Mixed Use Development
Railway Road, Meadowbank

Transport Assessment for Planning Proposal

Prepared for:

Sasco Developments Pty Ltd

10/10/2017

The Transport Planning Partnership

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Mixed Use Development Railway Road, Meadowbank

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V01	10/10/17	Jessica Szeto	Ken Hollyoak	Ken Hollyoak	

Table of Contents

Tables

Figures

APPENDICES

Executive Summary

This report has been prepared on behalf of Sasco Development Pty Ltd to accompany a Planning Proposal, lodged with City of Ryde Council. The Planning Proposal seeks approval to development a mixed-use development on land bound by Railway Road, Constitution Road and Faraday Lane, Meadowbank.

This report provides an assessment of the likely traffic implications arising from the proposed development and identifies mitigation measures, where necessary, to support the Planning Proposal.

Existing Transport Network Conditions

The proposed development site is located directly opposite the Meadowbank railway station, generally bound by Railway Road, Constitution Road and Faraday Lane, Meadowbank. One key issue within the immediate vicinity of the site is the existing pedestrian and vehicle conflicts at the existing pedestrian crossing at Railway Road (east side of the railway). In addition to this, the existing Northern Rail Corridor currently operates above capacity during peak commuter times, with additional rail capacity required.

Based on the current arrangement of the existing pedestrian crossing at Constitution Road-Railway Road, long delays and queues are currently experienced by motorists during peak commuter times, particularly upon train arrivals, when pedestrians cross the existing marked (zebra) pedestrian crossing in large groups. At present, some 423-465 two-way pedestrian movements occur during peak commuter times, equating to 7-8 pedestrian movements every minute.

Future Planned Transport Network

A number of strategic transport studies have been carried out by Council within the Meadowbank area, with a particular focus on the required road and pedestrian network upgrades to facilitate future growth and development of the area, notably the Shepherds Urban Renewal Development project.

Based on these studies, the following key planned road/transport network upgrades have been identified:

- signalisation of Bowden Street-Constitution Road (provided by Shepherds Bay Development)
- signalisation of the existing marked pedestrian crossing at Constitution Road-Railway Parade (50% contributions provided by the Shepherds Bay development). N.B. It is understood Council is currently working with Roads and Maritime Services to deliver the signal controlled pedestrian crossing at this location.

Further to this, the following public transport infrastructure options have been suggested as part of the Rhodes East Priority Precinct to increase rail capacity:

- *Sydney Metro City & Southwest timetable adjustments to cater for increased capacity via additional services and less crowded services at Rhodes (with Northern Line customers diverting on to the Metro at Epping, prior to reaching Rhodes).*
- *Quadruplication of the Northern Line through Rhodes and north over the Parramatta River rail bridge, allowing more services to stop at Rhodes Station.*
- *Mass transit – either providing a new station and service at Rhodes or by alleviating congestion on the Northern Line (e.g. by allowing existing passengers to interchange and connect through to the Sydney CBD or Greater Parramatta).*

The above rail capacity improvement options would provide additional rail capacity and assist alleviate existing rail capacity issues, particularly along the Northern Line. However, any additional rail network upgrades with potential funding mechanisms in place should be considered to address the existing deficiencies in the network, as well as to support future demand and growth in the area.

Proposed Development

At this stage, the proposed mixed-use development is set to comprise the following indicative uses for traffic analysis purposes:

- Residential 358 apartments
- Commercial 1,745m^2 GFA
- Child Care Centre 65 places
- Gym 465m^2 GFA
- Specialty Retail 1,397m^2 GFA
- Retail / Supermarket 2,284m^2 GFA

The proposed development is expected to generate 198 and 319 trips in the AM and PM Peak, respectively. The proposed development traffic only is expected to increase the overall traffic implications by less than 12% in the future case. A majority of the traffic generated in the future case will be predominately driven by the Shepherds Bay Development by Holdmark.

Traffic and Transport Analysis

The following improvement works have been identified to ensure that the surrounding road network operates at an acceptable level, in the future case with the proposed development:

- signalisation of the Bowden Street-Constitution Road intersection (N.B. these works are already committed and will be provided by the Shepherds Bay Development)

- signalisation of the Railway Road-Constitution Road intersection (N.B. 50% contributions provided by the Shepherds Bay Development).

Based on the draft Meadowbank Pedestrian Access Management Plan, it is understood that Council is currently working with Roads and Maritime Services to deliver the signal controlled pedestrian crossing at the Railway Road-Constitution Road intersection.

Summary of Key Findings

- Strategic transport investigations are understood to be currently under investigation/consideration to provide additional rail capacity to support future growth and development along the Northern Rail Corridor, notably the Rhodes East Priority Precinct and surrounding centres.
- Traffic modelling indicates that the surrounding key intersections will operate at an acceptable level of service in the future case, with consideration to the future signalisation of Bowden Street-Constitution Road (provided by Shepherds Bay) and Railway Road-Constitution Road (currently being investigated by Council) intersections.
- The Ryde Section 94 Contributions Plan permits Council to collect contributions for Roads and Traffic Management Facilities in Meadowbank. Monetary contributions levied as part of the future development application will go towards the recommended upgrade to the existing pedestrian crossing on Railway Road.
- A framework travel plan would be implemented as part of the proposed development to facilitate a modal shift towards more sustainable modes of transport (e.g. public transport and/or car share) as opposed to single-occupancy car trips.
- The proposed development would provide a range of uses, with the retail and commercial component envisaged to support local job opportunities, particularly the anticipated increased residential uptake/population in the precinct.
- The proposed development is considered consistent with the key objectives set out in a Plan for Growing Sydney, specifically to provide new housing and jobs along the Northern railway line.

1 Introduction

The Transport Planning Partnership (TTPP) Pty Ltd has prepared this traffic impact assessment report on behalf of Sasco Development Pty Ltd to accompany a Planning Proposal to be lodged with City of Ryde Council (Council).

The Planning Proposal seeks approval to develop a mixed-use development on land at 27 Railway Road and land bound by Railway Road, Constitution Road and Faraday Lane, Meadowbank.

At this stage, the proposed mixed-use development is set to comprise the following indicative uses for traffic analysis purposes:

- Residential 358 apartments
- Commercial 1,745m^2 GFA
- Child Care Centre 65 places
- Gym 465m^2 GFA
- Specialty Retail 1,397m^2 GFA
- Retail / Supermarket 2,284m^2 GFA

The report assesses the traffic implications associated with the proposed development.

The remainder of the report is set out as follows:

- Chapter 2 discusses the existing conditions including a description of the subject site
- Chapter 3 provides strategic context of the future planned upgrades surrounding the site
- Chapter 4 provides a brief description of the proposed development
- Chapter 5 assesses the proposed on-site parking provision and internal layout
- Chapter 7 examines the traffic generation and resultant traffic implications arising from the proposed development
- Chapter 8 presents framework for the implementation of a framework travel plan for the site
- Chapter 9 presents the conclusions of the assessment.

2 Existing Condition

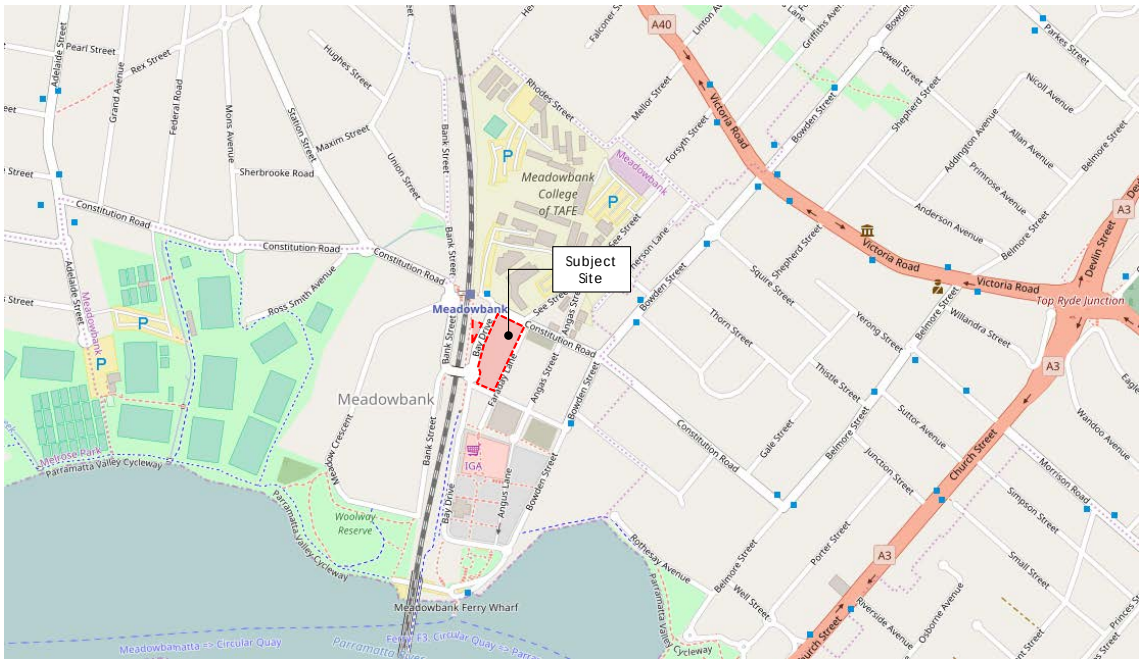
2.1 Site Description

The subject site is bound by Constitution Road, Railway Road, Underdale Lane, Faraday Lane to the north, west, south and east boundary, respectively. The site is located directly opposite to the Meadowbank railway station and falls within the City of Ryde Council local government area.

The site is of approximately 8,100m^2 is currently occupied by a combination of light industrial warehouses and specialty retail shops, with vehicle access currently provided at the rear of the site on Faraday Lane.

The location of the subject site and its environs is presented in Figure 1 below.

Figure 1: Locality Map



Source: ArcGIS

The subject site landholdings are provided in Table 1 and graphically presented in Figure 2 below.

Table 1: Subject Site Landholdings

Street Address	Lot/s	DP / SP
1 – 5A Railway Road, Meadowbank	1, 2, 3, 4, 5, 6, 7, 8	13637
9 – 11 Railway Road, Meadowbank		Strata Plan 35053
12 Railway Road, Meadowbank	1	384872

Street Address	Lot/s	DP / SP
13 -17 Railway Road, Meadowbank	2	384872
18 – 20 Railway Road, Meadowbank	9, 10 and 11	7533
50 Constitution Road, Meadowbank	4 and 5	7533

Figure 2: Subject Site Landholdings Map

Source: Urbis

Land uses surrounding the subject site predominately comprise specialty retail and residential use, including some small café and newsagency shops near the Meadowbank railway station. In addition to this, it is noted that the TAFE NSW Meadowbank Campus and Shepherds Bay Village Plaza Shopping Centre are located to the north and south of the site, respectively.

2.2 Abutting Road Network

The subject site is surrounded by a network of local roads, including Constitution Road, Railway Road, Underdale Lane and Faraday Lane. A brief description of these local roads is provided below.

2.2.1 Constitution Road

Constitution Road functions as a collector road and provide good connectivity between Belmore Street and Bowden Street, as well as to the Meadowbank railway

station. The road travels along the northern perimeter of the subject site and is generally aligned in a north east-south west direction. The road is generally configured as a two-way, two-lane road (one traffic lane in each direction) across a 9m wide road carriageway. Kerbside car parking is generally provided on both sides of the road, east of Bowden Street.

2.2.2 Railway Road

Railway Road functions as a two-way local road and runs along the west boundary of the site. The road is aligned in a north-south direction and provides connectivity between Constitution Road and Bank Street-Bay Drive-Underdale Lane. In addition to this, Railway Road provides direct vehicle access to key drop off and pick up areas to the Meadowbank Railway station, including the small car parking area / shared zone within the Meadowbank railway station, as shown in Figure 3.

In addition to this, short-term car parking restrictions currently apply on either side of Railway Road and are understood to be typically used by customers and patrons to the specialty retail and café uses surrounding the site, in particular near the Meadowbank railway station. A raised pedestrian crossing is currently provided across Railway Road on approach to Constitution Road and is shown in Figure 4.

Figure 3: Meadowbank Railway Station car park / shared zone

Figure 4: Existing Pedestrian Crossing

2.2.3 Underdale Lane

Underdale Lane functions as a two-way local road, generally aligned in a north east-south west direction. The laneway provides connectivity between Bowden Street and Railway Road at the east and west ends, respectively. In addition to this, Underdale Lane provides direct vehicle access to Faraday Lane, which primarily serves as a service road for vehicle access to properties.

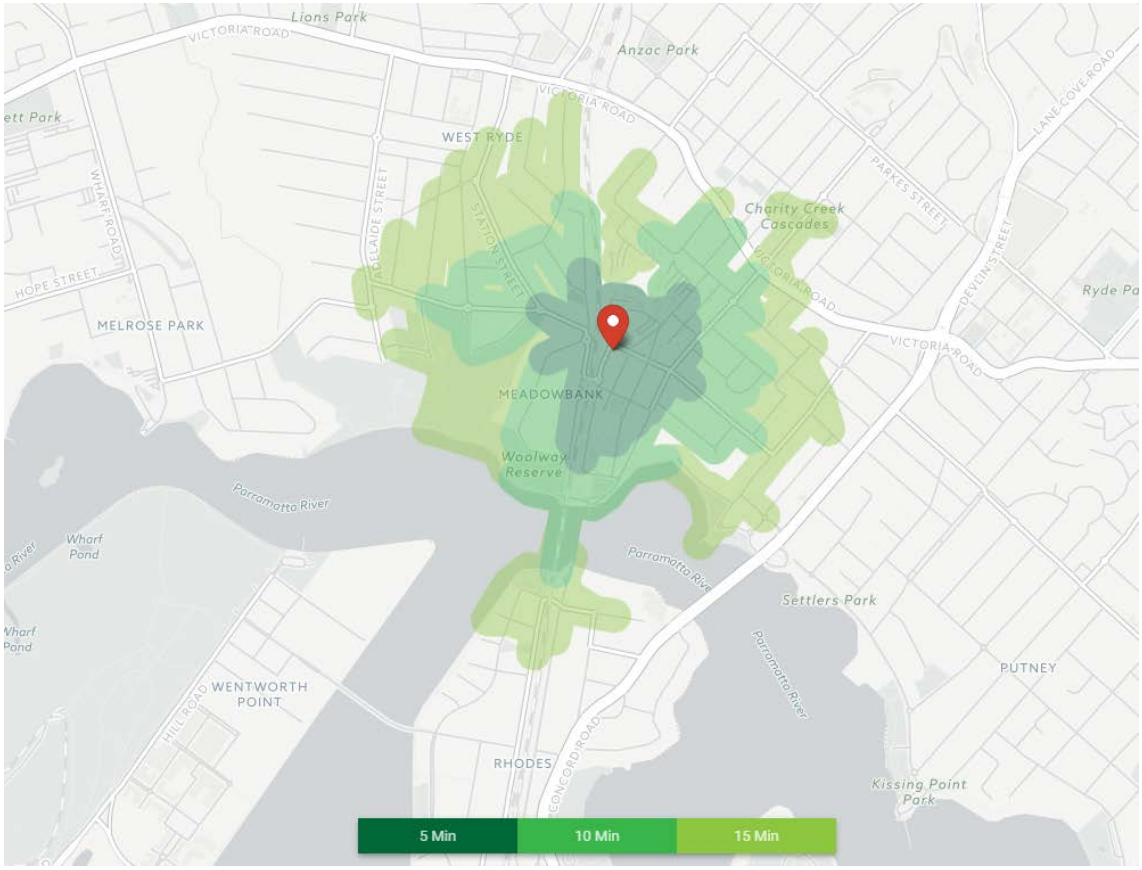
2.2.4 Faraday Lane

Faraday Lane functions as a two-way cul-de-sac local road, generally aligned in a north-south direction. The laneway travels along the east boundary of the site and as indicated above, primarily serves as a service road for vehicle access to properties. Kerbside car parking is generally permitted on one or both sides of the road.

2.3 Pedestrian Infrastructure

The pedestrian catchment within a 15-minute walking distance from the site is shown in Figure 5.

Figure 5: Pedestrian Catchment Surrounding the Site (15-minute walking distance)



Within the immediate vicinity of the subject site, paved pedestrian footpaths are generally provided along Railway Road (both sides) and Constitution Road (north side only), which provide pedestrian access between the Meadowbank railway station and residential properties surrounding the site, including the TAFE NSW Meadowbank Campus and Shepherds Bay Village Plaza Shopping Centre.

However, it is noted that the current pedestrian facilities along Constitution Road are relatively steep with a narrow 1.0m footpath along the north side of the road, as shown in Figure 6.

It is understood that this roadway (including pedestrian paths) will most likely be upgraded as part of the proposed signalisation of Bowden Street and Constitution Road provided by the Shepherds Bay Urban Renewal Development.

Figure 6: Constitution Road Pedestrian Footpath

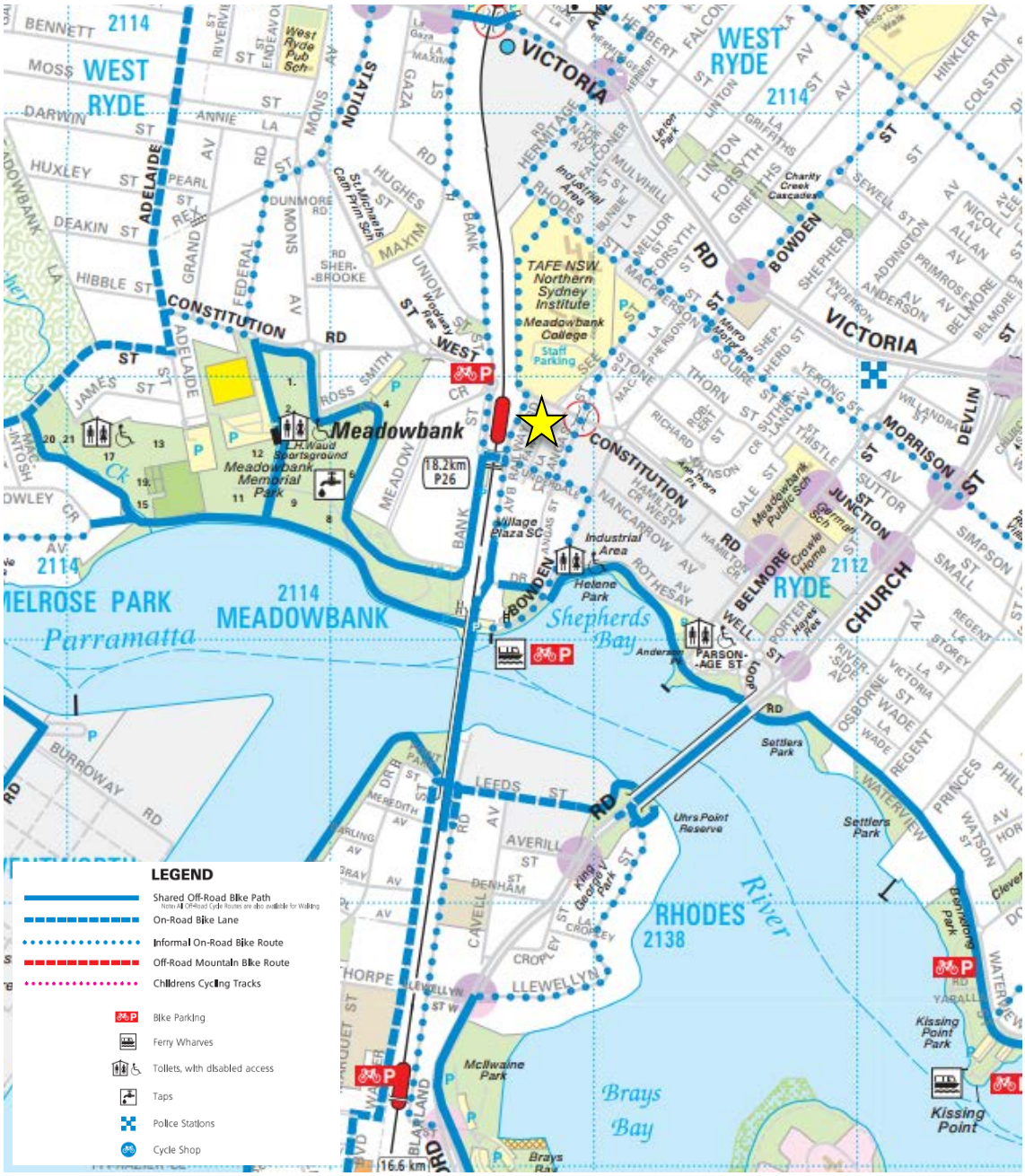
Source: Route360

2.4 Cycling Infrastructure

Well-established cycling routes are provided within the vicinity of the subject site. A recognised informal on-road bike route exists along Underdale Lane and Railway Road, providing connectivity between the TAFE NSW Meadowbank Campus, Meadowbank railway station and Shepherds Bay precinct area. In addition to this, fully enclosed bicycle lockers are provided at the Meadowbank railway station and Meadowbank wharf.

An extract of Council's bike map is presented in Figure 7.

Figure 7: Council Bike Map

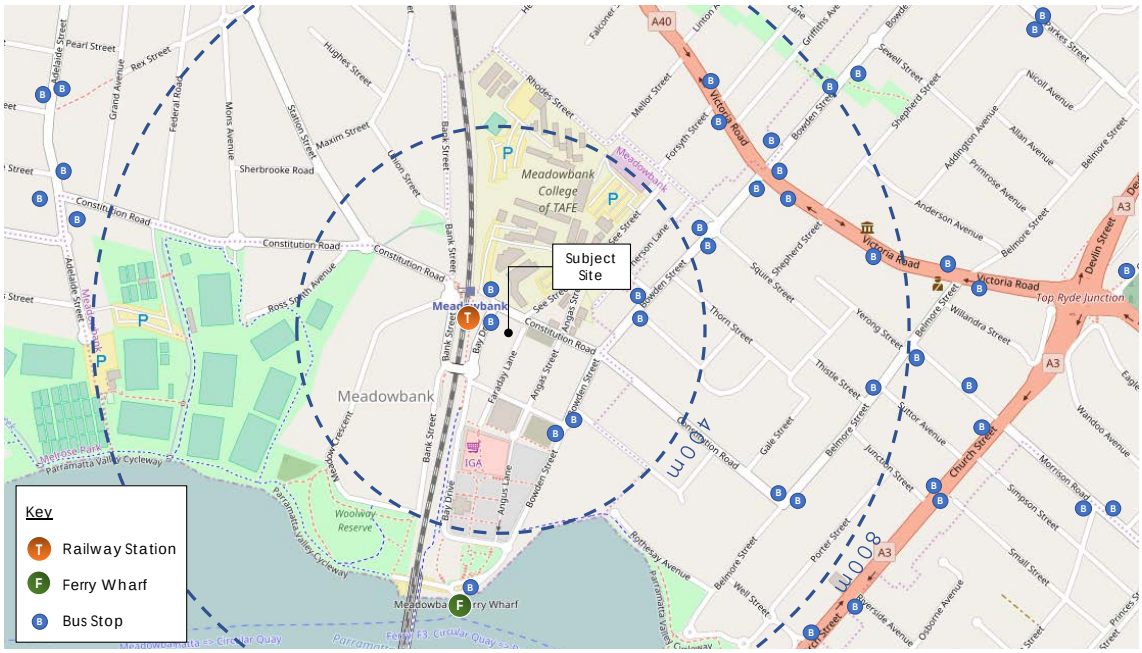


Source: City of Ryde Council

2.5 Public Transport Facilities

The subject site is well serviced by public transport services, including rail, bus and ferry services, being located directly opposite the Meadowbank railway station. The site's proximity to public transport facilities within an 800m radius catchment is shown in Figure 8.

Figure 8: Site Proximity to Public Transport Services



Basemap Source: ArcGIS

A summary of the existing public transport services is provided in Table 2.

Table 2: Summary of Existing Public Transport Services

Service	Route #	Route Description	Proximity to Site	Frequency (on-peak)	Frequency (off-peak)
Rail	T1 Northern Line	Meadowbank to Chatswood via Central	< 50m	4-mins AM 15-mins PM	15-20 mins
		Meadowbank to Hornsby via Epping		Every 15-mins	
Ferry	F3: Parramatta River Ferry to Circular Quay	Meadowbank to Parramatta & Meadowbank to Circular Quay	< 600m	Every 30-mins	
Bus	507	Macquarie University to Circular Quay via Putney	< 50m	30-mins	hourly
	513	Meadowbank Wharf to Carlingford via West Ryde	< 300m	hourly	
	M52	Parramatta to City Circular Quay	< 800m	10-mins	20-mins
	534	West Ryde to Chatswood via North Ryde		15-mins	40-mins
	524	Ryde to Parramatta via West Ryde		30-mins	hourly

Further analysis on the existing rail line service demand and capacity, including future rail capacity, is provided in Section 6.

2.6 BTS Journey to work Data

Journey to Work (JTW) data from the Bureau of Transport Statistics (BTS), derived from the 2011 Census, have been obtained to understand existing transportation modes to

and from the subject site. A summary of the existing mode splits of transportation is presented in Table 3.

Table 3: Existing Travel Mode Splits

Mode of Travel	Proportion (%)	
	where employed residents are travelling to (residential-trips)	where employed people are coming from (non-residential trips)
Vehicle Driver (incl. vehicle passenger)	47%	68%
Train	37%	15%
Walked only	3%	3%
Bus	1%	1%
Ferry/Tram	1%	0%
Other [1]	11%	13%

[1] Other includes mode not stated, worked at home or other mode

Table 2 indicates that a majority of employed people within the Meadowbank area generally travel via car to/from the area, with up to 68% of employed people travelling via vehicle. However, residents living within the Meadowbank area generally travel either by car or train, with 47% of employed residents travelling via car and 37% travelling via train.

Comparably, it is noted that a 37% uptake in train travel for residential trips is considered high compared to the current JTW data within the Greater Sydney and Ryde LGA, which are in the order of 14% and 13% mode splits for train travel.

In addition to this, the directional distributions of trips to/from the Meadowbank area are summarised in Table 4.

Table 4: Existing Travel Patterns

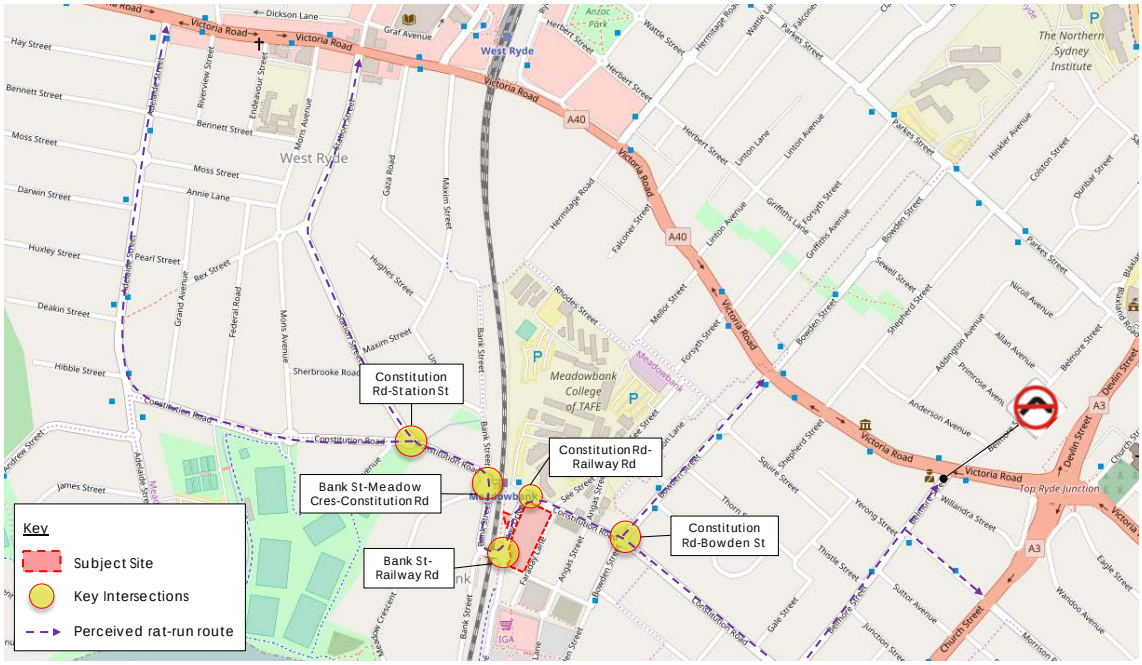
Direction of Travel	Proportion (%)	
	where employed residents are travelling to (residential-trips)	where employed people are coming from (non-residential trips)
North / East	64%	48%
West	10%	25%
South	26%	27%

2.7 Key Surrounding Intersections

Within the vicinity of the subject site, the key surrounding intersections are:

- Constitution Road-Bowden Street (roundabout)
- Constitution Road-Railway Road (unsignalised)
- Bank Street-Railway Road (roundabout)
- Bank Street-Meadow Crescent-Constitution Road West (roundabout)
- Constitution Road-Station Street (roundabout).

Figure 9: Surrounding Key Intersections



Basemap Source: ArcGIS

In addition to this, it is understood that Constitution Road is a perceived rat-run route to avoid congestion along Victoria Road at certain times from the external road network (i.e. not from the local area). Based on site inspections, the rat-run route through Meadowbank was observed to be primarily generated from motorists off Victoria Road/Church Street.

However, it is noted that the key surrounding intersections were observed to generally operate satisfactory during the interpeak times. During peak periods, some queueing can occur on key east and west approaches, which is further exacerbated by the existing pedestrian crossing outside of the Meadowbank railway station.

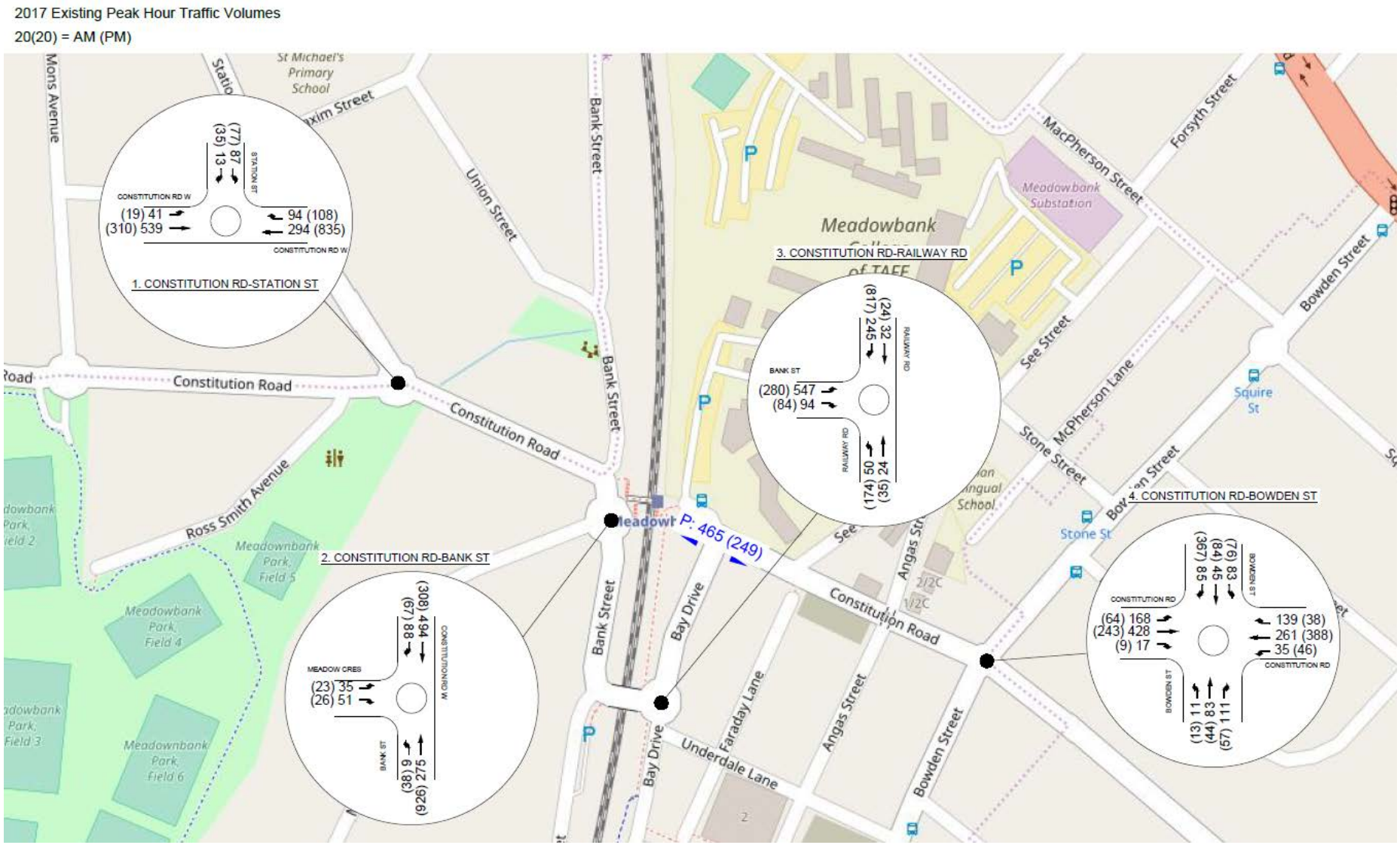
2.8 Traffic Volumes

TTPP commissioned traffic surveys which were conducted at key surrounding intersections on Thursday, 11 May 2017 between 6.30am-9.30am and 3.30pm-7.30pm. Based on the traffic surveys, the following peak hours were identified:

- morning peak: 7.30am-8.30am
- evening peak: 4.30pm-5.30pm

A summary of the network peak traffic flows surrounding the site is shown in Figure 10 overleaf.

Figure 10: Existing Peak Traffic Volumes



Basemap Source: Open Street Map

2.9 Pedestrian Volumes

As noted previously, a raised pedestrian crossing is provided across Railway Road directly outside of the Meadowbank railway station. Given the proximity of the site to the Meadowbank railway station, it is noted that pedestrian volumes through the area are generally high, particularly during typical peak commuter times.

Based on this, TTPP has commissioned a pedestrian count at the existing raised pedestrian crossing outside of the Meadowbank railway station on Thursday, 11 May 2017 between 6.30am-9.30am and 3.30pm-7.30pm. Two-way pedestrian flows at the existing pedestrian crossing were recorded every 15-minute interval, with the results summarised in Figure 11.

Figure 11: Summary of Existing Pedestrian Volumes

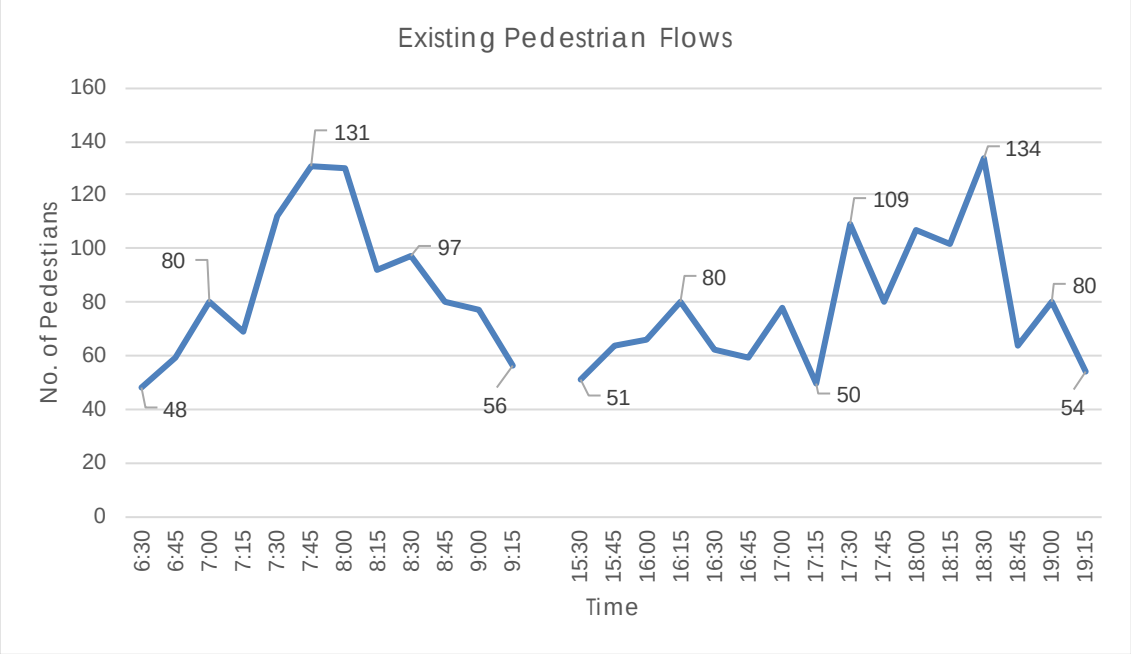


Figure 11 indicates that current pedestrian volumes crossing at the existing pedestrian crossing are high, with up to 134 two-way pedestrian movements in any given 15-minute period during the morning and evening peak. On average, approximately 81 two-way pedestrian movements were recorded every 15-minutes during the survey period.

The peak hour pedestrian flows at the existing pedestrian crossing were found to be as follows:

- morning peak hour (7.30am-8.30am):
  - 465 two-way pedestrian movements (40 eastbound and 425 westbound)
- evening peak hour (5.45pm-6.45pm)

- 423 two-way pedestrian movements (373 eastbound and 50 westbound)

Based on the existing pedestrian flows surrounding the area, it is understood that Council intends to upgrade the existing pedestrian crossing to a signalised pedestrian crossing. This is further detailed in Section 3.

Notwithstanding this, it is unclear when the proposed signalised pedestrian crossing would be implemented, however, a review of the existing pedestrian and vehicular flows against the RMS warrants are set out below. Future anticipated pedestrian and vehicular flows are further assessed in Section 7.

2.9.1 RMS Warrants

The RMS Traffic Signal Design Guide (Section 2 Warrants) suggests that a signalised mid-block marked foot crossing may be considered if the following warrants are met:

- *For each four one-hour periods of an average day:*
  - *The pedestrian flow crossing the road exceeds 250 persons/hour; and*
  - *The vehicular flow exceeds 600 vehicles/hour in each direction or, when there is a central median of ate least 1.2m wide, 1000 vehicles/hour in each direction.*

Table 5: Summary of Pedestrian and Vehicular Flows (Thursday, 11 May 2017)

	Time Period	Two-Way Pedestrian Flows (P) (persons/hour)	Railway Road southbound (V1) (vehicles/hour)	Railway Road northbound (V2) (vehicles/hour)
AM	6.30am-7.30am	256	188	573
	7.30am-8.30am	465	277	571
	8.30am-9.30am	310	279	536
PM	3.30pm-4.30pm	261	768	266
	4.30pm-5.30pm	249	841	313
	5.30pm-6.30pm	398	688	343
	6.30pm-7.30pm	332	369	179

Based on the above traffic surveys, the existing marked (zebra) crossing do not currently satisfy the warrants as set out in the RMS Traffic Signal Design for signalised mid-block marked foot crossings. However, it should be noted that future development and growth within the area will further increase the need for the existing marked (zebra) crossing to be upgraded to provide acceptable solution for both pedestrians and motorists.

3 Future Planned Road/Infrastructure Upgrades

The subject site falls within the Meadowbank Employment Area (Shepherds Bay), which is generally bound by the Northern railway line, Constitution Road, Church Street and the Parramatta River.

The Shepherds Bay precinct is shown Figure 12.

Figure 12: Shepherds Bay Precinct

Source: City of Ryde Council

Based on information provided by Council's website, both the State government and the City of Ryde's current vision for the Shepherds Bay area is for it to be a high density residential area with retail and commercial uses focused within the precinct adjacent to the railway station.

Notwithstanding this, a number of studies have been carried out to investigate potential improvements to the surrounding road network (road and pedestrian infrastructure) to facilitate the envisaged growth of the Shepherds Bay precinct, including recent studies:

- Meadowbank Station West Pedestrian Access and Mobility Plan (draft dated 7 June 2017)
- Integrated Transport Strategy 2016-2031

- Meadowbank Employment Area Traffic Needs Assessment.

A brief overview of the above listed traffic and transport studies is provided below.

3.1 Meadowbank Station West Pedestrian Access and Mobility Plan

GHD has prepared a Meadowbank Station West Pedestrian Access and Mobility Plan (PAMP), on behalf of City of Ryde Council, to review the current pedestrian needs and improve pedestrian connections within the Meadowbanks Station West area.

As part of this PAMP, the following key pedestrian constraints and issues were identified:

- **Bank Street-Constitution Road West** – existing pedestrian crossing is sub-standard and crosses two approach lanes in a northbound direction. In addition to this, poor quality footpath surface and kerb ramps exist at this location. During peak commuter times, this pedestrian crossing impacts on existing traffic operations, resulting in long queues along Bank Street (northbound) and Railway Road.
- **Railway Street-Constitution Road** – existing pedestrian crossing impacts on existing traffic operations, resulting in long queues.

In addition to this, it should be noted that Council is currently working with Roads and Maritime Services to deliver a signal controlled pedestrian crossing at Railway Street-Constitution Road.

A summary of the high priority proposed updates that were identified as part of the PAMP is provided in Figure 13.

Figure 13: PAMP High Priority Projects – Proposed Upgrades

PAMP ID	Location (Street / Intersection)	Description of Proposed Treatment	RMS Priority	RMS Rank
106	Constitution Road / Railway Parade	Intersection re-design. Council is currently working with Roads and Maritime to deliver a signal controlled pedestrian crossing at this location.	76	1
34	Meadow Crescent, west of Bank Street	Re-design the intersection and resurface footpaths.	74	2
33	Meadow Crescent (western side)	Resurface the footpath (approximately 80 m in length)	62	3
65	Maxim St, west of Union St	Pedestrian crossing is to be replaced with a new crossing in 2017/18 (Roads and Maritime grant). Introduce AS.1428 compliant ramp on the northern side of the crossing.	60	4

Source: City of Ryde PAMP, prepared by GHD

3.2 Integrated Transport Strategy 2016-2031

The City of Ryde has developed an Integrated Transport Strategy (ITS) to provide a framework to plan a more cohesive and integrated transport network to support growth within the City of Ryde area. The ITS is centred around five key policy positions, including Integrated Land Use, Parking, Active Transport, Public Transport and Roads and Freight.

In addition to this, the ITS aims to:

- maximise opportunities to increase the use of public transport, walking and cycling
- reduce the frequency and length of trips on the transport system
- improve local traffic access and parking
- provide a framework for a more cohesive transport network by 2031.

As part of the ITS, the Meadowbank Local Centre Strategy identifies the following recommendations:

- signalising the intersection of Bowden Street-Constitution Road
- signalising the intersection of Railway Road and Constitution Road
- providing a pedestrian priority scheme through the local roads in Shepherd's Bay and through to the Meadowbank Station.

The key recommendations/actions to support future growth within the Meadowbank precinct area are summarised in Figure 14.

Figure 14: Meadowbank Town Centre

No.	Action	Lead Area	Term
MB1	Investigate signalising the intersection of Bowden Street with Constitution Road	CoR	Medium
MB2	Investigate signalising the intersection of Railway Road and Constitution Road	CoR	Medium
MB3	Investigate a pedestrian priority scheme through the locals roads in Shepherd's Bay and through to the Meadowbank Station	CoR	Short

Source: City of Ryde Council

3.3 Meadowbank Employment Area Traffic Needs Assessment

In 2012, the Meadowbank Employment Area Traffic Needs Assessment was prepared by Bitzious Consulting, on behalf of City of Ryde Council, to identify a number of upgrade works to support future growth and development within the Meadowbank Employment Area (Shepherds Bay).

The key objectives that led to the development of the preferred network are as follows:

- **Objective 1** – managing intersection capacity to limit the effect of rat running
- **Objective 2** – limiting the effects of through traffic on residential amenity
- **Objective 3** - actively encouraging the ease of pedestrian movements by appropriately managing pedestrian and traffic conflict points
- **Objective 4** - facilitating appropriate alternative traffic routes in Meadowbank through intersection and other upgrades on these routes
- **Objective 5** – fixing existing traffic and pedestrian safety issues that will be exacerbated with increasing traffic.

The 2031 Meadowbank preferred network is shown in Figure 15.

Figure 15: Meadowbank 2031 Preferred Network

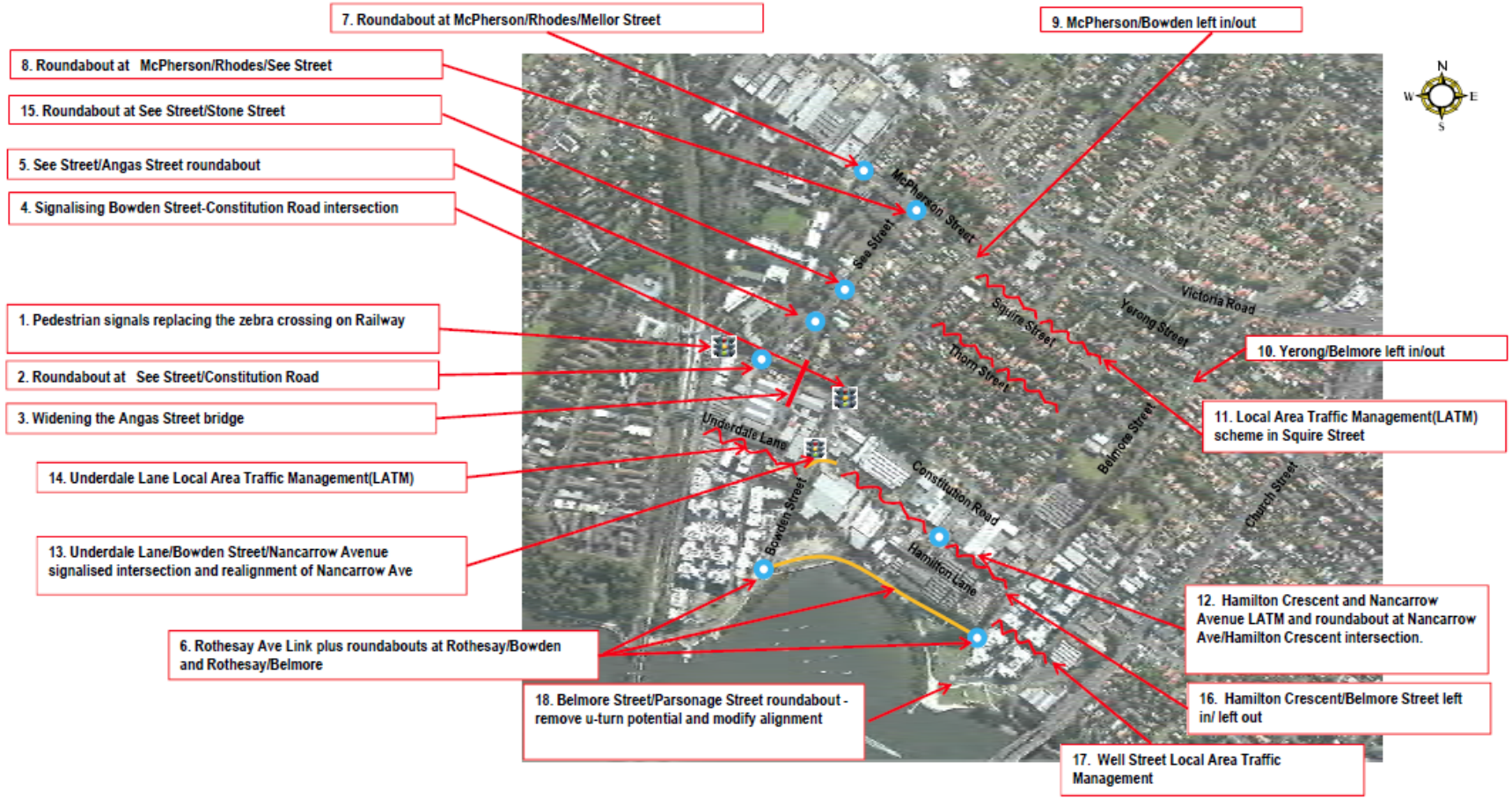


Figure ES1: Meadowbank 2031 Preferred Network

Source: Meadowbank Employment Area Traffic Needs Assessment

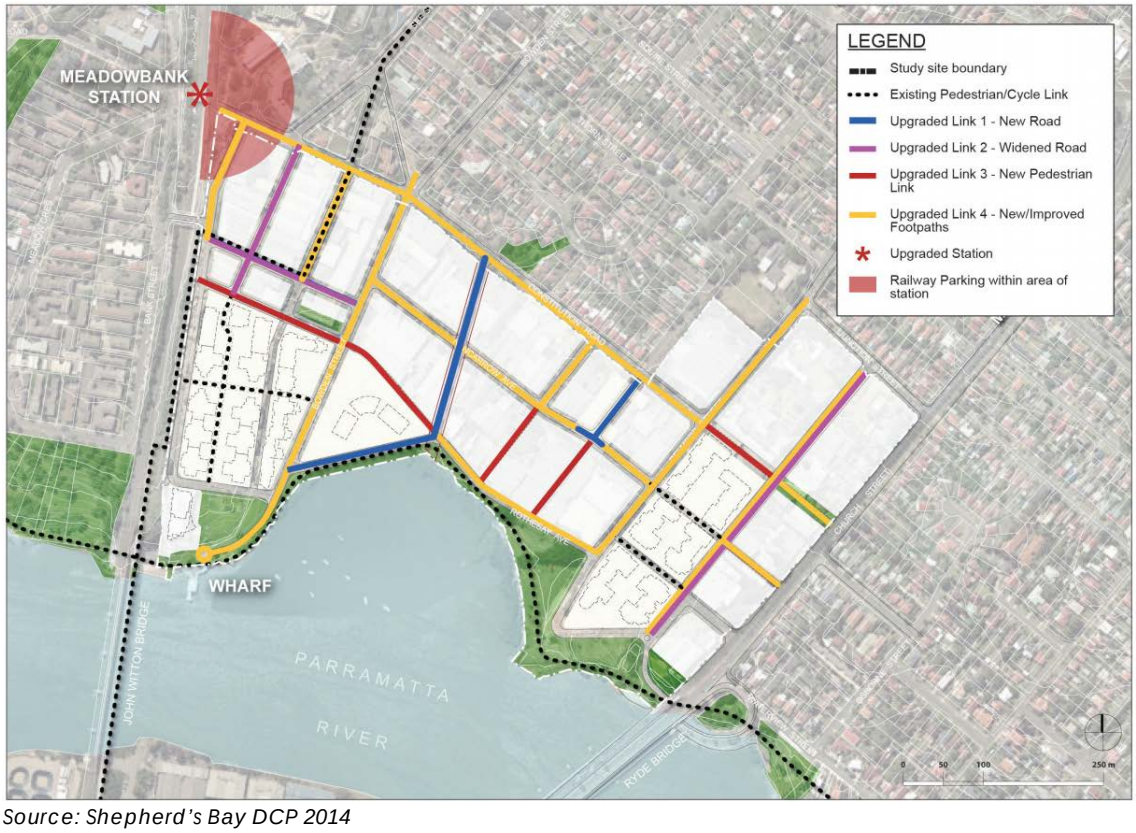
In addition to this, based on preliminary discussions held with Council's Traffic Engineers, it is noted that the proposed roundabout at the See Street-Angas Street roundabout is unlikely to go ahead.

3.4 Shepherd's Bay Development Control Plan 2014

As part of Council's desired future character for the Shepherd's Bay area, the key vision for the area is to create a higher density transit-orientated neighbourhood to provide a mix of residential and commercial/retail uses. In addition to this, commercial and retail development is envisaged to be concentrated around Meadowbank Station and along Church Street, with residential development dominate between these employment nodes.

Notwithstanding this, Council has identified a number of public domain upgrades to facilitate the growth and development within Shepherds Bay, as shown in Figure 16.

Figure 16: 2014 DCP Domain Upgrade



Source: Shepherd's Bay DCP 2014

3.5 Shepherds Bay Urban Renewal Development

Holdmark is planning to deliver a number of residential developments as part of the Shepherds Bay Meadowbank Urban Renewal Project across 9 key stages, as shown in Figure 17.

Figure 17: Shepherds Bay Meadowbank Urban Renewal Project

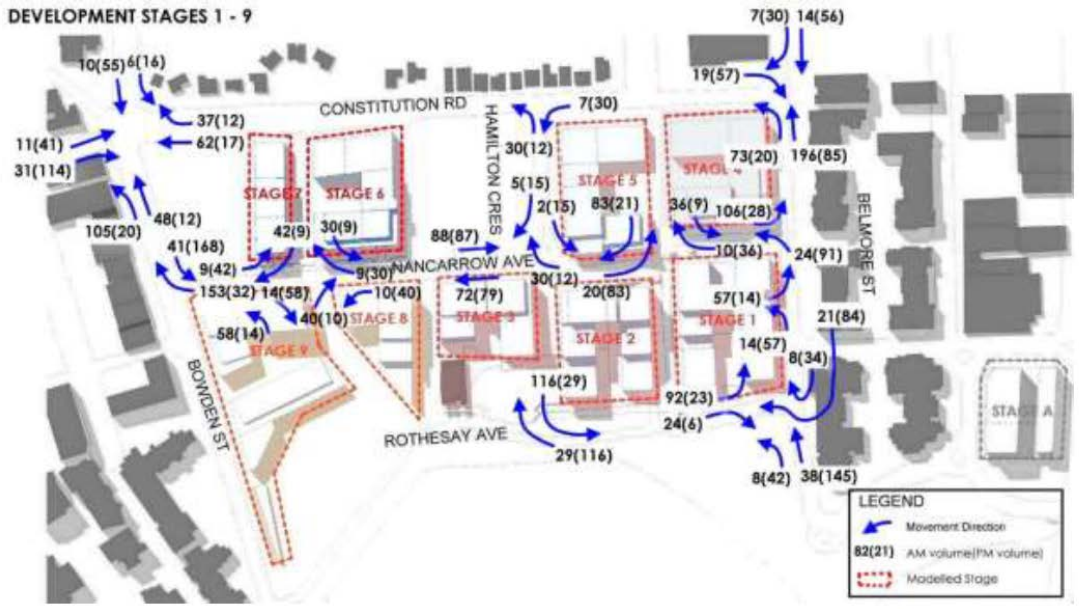
Source: City of Ryde Council

The nine key stages of the Shepherds Bay Urban Renewal Development are summarised as follows:

- **Stage 1** – residential flat building containing 246 apartments
- **Stages 2 and 3** – 2 residential flat buildings containing 453 apartments
- **Stages 4 and 5** – 2 residential flat buildings containing 511 residential apartments
- **Stages 6 and 7** – 2 residential flat buildings containing 311 residential apartments, including infrastructure works (lowering of Constitution Road), traffic signals and stormwater infrastructure through the site
- **Stages 8 and 9** – 3 residential flat buildings containing 422 residential apartments.

A summary of the proposed development traffic arising from the above Shepherds Bay Urban development is provided in Figure 18.

Figure 18: Shepherds Bay Meadowbank Urban Development Traffic



Source: Traffic Impact Assessment, Road Delay Solutions, dated June 2026

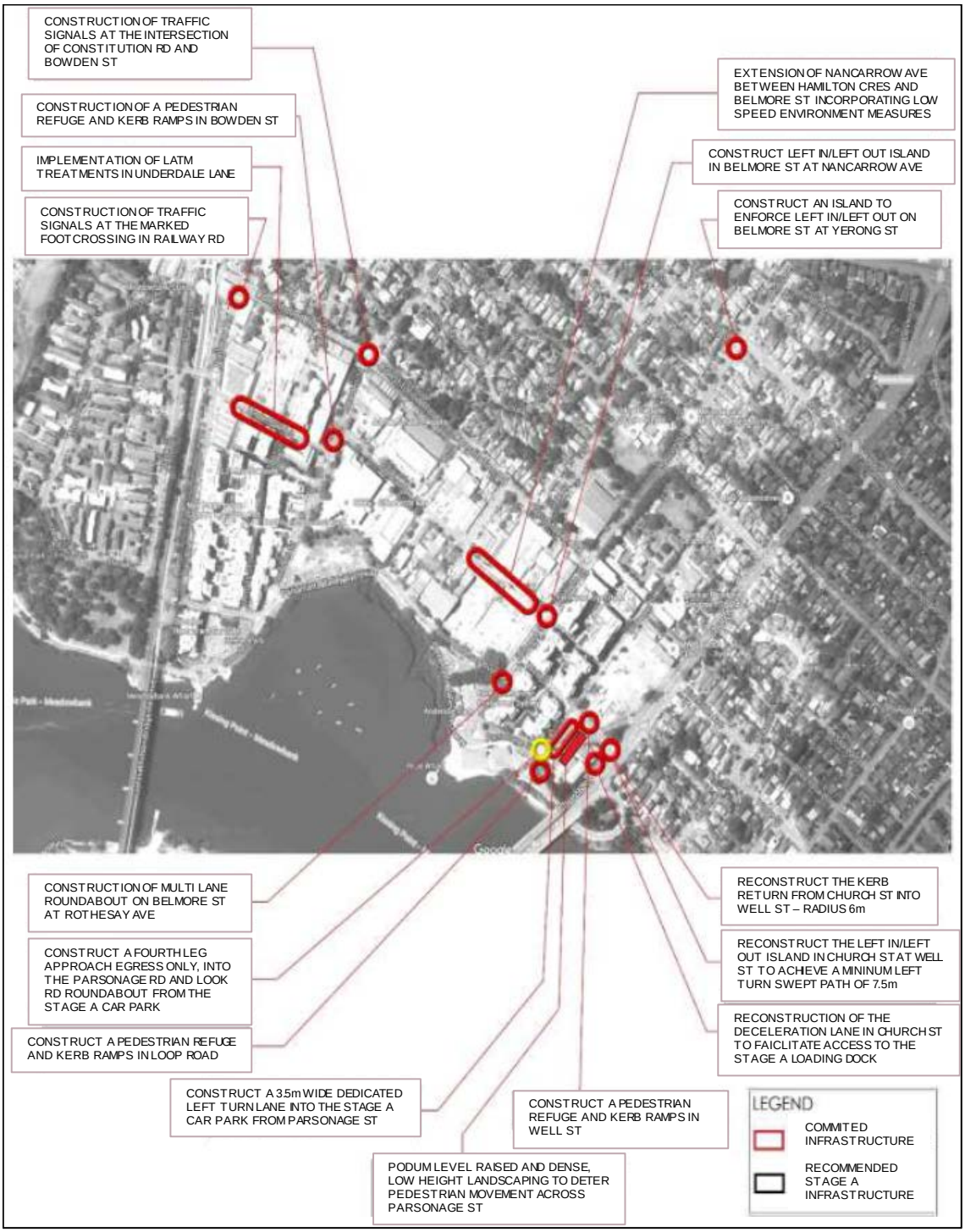
Further to this, it is understood that the following committed infrastructure upgrades will be provided as part of the Shepherds Bay Urban Renewal Development:

- extension of Nancarrow Avenue between Hamilton Crescent and Belmore Street
- provision of left in/left out at the intersection of Belmore Street and Hamilton Crescent
- provision of left in/left out at the intersection of Belmore Street and Yerong Street
- Underdale Lane Local Area Traffic Management (LATM) measures
- installation of a pedestrian refuge on Bowden Street near Nancarrow Avenue
- installation of roundabout in Belmore Street at Rothesay Avenue
- provision of left in/left out at the intersection of Belmore Street and Yerong Street
- installation of traffic signals at the intersection of Constitution Road and Bowden Street
- installation of traffic signals on Railway Road at the current pedestrian crossing near Meadowbank railway station.

In addition to this, additional infrastructure upgrades are planned further east of the site, near Church Street, to facilitate future growth and development in the area.

A summary of the planned future infrastructure upgrades in the area is shown in Figure 19.

Figure 19: Vehicular Access and Public Transport Plan



Source: Road Delay Solutions

Notwithstanding this, as noted previously, Constitution Road is considered a rat-run route to avoid congestion along Victoria Road/Church Street. The proposed traffic management measures, including signalisation of new intersections and provision of LATM's, will most likely discourage rat-running generated by Victoria Road and Church Street traffic through the Meadowbank area.

4 Proposed Development

4.1 Proposal Description

The proposed development involves the construction of a mixed-use development at the corner of Railway Road and Constitution Road, Meadowbank. The proposed development site is shown below.

Figure 20: Proposed Development Site

Source: Urbis

At this stage, the proposed mixed-use development is set to comprise the following indicative uses for traffic analysis purposes:

- Residential 358 apartments
- Commercial 1,745m² GFA
- Child Care Centre 65 places
- Gym 465m² GFA
- Specialty Retail 1,397m² GFA
- Retail / Supermarket 2,284m² GFA

In addition to this, it is proposed to provide a basement car park to serve the proposed development.

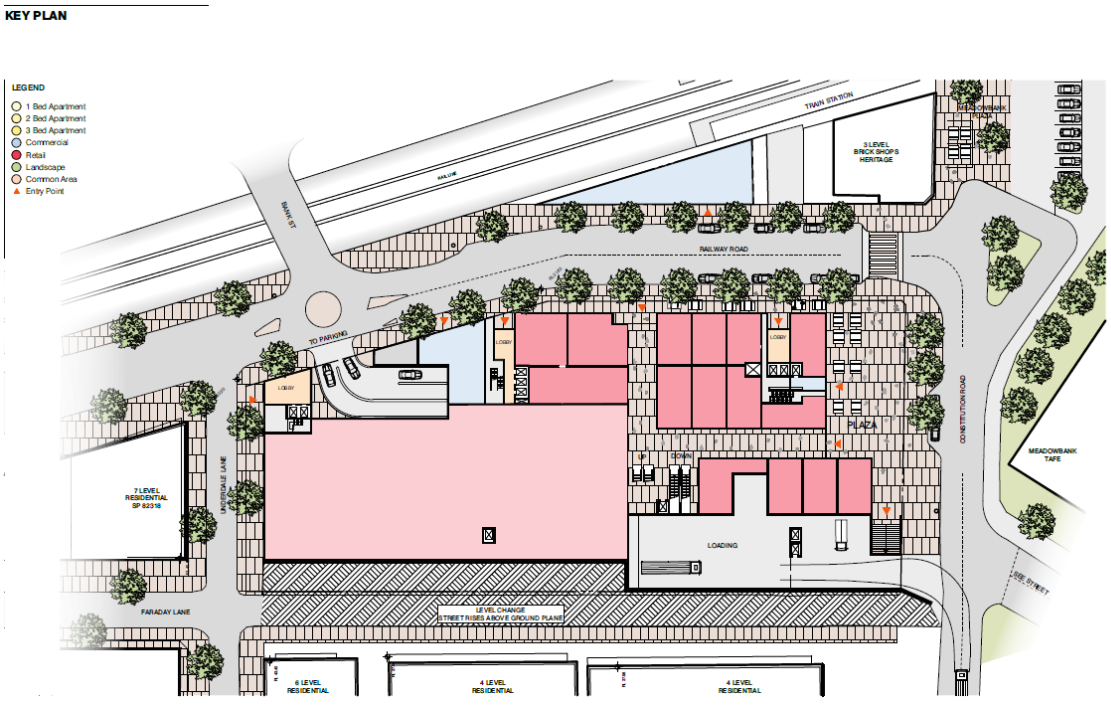
4.2 Vehicle Access

Two new separate vehicle accesses are proposed to serve the proposed development and are as follows:

- Railway Road Access:
  - single two-way vehicle access off the existing roundabout at Railway Road-Bank Street to provide access to the basement car park. This access will be restricted to cars only.
- Constitution Road Access:
  - single two-way vehicle access off Constitution Road to provide access to the loading dock. This access will be restricted to service vehicles only.

The proposed site layout plan is shown in Figure 21.

Figure 21: Proposed Site Layout Plan



Source: Fender Katsalidis Architects

In addition to this, it is noted that the proposed development is envisaged to provide an automatic number plate recognition system, rather than typical boom gate systems, to ensure free flow traffic conditions upon entry thereby minimising any potential traffic implications arising from the proposed development.

5 Parking Assessment

5.1 Car Parking

5.1.1 Council Development Control Plan (DCP) 2014

The car parking requirement for the proposed development has been assessed against Council's DCP 2014, Part 9.3 Parking Controls. Based on this, the car parking requirement for the proposed development is summarised in Table 6.

Table 6: Council DCP 2014 Car Parking Requirements

Land Use		Size	Car Parking Rate	Car Parking Requirement
Residential	Residents	358 apartments: • 100 x 1-bedroom • 186 x 2-bedroom • 72 x 3-bedroom	• 0.6 to 1 space per 1-bedroom dwelling, plus • 0.9 to 1.2 spaces per 2-bedroom dwelling, plus • 1.4 to 1.6 spaces per 3-bedroom	329-439 spaces
	Visitors		1 visitor space per 5 dwellings	72 spaces
Commercial		1,745m² GFA	1 space per 40m2 GFA	44 spaces
Child Care Centre		65 places	• 1 space per 8 children, plus • 1 space per 2 employees	9 spaces plus 1 space per 2 employees
Gym		465m² GFA	1-1.5 spaces per 20m2 GFA	24-35 spaces
Specialty Retail		1,397m² GFLA	1 space per 25m2 GFA	56 spaces
Retail / Supermarket		2,284m² GFLA		92 spaces
Total Car Parking Requirement				**623-744 spaces**

Table 6 indicates that the proposed development should provide 623-744 car parking spaces plus 1 space per 2 child care centre employees to satisfy Council DCP car parking requirements.

5.1.2 State Environmental Planning Policy No.65 (SEPP 65)

As part of the State Environmental Planning Policy No.65 (SEPP 65), the Apartment Design Guide states that:

- *For development in the following locations:*
  - *on sites that are within 800 metres of a railway station or light rail stop in the Sydney Metropolitan Area; or*

- *on land zoned, and sites within 400 metres of land zoned, B3 Commercial Core, B4 Mixed Use or equivalent in a nominated regional centre*

- *the minimum car parking requirement for residents and visitors is set out in the Guide to Traffic Generating Developments, or the car parking requirement prescribed by the relevant council, which ever is less.*

Given that the site is located within 800 metres of the Meadowbank railway station, it is noted that SEPP 65 is applicable for the residential component of the proposed development. On this basis, the residential car parking rates as set out in the RMS Guide to Traffic Generating Developments for Metropolitan Sub-Regional Centres are as follows:

- 0.6 spaces per 1-bedroom unit
- 0.9 spaces per 2-bedroom unit
- 1.4 spaces per 3-bedroom unit
- 1 space per 5 units (visitor parking).

Based on this, the proposed development is required to provide 401 car parking spaces (329 residential and 72 visitor car parking spaces).

Taking into consideration the above, it is proposed to comply with the car parking requirements as set out in Council's DCP and RMS Guide or otherwise, provide adequate parking to accommodate the anticipated parking demand of the proposed development. In addition, appropriate allocation for service and loading facilities would also be provided.

Further to this, the car park and associated elements are proposed to be designed in accordance with the design requirements set out in the relevant Australian Standards for car parking facilities.

5.2 Bicycle Parking

In accordance with Council's DCP, bicycle parking should be provided at a rate of 10% of the required car parking spaces or part thereof. The proposed development is proposed to provide appropriate allocation for bicycle parking facilities to serve the anticipated demand of the site.

6 Public Transport Analysis

6.1 Existing Rail Capacity

As indicated previously, Meadowbank railway station is currently serviced by the T1 Northern Line via Strathfield, which provides connectivity between Central and Epping via Strathfield. This rail network is shown in Figure 22.

Figure 22: T1 Northern Line Rail Network

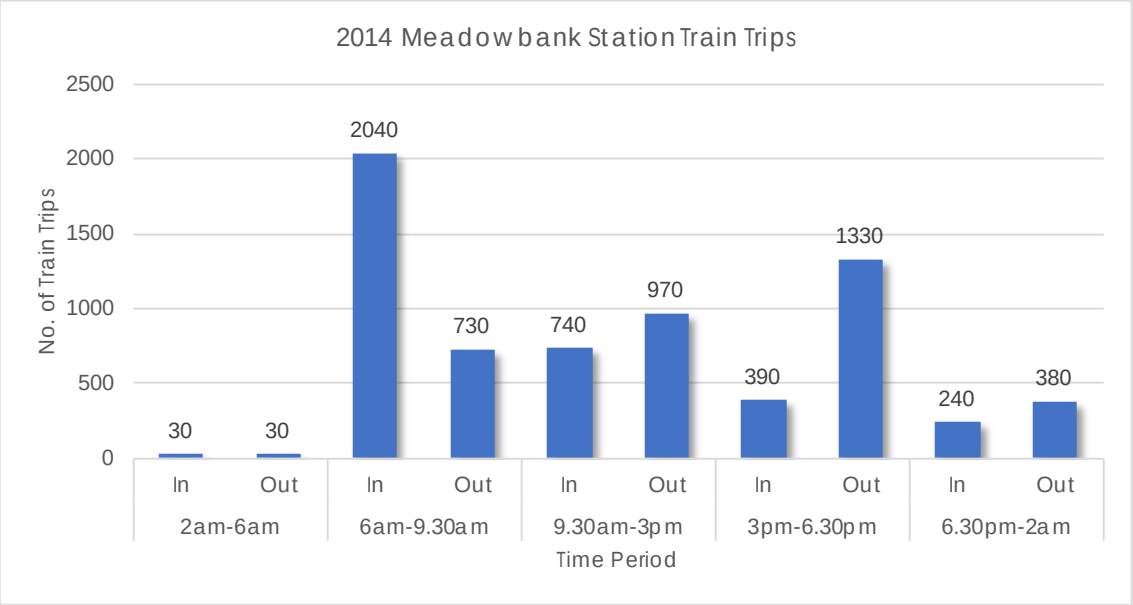
Source: Transport for NSW

Train load data obtained from Transport for NSW indicate that there are currently approximately 70 train services that run on weekdays and 40 train services on weekends at the Meadowbank Station in both directions to provide connectivity to Central and Epping via Strathfield.

Based on recent 2014 Station Barrier Counts at Meadowbank Station collected by Transport for NSW, a total of 6,880 people currently tap in and out of the Meadowbank Station per day.

A summary of the existing station barrier counts is provided in Figure 23.

Figure 23: Summary of 2014 Station Barrier Counts at Meadowbank Station



Source: Transport for NSW

Further to this, the AM Peak demand and capacity of the existing T1 Northern Line (CBD cordon) has been estimated based on information made available by Transport for NSW and is summarised in Table 7.

Table 7: Current Peak Hour Rail Demand and Capacity

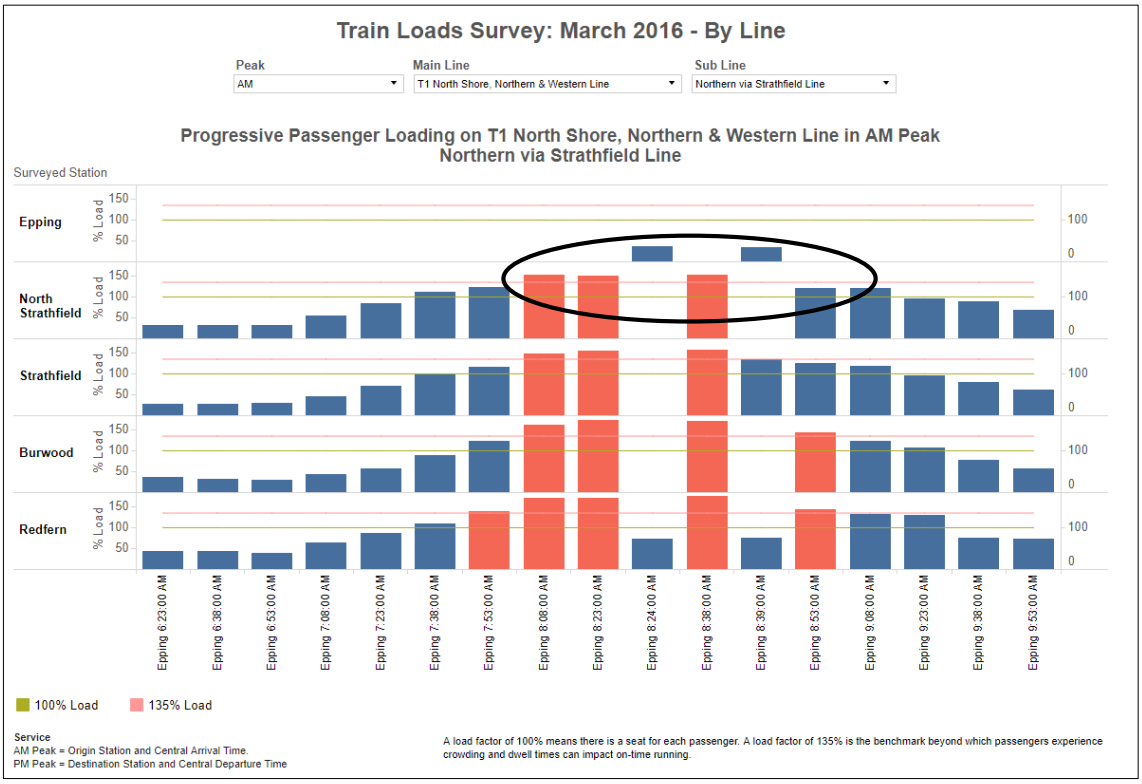
Peak Time	No. of Trains	Seating Capacity (pph)	Nominal capacity (pph)	Average Load Capacity	Maximum Load Capacity
AM Peak	6	5,364	7,241	148% (7,939 pph)	177% (9,494 pph)

[1] A seating capacity of approx. 894 seats per train has been assumed based on Transport for NSW information

A nominal capacity of 135% is generally the benchmark beyond where passengers begin to experience crowding and dwell times, which can impact on-time running of rail services. Table 8 indicates that the existing T1 Northern Line currently exceeds the nominal capacity with an average load capacity of 148% and maximum load capacity of 177% in the AM Peak. Passengers on this line currently experience crowding.

Further to this, it is noted that the T1 Northern Line experiences relatively heavy loadings on approach to Strathfield, with seating capacity generally reached well before this station. The existing train loads on the T1 Northern Line, provided by Transport for NSW, is graphically presented in Figure 24.

Figure 24: Train Loads Survey – March 2016



Source: Transport for NSW, March 2016

The above data suggests that existing demand on the T1 Northern Line currently exceeds the nominal capacity during the AM peak. Based on this, at least 1-3 additional rail services (approx. 894 seats per train) will need to be provided in the AM peak to ensure that the existing rail service generally operates within the nominal capacity of 135%.

Further to this, it is should be noted that from late 2018, buses will replace trains for around seven months between Epping and Chatswood whilst the line is converted to metro operations. Based on these temporary construction activities, commuters may opt to use the T1 Northern Line via Strathfield to the city and thereby, further exacerbating the existing rail capacity issues.

As such, additional rail capacity will need to be provided to meet the existing demand of the rail service alone. This issue will be further exacerbated by the future development and growth of the Meadowbank area, including surrounding areas such as Rhodes.

6.2 Future Rail Capacity

As detailed in Section 3.5, the Shepherds Bay Urban Renewal Development is set to introduce a total of 1,943 residential apartments. Assuming an average household size of 2.3 persons per dwelling based on recent 2016 census data, this would equate to an

additional 4,469 people within the Meadowbank area. Based on this, it has been estimated that there would be approximately 1,557 full-time equivalent employed residents using JTW information.

With 2011 Census data indicating that 37% of employed residents travel by train, this would likely result in an additional 576 train passengers from the proposed Shepherds Bay Urban Renewal development alone.

Notwithstanding the above, the proposed development (of which this report relates to) is projected to increase the population of Shepherds Bay by 848 people, in accordance with the Social Infrastructure Study and Social Impact Assessment prepared by Cred Consulting as part of the DA package of works.

Based on this, the proposed development has been estimated to generate an additional 296 full-time equivalent employees/employed residents. Conservatively assuming that 37% of people would travel via train, this would equate to an addition of up to 99 train passengers.

Taking the above into consideration, the forecasted future peak hour rail demand along the T1 Northern Line via Strathfield arising from future development is estimated in Table 8.

Table 8: Forecasted Future Peak Hour Rail Demand

Peak Time	Existing Average Demand (pph)	Shepherds Development Demand (pph)	Proposed Development Demand (pph)	Total Demand (pph)
AM Peak	7,939	+576	+99	7,939
PM Peak	4,148	+576	+99	4,148

Table 8 indicates that there would be some 8,614 and 4,823 train passengers in the AM and PM peak hour, respectively, in the future. Consequently, at least 10 train services (i.e. an addition of four train services from the existing six) will need to be provided in the AM peak to ensure acceptable rail operation on the basis of future development within the Meadowbank area alone. However, it is noted that the above figures do not include other surrounding development, such as Rhodes East development precinct.

Thus, additional rail capacity and services will need to be explored to not only meet the existing deficiencies of the rail network, but also support future growth and development within the area. The proposed development is well located for public transport access and has the potential to be a Transit Oriented Development.

Whilst the NSW Government has recently upgraded the Meadowbank Wharf with extra ferry services and new ferries as part of the Transport Access Program, additional rail network upgrades should be considered with potential funding mechanisms in place to address the existing deficiencies in the network, as well as to support future demand and growth in the area.

6.3 Strategic Transport Planning

A Plan for Growing Sydney, released in December 2014, has identified Rhodes as a Strategic Centre within the Global Economic Corridor to provide for new housing and jobs along the Northern railway line corridor and the various centres it serves, including Meadowbank.

Based on this, to accommodate larger residential populations within a walkable catchment of public transport corridors and centres and maintain a functional transport system, the following two scenarios apply, both of which are applicable to Meadowbank:

1. **Live-work locally** is preferred so outward-bound travel is contained, such that peak period journeys can be substantially undertaken by active modes.
   However, for this to be feasible:
   - there needs to be employment opportunities in the locality
   - jobs must be of a quality to attract workers, and pay commensurate with the cost of housing (purchase or rental) in the locality
   - urban design within the active transport catchment must facilitate cycling and walking and the streets must feel safe and attractive for pedestrians.

2. A **balance of residential and commercial uses** evenly distributes peak travel both inbound and outbound more efficiently using the capacity of the transport system (e.g. in the morning peak, residential trips generally travel outbound while commercial trips travel inbound).
   However, this requires:
   - encourage an appropriate mix of uses
   - integration of uses to create an attractive, liveable urban environment
   - public transport connections to major centres
   - public transport network design to accommodate two-way passenger flows.

The proposed development would provide a range of uses, with the retail and commercial component envisaged to support local job opportunities, particularly the anticipated increased residential uptake/population in the precinct. With the above in mind, the proposed development is considered consistent with the key objectives set out in a Plan for Growing Sydney, specifically to provide new housing and jobs along the Northern railway line.

Notwithstanding this, as indicated in the above, the existing rail network is currently above capacity during peak periods, with future planned growth and development in area set to exacerbate the existing rail capacity constraints.

Further to this, Rhodes East Priority Precinct Traffic and Transport Report, prepared by Jacobs, indicate that an additional 3,000 dwellings are expected in 2036, with an additional 1,535 person trips in the 2036 two-hour morning peak (i.e. 768 person trips per hour).

Based on this and the envisaged growth in the area, the following options have been suggested in the Rhodes East Traffic and Transport Report to address the need for increased rail capacity:

- *Sydney Metro City & Southwest timetable adjustments to cater for increased capacity via additional services and less crowded services at Rhodes (with Northern Line customers diverting on to the Metro at Epping, prior to reaching Rhodes).*
- *Quadruplication of the Northern Line through Rhodes and north over the Parramatta River rail bridge, allowing more services to stop at Rhodes Station.*
- *Mass transit – either providing a new station and service at Rhodes or by alleviating congestion on the Northern Line (e.g. by allowing existing passengers to interchange and connect through to the Sydney CBD or Greater Parramatta).*

The above rail capacity improvement options would provide additional rail capacity and assist alleviate existing rail capacity issues, particularly along the Northern Line. However, as noted previously, any additional rail network upgrades with potential funding mechanisms in place should be considered to address the existing deficiencies in the network, as well as to support future demand and growth in the area.

7 Traffic Assessment

7.1 Adjacent Development Traffic Generation

As detailed in Section 3.5, Holdmark is planning to develop 1,943 residential apartments as part of the Shepherds Bay Urban Renewal project, across the following nine key stages:

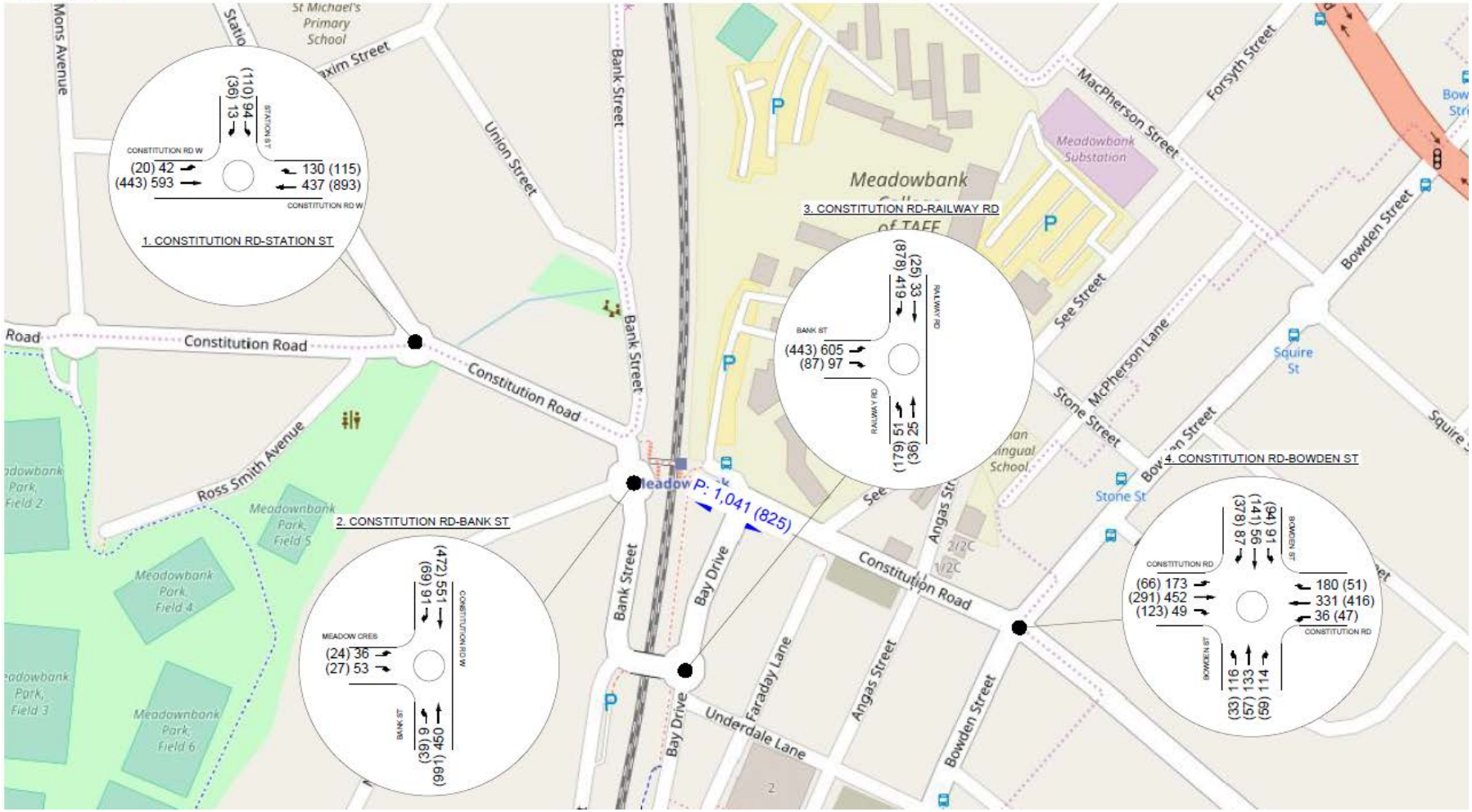
- **Stage 1** – residential flat building containing 246 apartments
- **Stages 2 and 3** – 2 residential flat buildings containing 453 apartments
- **Stages 4 and 5** – 2 residential flat buildings containing 511 residential apartments
- **Stages 6 and 7** – 2 residential flat buildings containing 311 residential apartments, including infrastructure works (lowering of Constitution Road), traffic signals and stormwater infrastructure through the site
- **Stages 8 and 9** – 3 residential flat buildings containing 422 residential apartments.

The anticipated traffic generation arising from the above development is provided in Figure 18.

Assuming a future growth of 0.3% per annum (consistent with the Meadowbank Employment Area Traffic Needs Assessment 2012), the future 10-year projected traffic conditions surrounding the subject site (plus the above adjacent development traffic) is provided in Figure 25. It is noted that these future projected traffic volumes surrounding the site do not include the proposed development traffic.

Figure 25: Future Base Case Traffic Volumes

2027 Future Base Peak Hour Traffic Volumes (plus Shepherds Bay Urban Development)
20(20) = AM (PM)



Basemap Source: Open Street Map

7.2 Proposed Development Traffic Generation

As indicated previously, the proposed mixed-use development is set to comprise the following indicative uses for traffic analysis purposes:

- Residential 358 apartments
- Commercial 1,745m^2 GFA
- Child Care Centre 65 places
- Gym 465m^2 GFA
- Specialty Retail 1,397m^2 GFA
- Retail / Supermarket 2,284m^2 GFA

RMS provides traffic generation rates for different land uses in their Guide to Traffic Generating Developments and in their Technical Direction (TDT 2013/4a) containing revised rates. As the site is directly located opposite the Meadowbank railway station, trip rates of 0.19 and 0.15 trips per unit in the AM and PM peak are considered appropriate for the development.

In addition to this, it is noted that the proposed specialty retail component is envisaged to be non-destinational retail (i.e. not independent trip generations, but will mainly serve the occupants of the development site, neighbouring residents and shoppers at the retail/supermarket) and therefore, has been excluded in the traffic generation estimates.

Notwithstanding the above, recent traffic surveys at two similar sized supermarket stores (N.B. Aldi supermarkets are of this size) found that the peak hour traffic generation was in the order of 160 and 200 vehicles per hour (two-way) during weekday afternoon and Saturday peak periods, respectively. In addition to this, 18% of non-residential trips (i.e. gym and retail/supermarket trips) have been assumed to be passing trade and thus, the trip generation estimates from these uses have been discounted and re-routed accordingly.

The proposed development trip generation estimates are summarised in Table 9.

Table 9: Proposed Development Trip Generation Estimates

Land Use	Size	Design Trip Rate		Trip Generation	
		AM Peak	PM Peak	AM Peak	PM Peak
Residential	358 apartments	0.19 trips per unit	0.15 trips per unit	68 trips	54 trips
Commercial	1,745m² GFA	1.6 trips per 100m² GFA	1.2 trips per 100m² GFA	28 trips	21 trips
Child Care Centre	65 places	0.8 trips per child	0.7 trips per child	52 trips	46 trips
Gym	465m² GFA	2.25 trips per 100m² GFA[1] x 0.82	9 trips per 100m² GFA x 0.82	9 trips	34 trips
Supermarket	2,284m² GFA	50 trips[1] x 0.82	200 trips x 0.82	41 trips	164 trips
Total				**198 trips**	**319 trips**

[1] It has been assumed that 25% of PM trips occur in the AM peak

7.3 Distribution and assignment of Development Traffic

In terms of traffic distribution of the proposed residential and non-residential uses on the surrounding road network, the following distribution patterns have been assumed:

- residential uses
  - morning peak: 20% inbound traffic / 80% outbound traffic movements
  - evening peak: 80% inbound traffic / 20% outbound traffic movements
- commercial uses
  - morning peak: 80% inbound traffic / 20% outbound traffic movements
  - evening peak: 20% inbound traffic / 80% outbound traffic movements
- child care, gym, retail uses
  - morning peak: 60% inbound traffic / 40% outbound traffic movements
  - evening peak: 40% inbound traffic / 60% outbound traffic movements

Taking the above into consideration and existing traffic patterns based on BTS journey to work data (refer to Section 0), the resultant inbound and outbound traffic distributions arising from the proposed development is provided in Table 10.

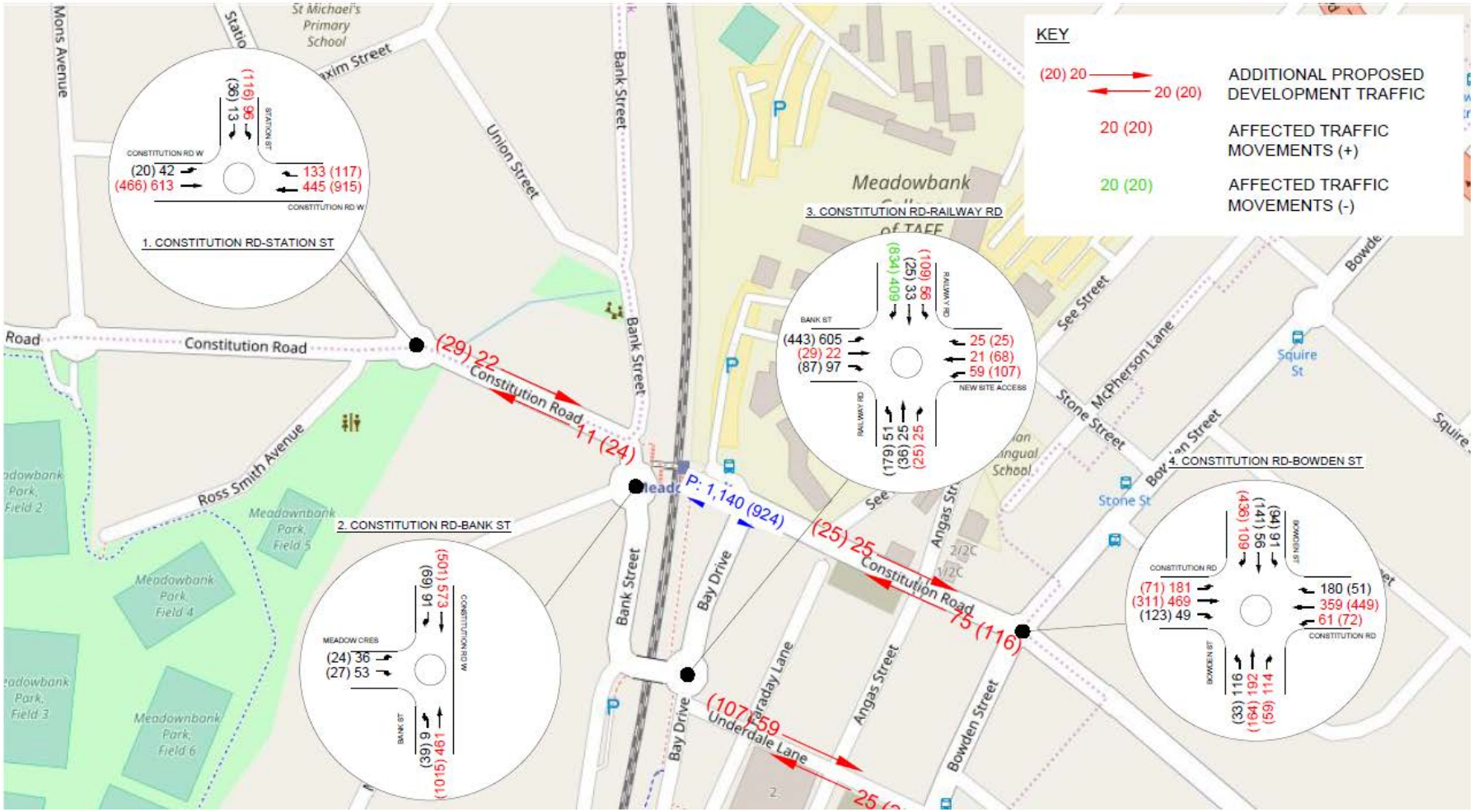
Table 10: Proposed Development Trip Generation Distribution

Direction	AM Peak		PM Peak	
	Inbound	Outbound	Inbound	Outbound
North / East	49	57	77	85
West	22	17	29	42
South	26	27	39	47
Total	**97**	**101**	**145**	**174**

The ultimate future peak hour traffic surrounding the subject site is presented in Figure 26.

Figure 26: Ultimate Future Case Traffic Volumes

2027 Ultimate Future Peak Hour Traffic Volumes (plus proposed development traffic)
20(20) = AM (PM)



Basemap Source: Open Street Map

7.4 Intersection Capacity Analysis

7.4.1 Overview

Intersection capacity analysis has been conducted using SIDRA Intersection 7 modelling software on key surrounding intersections to assess the traffic implications arising from the proposal. The following scenarios have been assessed:

- **Scenario 1 (S1)** – existing base case analysis using surveyed traffic flows in Figure 10
- **Scenario 2 (S2)** – S1 above plus 0.3% future growth across a period of 10-years and projected Shepherds Bay Urban Renewal development traffic only as shown in Figure 25 (with committed improvements)
- **Scenario 3 (S3)** – S2 above plus proposed development traffic (without new intersection improvement works)
- **Scenario 4 (S4)** – S2 above plus proposed development traffic (with new intersection improvement works).

In addition to this, based on the existing planning controls of the site, the site could provide up to 290 residential apartments, and thereby theoretically generate 55 trips in the AM and 44 trips in the PM peak. Consequently, the proposed development traffic would result in a net increase of 143 and 275 trips in the AM and PM peak, respectively.

However, for the purpose of estimating the traffic generation arising from the proposed development, the existing traffic generation of the site has not been deducted as part of the traffic analysis.

7.4.2 Level of Service Criteria

RMS uses the performance measure level of service to define how efficient an intersection is operating under given prevailing traffic conditions. Level of service is directly related to the delays experienced by traffic travelling the intersection. Level of service ranges from LoS A to LoS F. LoS A indicates the intersection is operating with spare capacity, while LoS F indicates the intersection is operating above capacity. LoS D is the long term desirable level of service.

At signalised intersections, the average delay is the volume weighted average of all movements. For roundabouts and priority (give way and stop sign) controlled intersections, the average delay relates to the worst movement.

Table 11 shows the criteria that SIDRA Intersection adopts in assessing the level of service.

Table 11: RMS Level of Service Criteria

Level of Service (LoS)	Average Delay per vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode	At capacity, requires other control mode.
F	Greater than 70	Unsatisfactory, requires additional capacity	Unsatisfactory, requires other control mode or major treatment

A summary of the AM and PM peak traffic modelling results is provided in Table 12 and Table 13, respectively, with full movement summaries provided in Appendix A.

Table 12: SIDRA Intersection Analysis Results – AM Peak

Intersection	Proposed Improvement Works for S4	S1 Existing Base			S2 Future Base Case (no proposed development)			S3 Ultimate Future Case (without improvement works)			S4 Ultimate Future Case (with improvement works)		
		Ave. Delay (s)	95th %tile Queue Length (m)	LoS	Ave. Delay (s)	95th %tile Queue Length (m)	LoS	Ave. Delay (s)	95th %tile Queue Length (m)	LoS	Ave. Delay (s)	95th %tile Queue Length (m)	LoS
Constitution Rd-Station St	No works	19	12	B	22	15	B	23	16	B	23	16	B
Meadow Cres-Constitution Rd	No works	7	24	A	8	60	A	9	65	A	9	65	A
Railway Rd-Bank St	No works	8	95	A	8	147	A	20	240	B	20	240	B
Railway Rd-Constitution Rd	Signalisation and auxiliary lane	44	138	D	91	299	F	209	615	F	16	141	B
Bowden St-Constitution Rd	No works[1]	28	96	B	21	90	B	22	99	B	22	99	B

[1] It has been assumed that the proposed signalisation of the Bowden St-Constitution Rd would be provided in the future base case

Table 13: SIDRA Intersection Analysis Results – PM Peak

Intersection	Proposed Improvement Works for S4	S1 Existing Base			S2 Future Base Case (no proposed development)			S3 Ultimate Future Case (without improvement works)			S4 Ultimate Future Case (with improvement works)		
		Ave. Delay (s)	95th %tile Queue Length (m)	LoS	Ave. Delay (s)	95th %tile Queue Length (m)	LoS	Ave. Delay (s)	95th %tile Queue Length (m)	LoS	Ave. Delay (s)	95th %tile Queue Length (m)	LoS
Constitution Rd-Station St	No Works	13	25	A	17	59	B	18	70	B	18	70	B
Meadow Cres-Constitution Rd	No works	27	92	B	27	122	B	29	136	C	29	136	C
Railway Rd-Bank St	No works	19	87	A	26	99	B	50	257	D	50	257	D
Railway Rd-Constitution Rd	Signalisation and auxiliary lane	21	169	B	259	1,030	F	448	1,604	F	14	185	A
Bowden St-Constitution Rd	No works[1]	37	125	C	24	91	B	25	116	B	25	116	B

[1] It has been assumed that the signalisation of the Bowden St-Constitution Rd would be provided in the future base case

Table 12 and Table 13 indicate that the intersections will operate at an acceptable level of service in the future at LoS D or better. The exception to this is at the existing pedestrian crossing at Railway Rd-Constitution Rd intersection, where unsatisfactory intersection performance will occur in the future case, irrespective of the proposed development traffic. On this basis, the proposed signalisation of this intersection is considered imperative to achieve an acceptable intersection operation.

That being said, it is noted that the proposed signalisation of the Bowden St-Constitution Rd (100% contribution) and Railway Rd-Constitution Rd (50% contribution) intersections are understood to be already committed by the Shepherds Bay Urban Renewal development. However, the traffic impact assessment report for the Shepherds Bay Urban Renewal Development indicates that the proposed signalisation of the Railway Rd-Constitution Rd would not be installed unless the RMS warrant is met.

On this basis, the projected future pedestrian and vehicular flows along Railway Road is compared against the existing traffic conditions in Table 14.

Table 14: Future Projected Pedestrian and Vehicular Flows – Railway Road

Peak	S1 Existing Base Case			S2 Future Base Case			S3 Ultimate Future Case		
	P/hr	V1/hr (SB)	V2/hr (NB)	P/hr	V1/hr (SB)	V2/hr (NB)	P/hr	V1/hr (SB)	V2/hr (NB)
AM	465	277	571	1,041 (+124%)	452 (+63%)	630 (+10%)	1,140 (+10%)	498 (+10%)	655 (4%)
PM	249	841	313	825 (+231%)	903 (+7%)	479 (+53%)	924 (+12%)	968 (7%)	504 (+5%)

where, P = two-way pedestrian flows
V1 = Railway Road southbound traffic
V2 = Railway Road northbound traffic

Table 14 indicates that the future projected pedestrian and vehicle flows are primarily driven by future growth and the Shepherds Bay Urban Renewal Development, with the proposed development traffic projected to only increase the overall traffic implications by less than 12%.

However, that being said, it is noted that the warrants for the proposed signalisation of the existing pedestrian crossing along Railway Road, as discussed in Section 2.9, would still not likely be met in the future as a result of the lower traffic volumes in one direction (i.e. less than 600 vehicles per hour). However, the pedestrian volumes are anticipated to increase to 924-1,140 pedestrians during peak periods, which would likely result in worse delays and queues than currently experienced.

Taking the above into consideration and the traffic modelling results, the proposed signalisation of the Railway Rd-Constitution Rd to replace the existing pedestrian (zebra) crossing will need to be provided to ensure an acceptable level of service in the future. At present, the existing pedestrian crossing results in some excessing queueing and

delays on approach, which will be further exacerbated by future growth and development in the area, particularly the projected increase in train passengers.

7.4.3 Planned Future Intersection Upgrade Works

Based on the traffic report, prepared by Road Delay Solutions (dated June 2016), for Stages 1 to 9, it is understood that the Constitution Road and Bowden Street intersection is envisaged to be designed as per Figure 28. This signalisation will be provided by the Shepherds Bay Urban Renewal Development.

Figure 27: Existing Constitution Rd-Bowden St Intersection

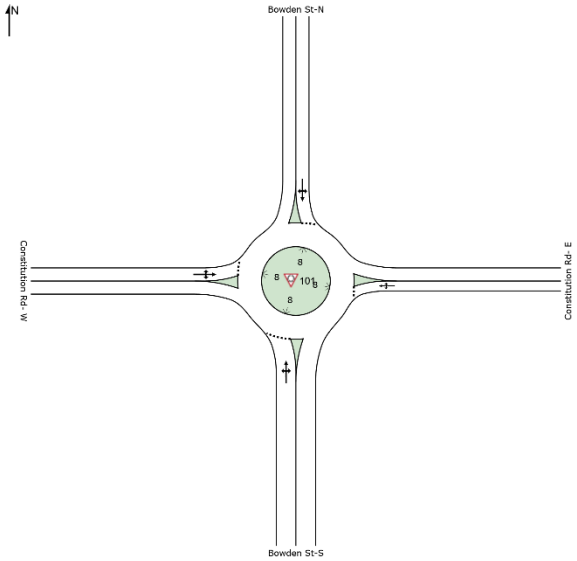
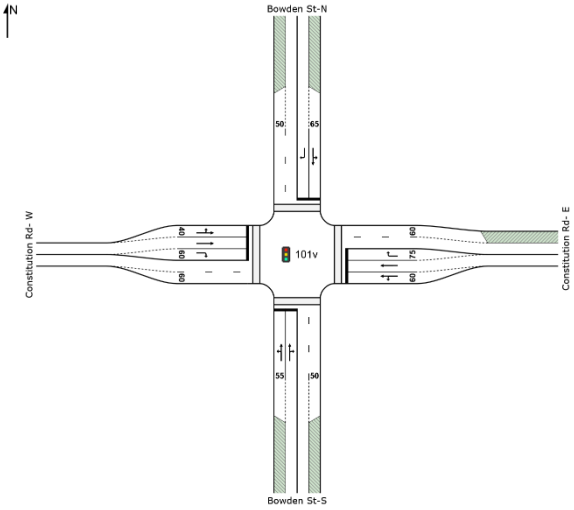


Figure 28: Proposed Constitution Rd-Bowden St Intersection



This design has been incorporated in our traffic analysis as part of Scenario S4. However, no intersection layout plans currently publicly available for the proposed signalisation of the Railway Rd-Constitution Rd. It is noted that the Shepherds Bay Urban Renewal Development is anticipated to contribute 50% for the proposed future signalisation of this intersection.

Notwithstanding this, the recommended intersection layout plan as modelled as part of our traffic assessment is as per Figure 30. It is noted that the final design of the intersection would be subject to consultation with the relevant authorities and further investigation works. However, based on the draft Meadowbank Pedestrian Access Management Plan, it is understood that Council is currently working with RMS to deliver the signal controlled pedestrian crossing at the Railway Road-Constitution Road intersection.

Figure 29: Existing Railway Rd-Constitution Rd Intersection

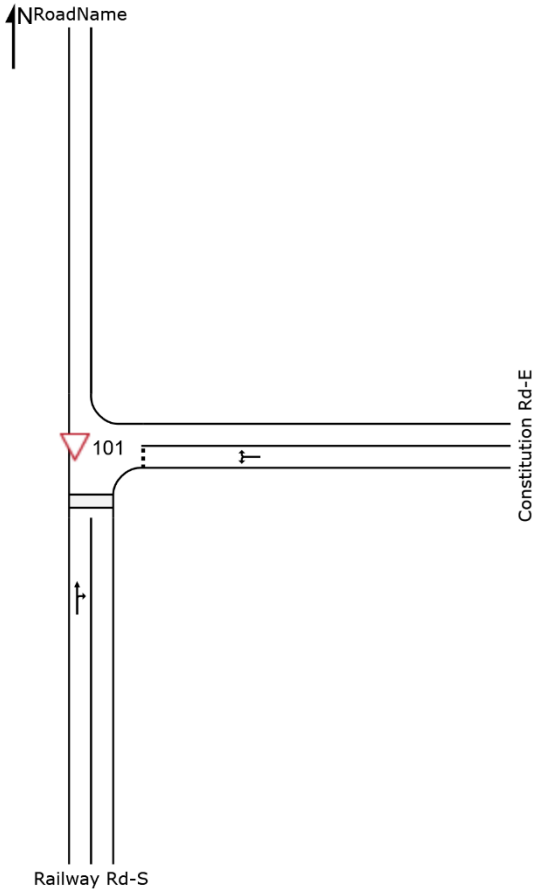
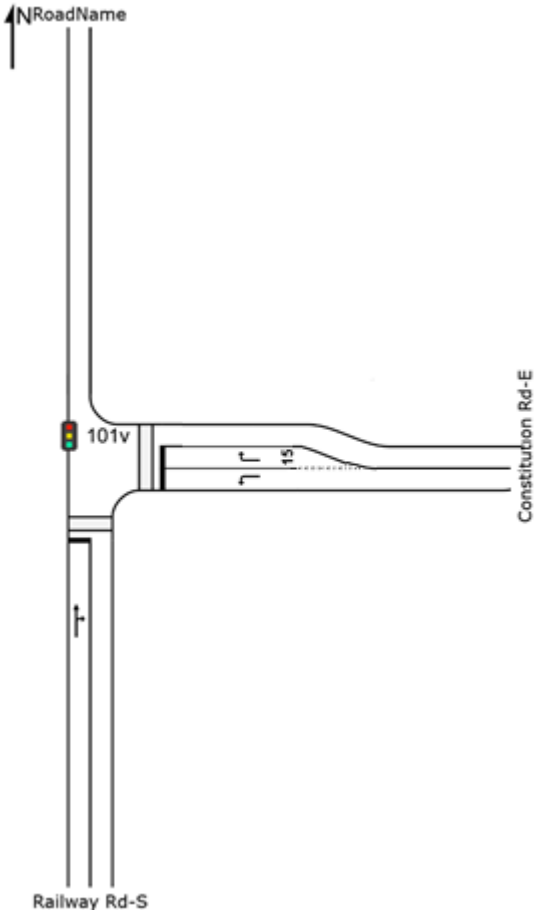


Figure 30: Proposed Railway Rd-Constitution Rd Intersection



In summary, the following intersection improvement works will need to be considered to facilitate the proposed development traffic and ensure that the surrounding key intersections operate at an acceptable level of service, irrespective of the proposed development traffic:

- Railway Road-Constitution Road (50% provided by Shepherds Bay)
  - *signalise existing pedestrian crossing and provide additional lanes (N.B. Council has already identified this as part Council's Meadowbank Employment Area Traffic Needs Assessment 2012)*

  This option will achieve satisfactory intersection performance during both AM and PM peak periods, however, additional lanes will need to be provided on both south and east approaches to provide dedicated left and right turn bays as these are the key movements at this junction. A separate pedestrian phase is also recommended to provide minimise the delay from left turn movements from Constitution Road to Railway Road as a result of the high pedestrian activity during peak commuter times, similar to existing Sydney CBD sites.
- Constitution Road-Bowden Street (100% provided by Shepherds Bay)

- *signalise intersection and provide additional lanes on approach (N.B. Council has already identified this as part Council's Meadowbank Employment Area Traffic Needs Assessment 2012)*

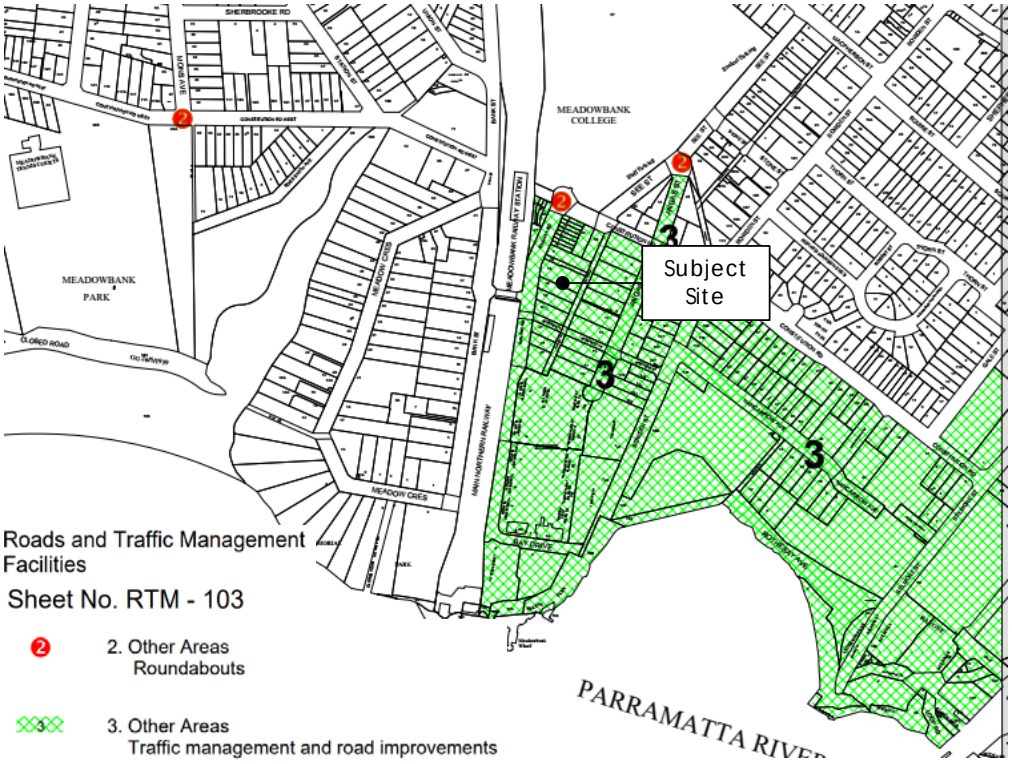
The proposed improvement works are understood to be currently carried out as part of the Shepherds Bay Urban Renewal development.

The proposed intersection improvement works will be further investigated in consultation with the relevant stakeholders (e.g. RMS, Council and Transport for NSW) as the project progresses. Further to this, as noted previously, the proposed signalisation of key intersections along the Constitution Road corridor (including implementation of LATM's) will most likely discourage rat running through the area and thus, through traffic volumes may possibly decrease in the future.

7.4.4 Ryde Section 94 Development Contributions

Further to the above, it is noted that Council's Section 94 Development Contribution Plan 2007 Interim Update (2014), effective from 10 December 2014, indicates that some traffic management and road improvement contributions may be applicable to the green area outlined below (of which the subject site is located within).

Figure 31: S94 Development Contribution Plan 2007 Interim Update (2014)



Source: City of Ryde Council

Thus, it should be noted that the Ryde Section 94 Contributions Plan permits Council to collect contributions for Roads and Traffic Management Facilities in Meadowbank. Monetary contributions levied as part of the future development application will go

towards the recommended upgrade to the existing pedestrian crossing on Railway Road.

Notwithstanding the above, in order to reduce the traffic impact associated with the proposed development, a framework travel plan would be implemented to assist manage travel patterns to/from the site, while also minimising car trips (particularly single-occupancy car trips). This framework travel plan will generally target residents, office staff and visitors to the proposed development to promote the use of more sustainable modes of transport, particularly given the site's proximity to the Meadowbank railway station.

It is envisaged that the any approval of the proposed development would include a condition of consent requirement a framework travel plan to be prepared to promote sustainable travel. On this basis, a framework for the implementation of such travel plan is provided below, noting that the full framework travel plan document will be provided at a later stage.

8 Framework Travel Plan

8.1 Overview

The key role of a Framework Travel Plan (FTP) is to bring about better transport arrangements to manage travel demands, particularly promoting more sustainable modes of travel, modes which have a low environmental impact such as walking, cycling, public transport and better management of car use.

As indicated previously, it is envisaged that any approval of the proposed development would include a condition of consent requiring a FTP to be prepared to promote sustainable travel. This FTP would be prepared to mainly target residents and staff (and to a lesser extent visitors) of the proposed development. This section provides a framework for the implementation of such a travel plan, noting that the full FTP document will be provided at a later stage.

8.2 Framework Travel Plan (FTP)

The transport sector is a large contributor of Australia's energy-related greenhouse gas emissions through fossil fuels such as petrol, oil, diesel and gas. Whilst transport is a necessary part of life, the effects can be managed through the implementation of a travel plan.

A FTP is a package of coordinated strategies and measures to promote and encourage sustainable travel, such as walking, cycling and public transport etc. Such plans aim to influence the way people move to/from a business, residential complex or any other organisation to deliver better environmental outcomes and provide a range of travel choices, whilst also reducing the reliance on private car usage, particularly single occupancy car trips.

The planning of the new development would need to accommodate innovative ideas to better manage the transport demand of the project. It will be necessary to introduce new measures to ensure that trips generated by the proposed development are not solely private car based, particularly single occupancy trips.

8.3 Potential Measures

The subject site is located directly opposite the Meadowbank railway station, servicing high frequency rail services. The FTP would put in place measures to encourage a modal shift away from car usage.

Notably, TTPP staff have been involved in a number of green travel plans (much like FTPs) for an array of different land uses, including sites at the Australia Technology Park and Harold Park in Sydney.

At these sites, the following measures are provided:

- compliance with the stringent parking controls applicable to the site
- creation of street networks and associated cycle ways, footpaths and links to encourage cycling and walking
- provision of a Transport Access Guide (TAG) which would be given to all residents, staff and visitors
- provision of public transport noticeboards to make residents, staff and visitors more aware of the alternative transport options available to them. The format would be based upon the TAG
- provision of yearly membership to a GoOccasional car share which would have dedicated cars and dedicated parking spaces reasonably close to the proposed development
- provision of Opal cards (pre-loaded with credits) for the initial occupation of the development so that staff and residents will be encouraged to make public transport their modal choice from the day they occupy the property
- provision of bicycle facilities including bicycle parking for residents, staff and visitors, bicycle racks for visitors and shower and change room facilities
- provision of a half yearly newsletter to staff, residents and visitors to promote local travel initiatives
- connect staff working at the site to carpool together by creating a Carpooling club or registry/forum on the company website.

Much like these sites, the proposed development would benefit greatly from the implementation of the above measures to promote the use of more sustainable modes of travel, pertinently public transport, car-share, walking and cycling.

8.4 Monitoring of the FTP

Whilst there is no standard methodology for monitoring ta FTP, it is recommended that the FTP be monitored on a regularly basis to ensure that the desired benefits are achieved or otherwise, suitable measures be implemented to reduce the private car usage (particularly single car occupancy trips). At this early stage, it is not possible to identify what additional modifications may be required to reach the desired outcomes of the FTP as this would be dependent upon the particular circumstances at the time.

Thus, it is recommended that the FTP be monitored on a regularly basis, e.g. yearly, through travel surveys or similar. Travel surveys would show how staff/visitors travel

to/from the site and assist identify whether the proposed initiatives and measures outlined in the FTP are effective or are required to be replaced or modified to ensure that the best outcomes are achieved. Regular consultation with staff and visitors would also be beneficial to help understand people's reasons for travelling the way they do and help identify any potential barriers to change their travel behaviours.

In order to ensure successful implementation of the FTP, a Travel Plan Coordinator (TPC) or the Building Manager should be appointed to oversee the measures and resultant impacts of the FTP.

8.5 Summary

Although it is difficult to predict what measures might be achievable until the building is occupied, the above paragraphs provide a framework for the development and implementation of a future travel plan for the site.

On the basis of all such measures being fully incorporated into the development, it is anticipated that the subject site would generate significantly less traffic than other mixed-use development sites in the vicinity. Subsequently, this would have the positive effect in reducing the traffic impact associated with the proposed development on the surrounding road network.

9 Conclusion

This report examines the traffic and parking implications of the proposed development at Railway Road, Meadowbank. The key findings of the report are presented below.

- It is proposed to provide a mixed-use development on 27 Railway Road and land bound by Constitution Road, Railway Road and Faraday Lane, Meadowbank. The proposed development is considered consistent with the key objectives set out in a Plan for Growing Sydney for the area, specifically delivering new housing and jobs at Rhodes and surrounding centres (Meadowbank).
- At this stage, proposed mixed-use development is envisaged to comprise of 358 residential apartments, 1,745m^2 GFA commercial, a child care centre (65 places), 465m^2 GFA gym, 1,397m^2 GFA specialty retail and 2,284m^2 GFA retail/supermarket uses.
- It is proposed to provide a basement car park, with access provided directly off Railway Road. A separate access is proposed to be provided off Constitution Road for service vehicles only. Appropriate car parking provision, including end of trip and loading facilities, will be provided to serve the anticipated demand of the development site.
- The proposed development is expected to generate circa 198 and 319 two-way vehicle trips in the AM and PM peak hour, respectively.
- Traffic modelling indicates that the surrounding key intersections will operate at an acceptable level of service in the future case, with the exception of the existing zebra pedestrian crossing at Railway Rd-Constitution Road (N.B. model includes the proposed future signalisation of the Constitution Rd-Bowden St intersection provided by the Shepherds Bay Urban Renewal development)
- As part of the Shepherds Bay Urban Renewal project, a number of infrastructure improvements are proposed to improve overall capacity and intersection operation surrounding the Meadowbank area, including the proposed signalisation of the Constitution Rd-Bowden Street and Railway Rd-Constitution Rd intersection (once the RMS warrants are met for a mid-block pedestrian crossing)
- However, the proposed signalisation of the Railway Rd-Constitution Rd will need to be provided to ensure an acceptable level of service in the future, irrespective of the proposed development. It is understood that the Shepherds Bay Urban Renewal Development is committed to contribute 50% for the proposed signalisation.
- The Ryde Section 94 Contributions Plan permits Council to collect contributions for Roads and Traffic Management Facilities in Meadowbank. Monetary contributions levied as part of the future development application will go towards the recommended upgrade to the existing pedestrian crossing on Railway Road.

- A framework travel plan should be implemented as part of the proposed development to facilitate a modal shift towards more sustainable modes of transport (e.g. public transport and/or car share) as opposed to single-occupancy car trips.
- Future strategic transport infrastructure improvement works are envisaged to occur to facilitate future growth and development in the area, particularly around the Rhodes East Priority Precinct. Some improvement options suggested to increase rail capacity within the area, particularly along the Northern Line, as per the Rhodes East Priority Traffic and Transport Report are as follows:
  - *Sydney Metro City & Southwest timetable adjustments to cater for increased capacity via additional services and less crowded services at Rhodes (with Northern Line customers diverting on to the Metro at Epping, prior to reaching Rhodes).*
  - *Quadruplication of the Northern Line through Rhodes and north over the Parramatta River rail bridge, allowing more services to stop at Rhodes Station.*
  - *Mass transit – either providing a new station and service at Rhodes or by alleviating congestion on the Northern Line (e.g. by allowing existing passengers to interchange and connect through to the Sydney CBD or Greater Parramatta).*

Overall, it is concluded that the traffic and parking aspects of the proposed development would be acceptable, subject to the future planned intersection improvement and infrastructure works in the vicinity.

Appendix A

SIDRA Intersection Results

MOVEMENT SUMMARY

Site: 101 [Station St- Constitution Rd (Ex AM)]

17101 Meadowbank
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Constitution Rd-E											
5	T1	309	1.7	0.186	3.6	LOS A	0.9	6.4	0.06	0.47	47.2
6a	R1	99	2.1	0.186	6.1	LOS A	0.9	6.4	0.06	0.47	46.8
Approach		408	1.8	0.186	4.2	LOS A	0.9	6.4	0.06	0.47	47.1
NorthWest: Station St-NW											
27a	L1	92	3.4	0.342	14.6	LOS B	1.6	11.5	0.72	0.88	41.3
29b	R3	14	0.0	0.342	18.8	LOS B	1.6	11.5	0.72	0.88	41.5
Approach		105	3.0	0.342	15.2	LOS B	1.6	11.5	0.72	0.88	41.3
West: Constitution Rd-W											
10b	L3	43	4.9	0.287	4.5	LOS A	1.7	12.1	0.23	0.43	46.2
11	T1	567	0.2	0.287	3.8	LOS A	1.7	12.1	0.23	0.43	47.1
Approach		611	0.5	0.287	3.8	LOS A	1.7	12.1	0.23	0.43	47.0
All Vehicles		1124	1.2	0.342	5.0	LOS A	1.7	12.1	0.21	0.49	46.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Station St- Constitution Rd (Ex PM)]

17101 Meadowbank
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Constitution Rd-E											
5	T1	879	0.1	0.452	3.6	LOS A	2.7	19.1	0.13	0.44	47.2
6a	R1	114	0.0	0.452	6.1	LOS A	2.7	19.1	0.13	0.44	46.8
Approach		993	0.1	0.452	3.9	LOS A	2.7	19.1	0.13	0.44	47.2
NorthWest: Station St-NW											
27a	L1	81	0.0	0.247	8.3	LOS A	1.3	8.8	0.62	0.76	44.1
29b	R3	37	0.0	0.247	12.5	LOS A	1.3	8.8	0.62	0.76	44.3
Approach		118	0.0	0.247	9.6	LOS A	1.3	8.8	0.62	0.76	44.2
West: Constitution Rd-W											
10b	L3	20	0.0	0.529	6.6	LOS A	3.6	25.0	0.51	0.57	45.5
11	T1	326	0.0	0.529	6.0	LOS A	3.6	25.0	0.51	0.57	46.3
Approach		346	0.0	0.529	6.0	LOS A	3.6	25.0	0.51	0.57	46.2
All Vehicles		1457	0.1	0.529	4.9	LOS A	3.6	25.0	0.26	0.49	46.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Meadow Cres-Bank St (Ex AM)]

17101 Meadowbank
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bank St- S											
1	L2	9	11.1	0.481	5.6	LOS A	2.9	20.1	0.42	0.52	45.8
2	T1	289	0.7	0.481	5.3	LOS A	2.9	20.1	0.42	0.52	46.7
Approach		299	1.1	0.481	5.3	LOS A	2.9	20.1	0.42	0.52	46.6
North: Constitution Rd- N											
8	T1	520	1.4	0.438	3.8	LOS A	3.4	24.0	0.26	0.45	46.9
9	R2	93	0.0	0.438	7.2	LOS A	3.4	24.0	0.26	0.45	46.7
Approach		613	1.2	0.438	4.3	LOS A	3.4	24.0	0.26	0.45	46.8
West: Meadow Cr-W											
10	L2	37	2.9	0.040	4.1	LOS A	0.2	1.5	0.32	0.56	45.2
12	R2	54	0.0	0.040	7.2	LOS A	0.2	1.5	0.32	0.56	45.8
Approach		91	1.2	0.040	5.9	LOS A	0.2	1.5	0.32	0.56	45.6
All Vehicles		1002	1.2	0.481	4.8	LOS A	3.4	24.0	0.32	0.48	46.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Meadow Cres-Bank St (Ex PM)]

17101 Meadowbank
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bank St- S											
1	L2	40	0.0	0.813	5.0	LOS A	13.0	91.7	0.66	0.47	45.3
2	T1	975	0.9	0.813	4.9	LOS A	13.0	91.7	0.66	0.47	46.0
Approach		1015	0.8	0.813	4.9	LOS A	13.0	91.7	0.66	0.47	46.0
North: Constitution Rd- N											
8	T1	324	0.0	0.271	3.6	LOS A	2.0	14.1	0.17	0.44	47.1
9	R2	71	0.0	0.271	7.0	LOS A	2.0	14.1	0.17	0.44	46.9
Approach		395	0.0	0.271	4.2	LOS A	2.0	14.1	0.17	0.44	47.1
West: Meadow Cr-W											
10	L2	24	0.0	0.320	23.6	LOS B	1.4	9.9	0.84	0.96	36.8
12	R2	27	0.0	0.320	26.7	LOS B	1.4	9.9	0.84	0.96	37.2
Approach		52	0.0	0.320	25.2	LOS B	1.4	9.9	0.84	0.96	37.0
All Vehicles		1461	0.6	0.813	5.4	LOS A	13.0	91.7	0.53	0.48	45.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Bank St-Railway Rd (Ex AM)]

17101 Meadowbank
Roundabout

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Rd-S											
1	L2	53	2.0	0.095	6.2	LOS A	0.5	3.5	0.47	0.59	45.3
2	T1	25	8.3	0.095	5.9	LOS A	0.5	3.5	0.47	0.59	45.8
Approach		78	4.1	0.095	6.1	LOS A	0.5	3.5	0.47	0.59	45.5
North: Railway Rd-N											
8	T1	34	0.0	0.413	5.2	LOS A	2.3	16.8	0.39	0.64	45.1
9	R2	258	2.9	0.413	7.9	LOS A	2.3	16.8	0.39	0.64	44.8
Approach		292	2.5	0.413	7.6	LOS A	2.3	16.8	0.39	0.64	44.9
West: Bank St-W											
10	L2	576	1.6	0.779	5.4	LOS A	13.5	95.4	0.52	0.47	45.1
12	R2	99	0.0	0.779	7.6	LOS A	13.5	95.4	0.52	0.47	45.4
Approach		675	1.4	0.779	5.7	LOS A	13.5	95.4	0.52	0.47	45.2
All Vehicles		1044	1.9	0.779	6.3	LOS A	13.5	95.4	0.48	0.53	45.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Bank St-Railway Rd (Ex PM)]

17101 Meadowbank
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Rd-S											
1	L2	183	1.1	0.571	19.3	LOS B	4.7	33.2	0.96	1.11	38.9
2	T1	37	5.7	0.571	19.2	LOS B	4.7	33.2	0.96	1.11	39.3
Approach		220	1.9	0.571	19.3	LOS B	4.7	33.2	0.96	1.11	39.0
North: Railway Rd-N											
8	T1	25	0.0	0.844	5.6	LOS A	12.3	86.6	0.75	0.60	44.4
9	R2	860	0.6	0.844	8.3	LOS A	12.3	86.6	0.75	0.60	44.1
Approach		885	0.6	0.844	8.2	LOS A	12.3	86.6	0.75	0.60	44.1
West: Bank St-W											
10	L2	295	0.0	0.571	5.2	LOS A	4.7	33.2	0.36	0.54	45.4
12	R2	88	0.0	0.571	7.5	LOS A	4.7	33.2	0.36	0.54	45.7
Approach		383	0.0	0.571	5.7	LOS A	4.7	33.2	0.36	0.54	45.5
All Vehicles		1488	0.6	0.844	9.2	LOS A	12.3	86.6	0.68	0.66	43.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Pedestrian Crossing (Ex AM)]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Rd-S											
2	T1	21	0.0	0.939	44.0	LOS D	19.3	137.5	0.96	2.32	33.6
3	R2	601	1.9	0.939	35.1	LOS C	19.3	137.5	0.96	2.32	33.2
Approach		622	1.9	0.939	35.4	NA	19.3	137.5	0.96	2.32	33.2
East: Constitution Rd-E											
4	L2	292	2.5	0.524	12.5	LOS A	3.1	22.2	0.75	1.04	42.4
6	R2	42	0.0	0.524	11.7	LOS A	3.1	22.2	0.75	1.04	41.9
Approach		334	2.2	0.524	12.4	LOS A	3.1	22.2	0.75	1.04	42.3
All Vehicles		956	2.0	0.939	27.4	NA	19.3	137.5	0.89	1.87	35.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Pedestrian Crossing (Ex PM)]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Rd-S											
2	T1	11	0.0	0.321	6.3	LOS A	1.8	12.4	0.59	0.76	45.5
3	R2	332	0.6	0.321	7.2	LOS A	1.8	12.4	0.59	0.76	44.7
Approach		342	0.6	0.321	7.2	NA	1.8	12.4	0.59	0.76	44.7
East: Constitution Rd-E											
4	L2	885	0.6	0.924	20.9	LOS B	24.1	169.2	0.92	2.03	38.6
6	R2	42	0.0	0.924	20.2	LOS B	24.1	169.2	0.92	2.03	38.2
Approach		927	0.6	0.924	20.9	LOS B	24.1	169.2	0.92	2.03	38.6
All Vehicles		1269	0.6	0.924	17.2	NA	24.1	169.2	0.83	1.69	40.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Bowden St-Constitution Rd (Ex AM)]

17101 Meadowbank
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bowden St-S											
1	L2	12	0.0	0.544	11.9	LOS A	2.8	20.4	0.69	0.93	41.8
2	T1	87	10.8	0.544	11.4	LOS A	2.8	20.4	0.69	0.93	42.4
3	R2	117	0.0	0.544	14.2	LOS A	2.8	20.4	0.69	0.93	42.3
Approach		216	4.4	0.544	13.0	LOS A	2.8	20.4	0.69	0.93	42.3
East: Constitution Rd- E											
4	L2	37	5.7	0.792	13.5	LOS A	10.8	78.3	0.90	0.91	41.3
5	T1	275	3.8	0.792	13.4	LOS A	10.8	78.3	0.90	0.91	41.8
6	R2	146	2.9	0.792	16.3	LOS B	10.8	78.3	0.90	0.91	41.6
Approach		458	3.7	0.792	14.3	LOS A	10.8	78.3	0.90	0.91	41.7
North: Bowden St-N											
7	L2	87	8.4	0.706	26.2	LOS B	6.1	45.1	0.93	1.18	36.0
8	T1	47	13.3	0.706	26.6	LOS B	6.1	45.1	0.93	1.18	36.4
9	R2	89	3.5	0.706	28.3	LOS B	6.1	45.1	0.93	1.18	36.3
Approach		224	7.5	0.706	27.1	LOS B	6.1	45.1	0.93	1.18	36.2
West: Constitution Rd- W											
10	L2	177	6.5	0.826	16.6	LOS B	13.3	95.8	0.99	1.16	40.3
11	T1	451	2.6	0.826	16.1	LOS B	13.3	95.8	0.99	1.16	40.9
12	R2	18	0.0	0.826	18.9	LOS B	13.3	95.8	0.99	1.16	40.7
Approach		645	3.6	0.826	16.3	LOS B	13.3	95.8	0.99	1.16	40.7
All Vehicles		1543	4.3	0.826	16.8	LOS B	13.3	95.8	0.92	1.05	40.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Bowden St-Constitution Rd (Ex PM)]

17101 Meadowbank
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bowden St-S											
1	L2	14	7.7	0.455	17.4	LOS B	2.1	15.3	0.76	0.96	39.4
2	T1	46	2.3	0.455	16.6	LOS B	2.1	15.3	0.76	0.96	40.0
3	R2	60	5.3	0.455	19.8	LOS B	2.1	15.3	0.76	0.96	39.8
Approach		120	4.4	0.455	18.3	LOS B	2.1	15.3	0.76	0.96	39.8
East: Constitution Rd- E											
4	L2	48	0.0	0.887	33.6	LOS C	17.7	125.3	1.00	1.53	33.9
5	T1	408	1.3	0.887	33.6	LOS C	17.7	125.3	1.00	1.53	34.2
6	R2	40	2.6	0.887	36.7	LOS C	17.7	125.3	1.00	1.53	34.0
Approach		497	1.3	0.887	33.9	LOS C	17.7	125.3	1.00	1.53	34.1
North: Bowden St-N											
7	L2	80	1.3	0.776	14.6	LOS B	10.5	74.7	0.94	1.05	40.3
8	T1	88	2.4	0.776	14.4	LOS A	10.5	74.7	0.94	1.05	40.8
9	R2	386	1.4	0.776	17.3	LOS B	10.5	74.7	0.94	1.05	40.7
Approach		555	1.5	0.776	16.4	LOS B	10.5	74.7	0.94	1.05	40.6
West: Constitution Rd- W											
10	L2	67	1.6	0.590	8.1	LOS A	4.3	30.8	0.61	0.69	44.5
11	T1	256	0.8	0.590	7.8	LOS A	4.3	30.8	0.61	0.69	45.1
12	R2	9	22.2	0.590	10.9	LOS A	4.3	30.8	0.61	0.69	44.5
Approach		333	1.6	0.590	8.0	LOS A	4.3	30.8	0.61	0.69	45.0
All Vehicles		1504	1.7	0.887	20.5	LOS B	17.7	125.3	0.87	1.12	39.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Station St- Constitution Rd (FB AM)]

17101 Meadowbank
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Constitution Rd-E											
5	T1	460	1.1	0.271	3.6	LOS A	1.5	10.4	0.07	0.46	47.2
6a	R1	137	1.5	0.271	6.0	LOS A	1.5	10.4	0.07	0.46	46.8
Approach		597	1.2	0.271	4.1	LOS A	1.5	10.4	0.07	0.46	47.1
NorthWest: Station St-NW											
27a	L1	99	3.2	0.403	17.7	LOS B	2.0	14.5	0.76	0.93	39.9
29b	R3	14	0.0	0.403	21.9	LOS B	2.0	14.5	0.76	0.93	40.1
Approach		113	2.8	0.403	18.2	LOS B	2.0	14.5	0.76	0.93	39.9
West: Constitution Rd-W											
10b	L3	44	4.8	0.319	4.6	LOS A	2.0	14.0	0.28	0.44	46.0
11	T1	624	0.2	0.319	3.9	LOS A	2.0	14.0	0.28	0.44	46.9
Approach		668	0.5	0.319	4.0	LOS A	2.0	14.0	0.28	0.44	46.9
All Vehicles		1378	1.0	0.403	5.2	LOS A	2.0	14.5	0.22	0.49	46.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Station St- Constitution Rd (FB PM)]

17101 Meadowbank
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Constitution Rd-E											
5	T1	940	0.1	0.484	3.6	LOS A	3.3	23.2	0.15	0.43	47.2
6a	R1	121	0.0	0.484	6.1	LOS A	3.3	23.2	0.15	0.43	46.8
Approach		1061	0.1	0.484	3.9	LOS A	3.3	23.2	0.15	0.43	47.1
NorthWest: Station St-NW											
27a	L1	116	0.0	0.405	12.4	LOS A	2.4	16.7	0.77	0.92	42.1
29b	R3	38	0.0	0.405	16.7	LOS B	2.4	16.7	0.77	0.92	42.4
Approach		154	0.0	0.405	13.5	LOS A	2.4	16.7	0.77	0.92	42.2
West: Constitution Rd-W											
10b	L3	21	0.0	0.731	9.5	LOS A	8.4	58.5	0.74	0.69	43.9
11	T1	466	0.0	0.731	8.9	LOS A	8.4	58.5	0.74	0.69	44.6
Approach		487	0.0	0.731	8.9	LOS A	8.4	58.5	0.74	0.69	44.6
All Vehicles		1702	0.1	0.731	6.2	LOS A	8.4	58.5	0.37	0.55	45.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Meadow Cres-Bank St (FB AM)]

17101 Meadowbank
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bank St- S											
1	L2	9	11.1	0.752	8.2	LOS A	8.6	60.2	0.71	0.64	44.5
2	T1	474	0.4	0.752	7.9	LOS A	8.6	60.2	0.71	0.64	45.3
Approach		483	0.7	0.752	7.9	LOS A	8.6	60.2	0.71	0.64	45.3
North: Constitution Rd- N											
8	T1	580	1.3	0.484	3.9	LOS A	4.2	30.0	0.30	0.45	46.8
9	R2	96	0.0	0.484	7.2	LOS A	4.2	30.0	0.30	0.45	46.6
Approach		676	1.1	0.484	4.3	LOS A	4.2	30.0	0.30	0.45	46.8
West: Meadow Cr-W											
10	L2	38	2.8	0.047	4.6	LOS A	0.3	2.4	0.54	0.57	44.8
12	R2	56	0.0	0.047	7.6	LOS A	0.3	2.4	0.54	0.57	45.4
Approach		94	1.1	0.047	6.4	LOS A	0.3	2.4	0.54	0.57	45.1
All Vehicles		1253	0.9	0.752	5.9	LOS A	8.6	60.2	0.48	0.53	46.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Meadow Cres-Bank St (FB PM)]

17101 Meadowbank
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bank St- S											
1	L2	41	0.0	0.870	5.5	LOS A	17.2	121.5	0.82	0.50	44.9
2	T1	1043	0.8	0.870	5.3	LOS A	17.2	121.5	0.82	0.50	45.5
Approach		1084	0.8	0.870	5.3	LOS A	17.2	121.5	0.82	0.50	45.5
North: Constitution Rd- N											
8	T1	497	0.0	0.383	3.6	LOS A	3.3	23.1	0.20	0.43	47.1
9	R2	73	0.0	0.383	7.0	LOS A	3.3	23.1	0.20	0.43	47.0
Approach		569	0.0	0.383	4.1	LOS A	3.3	23.1	0.20	0.43	47.1
West: Meadow Cr-W											
10	L2	25	0.0	0.346	23.7	LOS B	1.7	11.6	0.86	0.98	36.8
12	R2	28	0.0	0.346	26.8	LOS B	1.7	11.6	0.86	0.98	37.2
Approach		54	0.0	0.346	25.4	LOS B	1.7	11.6	0.86	0.98	37.0
All Vehicles		1707	0.5	0.870	5.5	LOS A	17.2	121.5	0.62	0.49	45.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Bank St-Railway Rd (FB AM)]

17101 Meadowbank
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Rd-S											
1	L2	54	2.0	0.120	7.7	LOS A	0.6	4.6	0.61	0.69	44.5
2	T1	26	8.0	0.120	7.4	LOS A	0.6	4.6	0.61	0.69	45.0
Approach		80	3.9	0.120	7.6	LOS A	0.6	4.6	0.61	0.69	44.7
North: Railway Rd-N											
8	T1	35	0.0	0.639	5.6	LOS A	5.3	37.9	0.56	0.66	44.8
9	R2	441	1.7	0.639	8.4	LOS A	5.3	37.9	0.56	0.66	44.5
Approach		476	1.5	0.639	8.2	LOS A	5.3	37.9	0.56	0.66	44.5
West: Bank St-W											
10	L2	637	1.5	0.855	5.9	LOS A	20.7	146.6	0.74	0.45	44.7
12	R2	102	0.0	0.855	8.1	LOS A	20.7	146.6	0.74	0.45	45.0
Approach		739	1.3	0.855	6.2	LOS A	20.7	146.6	0.74	0.45	44.7
All Vehicles		1295	1.5	0.855	7.0	LOS A	20.7	146.6	0.67	0.54	44.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Bank St-Railway Rd (FB PM)]

17101 Meadowbank
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Rd-S											
1	L2	188	1.1	0.662	25.6	LOS B	6.0	42.5	1.00	1.19	36.5
2	T1	38	5.6	0.662	25.5	LOS B	6.0	42.5	1.00	1.19	36.8
Approach		226	1.9	0.662	25.5	LOS B	6.0	42.5	1.00	1.19	36.6
North: Railway Rd-N											
8	T1	26	0.0	0.847	5.4	LOS A	13.5	95.1	0.80	0.59	44.3
9	R2	924	0.6	0.847	8.1	LOS A	13.5	95.1	0.80	0.59	44.0
Approach		951	0.6	0.847	8.0	LOS A	13.5	95.1	0.80	0.59	44.0
West: Bank St-W											
10	L2	466	0.0	0.833	6.3	LOS A	14.2	99.1	0.74	0.53	44.7
12	R2	92	0.0	0.833	8.5	LOS A	14.2	99.1	0.74	0.53	45.0
Approach		558	0.0	0.833	6.7	LOS A	14.2	99.1	0.74	0.53	44.7
All Vehicles		1735	0.5	0.847	9.9	LOS A	14.2	99.1	0.81	0.65	43.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Pedestrian Crossing (FB AM)_P Factor 1.0]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Rd-S											
2	T1	21	0.0	1.046	90.8	LOS F	42.1	298.8	1.00	3.74	23.5
3	R2	663	1.7	1.046	81.6	LOS F	42.1	298.8	1.00	3.74	23.2
Approach		684	1.7	1.046	81.9	NA	42.1	298.8	1.00	3.74	23.3
East: Constitution Rd-E											
4	L2	476	1.5	0.824	20.0	LOS B	8.8	62.4	0.90	1.54	38.9
6	R2	42	0.0	0.824	19.9	LOS B	8.8	62.4	0.90	1.54	38.6
Approach		518	1.4	0.824	20.0	LOS B	8.8	62.4	0.90	1.54	38.9
All Vehicles		1202	1.6	1.046	55.2	NA	42.1	298.8	0.96	2.79	28.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Pedestrian Crossing (FB PM)_P Factor 1.0]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Rd-S											
2	T1	11	0.0	0.622	15.8	LOS B	5.4	38.1	0.76	1.15	42.8
3	R2	504	0.4	0.622	12.1	LOS A	5.4	38.1	0.76	1.15	42.1
Approach		515	0.4	0.622	12.2	NA	5.4	38.1	0.76	1.15	42.1
East: Constitution Rd-E											
4	L2	951	0.6	1.270	258.6	LOS F	146.5	1030.1	1.00	8.21	11.0
6	R2	42	0.0	1.270	257.9	LOS F	146.5	1030.1	1.00	8.21	10.9
Approach		993	0.5	1.270	258.5	LOS F	146.5	1030.1	1.00	8.21	11.0
All Vehicles		1507	0.5	1.270	174.4	NA	146.5	1030.1	0.92	5.80	14.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [Bowden St-Constitution Rd (FB AM) - Signal]

17101 Meadowbank
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bowden St-S											
1	L2	122	0.0	0.247	32.7	LOS C	4.2	29.7	0.83	0.76	34.3
2	T1	140	6.8	0.587	30.9	LOS C	10.1	72.7	0.92	0.80	34.5
3	R2	120	0.0	0.587	35.4	LOS C	10.1	72.7	0.92	0.80	34.4
Approach		382	2.5	0.587	32.9	LOS C	10.1	72.7	0.89	0.78	34.4
East: Constitution Rd- E											
4	L2	38	5.6	0.102	16.1	LOS B	2.1	15.5	0.53	0.53	41.9
5	T1	348	3.0	0.277	11.7	LOS A	6.7	48.3	0.57	0.50	43.0
6	R2	189	2.2	0.590	28.4	LOS B	6.8	48.6	0.84	0.81	35.7
Approach		576	2.9	0.590	17.5	LOS B	6.8	48.6	0.65	0.60	40.2
North: Bowden St-N											
7	L2	96	7.7	0.311	31.9	LOS C	5.4	40.4	0.82	0.73	35.1
8	T1	59	10.7	0.311	27.2	LOS B	5.4	40.4	0.82	0.73	35.4
9	R2	92	3.4	0.258	33.2	LOS C	3.2	23.4	0.83	0.75	34.3
Approach		246	6.8	0.311	31.3	LOS C	5.4	40.4	0.83	0.74	34.9
West: Constitution Rd- W											
10	L2	182	6.4	0.210	18.6	LOS B	4.5	33.4	0.60	0.71	39.5
11	T1	476	2.4	0.507	13.3	LOS A	12.6	89.7	0.65	0.57	42.3
12	R2	52	0.0	0.105	19.2	LOS B	1.3	9.0	0.59	0.68	39.3
Approach		709	3.3	0.507	15.1	LOS B	12.6	89.7	0.63	0.62	41.3
All Vehicles		1914	3.5	0.590	21.4	LOS B	12.6	89.7	0.71	0.66	38.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P3	North Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
All Pedestrians		211	39.3	LOS D			0.94	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101v [Bowden St-Constitution Rd (FB PM) - Signal]

17101 Meadowbank
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bowden St-S											
1	L2	35	3.0	0.058	18.5	LOS B	1.2	8.4	0.57	0.60	40.2
2	T1	60	1.8	0.170	15.2	LOS B	2.8	20.1	0.61	0.62	40.2
3	R2	62	5.1	0.170	20.2	LOS B	2.8	20.1	0.62	0.62	39.8
Approach		157	3.4	0.170	17.9	LOS B	2.8	20.1	0.61	0.62	40.0
East: Constitution Rd- E											
4	L2	49	0.0	0.197	27.6	LOS B	3.8	26.7	0.75	0.66	37.0
5	T1	438	1.2	0.533	24.6	LOS B	12.9	91.0	0.83	0.72	37.3
6	R2	54	2.0	0.189	34.5	LOS C	1.9	13.7	0.83	0.74	33.7
Approach		541	1.2	0.533	25.9	LOS B	12.9	91.0	0.82	0.72	36.9
North: Bowden St-N											
7	L2	99	1.1	0.272	19.1	LOS B	6.4	45.0	0.63	0.61	40.6
8	T1	148	1.4	0.272	14.5	LOS A	6.4	45.0	0.63	0.61	40.9
9	R2	398	1.3	0.583	22.4	LOS B	12.6	89.2	0.77	0.80	38.1
Approach		645	1.3	0.583	20.1	LOS B	12.6	89.2	0.71	0.73	39.1
West: Constitution Rd- W											
10	L2	69	1.5	0.154	28.8	LOS C	2.8	19.7	0.76	0.70	36.0
11	T1	306	0.7	0.418	23.7	LOS B	9.6	67.7	0.80	0.69	37.7
12	R2	129	1.6	0.567	40.7	LOS C	5.4	38.2	0.95	0.80	31.9
Approach		505	1.0	0.567	28.8	LOS C	9.6	67.7	0.83	0.72	35.8
All Vehicles		1848	1.4	0.583	24.0	LOS B	12.9	91.0	0.77	0.71	37.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P3	North Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
All Pedestrians		211	39.3	LOS D			0.94	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Station St- Constitution Rd (PD AM)]

17101 Meadowbank
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Constitution Rd-E											
5	T1	468	1.1	0.277	3.6	LOS A	1.5	10.7	0.07	0.46	47.2
6a	R1	140	1.5	0.277	6.0	LOS A	1.5	10.7	0.07	0.46	46.8
Approach		608	1.2	0.277	4.1	LOS A	1.5	10.7	0.07	0.46	47.1
NorthWest: Station St-NW											
27a	L1	101	3.1	0.425	18.9	LOS B	2.2	15.7	0.77	0.95	39.4
29b	R3	14	0.0	0.425	23.2	LOS B	2.2	15.7	0.77	0.95	39.6
Approach		115	2.8	0.425	19.5	LOS B	2.2	15.7	0.77	0.95	39.4
West: Constitution Rd-W											
10b	L3	44	4.8	0.329	4.6	LOS A	2.1	14.7	0.28	0.45	46.0
11	T1	645	0.2	0.329	3.9	LOS A	2.1	14.7	0.28	0.45	46.9
Approach		689	0.5	0.329	4.0	LOS A	2.1	14.7	0.28	0.45	46.9
All Vehicles		1413	1.0	0.425	5.3	LOS A	2.2	15.7	0.23	0.49	46.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Station St- Constitution Rd (PD PM)]

17101 Meadowbank
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Constitution Rd-E											
5	T1	963	0.1	0.496	3.6	LOS A	3.5	24.4	0.15	0.43	47.2
6a	R1	123	0.0	0.496	6.1	LOS A	3.5	24.4	0.15	0.43	46.8
Approach		1086	0.1	0.496	3.9	LOS A	3.5	24.4	0.15	0.43	47.1
NorthWest: Station St-NW											
27a	L1	122	0.0	0.441	13.7	LOS A	2.7	19.0	0.80	0.95	41.6
29b	R3	38	0.0	0.441	17.9	LOS B	2.7	19.0	0.80	0.95	41.8
Approach		160	0.0	0.441	14.7	LOS B	2.7	19.0	0.80	0.95	41.6
West: Constitution Rd-W											
10b	L3	21	0.0	0.767	10.8	LOS A	10.0	69.8	0.80	0.74	43.3
11	T1	491	0.0	0.767	10.1	LOS A	10.0	69.8	0.80	0.74	44.0
Approach		512	0.0	0.767	10.1	LOS A	10.0	69.8	0.80	0.74	44.0
All Vehicles		1758	0.1	0.767	6.7	LOS A	10.0	69.8	0.40	0.57	45.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Meadow Cres-Bank St (PD AM)]

17101 Meadowbank
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bank St- S											
1	L2	9	11.1	0.768	8.6	LOS A	9.3	65.4	0.74	0.65	44.3
2	T1	485	0.4	0.768	8.3	LOS A	9.3	65.4	0.74	0.65	45.1
Approach		495	0.6	0.768	8.3	LOS A	9.3	65.4	0.74	0.65	45.0
North: Constitution Rd- N											
8	T1	603	1.2	0.499	3.9	LOS A	4.5	31.8	0.31	0.45	46.8
9	R2	96	0.0	0.499	7.2	LOS A	4.5	31.8	0.31	0.45	46.6
Approach		699	1.1	0.499	4.3	LOS A	4.5	31.8	0.31	0.45	46.7
West: Meadow Cr-W											
10	L2	38	2.8	0.047	4.6	LOS A	0.4	2.5	0.55	0.57	44.8
12	R2	56	0.0	0.047	7.7	LOS A	0.4	2.5	0.55	0.57	45.4
Approach		94	1.1	0.047	6.4	LOS A	0.4	2.5	0.55	0.57	45.1
All Vehicles		1287	0.9	0.768	6.0	LOS A	9.3	65.4	0.49	0.54	46.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Meadow Cres-Bank St (PD PM)]

17101 Meadowbank
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bank St- S											
1	L2	41	0.0	0.890	5.6	LOS A	19.3	135.9	0.90	0.50	44.7
2	T1	1068	0.8	0.890	5.5	LOS A	19.3	135.9	0.90	0.50	45.3
Approach		1109	0.8	0.890	5.5	LOS A	19.3	135.9	0.90	0.50	45.3
North: Constitution Rd- N											
8	T1	527	0.0	0.402	3.6	LOS A	3.6	25.1	0.20	0.42	47.1
9	R2	73	0.0	0.402	7.0	LOS A	3.6	25.1	0.20	0.42	47.0
Approach		600	0.0	0.402	4.0	LOS A	3.6	25.1	0.20	0.42	47.1
West: Meadow Cr-W											
10	L2	25	0.0	0.379	25.9	LOS B	1.9	13.0	0.88	1.00	36.0
12	R2	28	0.0	0.379	29.0	LOS C	1.9	13.0	0.88	1.00	36.4
Approach		54	0.0	0.379	27.6	LOS B	1.9	13.0	0.88	1.00	36.2
All Vehicles		1763	0.5	0.890	5.7	LOS A	19.3	135.9	0.66	0.49	45.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Bank St-Railway Rd (PD AM)]

17101 Meadowbank
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Rd-S											
1	L2	54	2.0	0.169	8.1	LOS A	1.0	6.8	0.67	0.75	44.0
2	T1	26	8.0	0.169	7.9	LOS A	1.0	6.8	0.67	0.75	44.5
3	R2	26	0.0	0.169	10.3	LOS A	1.0	6.8	0.67	0.75	44.3
Approach		106	3.0	0.169	8.6	LOS A	1.0	6.8	0.67	0.75	44.2
East: Site Access-E											
4	L2	62	0.0	0.159	8.0	LOS A	0.9	6.6	0.70	0.75	44.1
5	T1	22	0.0	0.159	7.6	LOS A	0.9	6.6	0.70	0.75	44.6
6	R2	26	0.0	0.159	10.3	LOS A	0.9	6.6	0.70	0.75	44.4
Approach		111	0.0	0.159	8.5	LOS A	0.9	6.6	0.70	0.75	44.3
North: Railway Rd-N											
7	L2	59	0.0	0.783	10.7	LOS A	9.9	70.4	0.83	0.81	42.0
8	T1	35	0.0	0.783	10.1	LOS A	9.9	70.4	0.83	0.81	42.6
9	R2	431	1.7	0.783	12.9	LOS A	9.9	70.4	0.83	0.81	42.3
Approach		524	1.4	0.783	12.5	LOS A	9.9	70.4	0.83	0.81	42.3
West: Bank St-W											
10	L2	637	1.5	0.955	18.3	LOS B	34.0	240.3	1.00	0.71	39.3
11	T1	23	0.0	0.955	17.7	LOS B	34.0	240.3	1.00	0.71	39.7
12	R2	102	0.0	0.955	20.4	LOS B	34.0	240.3	1.00	0.71	39.5
Approach		762	1.2	0.955	18.5	LOS B	34.0	240.3	1.00	0.71	39.3
All Vehicles		1503	1.3	0.955	15.0	LOS B	34.0	240.3	0.90	0.75	41.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Bank St-Railway Rd (PD PM)]

17101 Meadowbank
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Rd-S											
1	L2	188	1.1	0.846	47.6	LOS D	10.3	73.0	1.00	1.42	29.9
2	T1	38	5.6	0.846	47.6	LOS D	10.3	73.0	1.00	1.42	30.1
3	R2	26	0.0	0.846	49.7	LOS D	10.3	73.0	1.00	1.42	30.0
Approach		253	1.7	0.846	47.8	LOS D	10.3	73.0	1.00	1.42	29.9
East: Site Access-E											
4	L2	113	0.0	0.595	22.2	LOS B	5.4	37.6	1.00	1.14	37.8
5	T1	72	0.0	0.595	21.7	LOS B	5.4	37.6	1.00	1.14	38.1
6	R2	26	0.0	0.595	24.4	LOS B	5.4	37.6	1.00	1.14	38.0
Approach		211	0.0	0.595	22.3	LOS B	5.4	37.6	1.00	1.14	37.9
North: Railway Rd-N											
7	L2	115	0.0	0.977	20.5	LOS B	36.5	256.5	1.00	0.88	37.8
8	T1	26	0.0	0.977	19.8	LOS B	36.5	256.5	1.00	0.88	38.2
9	R2	878	0.6	0.977	22.6	LOS B	36.5	256.5	1.00	0.88	38.1
Approach		1019	0.5	0.977	22.3	LOS B	36.5	256.5	1.00	0.88	38.0
West: Bank St-W											
10	L2	466	0.0	0.957	24.8	LOS B	29.7	208.0	1.00	0.87	36.7
11	T1	31	0.0	0.957	24.4	LOS B	29.7	208.0	1.00	0.87	37.0
12	R2	92	0.0	0.957	27.1	LOS B	29.7	208.0	1.00	0.87	36.9
Approach		588	0.0	0.957	25.2	LOS B	29.7	208.0	1.00	0.87	36.7
All Vehicles		2071	0.5	0.977	26.2	LOS B	36.5	256.5	1.00	0.97	36.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Pedestrian Crossing (PD AM)]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Rd-S											
2	T1	21	0.0	1.195	209.4	LOS F	86.6	614.9	1.00	6.12	13.2
3	R2	689	1.7	1.195	200.3	LOS F	86.6	614.9	1.00	6.12	13.2
Approach		711	1.6	1.195	200.5	NA	86.6	614.9	1.00	6.12	13.2
East: Constitution Rd-E											
4	L2	524	1.4	0.982	47.8	LOS D	21.8	154.2	0.99	2.63	30.1
6	R2	42	0.0	0.982	47.1	LOS D	21.8	154.2	0.99	2.63	29.8
Approach		566	1.3	0.982	47.8	LOS D	21.8	154.2	0.99	2.63	30.0
All Vehicles		1277	1.5	1.195	132.8	NA	86.6	614.9	1.00	4.57	17.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Pedestrian Crossing (PD PM)]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Rd-S											
2	T1	11	0.0	0.718	20.8	LOS B	7.1	50.1	0.83	1.31	41.4
3	R2	531	0.4	0.718	15.1	LOS B	7.1	50.1	0.83	1.31	40.7
Approach		541	0.4	0.718	15.2	NA	7.1	50.1	0.83	1.31	40.7
East: Constitution Rd-E											
4	L2	1019	0.5	1.482	447.7	LOS F	228.2	1604.0	1.00	11.19	7.0
6	R2	42	0.0	1.482	446.8	LOS F	228.2	1604.0	1.00	11.19	7.0
Approach		1061	0.5	1.482	447.7	LOS F	228.2	1604.0	1.00	11.19	7.0
All Vehicles		1602	0.5	1.482	301.6	NA	228.2	1604.0	0.94	7.85	9.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [Bowden St-Constitution Rd (PD AM) - Future Signal]

17101 Meadowbank
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bowden St-S											
1	L2	122	0.0	0.228	30.9	LOS C	4.1	28.8	0.80	0.75	34.9
2	T1	202	4.7	0.639	29.2	LOS C	12.4	88.8	0.92	0.80	35.2
3	R2	120	0.0	0.639	33.8	LOS C	12.4	88.8	0.92	0.80	35.0
Approach		444	2.1	0.639	30.9	LOS C	12.4	88.8	0.88	0.79	35.1
East: Constitution Rd- E											
4	L2	64	3.3	0.123	17.9	LOS B	2.6	18.5	0.57	0.60	40.7
5	T1	378	2.8	0.333	13.3	LOS A	8.4	60.0	0.61	0.54	42.2
6	R2	189	2.2	0.655	32.7	LOS C	7.5	53.5	0.89	0.85	34.3
Approach		632	2.7	0.655	19.6	LOS B	8.4	60.0	0.69	0.64	39.3
North: Bowden St-N											
7	L2	96	7.7	0.288	30.1	LOS C	5.2	39.1	0.80	0.72	35.7
8	T1	59	10.7	0.288	25.5	LOS B	5.2	39.1	0.80	0.72	36.1
9	R2	115	2.8	0.350	35.0	LOS C	4.2	30.4	0.86	0.77	33.7
Approach		269	6.3	0.350	31.2	LOS C	5.2	39.1	0.83	0.74	34.9
West: Constitution Rd- W											
10	L2	191	6.1	0.229	20.0	LOS B	5.0	36.6	0.63	0.72	38.9
11	T1	494	2.3	0.564	14.8	LOS B	13.9	98.9	0.69	0.61	41.6
12	R2	52	0.0	0.121	21.8	LOS B	1.4	9.8	0.64	0.70	38.2
Approach		736	3.1	0.564	16.6	LOS B	13.9	98.9	0.67	0.64	40.6
All Vehicles		2081	3.2	0.655	22.4	LOS B	13.9	98.9	0.74	0.69	38.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P3	North Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
All Pedestrians		211	39.3	LOS D			0.94	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101v [Bowden St-Constitution Rd (PD PM) - Future Signal]

17101 Meadowbank
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bowden St-S											
1	L2	35	3.0	0.083	17.0	LOS B	1.8	12.4	0.55	0.54	41.4
2	T1	173	0.6	0.243	13.4	LOS A	4.8	34.0	0.59	0.57	41.5
3	R2	62	5.1	0.243	18.3	LOS B	4.8	34.0	0.60	0.58	41.2
Approach		269	2.0	0.243	15.0	LOS B	4.8	34.0	0.59	0.57	41.4
East: Constitution Rd- E											
4	L2	76	0.0	0.241	30.3	LOS C	4.4	31.2	0.80	0.71	35.8
5	T1	473	1.1	0.653	27.4	LOS B	15.6	110.3	0.89	0.78	36.3
6	R2	54	2.0	0.218	37.4	LOS C	2.0	14.4	0.86	0.74	32.8
Approach		602	1.0	0.653	28.7	LOS C	15.6	110.3	0.88	0.76	35.9
North: Bowden St-N											
7	L2	99	1.1	0.260	17.8	LOS B	6.1	43.0	0.60	0.60	41.1
8	T1	148	1.4	0.260	13.2	LOS A	6.1	43.0	0.60	0.60	41.5
9	R2	459	1.1	0.726	24.8	LOS B	16.5	116.4	0.84	0.85	37.2
Approach		706	1.2	0.726	21.4	LOS B	16.5	116.4	0.76	0.76	38.5
West: Constitution Rd- W											
10	L2	75	1.4	0.180	30.5	LOS C	3.1	22.2	0.79	0.71	35.3
11	T1	327	0.6	0.487	25.7	LOS B	10.8	75.7	0.84	0.72	36.9
12	R2	129	1.6	0.731	49.1	LOS D	6.1	43.1	1.00	0.91	29.7
Approach		532	1.0	0.731	32.1	LOS C	10.8	75.7	0.87	0.76	34.7
All Vehicles		2109	1.2	0.731	25.4	LOS B	16.5	116.4	0.80	0.74	37.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P3	North Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
All Pedestrians		211	39.3	LOS D			0.94	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101v [Pedestrian Crossing (PD AM) - Signal]

New Site
Signals - Fixed Time Isolated Cycle Time = 75 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Rd-S											
2	T1	21	0.0	0.725	14.4	LOS A	19.9	140.9	0.82	0.84	39.7
3	R2	689	1.7	0.725	19.0	LOS B	19.9	140.9	0.82	0.84	39.3
Approach		711	1.6	0.725	18.8	LOS B	19.9	140.9	0.82	0.84	39.3
East: Constitution Rd-E											
4	L2	524	1.4	0.459	10.8	LOS A	8.9	63.0	0.50	0.71	43.2
6	R2	42	0.0	0.283	42.4	LOS C	1.6	10.9	0.98	0.73	31.1
Approach		566	1.3	0.459	13.2	LOS A	8.9	63.0	0.54	0.71	42.0
All Vehicles		1277	1.5	0.725	16.3	LOS B	19.9	140.9	0.69	0.78	40.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	489	32.4	LOS D	1.0	1.0	0.94	0.94
P2	East Full Crossing	53	31.8	LOS D	0.1	0.1	0.92	0.92
All Pedestrians		542	32.3	LOS D			0.94	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101v [Pedestrian Crossing (PD PM) - Signal]

New Site
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Rd-S											
2	T1	11	0.0	0.478	10.2	LOS A	12.9	90.8	0.59	0.75	41.6
3	R2	531	0.4	0.478	14.8	LOS B	12.9	90.8	0.59	0.75	41.1
Approach		541	0.4	0.478	14.7	LOS B	12.9	90.8	0.59	0.75	41.1
East: Constitution Rd-E											
4	L2	1019	0.5	0.780	12.2	LOS A	26.3	184.7	0.65	0.79	42.5
6	R2	42	0.0	0.340	51.2	LOS D	1.9	13.3	0.99	0.73	29.0
Approach		1061	0.5	0.780	13.7	LOS A	26.3	184.7	0.66	0.79	41.7
All Vehicles		1602	0.5	0.780	14.0	LOS A	26.3	184.7	0.64	0.77	41.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	262	39.6	LOS D	0.6	0.6	0.94	0.94
P2	East Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
All Pedestrians		315	39.6	LOS D			0.94	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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