-31
	Average	47	73	82	-9
	Average	55	217	26	191

Appendix B

Swept Path Analysis



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Ove Arup Pty Ltd
 ABN 18 000 966 165



Client
 Kingston City Council

Job Title
 Moorabbin Structure Plan
 Transport Study

Drawing Title
 Intersection access to Safeway

Scale at A4
 1 : 2000
 Plot ID

Drawing Status
 DRAFT

Job No 206886-02	Drawing No v1	Issue
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