Issue History

File Name	Prepared	Reviewed	Issued by	Date	Issued to
P6458.001T Newcastle Indoor Sports Facility SIDRA Intersection Modelling Technical Note	R. Jain T. Islam	A. Grey	A. Grey	04/05/2024	Simone.Larsen@app.com.au
P6458.002T Newcastle Indoor Sports Facility SIDRA Intersection Modelling Technical Note	T. Islam	A. Grey	A. Grey	20/05/2024	Simone.Larsen@app.com.au
P6458.003T Newcastle Indoor Sports Facility SIDRA Intersection Modelling Technical Note	T. Islam	A. Grey	A. Grey	28/05/2024	Simone.Larsen@app.com.au

Newcastle Indoor Sports Facility

SIDRA Intersection Modelling Technical Note

1. Introduction

1.1 Background

Bitzios Consulting has been engaged by the Basketball Association of Newcastle Limited to undertake SIDRA intersection modelling to inform a Traffic and Transport Impact Assessment, prepared by SECAsolution, for the proposed Hunter Basketball Stadium (subject site) located at the corner of Turton Road / Monash Road. The study area encompasses the following five (5) intersections:

- **Intersection 1**: Turton Road / Griffiths Road
- **Intersection 2**: Turton Road / Young Road
- **Intersection 3**: Turton Road / MacDonald Jones Stadium Site Access
- **Intersection 4**: Turton Road / Monash Road
- **Intersection 5**: Turton Road / Lambton Road.

The locations of the subject sites and intersections are shown below Figure 1.1.

Adapted from Google Maps

Figure 1.1: Subject Site and Intersections

The purpose of the modelling is to assess the potential traffic impacts at the subject intersections and identify any potential upgrades required to mitigate the significant and detrimental traffic impacts. To understand these impacts, the subject intersections were modelled in SIDRA 9.1 Plus. This technical note outlines the model development process and modelling results of the Base and Project Case scenarios.

2. Modelling Methodology

2.1 Modelling Scenarios

The following scenarios were modelled:

- **Base Case**: Existing conditions of the subject intersection
- **Project Case**: Similar to **Base Case**, with additional traffic generated from the proposed development of Hunter Basketball Stadium
- **Project Case with Upgrades**: Similar to **Project Case**, with SIDRA-optimised signal phasing time.

It is notable that both the 'Project Case' and 'Project Case with Upgrades' account for zero-growth for the 10-year horizon/future year scenarios, as per advice and confirmation from TfNSW. The summary of the traffic input for each scenario is provided in Table 2.1.

Table 2.1: Traffic Demand for Modelling Scenarios

Scenario	Applied Traffic Demand
Base Case	Intersection Turn Count 2024 only
Project Case	Intersection Turn Count 2024 + Development Traffic from the subject site*
Project Case with Upgrades	Same as Project Case.

**Development Traffic is determined as per the Report: P2614 Newcastle Indoor Sports Centre Traffic Generation and Assignment by SECAsolution for Weekday and Weekend.*

All the scenarios were modelled for the following peak hours:

- **Weekday:**
  - AM Peak: 08:00 – 09:00
  - PM Peak: 16:45 – 17:45
- **Weekend:**
  - Peak: 11:15 AM -12:15 PM.

For all the scenarios, the intersections were modelled and processed as individual sites. No queue pushbacks or queuing across the intersections were observed from the survey videos, nor from the SIDRA models and hence processing the sites as one whole network was not necessitated.

3. Base Model Development

3.1 Geometrical Layout

The geometric layouts have been coded in SIDRA in accordance with the existing arrangements using Google Maps. The geometric layouts for all the subject intersections are attached in **Attachment B.**

3.2 Traffic Surveys

Matrix was commissioned by Bitzios Consulting to undertake the Intersection Counts Survey for all the intersections modelled. For different scenarios of the model the following days and times of the same week were nominated for data collection:

- **Weekday: Thursday, 4th April 2024**

- AM: 07:00 – 10:00 (3-hour survey)
- PM: 15:00 – 18:00 (3-hour survey)

- **Weekend: Saturday, 6th April 2024**
  - Time: 10:00 – 14:00 (4-hour survey).

Traffic flow diagrams with the collected survey data for Weekday AM, PM and Weekend have been provided in **Attachment A.**

3.3 Bus Movements

Bus movements were accounted for at the intersections during the nominated peak hours. The following measures were implemented for bus movements:

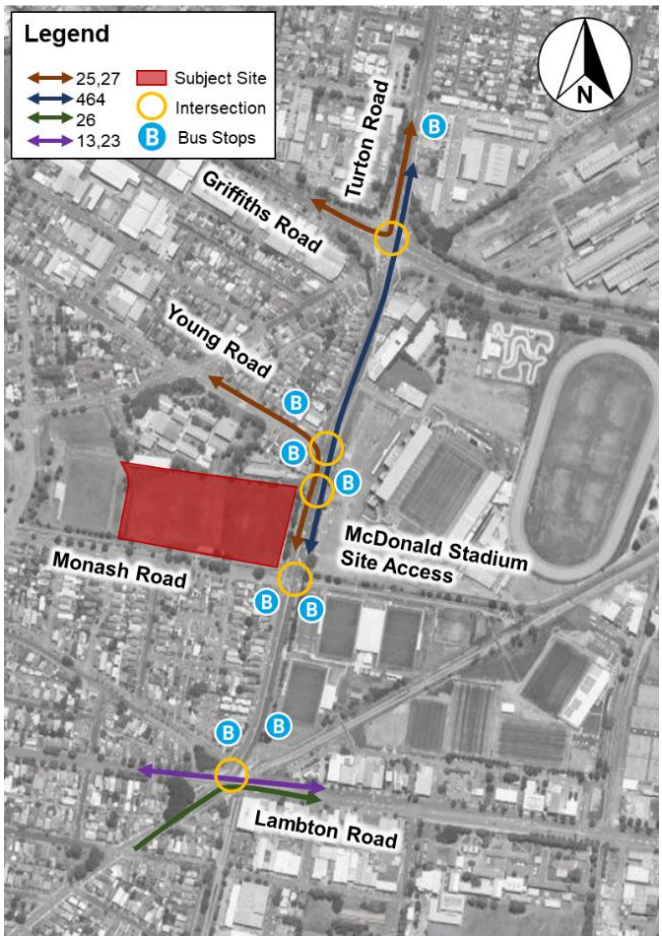
- Buses were treated as Heavy Vehicle and so the volumes for Heavy Vehicles were inclusive of the identified Buses for all scenarios. Exception applies for Turton Road / Lambton Road. Due to having bus queue jump lane at the intersection, buses were exclusively classified in terms of volume and vehicle class
- For Turton Road / Lambton Road, buses are configured to pass through the bus queue jump lane in every cycle of the model.

The classified bus movement for Weekday AM, PM and Weekend peak at Turton Road / Lambton Road are provided in Table 3.1.

Table 3.1: Bus Services and Volumes (AM Peak)

West Approach (Weekday: AM Peak)	
Service/Route No.	**Number of Services (Through)**
13	4
23	2
761	1
830	1
832	1
833	1
Total	**10**
West Approach (Weekday: PM Peak)	
13	4
23	3
Total	**7**
West Approach (Weekend Peak)	
13	2
23	1
Total	**3**

The bus movements along with adjacent stops at the subject intersections have been depicted in Figure 3.1.



Adapted from TfNSW Bus Routes

Figure 3.1: Bus Services at the Subject Intersections

The classified bus movement routes for Weekday AM, PM and Weekend peak at Turton Road / Lambton Road bus lane is showed in Figure 3.2.

Adapted from SIX Maps

Figure 3.2: Eastbound Bus Services at Turton Road / Lambton Road / Bridges Road

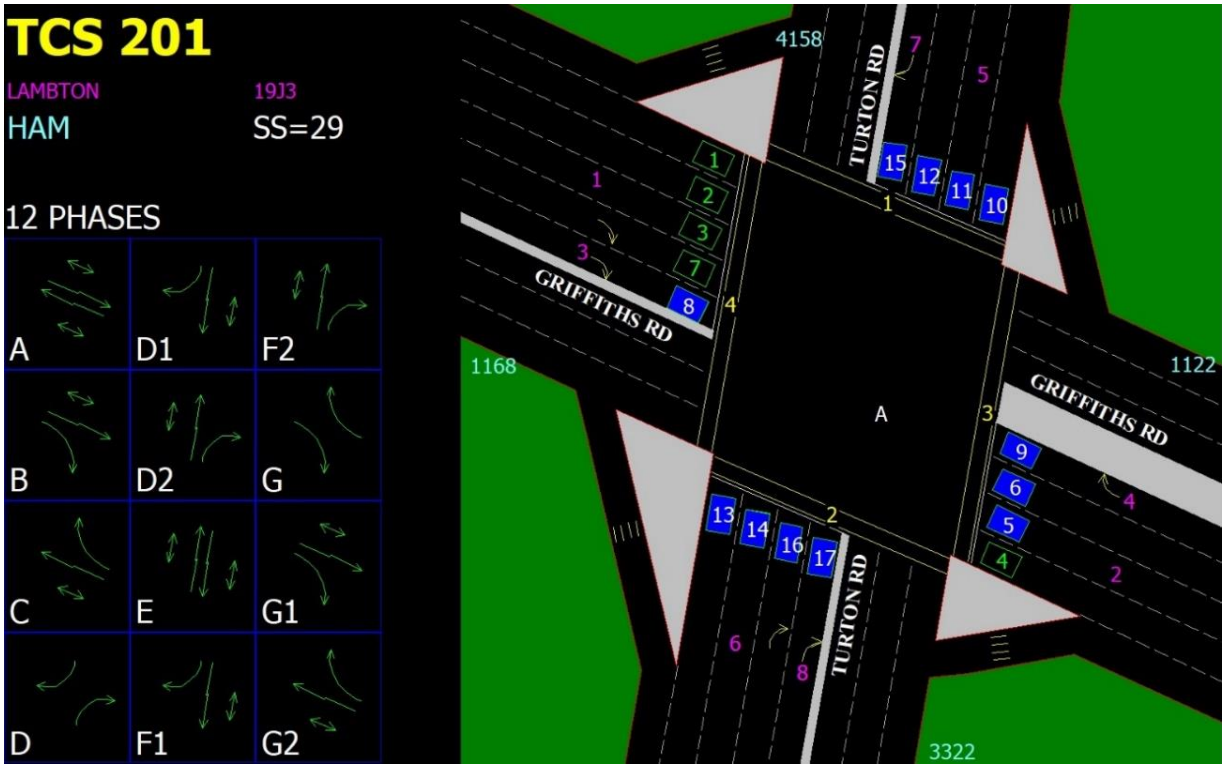
3.4 SCATS Data

For the three signalised intersections, SCATS data were acquired from Transport for New South Wales (TfNSW) for the same survey days (Weekday: Thursday 4th April and Weekend: Saturday 6th April) as the Intersection Counts survey. The phase time data was analysed for every 15 minutes of the peak hour to determine the phase sequences, average phases and cycle times for each peak period of the different days for the following intersections:

- Turton Road / Griffiths Road - TCS 201
- Turton Road / Young Road - TCS 3322
- Turton Road / Lambton Road / Bridges Road - TCS 350.

In addition, LX file was also acquired for the relevant region (HAM = Hamilton) to check the signal coordination direction between the signalised intersections.

The provided TCS graphics and all the phases for the above mentioned intersections are shown in , Figure 3.4 and Figure 3.5 respectively.

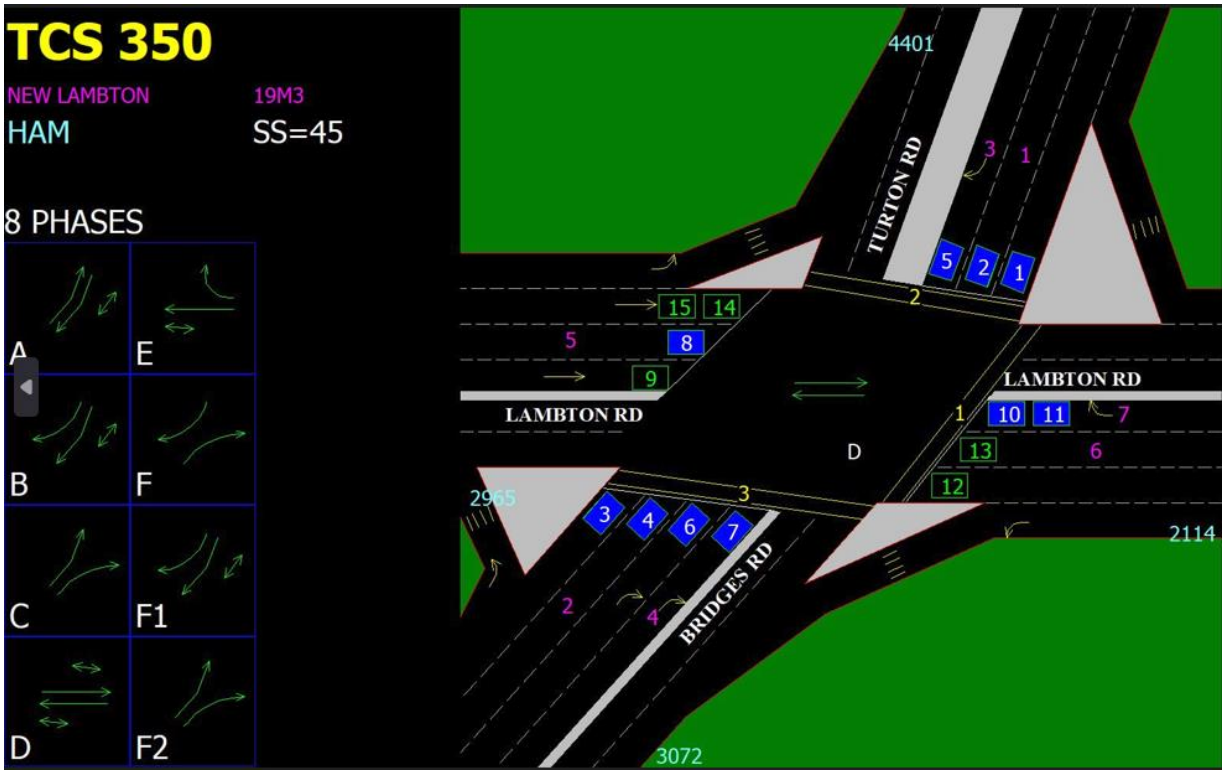


Adapted from TfNSW

Figure 3.3: Turton Road / Griffiths Road - TCS 201 Signal Phasing

Adapted from TfNSW

Figure 3.4: Turton Road / Young Road - TCS 3322 Signal Phasing



Adapted from TfNSW

Figure 3.5: Turton Road / Lambton Road / Bridges Road - TCS 350 Signal Phasing

3.5 Calibration and Validation

Initially, the 95th percentile back of queue lengths were recorded from the video footage of traffic surveys of Thursday 4th April and Friday 6th April for each approach. Due to limitation of the camera coverage and quality of the videos, the back of queue lengths were estimated based on logical judgement and visual queueing where required.

A detailed comparison between modelled queues and observed queues for the critical (signalised) intersections is summarised in Table 3.2.

Table 3.2: Weekday Peaks Comparison of Back of Queue Lengths

Approach	Turns	AM Peak			PM Peak		
		Observed (Length)	Modelled (Length)	Difference (Length)	Observed (Length)	Modelled (Length)	Difference (Length)
Turton Road / Griffiths Road							
Turton Road (N)	T	90	87	3	126	136	10
	R	NA	47	NA	NA	55	NA
Griffiths Road (E)	T	96	115	19	114	115	1
	R	42	27	15	24	45	21
Turton Road (S)	T	NA	156	NA	NA	435	NA
	R	66	85	19	132	149	17
Griffiths Road (W)	T	126	138	12	138	171	33
	R	78	66	12	108	82	-26
Turton Road / Young Road							
Turton Road (N)	T	48	45	3	120	160	40
	R	18	15	3	18	23	5
Turton Road (S)	L/T	66	85	19	66	46	20
Young Road (W)	L	NA	26	NA	NA	54	NA
	R	NA	77	NA	NA	142	NA
Turton Road / Lambton Road / Bridges Road							
Turton Road (N)	T	126	137	11	150	126	24
	R	48	63	15	48	61	13
Lambton Road (E)	T	66	91	25	60	92	32
	R	NA	362	NA	NA	49	NA
Bridges Road (S)	T	NA	199	NA	NA	683	NA
	R	NA	55	NA	NA	467	NA
Lambton Road (W)	T	NA	135	NA	NA	102	NA

A detailed comparison between modelled queues and observed queues for the critical (signalised) intersections for Weekend peak is summarised in Table 3.3.

Table 3.3: Weekend Peak Comparison of Back of Queue Lengths

Approach	Turns	Weekend Peak		
		Observed (veh)	Modelled (veh)	Difference (veh)
Turton Road / Bridges Road				
Turton Road (N)	T	84	104	20
	R	NA	43	NA
Griffiths Road (E)	T	114	122	8
	R	30	39	9
Turton Road (S)	T	NA	90	NA
	R	36	50	14
Griffiths Road (W)	T	108	102	6
	R	90	87	4
Turton Road / Young Road				
Turton Road (N)	T	126	114	12
	R	12	11	1
Turton Road (S)	L/T	72	70	2
Young Road (W)	L	NA	34	NA
	R	NA	46	NA
Turton Road / Lambton Road / Bridges Road				
Turton Road (N)	T	138	157	19
	R	42	49	7
Lambton Road (E)	T	54	63	9
	R	NA	65	NA
Bridges Road (S)	T	NA	130	NA
	R	NA	70	NA
Lambton Road (W)	T	NA	72	NA

In some of the instances in different scenarios, the modelled queue lengths or their differences (highlighted in red or marked as NA) did not meet the acceptable range of queue. Following section investigates this unacceptable queue lengths:

Turton Road / Griffiths Road

- **Turton Road North RT:** Queue in right turn cannot be verified due to camera coverage limitations
- **Turton Road South:** Queue in through turn cannot be verified due to limitations of camera set-up
- **Griffiths Road West:** Through turn in PM does not meet the range for queue length but it does satisfy the modelled number of vehicle and so the length could be unsatisfactory due to variable queue length as the range considers vehicles of only 6m. Right turn on the other hand, is unacceptable only 1m of queue length which is negligible and can be deemed to be acceptable.

Turton Road / Young Road

- **Young Road West:** The queues could not be verified due to camera setup angle camera set-up.

Turton Road / Lambton Road / Bridges Road

- **Lambton Road East:** The right turn queues could not be verified due to camera setup angle camera set-up.

- **Bridges Road South:** Queue in through and right turn cannot be verified due to limitations of camera set-up
- **Lambton Road West:** Queues cannot be observed entirely from the camera

To further satisfy the validation requirements, the following parameters were adjusted in SIDRA:

- Shifting allocated times in given phase times of SCATS
- Change in signal coordination using LX data
- Change in default Area Type Factor.

A detailed comparison of the acceptable range of Queue Lengths between observation and model has been tabulated in **Attachment D.**

3.6 Modelling Results

The modelled performance of the Base Case intersections in the AM and PM peaks are provided in Table 3.4, Table 3.5 and Table 3.6.

Table 3.4: Base Case Weekday AM Intersection Performance

Approach	Weekday: AM Peak			
	DoS	Delay (s)	LoS	95% Back of Queue (m)
Turton Road / Griffiths Road				
North	0.62	44.0	D	86.6
East	0.66	38.6	C	115.3
South	0.94	51.9	D	155.5
West	0.59	29.3	C	137.8
Turton Road / Young Road				
North	0.27	6.5	A	44.6
South	0.55	6.1	A	84.9
West	0.59	54.8	D	77.1
Turton Road / Lambton Road / Bridges Road				
North-east	0.88	36.9	C	137.1
East	1.70	207.1	F	361.6
South-west	0.86	26.7	B	198.5
West	0.85	56.7	E	135.3
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit				
North	0.22	0.8	NA	4.7
East	1	913.3	F	29.3
South	0.39	0.1	NA	0
West	1.07	110.2	F	30.8

Table 3.5: Base Case Weekday PM Intersection Performance

Approach	Weekday: PM Peak			
	DoS	Delay (s)	LoS	95% Back of Queue (m)
Turton Road / Griffiths Road				
North	0.58	51.5	D	136.2
East	0.48	39.0	C	114.9
South	1.22	196.0	F	434.7
West	0.64	38.5	C	170.6
Turton Road / Young Road				
North	0.43	11.3	A	160.1
South	0.55	2.5	A	45.7
West	0.92	100.3	F	141.6
Turton Road / Lambton Road / Bridges Road				
North-east	0.73	19.2	B	126.4
East	0.37	24.9	B	92.3
South-west	1.79	809.1	F	467.3
West	0.44	30.8	C	102.3
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit				
North	0.34	1.0	NA	7.9
East	1	760.7	F	26.6
South	0.43	0.2	NA	0
West	1.63	589.1	F	219.5

Table 3.6: Base Case Weekend Intersection Performance

Approach	Weekend Peak			
	DoS	Delay (s)	LoS	95% Back of Queue (m)
Turton Road / Griffiths Road				
North	0.61	44.1	D	104
East	0.73	40.5	C	121.5
South	0.70	36.6	C	90.3
West	0.57	34.8	C	102.1
Turton Road / Young Road				
North	0.33	8.9	A	114.4
South	0.35	6.0	A	69.7
West	0.45	56.2	D	45.7
Turton Road / Lambton Road / Bridges Road				

Approach	Weekend Peak			
	DoS	Delay (s)	LoS	95% Back of Queue (m)
North-east	0.72	23.7	B	156.6
East	0.57	27.6	B	65.3
South-west	0.85	34.9	C	129.8
West	0.35	39.0	C	72.2
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit				
North	0.26	0.3	NA	2.4
East	1.0	842.3	F	25.8
South	0.29	0.1	NA	0
West	1.07	102.9	F	31.8

Detailed SIDRA results are supplemented in **Attachment B.**

4. Project Case Development

4.1 Site Access

There are two main ways to access the site:

- **From North:** Vehicles proceed to the south on Turton Road and then turn right at Young Road. Drivers would have to turn right and loop around until they get onto Turton Road again via Monash Road, before making a final left turn to the site access from Turton Road
- **From South:** Vehicles can drive up north along Turton Road and then turn left to access the site entrance.

For traffic travelling from west, they can just travel from Monash Road or Lambton Road to access the site.

The travel paths to access the site for both northbound and southbound vehicles are illustrated in Figure 4.1.

Figure 4.1: Travel Paths to Site Access

4.2 Development Traffic Generation and Distribution

For modelling the Project Case, development traffic was added on top of the Base Case existing traffic volumes. This additional demand is considered to make trips in and out of the proposed development.

The forecast trip generation from the development traffic were distributed as per the Report: *P2614 Newcastle Indoor Sports Centre Traffic Generation and Assignment by* SECAsolution for Weekday and Weekend. The forecast trip distribution from the traffic report was utilized to form the final volumes of Project Case in addition to the existing surveys.

The Total inbound and outbound trips are summarised in Table 4.1.

Table 4.1: Inbound and Outbound Trips

	Scenarios		
Trips	**Weekday: AM Peak**	**Weekday: PM Peak**	**Weekend Peak**
Inbound	42	202	120
Outbound	18	215	120
Total	**60**	**417**	**240**

4.2.1 Trip Distribution Diagrams

The traffic flow distribution diagram of the Development as well as Project Traffic (Base Traffic + Development Traffic) are illustrated in **Attachment A.**

4.3 Modelling Results

The modelled performance of the Project Case in AM and PM peaks are enlisted in Table 4.2 and Table 4.3.

Table 4.2: Project Case Weekday AM Intersection Performance

Approach	Weekday: AM Peak			
	DoS	Delay (s)	LoS	95% Back of Queue (m)
Turton Road / Griffiths Road				
North	0.62	44.0	D	87.5
East	0.66	38.6	C	115.3
South	0.96	53.6	D	157.2
West	0.59	29.3	C	137.8
Turton Road / Young Road				
North	0.31	6.7	A	44.6
South	0.56	6.1	A	87.3
West	0.59	54.8	D	77.1
Turton Road / Lambton Road / Bridges Road				
North-east	0.88	36.9	C	137.1
East	1.75	225.5	F	385.4
South-west	0.81	46.0	D	55.1
West	0.85	56.0	D	135.3
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit				

Approach	Weekday: AM Peak			
	DoS	Delay (s)	LoS	95% Back of Queue (m)
North	0.23	0.9	NA	5
East	1.0	892.8	F	29
South	0.39	0.1	NA	0
West	1.10	122.9	F	39.5

Table 4.3: Project Case Weekday PM Intersection Performance

Approach	Weekday: PM Peak			
	DoS	Delay (s)	LoS	95% Back of Queue (m)
Turton Road / Griffiths Road				
North	0.60	52.2	D	141.4
East	0.48	38.9	C	114.9
South	1.30	262.4	F	493.6
West	0.64	38.6	C	170.6
Turton Road / Young Road				
North	0.76	18.2	B	147.3
South	0.62	2.5	A	60.9
West	0.92	90.0	F	141.6
Turton Road / Lambton Road / Bridges Road				
North-east	0.73	19.2	B	126.4
East	0.46	25.4	B	92.3
South-west	1.79	493.9	F	755.9
West	0.44	30.3	C	102.3
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit				
North	0.23	0.9	NA	5
East	1.00	892.8	F	29
South	0.39	0.1	NA	0
West	1.10	122.9	F	39.5

The modelled performance of the Project Case Weekend peak is presented in Table 4.4.

Table 4.4: Project Case Weekend Intersection Performance

Approach	Weekend Peak			
	DoS	Delay (s)	LoS	95% Back of Queue (m)
Turton Road / Griffiths Road				
North	0.62	44.6	D	106.3
East	0.73	40.4	C	121.5
South	0.84	37.9	C	93.4
West	0.58	34.9	C	102.1
Turton Road / Young Road				
North	0.39	9.1	A	118.6
South	0.39	6.6	A	82.4
West	0.45	56.3	D	45.7
Turton Road / Lambton Road / Bridges Road				
North-east	0.72	23.7	B	156.6
East	0.63	28.1	B	74.2
South-west	0.85	35.6	C	138
West	0.35	37.5	C	72.2
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit				
North	0.26	0.4	NA	2.7
East	1.00	911.2	F	29.2
South	0.32	0.1	NA	0
West	1.12	137.4	F	59.4

Detailed SIDRA intersection results are supplemented in **Attachment C.**

4.4 Base Case vs Project Case Performance

Comparison of the intersections performance results is illustrated in Table 4.5. The majority of the intersections performance results show either improvements or negligible additional delay times at some approaches. The only anomalies are observed at Newcastle Hockey Centre Northern Exit approach's movements. This approach has no vehicle recorded for any turns as per the 2024 peak hour surveys for Weekday or Weekend. However, due to SIDRA software's limitations of being unable to model with zero vehicle volume for a specific approach, the technical assumption of one vehicle each turn for that very approach has been made in the model. Thus, the delay issue of crossing five lanes of Turton Road for the through movement or turning left or right onto Turton Road is observed in the Base Case and has only deteriorated in the Project Case. In contrast to the model, there is no demand in reality which leads to no delays. The modelled LoS for this approach, therefore, should not be interpreted as part of the intersection performance. This issue persists in the AM, PM and Weekend SIDRA models. No particular action would be required to address this delay as it is a very minor and unsafe movement for a priority-controlled driveway.

The other delay increase occurs at the intersection of Turton Road/Griffith Road during the PM peak. The delay increase is attributed to additional distributed traffic at Turton Road northbound right turn bay with

25 seconds additional delay during the PM peak. The performance comparison between Base Case and Project Case is provided in Table 4.5.

Table 4.5: Base Case vs Project Case SIDRA Results Comparison

Intersection	2024 Base					2024 Project					Average Delay Difference
	Traffic Volume (veh/h)	DoS (v/c)	Average Delay (s)	LoS	95th Percentile Queue (m)	Traffic Volume (veh/h)	DoS (v/c)	Average Delay (s)	LoS	95th Percentile Queue (m)	
AM Peak											**Project - Base**
Turton Road / Griffiths Road	4,869	0.94	39.8	LOS C	156	4,897	0.97	40.4	LOS C	157	0.6
Turton Road / Young Road	2,697	0.59	10.7	LOS A	85	2,726	0.59	10.7	LOS A	87	0.0
Turton Road / McDonald's Jones Stadium	2,675	1.79	896.8	LOS F	103	2,719	1.79	888.0	LOS F	103	-8.8
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit	2,676	1.07	1,885.7	LOS F	31	2,720	1.10	1,966.5	LOS F	40	80.8
Turton Road / Lambton Road / Bridges Road	4,234	1.70	72.0	LOS F	362	4,269	1.76	76.1	LOS F	385	4.1
PM Peak											
Turton Road / Griffiths Road	5,771	1.22	86.1	LOS F	435	6,045	1.30	110.7	LOS F	494	24.6
Turton Road / Young Road	3,528	0.92	16.2	LOS B	160	3,803	0.92	18.2	LOS B	147	2.0
Turton Road / McDonald's Jones Stadium	3,429	1.44	482.4	LOS F	209	3,642	1.44	482.4	LOS F	326	0.0
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit	3,451	1.63	2,201.8	LOS F	220	3,663	1.79	2,152.3	LOS F	360	-49.5
Turton Road / Lambton Road / Bridges Road	5,488	1.79	178.1	LOS F	683	5,644	1.79	186.1	LOS F	756	8.0
Weekend Peak											
Turton Road / Griffiths Road	4,780	0.73	38.4	LOS C	17	4,934	0.84	38.8	LOS C	122	0.4
Turton Road / Young Road	2,763	0.45	11.3	LOS A	16	2,917	0.45	11.4	LOS A	119	0.1
Turton Road / McDonald's Jones Stadium	2,664	1.28	454.2	LOS F	9	2,791	1.28	421.4	LOS F	66	-32.8
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit	2,704	1.07	1,597.0	LOS F	5	2,831	1.12	1,981.7	LOS F	59	384.7
Turton Road / Lambton Road / Bridges Road	4,123	0.85	29.6	LOS C	22	4,215	0.85	29.8	LOS C	157	0.2

5. Project Case Upgrade

Upgrades or signal optimisations have been introduced to resolve the limitations of accommodating the development traffic to improve the performances of the critical intersections as much as possible. It should be noted that proposed signal optimisations are expected to be implemented automatically by the SCATS system.

5.1 Development Traffic

The same traffic demand and distribution were applied as the Project Case.

5.2 Upgrade Measures

After analysing and comparing the intersection performances between the Base Case and the Project Case, it was observed that for most intersections, the impact upon additional development traffic would be negligible for which no particular upgrades would be required.

For Turton Road / Griffiths Road, the average delay denotes that the performance deteriorated in considerable amount at Turton Road right turn bay, which required necessary mitigation. This was resolved by optimising signal timing. No other geometric upgrades were adopted.

For some intersections, for instance Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit, the delay appears excessively high for SIDRA having at least one vehicle in the model where in reality there isn't any vehicle waiting and the single vehicle coded for the approach is due to SIDRA limitations.

The comparison of intersections performances is detailed in **Attachment E.**

5.3 Modelling Results

The modelled performance of the Project Case Upgrades/Signal Optimisation for Weekday PM peak are provided in Table 5.1. The AM signal coding was retained due to similar performance in the Base Case and the Project Case.

Table 5.1: Project Case Upgrades Weekday PM Intersection Performance

Approach	Weekday: PM Peak			
	DoS	Delay (s)	LoS	95% Back of Queue (m)
Turton Road / Griffiths Road				
North	0.46	40.3	C	116.2
East	0.81	38.5	C	112.6
South	1.05	126.9	F	324.2
West	0.71	59.2	E	86.4
Turton Road / Young Road				
North	0.76	18.2	B	147.3
South	0.62	2.5	A	60.9
West	0.92	90.0	F	141.6
Turton Road / Lambton Road / Bridges Road				
North-east	0.73	19.2	B	126.4
East	0.46	25.4	B	92.3
South-west	1.79	493.9	F	755.9
West	0.44	30.3	C	102.3
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit				
North	0.49	1.5	NA	11.2
East	1.0	743.7	F	26
South	0.47	0.2	NA	0
West	1.79	733.8	F	359.6

It is well understood that the modelling results, even with the upgrades, reflect the outputs of the 'Project Case' in most of the cases except for the boosted improvement in Delay and Queue (highlighted in green) at Turton Road / Griffiths Road intersection performance in Weekday PM peak. The weekend results in the project case would remain unchanged due to similarity of intersections performance in both scenarios and as explained for the AM peak.

Detailed SIDRA intersection results are supplemented in **Attachment B.**

6. Conclusion

Findings of the modelling are summarised below:

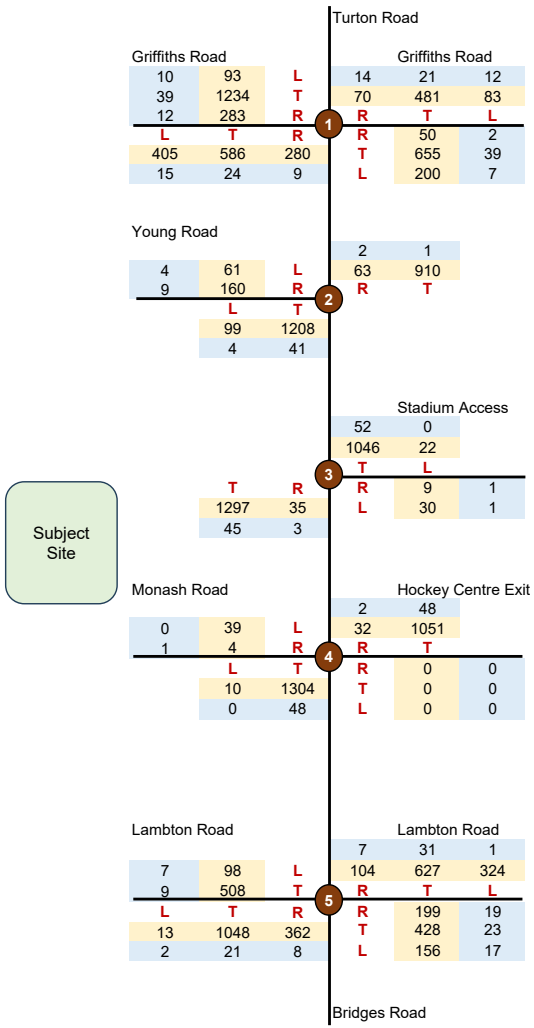
- SCATS traffic lights optimisation is mainly required for Turton Road / Griffiths Road due to the development traffic assigned to the northbound right turn lane at this intersection causing extra 24.6 seconds of delay at this approach
- No geometrical upgrades are seemingly required across any of the intersections due to the development
- Pedestrian movements are quite nominal/insignificant and hence unlikely to impact any of the signalised intersection phase times in a larger scale.

Upon undertaking SIDRA analysis, it can be confirmed that no to minor extra delays would be expected across most surrounding intersections after construction of the proposed Hunter Basketball Stadium.

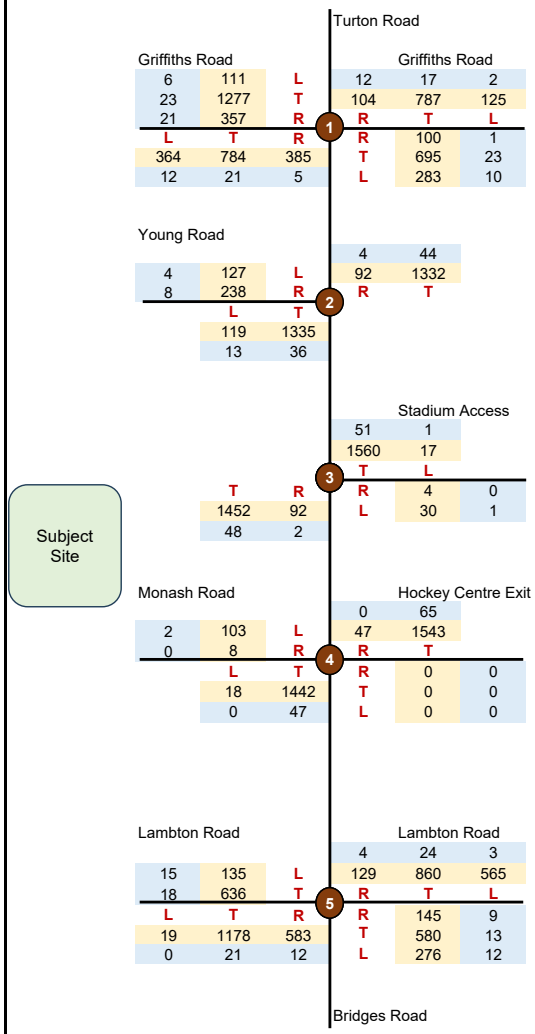
Attachment A: Traffic Flow Diagrams & Trip Generation

EXISTING TRAFFIC VOLUMES | TRAFFIC SURVEY DATA 2024

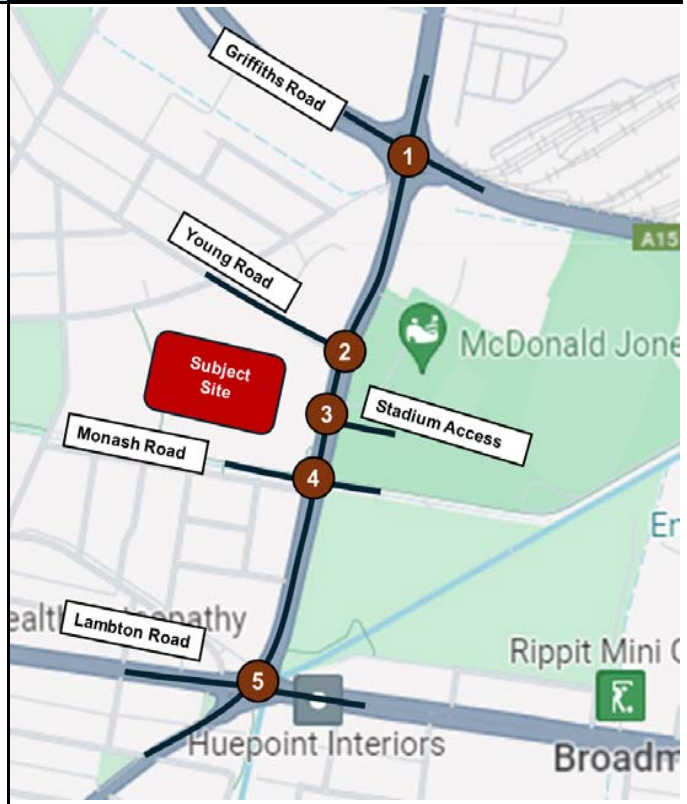
AM Peak 08:00-09:00



PM Peak 16:45-17:45



Locality Plan



Details

Date of Surveys:	Thu 4/04/2024
AM Peak:	8:00-9:00am
PM Peak:	4:45-5:45pm
Base Year:	2024

Document Control

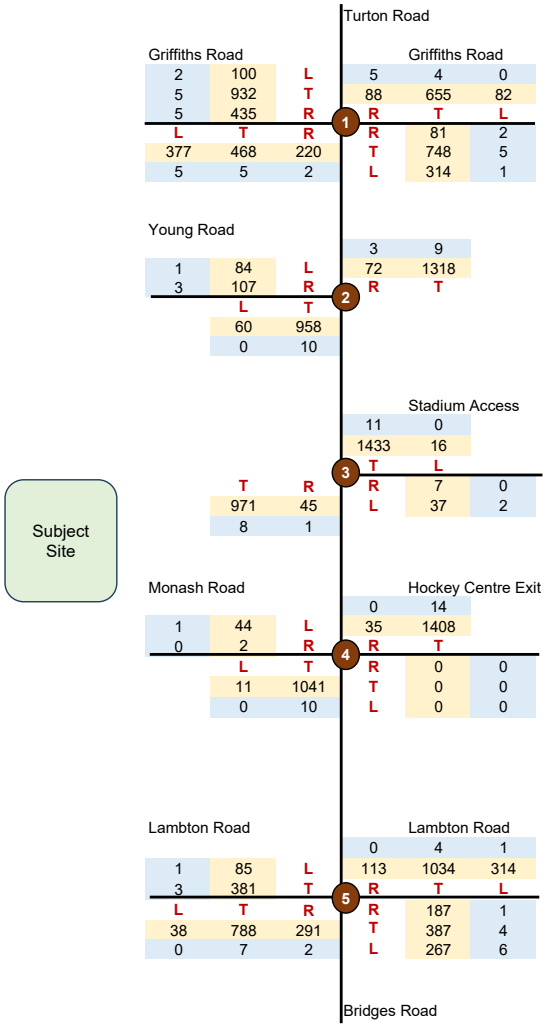
Job Number:	P6458	Job Name:	Newcastle Indoor Sports Facility TIA Modelling
Prepared By:	Tahmim Islam		
Reviewed By:	Alex Grey		

Legend

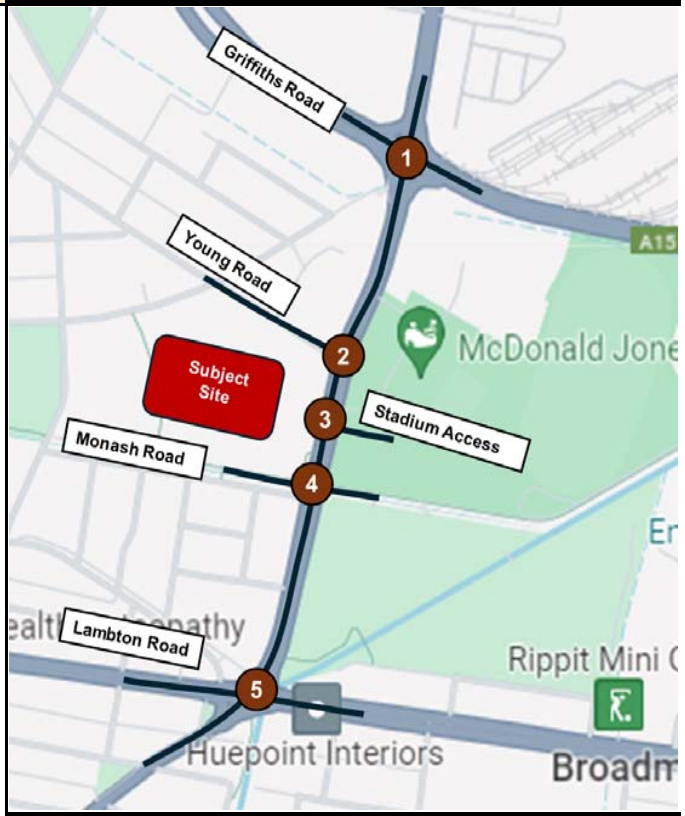
XX	Light Vehicle (LV) Volumes	L	Left Turn Movement
XX	Heavy Vehicle (HV) Volumes	T	Through Turn Movement
X	Intersection ID	R	Right Turn Movement

EXISTING TRAFFIC VOLUMES | TRAFFIC SURVEY DATA 2024

Weekend Peak 11:15-12:15



Locality Plan



Details

Date of Surveys:	Sat 6/04/2024
Weekend Peak:	11:15am-12:15pm
Base Year:	2024

Document Control

Job Number:	P6458	Job Name:	Newcastle Indoor Sports Facility TIA Modelling
Prepared By:	Tahmim Islam		
Reviewed By:	Alex Grey		

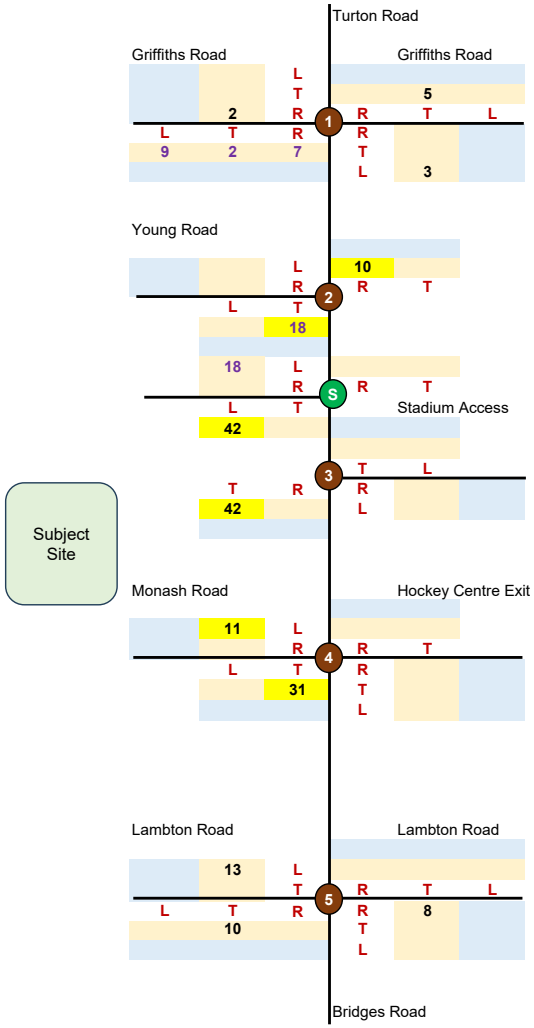
Legend

XX	Light Vehicle (LV) Volumes	L	Left Turn Movement
XX	Heavy Vehicle (HV) Volumes	T	Through Turn Movement
X	Intersection ID	R	Right Turn Movement

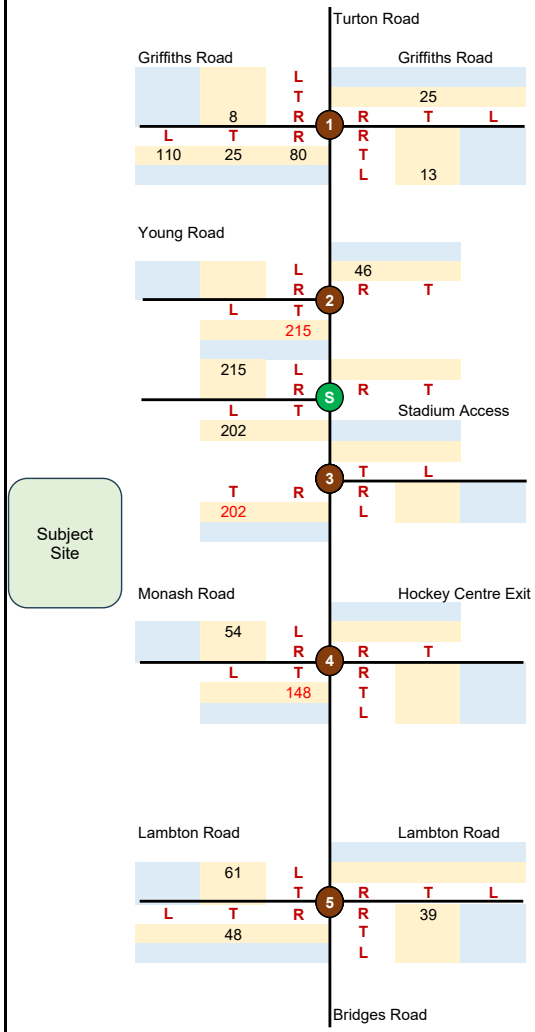
DEVELOPMENT TRAFFIC VOLUMES | TRAFFIC SURVEY DATA 2024

AM Peak 08:00-09:00

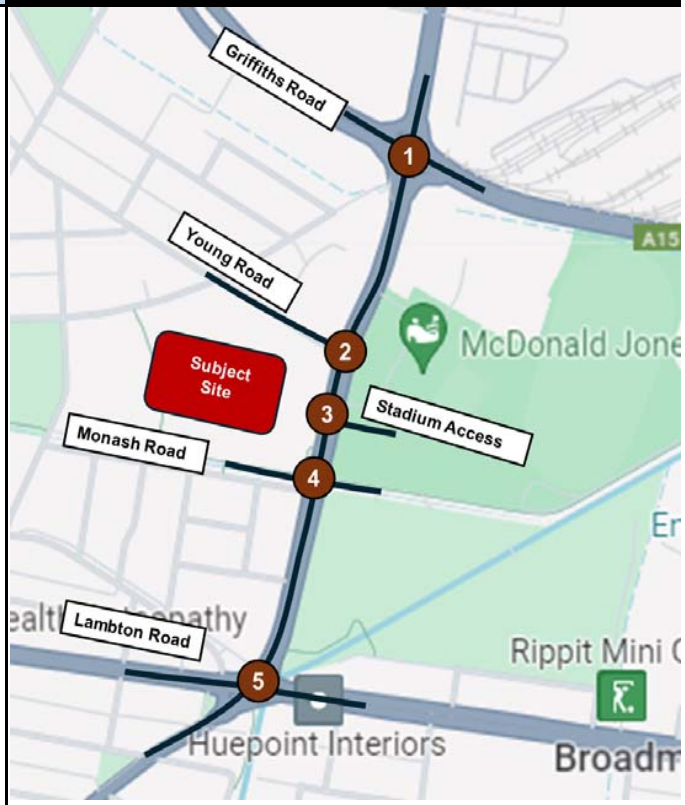
Inbound 42
Outboun 18



PM Peak 16:45-17:45



Locality Plan



Details

Date of Surveys:	Thu 4/04/2024
AM Peak:	8:00-9:00am
PM Peak:	4:45-5:45pm
Base Year:	2024

Document Control

Job Number:	P6458	Job Name:	Newcastle Indoor Sports Facility TIA Modelling
Prepared By:	Tahmim Islam		
Reviewed By:	Alex Grey		

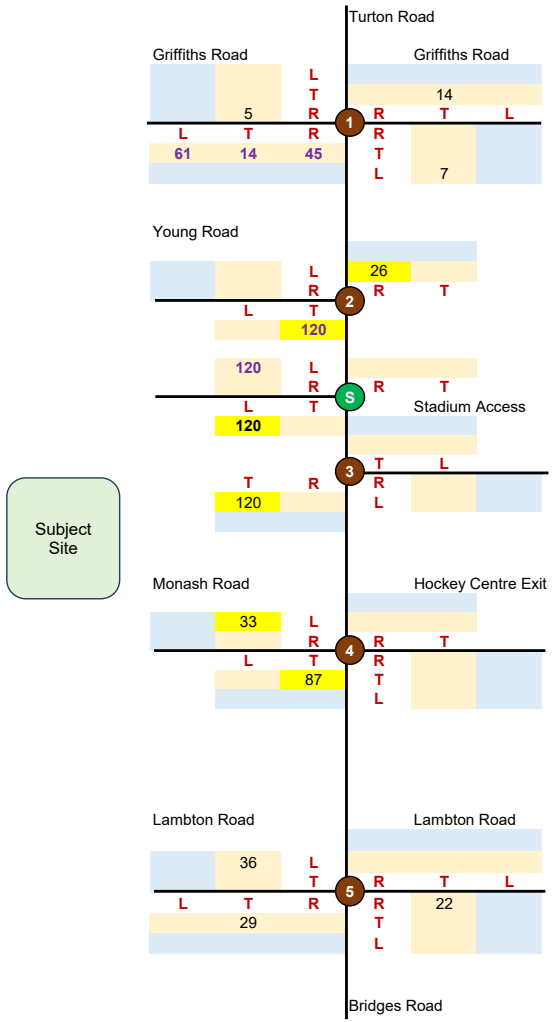
Legend

XX	Light Vehicle (LV) Volumes	L	Left Turn Movement
XX	Heavy Vehicle (HV) Volumes	T	Through Turn Movement
X	Intersection ID	R	Right Turn Movement

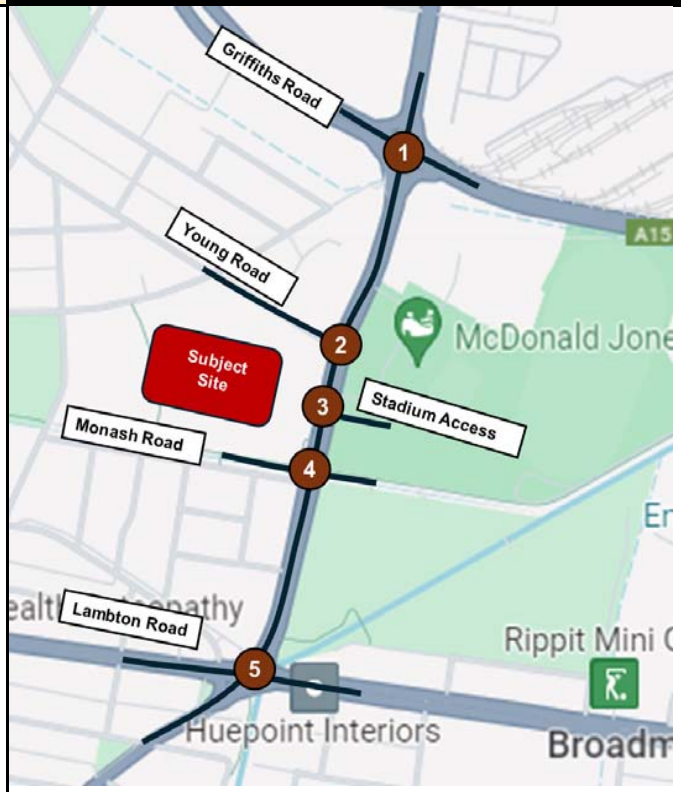
DEVELOPMENT TRAFFIC VOLUMES | TRAFFIC SURVEY DATA 2024

Weekend Peak 11:15-12:15

Inbound	120
Outbound	120



Locality Plan



Details

Date of Surveys:	Sat 6/04/2024
Weekend Peak:	11:15am-12:15pm
Base Year:	2024

Document Control

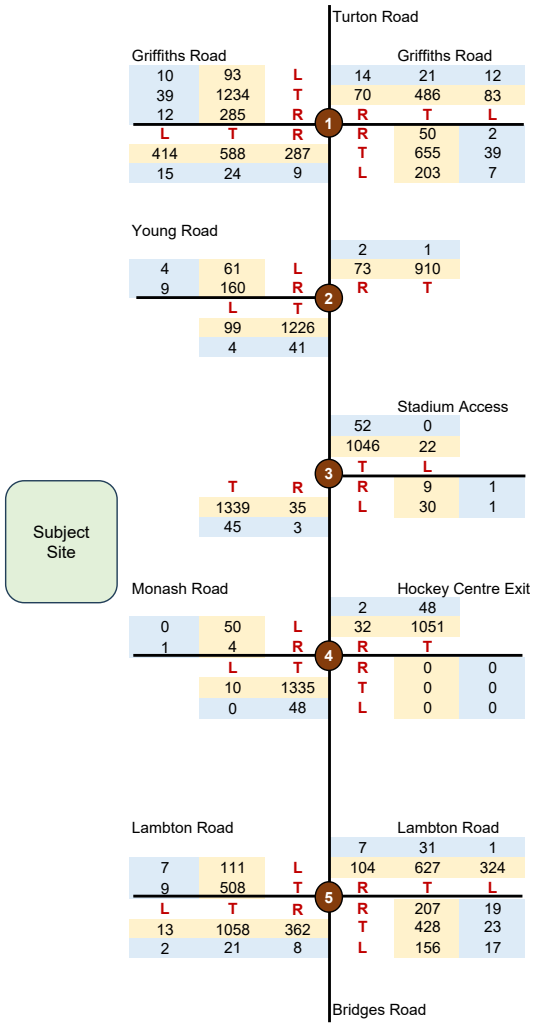
Job Number:	P6458	Job Name:	Newcastle Indoor Sports Facility TIA Modelling
Prepared By:	Tahmim Islam		
Reviewed By:	Alex Grey		

Legend

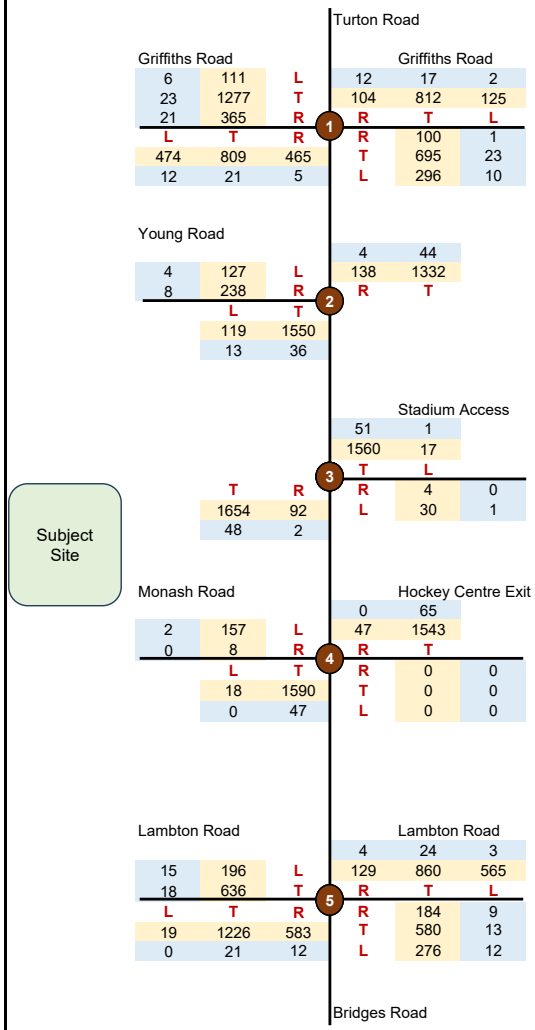
XX	Light Vehicle (LV) Volumes	L	Left Turn Movement
XX	Heavy Vehicle (HV) Volumes	T	Through Turn Movement
X	Intersection ID	R	Right Turn Movement

PROJECT TRAFFIC VOLUMES | TRAFFIC SURVEY DATA 2024

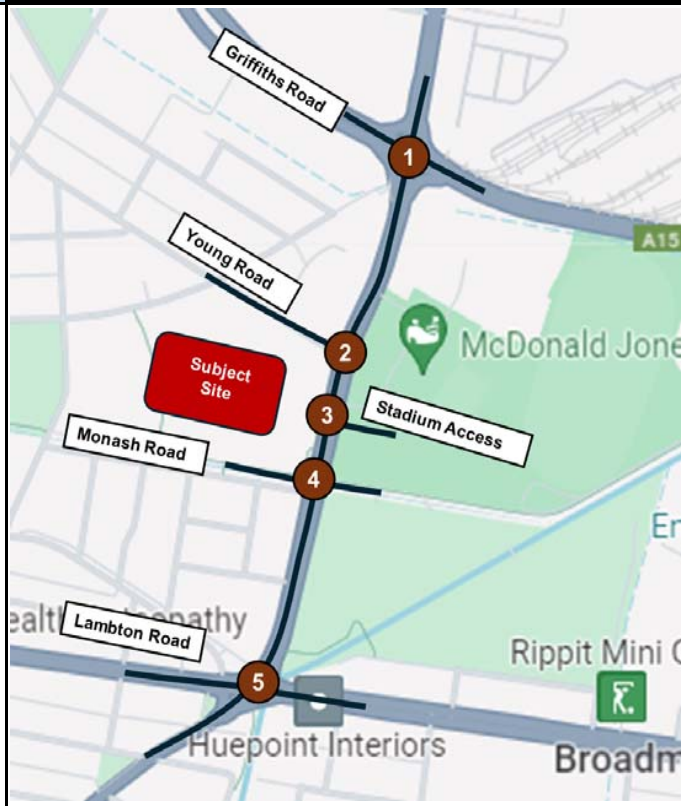
AM Peak 08:00-09:00



PM Peak 16:45-17:45



Locality Plan



Details

Date of Surveys:	Thu 4/04/2024
AM Peak:	8:00-9:00am
PM Peak:	4:45-5:45pm
Base Year:	2024

Document Control

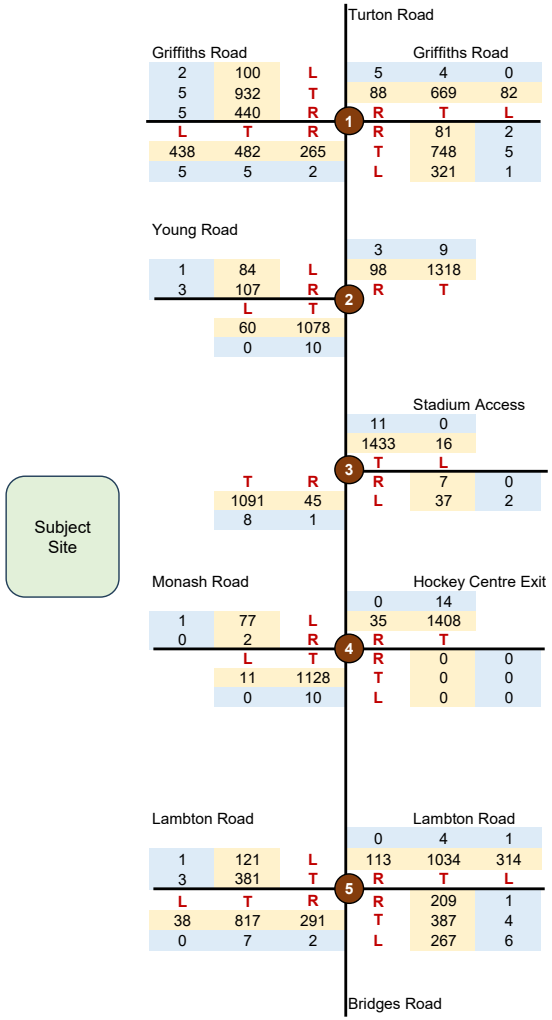
Job Number:	P6458	Job Name:	Newcastle Indoor Sports Facility TIA Modelling
Prepared By:	Tahmim Islam		
Reviewed By:	Alex Grey		

Legend

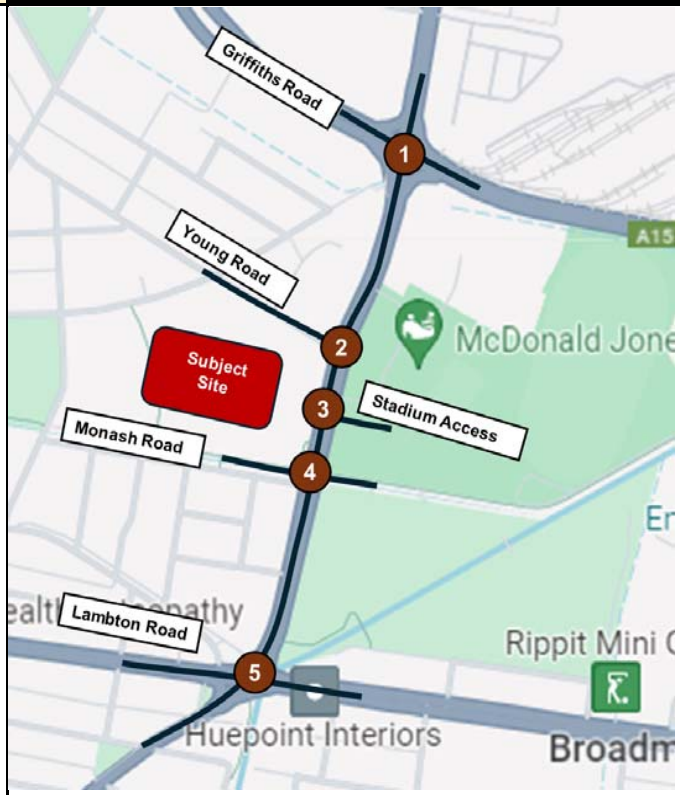
XX	Light Vehicle (LV) Volumes	L	Left Turn Movement
XX	Heavy Vehicle (HV) Volumes	T	Through Turn Movement
X	Intersection ID	R	Right Turn Movement

PROJECT TRAFFIC VOLUMES | TRAFFIC SURVEY DATA 2024

Weekend Peak 11:15-12:15



Locality Plan



Details

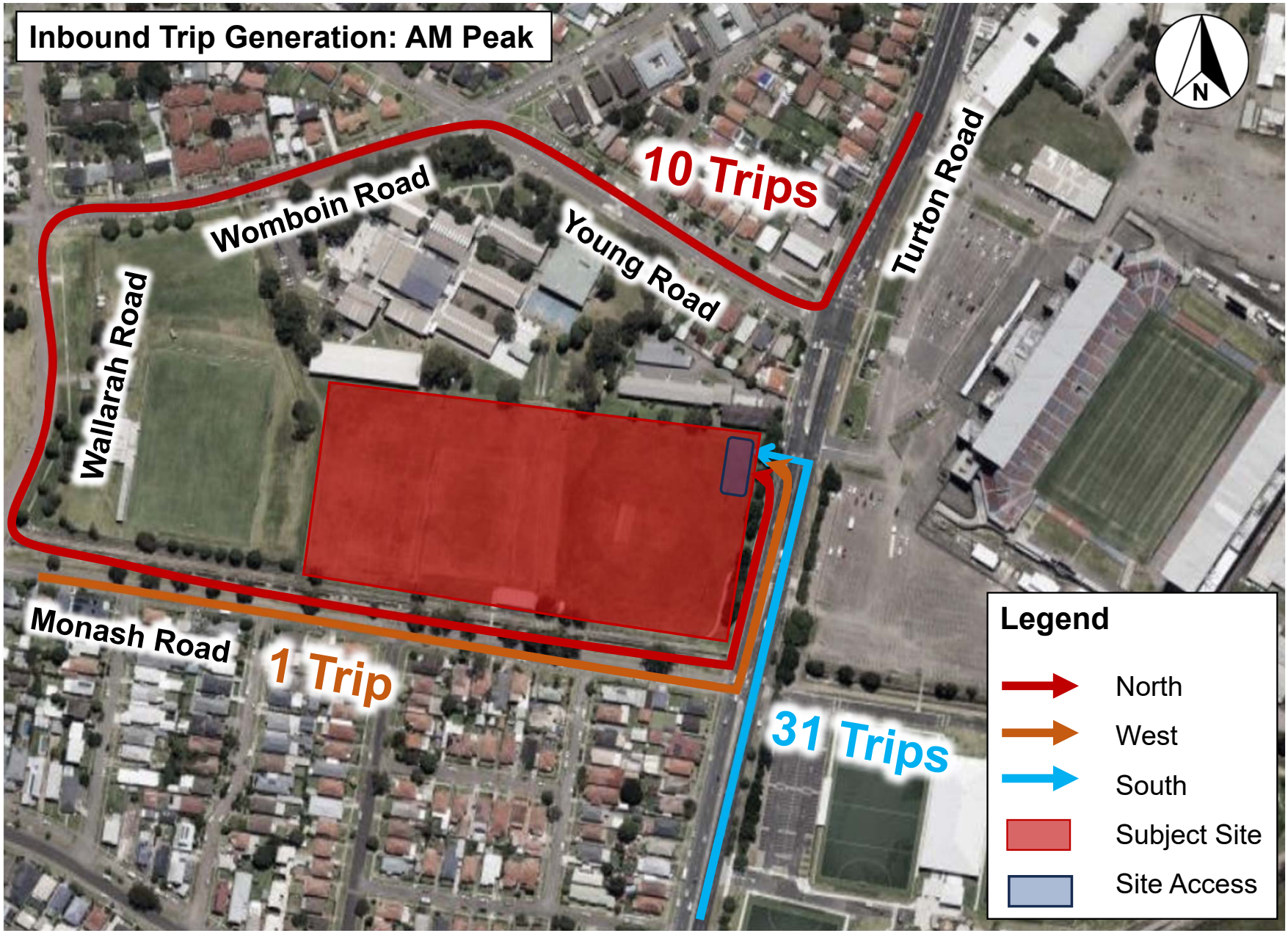
Date of Surveys:	Sat 6/04/2024
Weekend Peak:	11:15am-12:15pm
Base Year:	2024

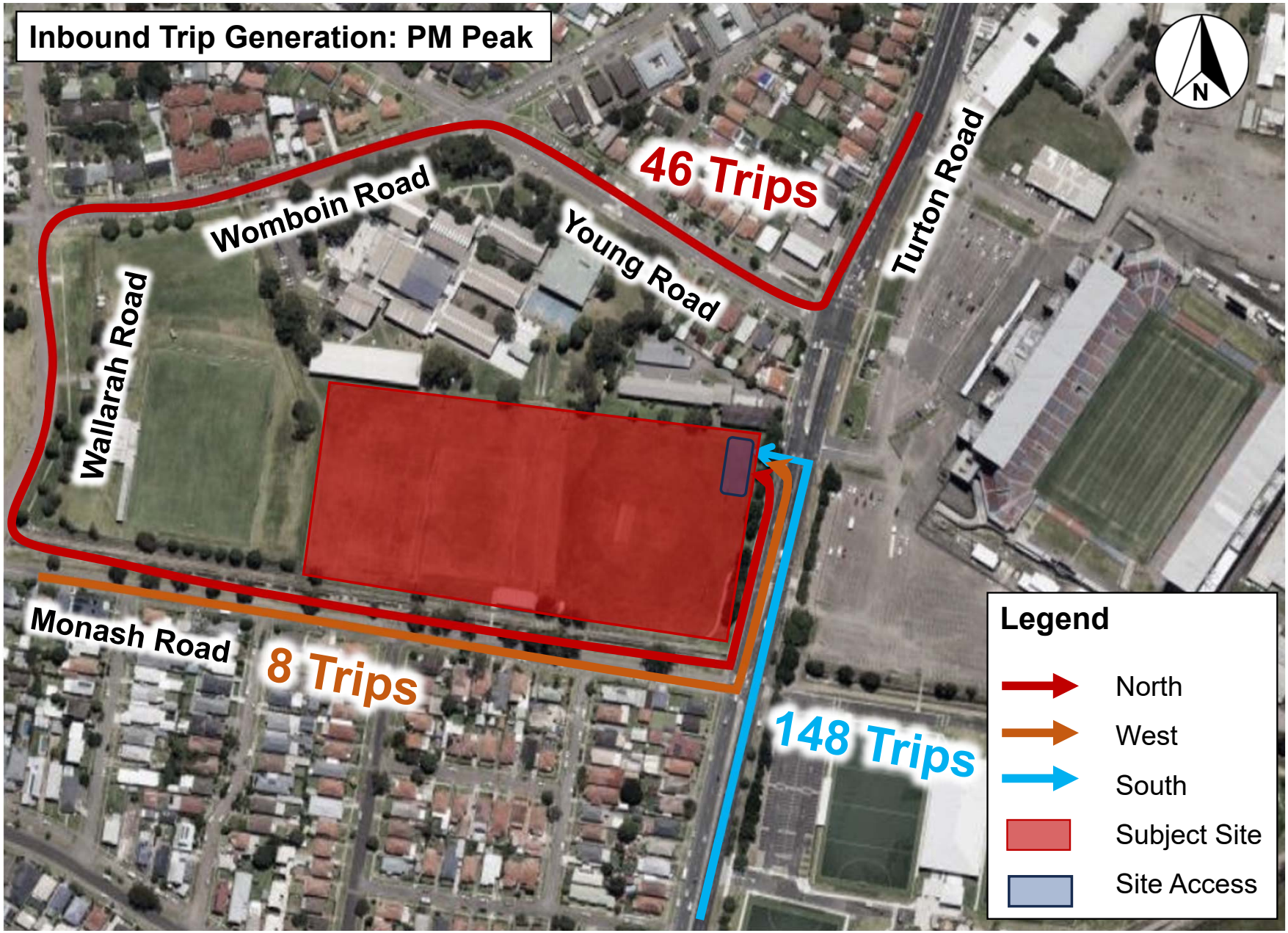
Document Control

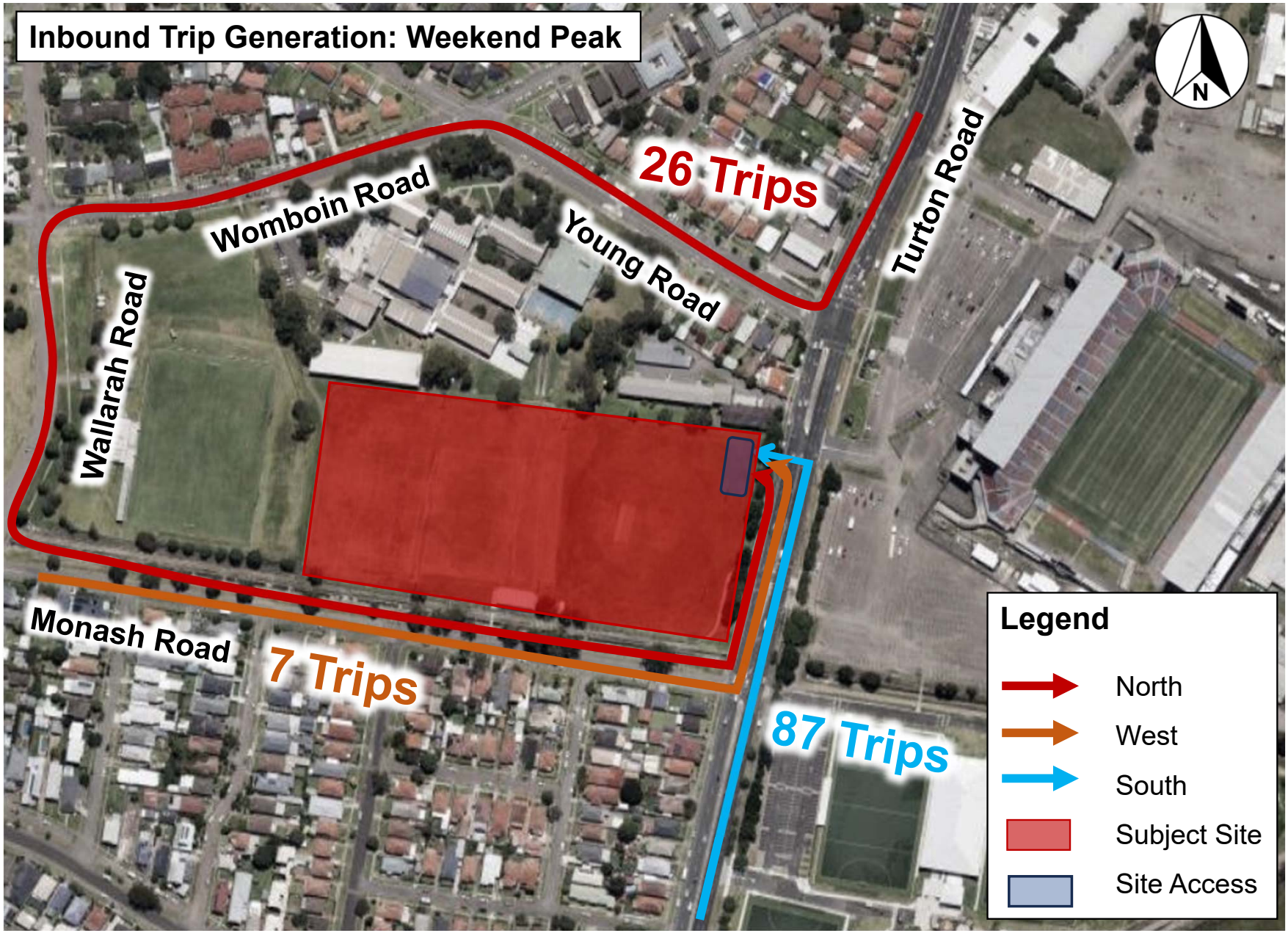
Job Number:	P6458	Job Name:	Newcastle Indoor Sports Facility TIA Modelling
Prepared By:	Tahmim Islam		
Reviewed By:	Alex Grey		

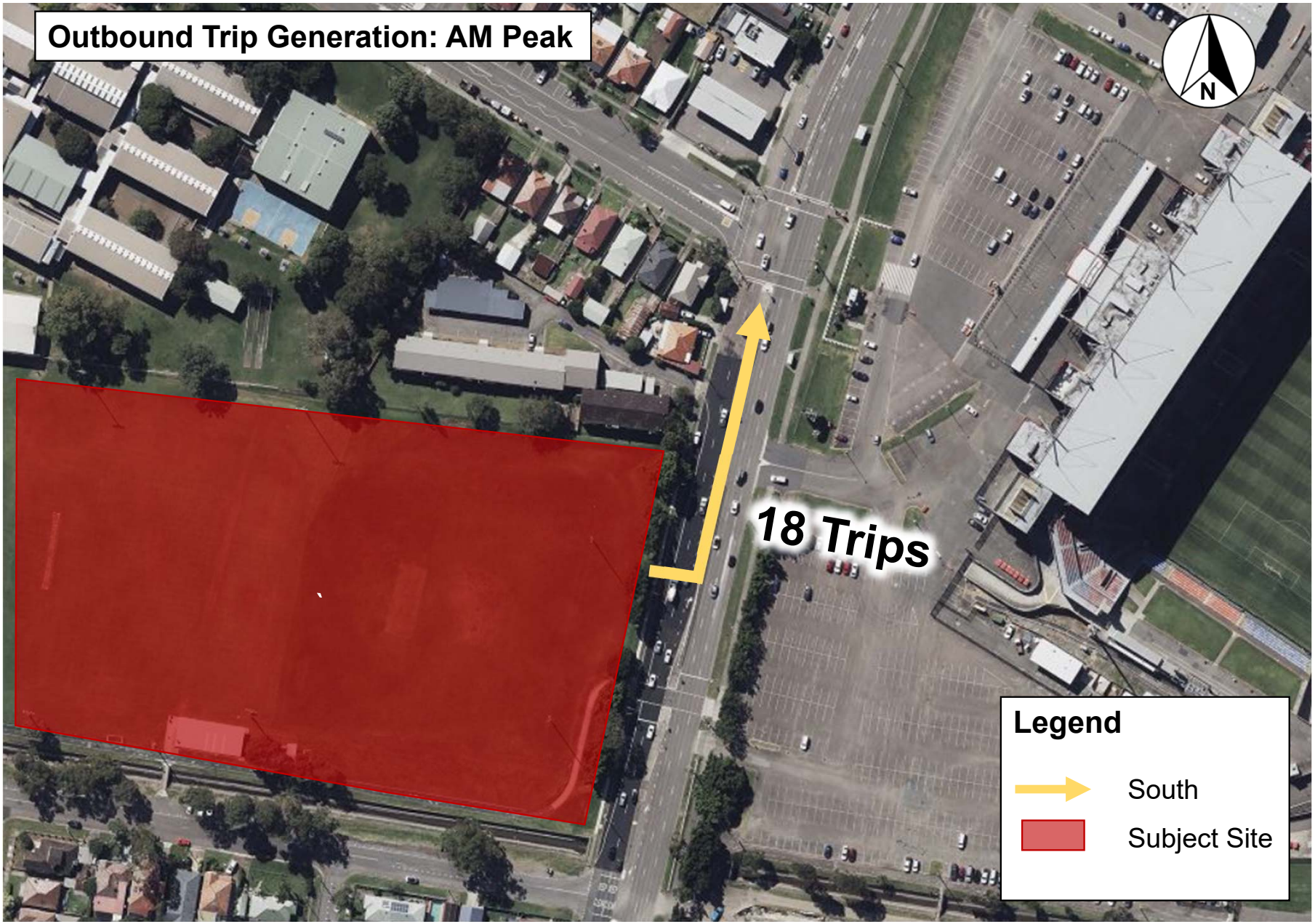
Legend

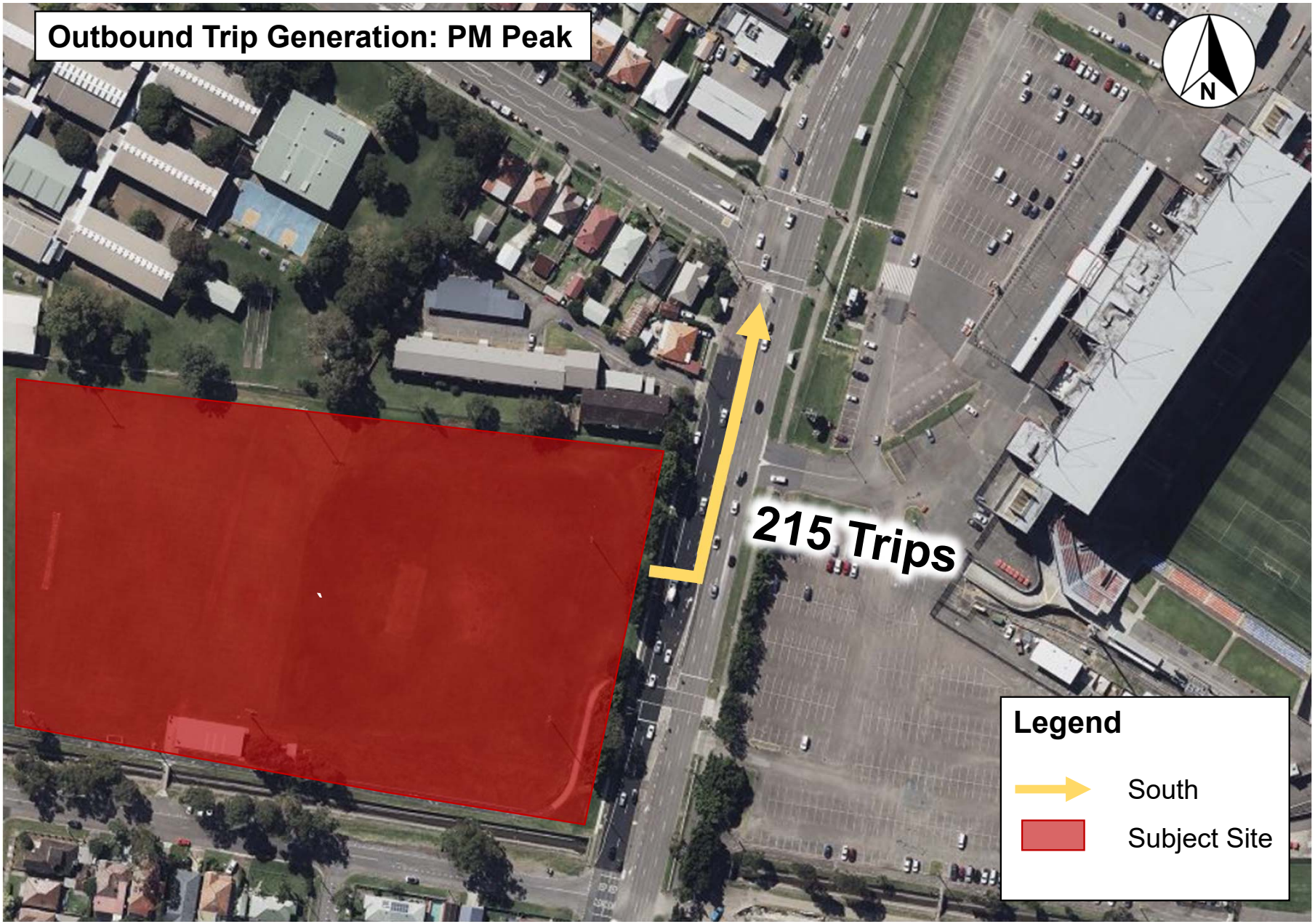
XX	Light Vehicle (LV) Volumes	L	Left Turn Movement
XX	Heavy Vehicle (HV) Volumes	T	Through Turn Movement
X	Intersection ID	R	Right Turn Movement

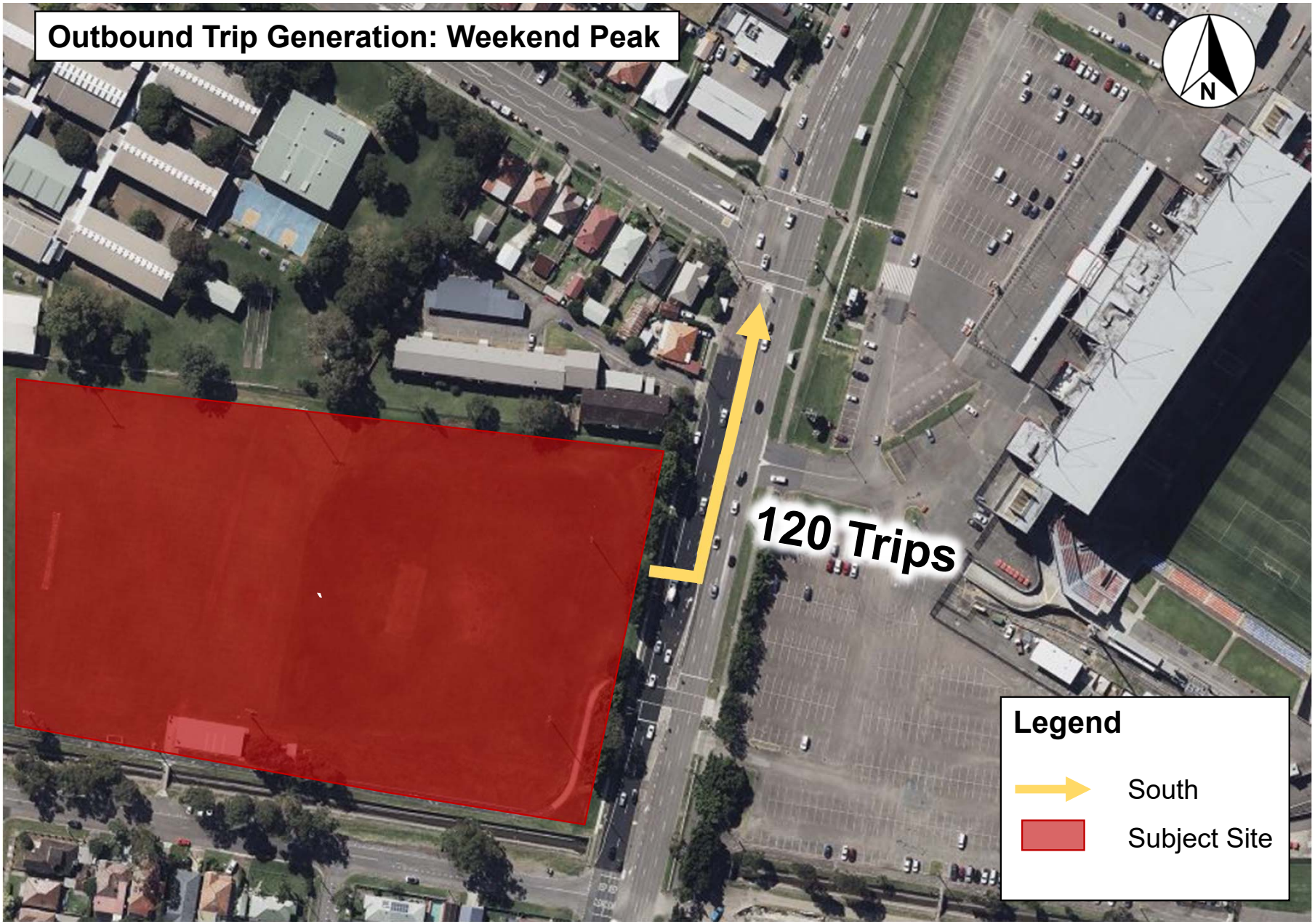

Inbound Trip Generation: AM Peak
N
10 Trips
Womboin Road
Young Road
Turton Road
Wallarah Road
Monash Road
1 Trip
31 Trips
Legend
North
West
South
Subject Site
Site Access


Inbound Trip Generation: PM Peak
N
46 Trips
Womboin Road
Young Road
Turton Road
Wallarah Road
Monash Road
8 Trips
148 Trips
Legend
North
West
South
Subject Site
Site Access


Inbound Trip Generation: Weekend Peak
N
26 Trips
Womboin Road
Young Road
Turton Road
Wallarah Road
Monash Road
7 Trips
87 Trips
Legend
North
West
South
Subject Site
Site Access


Outbound Trip Generation: AM Peak
N
18 Trips
Legend
South
Subject Site


Outbound Trip Generation: PM Peak
N
215 Trips
Legend
South
Subject Site


Outbound Trip Generation: Weekend Peak
N
120 Trips
Legend
South
Subject Site

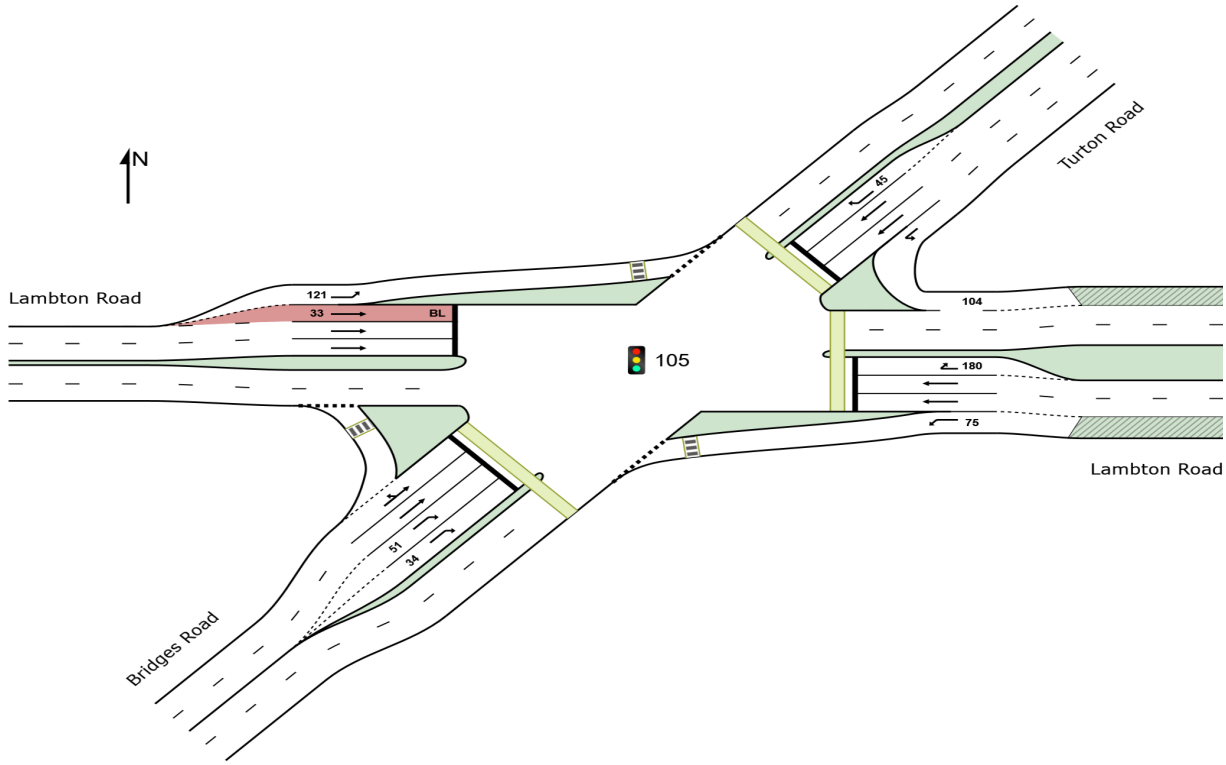
Attachment B: SIDRA Geometric Layouts

SITE LAYOUT

Site: 105 [Turton Road / Lambton Road / Bridges Road - TCS 350 (Site Folder: 2024 Base AM Peak)]

0800-0900
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



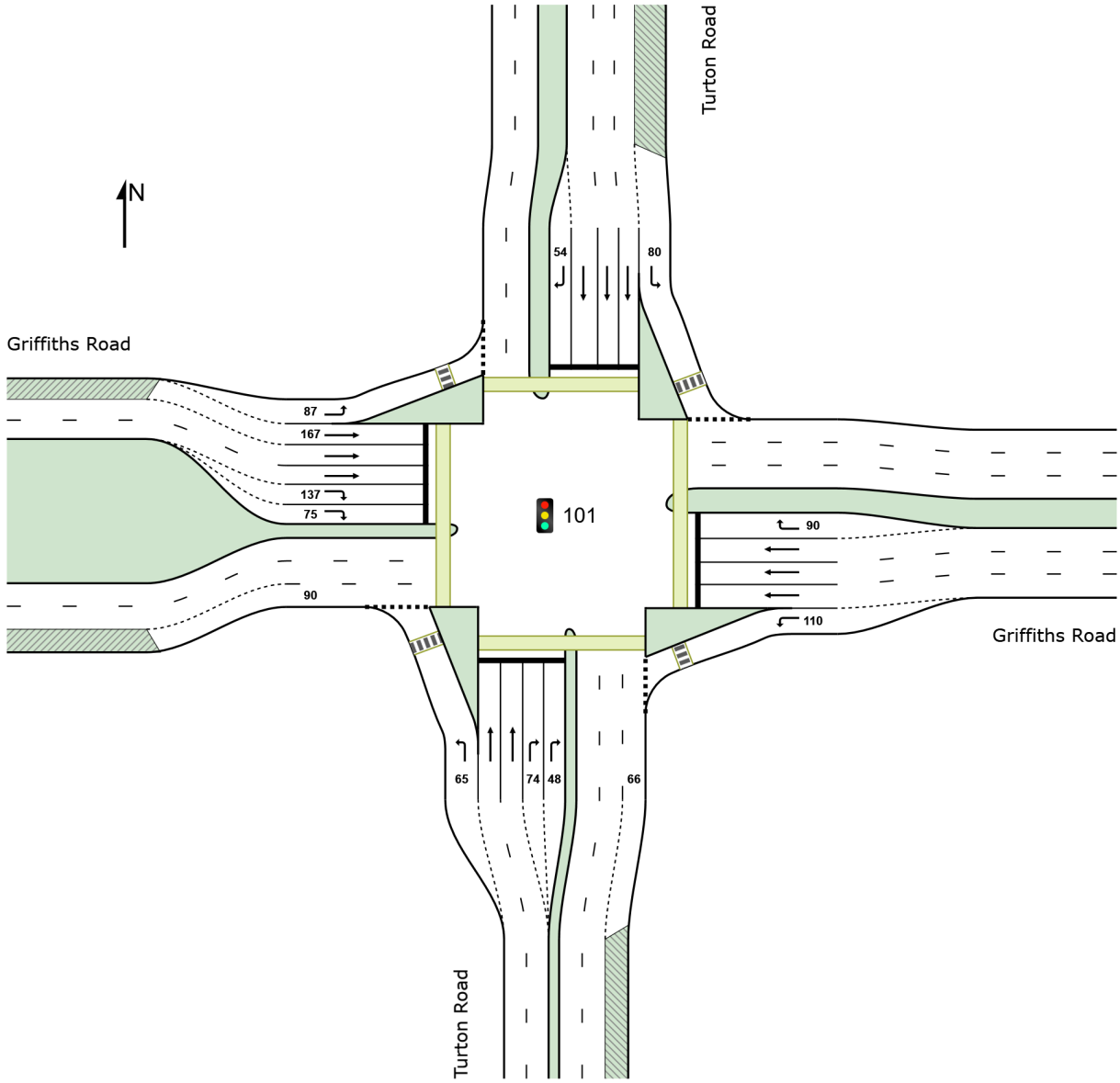
Organisation: BITZIOS CONSULTING | Licence: PLUS / FLOATING | Created: Thursday, 2 May 2024 3:37:39 PM
Project: P:\P6458 Newcastle Indoor Sports Facility TIA Modelling\Technical\Models\P6458.001M Newcastle Indoor Sports Facility TIA SIDRA Models.sip9

SITE LAYOUT

Site: 101 [Turton Road / Griffiths Road - TCS 201 (Site Folder: 2024 Base AM Peak)]

0800-0900
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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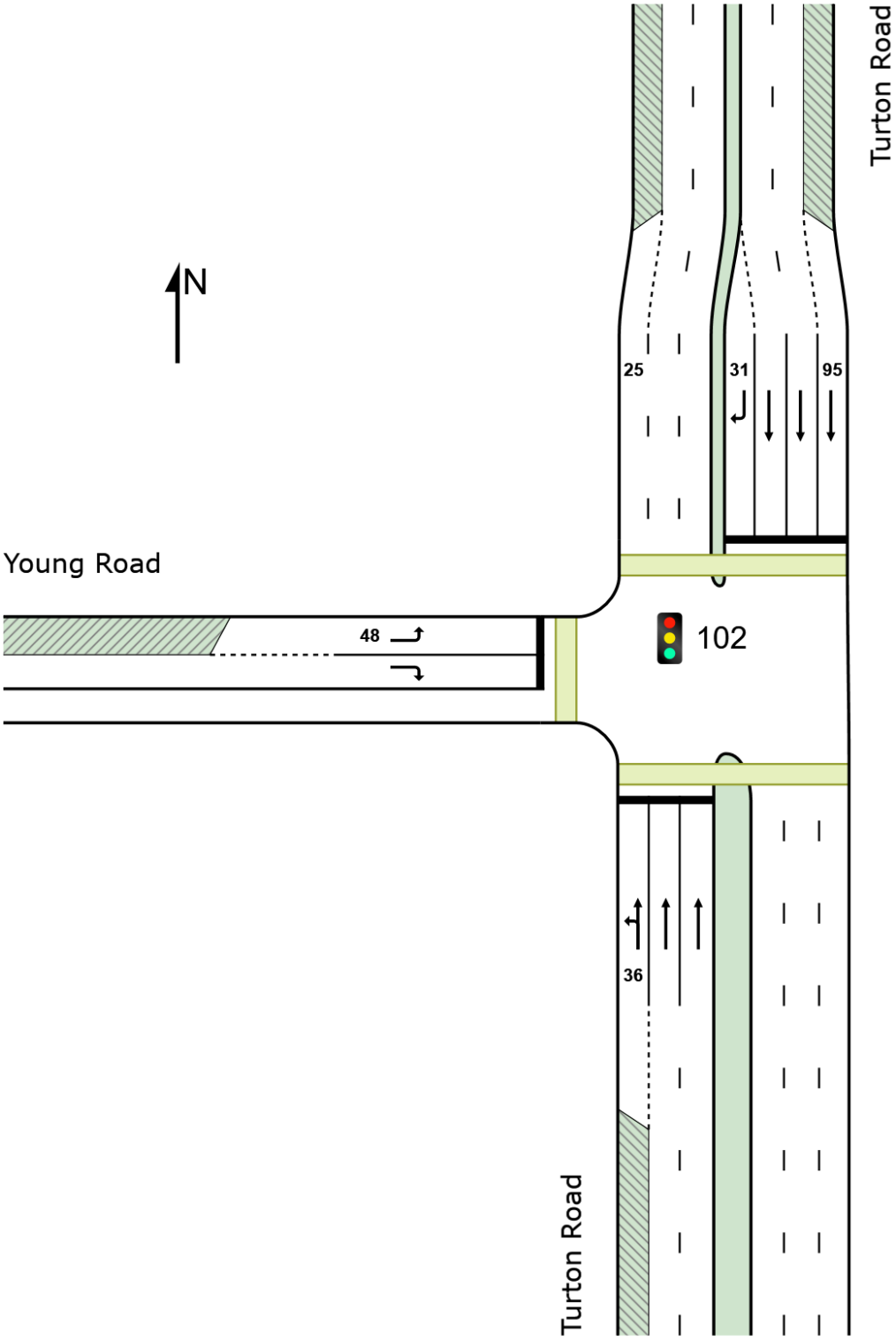
Project: P:\P6458 Newcastle Indoor Sports Facility TIA Modelling\Technical\Models\P6458.001M Newcastle Indoor Sports Facility TIA SIDRA Models.sip9

SITE LAYOUT

Site: 102 [Turton Road / Young Road - TCS 3322 (Site Folder: 2024 Base AM Peak)]

0800-0900
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.

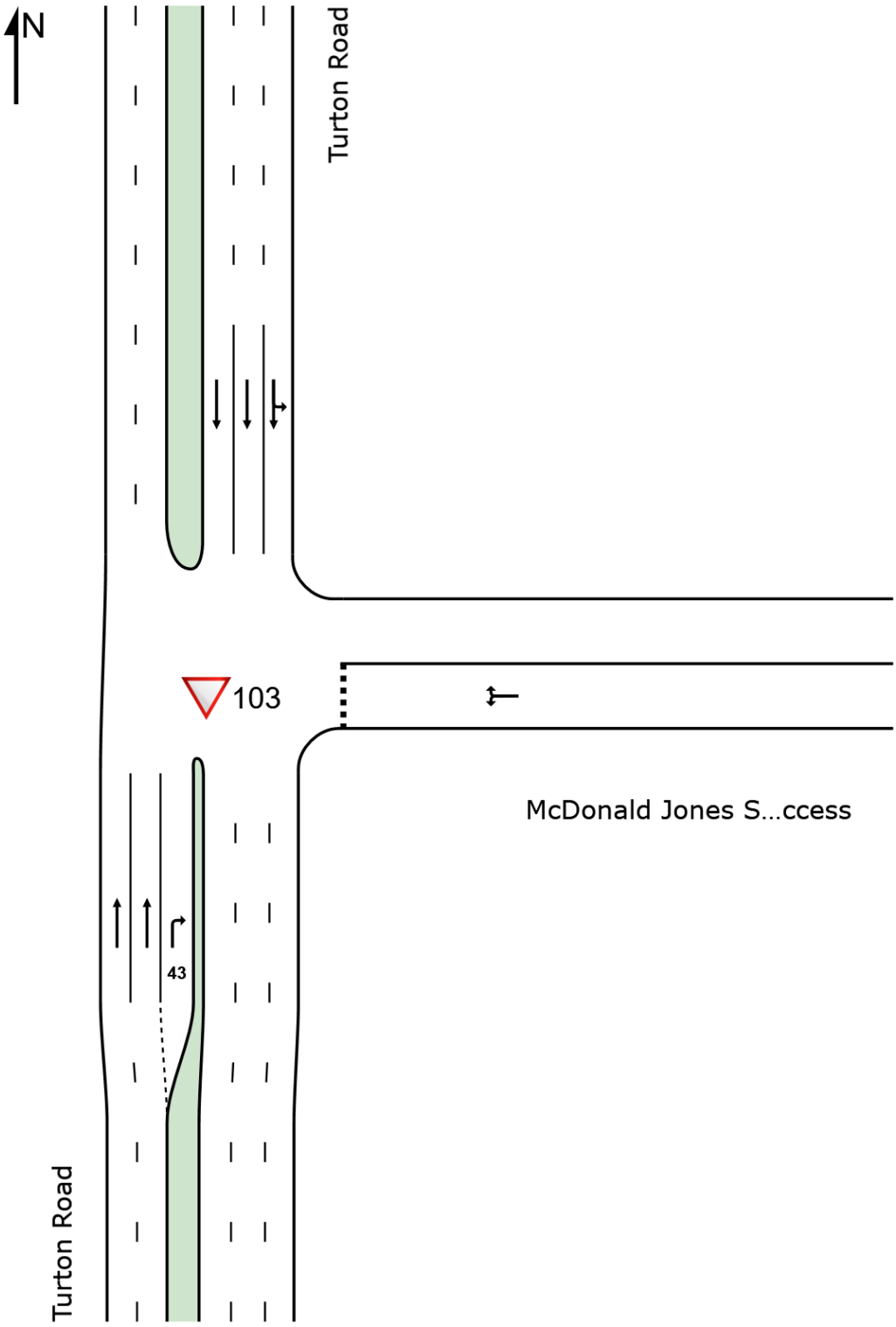


SITE LAYOUT

Site: 103 [Turton Road / McDonald Jones Stadium Southern Access (Site Folder: 2024 Base AM Peak)]

0800-0900
Site Category: Base Year
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.

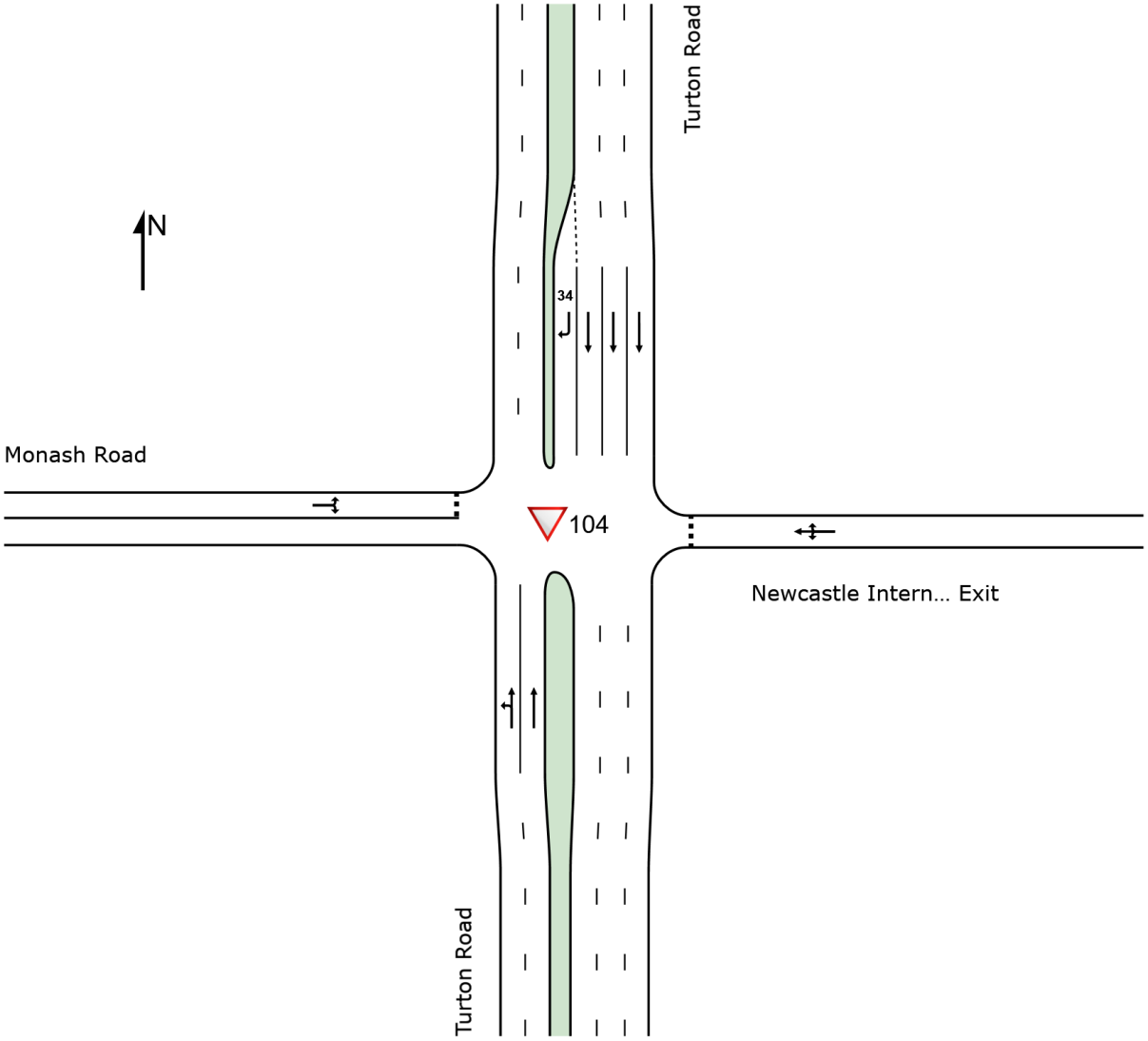


SITE LAYOUT

Site: 104 [Turton Road / Monash Road / Newcastle International Hockey Centre Northern Exit (Site Folder: 2024 Base AM Peak)]

0800-0900
Site Category: Base Year
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Organisation: BITZIOS CONSULTING | Licence: PLUS / FLOATING | Created: Thursday, 2 May 2024 3:37:39 PM
Project: P:\P6458 Newcastle Indoor Sports Facility TIA Modelling\Technical\Models\P6458.001M Newcastle Indoor Sports Facility TIA SIDRA Models.sip9

Attachment C: SIDRA Model Outputs

MOVEMENT SUMMARY

Site: 101 [Turton Road / Griffiths Road - TCS 201 (Site Folder: 2024 Base AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

0800-0900
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 132 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
1	L2	All MCs	442	3.6	442	3.6	0.401	15.1	LOS B	8.7	62.5	0.41	0.92	0.41	48.3
2	T1	All MCs	642	3.9	642	3.9	*0.776	57.2	LOS E	21.5	155.5	0.99	0.97	1.06	23.1
3	R2	All MCs	304	3.1	304	3.1	*0.943	94.0	LOS F	11.9	85.3	1.00	1.08	1.48	22.8
Approach			1388	3.6	1388	3.6	0.943	51.9	LOS D	21.5	155.5	0.81	0.98	0.94	27.5
East: Griffiths Road															
4	L2	All MCs	220	3.3	220	3.3	0.173	11.2	LOS A	3.9	28.2	0.32	0.64	0.32	48.9
5	T1	All MCs	731	5.6	731	5.6	0.561	43.9	LOS D	15.7	115.3	0.90	0.76	0.90	37.1
6	R2	All MCs	55	3.8	55	3.8	*0.662	78.5	LOS F	3.8	27.3	1.00	0.81	1.12	22.9
Approach			1005	5.0	1005	5.0	0.662	38.6	LOS C	15.7	115.3	0.78	0.74	0.78	37.8
North: Turton Road															
7	L2	All MCs	100	12.6	100	12.6	0.143	15.5	LOS B	2.7	20.9	0.45	0.67	0.45	43.7
8	T1	All MCs	528	4.2	528	4.2	0.456	44.7	LOS D	11.9	86.6	0.89	0.73	0.89	25.4
9	R2	All MCs	88	16.7	88	16.7	0.624	71.7	LOS F	5.8	46.5	1.00	0.81	1.05	22.9
Approach			717	6.9	717	6.9	0.624	44.0	LOS D	11.9	86.6	0.84	0.74	0.84	27.1
West: Griffiths Road															
10	L2	All MCs	108	9.7	108	9.7	0.101	10.1	LOS A	1.7	13.3	0.33	0.63	0.33	46.5
11	T1	All MCs	1340	3.1	1340	3.1	*0.589	24.1	LOS B	19.2	137.8	0.72	0.64	0.72	44.7
12	R2	All MCs	311	4.1	311	4.1	0.491	58.7	LOS E	9.1	66.2	0.95	0.80	0.95	28.0
Approach			1759	3.7	1759	3.7	0.589	29.3	LOS C	19.2	137.8	0.74	0.66	0.74	41.3
All Vehicles			4869	4.4	4869	4.4	0.943	39.8	LOS C	21.5	155.5	0.78	0.78	0.82	34.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Turton Road												
P1	Full	1	1	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
East: Griffiths Road												

P2	Full	9	9	60.2	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
North: Turton Road												
P3	Full	1	1	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
West: Griffiths Road												
P4	Full	7	7	60.2	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
All Pedestrians		18	19	60.2	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88

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: 102 [Turton Road / Young Road - TCS 3322 (Site Folder: 2024 Base AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

0800-0900
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 129 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
1	L2	All MCs	108	3.9	108	3.9	0.123	13.5	LOS A	2.9	21.0	0.37	0.59	0.37	28.5
2	T1	All MCs	1315	3.3	1315	3.3	* 0.554	5.4	LOS A	11.8	84.9	0.31	0.29	0.31	49.2
Approach			1423	3.3	1423	3.3	0.554	6.1	LOS A	11.8	84.9	0.32	0.31	0.32	46.3
North: Turton Road															
8	T1	All MCs	959	0.1	959	0.1	0.231	5.7	LOS A	6.4	44.6	0.34	0.30	0.34	48.1
9	R2	All MCs	68	3.1	68	3.1	* 0.270	18.2	LOS B	2.1	15.1	0.55	0.72	0.55	34.0
Approach			1027	0.3	1027	0.3	0.270	6.5	LOS A	6.4	44.6	0.35	0.33	0.35	46.2
West: Young Road															
10	L2	All MCs	68	6.2	68	6.2	0.178	47.7	LOS D	3.6	26.4	0.85	0.71	0.85	22.5
12	R2	All MCs	178	5.3	178	5.3	* 0.594	57.5	LOS E	10.5	77.1	0.97	0.81	0.97	12.8
Approach			246	5.6	246	5.6	0.594	54.8	LOS D	10.5	77.1	0.94	0.78	0.94	15.6
All Vehicles			2697	2.4	2697	2.4	0.594	10.7	LOS A	11.8	84.9	0.39	0.36	0.39	39.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Turton Road												
P1	Full	5	5	58.7	LOS E	0.0	0.0	0.95	0.95	225.3	200.0	0.89
North: Turton Road												
P3	Full	7	7	58.7	LOS E	0.0	0.0	0.95	0.95	225.3	200.0	0.89
West: Young Road												
P4	Full	4	4	58.6	LOS E	0.0	0.0	0.95	0.95	225.3	200.0	0.89
All Pedestrians		16	17	58.7	LOS E	0.0	0.0	0.95	0.95	225.3	200.0	0.89

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: 103 [Turton Road / McDonald Jones Stadium Southern Access (Site Folder: 2024 Base AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

0800-0900
Site Category: Base Year
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
2	T1	All MCs	1413	3.4	1413	3.4	0.380	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
3	R2	All MCs	40	7.9	40	7.9	0.237	26.9	LOS B	0.7	5.2	0.85	0.96	0.94	11.5
Approach			1453	3.5	1453	3.5	0.380	0.8	NA	0.7	5.2	0.02	0.03	0.03	54.1
East: McDonald Jones Stadium Southern Access															
4	L2	All MCs	33	3.2	33	3.2	1.791	724.1	LOS F	14.1	102.8	1.00	4.06	4.57	0.5
6	R2	All MCs	11	10.0	11	10.0	1.791	896.8	LOS F	14.1	102.8	1.00	4.06	4.57	0.5
Approach			43	4.9	43	4.9	1.791	766.2	LOS F	14.1	102.8	1.00	4.06	4.57	0.5
North: Turton Road															
7	L2	All MCs	23	0.0	23	0.0	0.214	4.0	LOS A	0.0	0.0	0.00	0.03	0.00	28.9
8	T1	All MCs	1156	4.7	1156	4.7	0.214	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.3
Approach			1179	4.6	1179	4.6	0.214	0.1	NA	0.0	0.0	0.00	0.01	0.00	58.4
All Vehicles			2675	4.0	2675	4.0	1.791	12.8	NA	14.1	102.8	0.03	0.08	0.09	22.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 104 [Turton Road / Monash Road / Newcastle International Hockey Centre Northern Exit (Site Folder: 2024 Base AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

0800-0900
Site Category: Base Year
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
1	L2	All MCs	11	0.0	11	0.0	0.387	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	56.5
2	T1	All MCs	1423	3.6	1423	3.6	0.387	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.6
Approach			1434	3.5	1434	3.5	0.387	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.6
East: Newcastle International Hockey Centre Northern Exit															
4	L2	All MCs	1	0.0	1	0.0	1.000	251.0	LOS F	4.2	29.3	1.00	1.01	1.02	1.5
5	T1	All MCs	1	0.0	1	0.0	1.000	1885.7	LOS F	4.2	29.3	1.00	1.01	1.02	1.9
6	R2	All MCs	1	0.0	1	0.0	1.000	603.0	LOS F	4.2	29.3	1.00	1.01	1.02	0.4
Approach			3	0.0	3	0.0	1.000	913.3	LOS F	4.2	29.3	1.00	1.01	1.02	1.3
North: Turton Road															
8	T1	All MCs	1157	4.4	1157	4.4	0.208	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	All MCs	36	5.9	36	5.9	0.216	27.2	LOS B	0.6	4.7	0.89	0.97	0.96	25.7
Approach			1193	4.4	1193	4.4	0.216	0.8	NA	0.6	4.7	0.03	0.03	0.03	56.8
West: Monash Road															
10	L2	All MCs	41	0.0	41	0.0	1.073	108.1	LOS F	4.3	30.8	1.00	1.46	2.13	11.8
12	R2	All MCs	5	20.0	5	20.0	1.073	126.7	LOS F	4.3	30.8	1.00	1.46	2.13	16.3
Approach			46	2.3	46	2.3	1.073	110.2	LOS F	4.3	30.8	1.00	1.46	2.13	12.4
All Vehicles			2676	3.9	2676	3.9	1.073	3.4	NA	4.3	30.8	0.03	0.04	0.05	51.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 105 [Turton Road / Lambton Road / Bridges Road - TCS 350 (Site Folder: 2024 Base AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

0800-0900
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 132 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lambton Road															
4a	L1	All MCs	182	9.8	182	9.8	0.189	8.8	LOS A	3.0	23.1	0.34	0.62	0.34	50.5
5	T1	All MCs	475	5.1	475	5.1	0.447	41.2	LOS C	12.5	91.1	0.87	0.73	0.87	37.9
6b	R3	All MCs	229	8.7	229	8.7	* 1.698	707.7	LOS F	48.1	361.6	1.00	2.10	3.88	3.9
Approach			886	7.0	886	7.0	1.698	207.1	LOS F	48.1	361.6	0.79	1.07	1.54	13.9
NorthEast: Turton Road															
24b	L3	All MCs	342	0.3	342	0.3	0.221	8.1	LOS A	0.0	0.0	0.00	0.58	0.00	51.0
25	T1	All MCs	693	4.7	693	4.7	0.551	41.7	LOS C	18.8	137.1	0.86	0.74	0.86	34.9
26a	R1	All MCs	117	6.3	117	6.3	* 0.884	92.7	LOS F	8.5	62.8	1.00	0.99	1.37	25.8
Approach			1152	3.6	1152	3.6	0.884	36.9	LOS C	18.8	137.1	0.62	0.72	0.65	34.8
West: Lambton Road															
10a	L1	All MCs	111	6.7	111	6.7	0.168	17.4	LOS B	3.3	24.6	0.51	0.67	0.51	45.4
11	T1	All MCs	555	3.6	555	3.6	* 0.846	64.5	LOS E	19.0	135.3	1.00	0.97	1.17	31.3
Approach			665	4.1	665	4.1	0.846	56.7	LOS E	19.0	135.3	0.92	0.92	1.06	32.9
SouthWest: Bridges Road															
30b	L3	All MCs	16	13.3	16	13.3	0.865	15.6	LOS B	14.0	99.7	0.41	0.48	0.49	49.1
31	T1	All MCs	1125	2.0	1125	2.0	* 0.865	20.3	LOS B	27.9	198.5	0.55	0.57	0.61	46.2
32a	R1	All MCs	389	2.2	389	2.2	0.807	45.8	LOS D	7.7	55.1	1.00	0.88	1.16	35.0
Approach			1531	2.1	1531	2.1	0.865	26.7	LOS B	27.9	198.5	0.67	0.65	0.75	39.7
All Vehicles			4234	3.9	4234	3.9	1.698	72.0	LOS F	48.1	361.6	0.72	0.80	0.94	26.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Lambton Road												
P2	Full	22	23	60.2	LOS F	0.1	0.1	0.96	0.96	226.9	200.0	0.88
NorthEast: Turton Road												
P6	Full	6	6	60.2	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88

SouthWest: Bridges Road											
P8 Full	1	1	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
All Pedestrians	29	31	60.2	LOS F	0.1	0.1	0.96	0.96	226.9	200.0	0.88

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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MOVEMENT SUMMARY

Site: 101 [Turton Road / Griffiths Road - TCS 201 (Site Folder: 2024 Base PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

1645 - 1745
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 131 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
1	L2	All MCs	396	3.2	396	3.2	0.341	27.2	LOS B	5.8	41.4	0.33	0.67	0.33	49.7
2	T1	All MCs	847	2.6	847	2.6	* 1.217	284.1	LOS F	60.7	434.7	1.00	1.87	2.40	6.6
3	R2	All MCs	411	1.3	411	1.3	* 1.081	176.8	LOS F	21.1	149.0	1.00	1.33	1.92	15.4
Approach			1654	2.4	1654	2.4	1.217	196.0	LOS F	60.7	434.7	0.84	1.45	1.78	10.9
East: Griffiths Road															
4	L2	All MCs	308	3.4	308	3.4	0.206	14.3	LOS A	6.8	49.1	0.39	0.67	0.39	47.5
5	T1	All MCs	756	3.2	756	3.2	0.467	45.4	LOS D	16.0	114.9	0.90	0.75	0.90	36.6
6	R2	All MCs	106	1.0	106	1.0	* 0.482	64.8	LOS E	6.4	45.3	0.96	0.77	0.96	25.6
Approach			1171	3.1	1171	3.1	0.482	39.0	LOS C	16.0	114.9	0.77	0.73	0.77	37.4
North: Turton Road															
7	L2	All MCs	128	1.6	128	1.6	0.176	19.7	LOS B	4.2	29.6	0.53	0.70	0.53	41.4
8	T1	All MCs	812	2.1	812	2.1	0.578	52.8	LOS D	19.1	136.2	0.93	0.78	0.93	24.3
9	R2	All MCs	117	10.3	117	10.3	0.474	77.6	LOS F	7.2	54.8	0.99	0.78	0.99	24.1
Approach			1058	3.0	1058	3.0	0.578	51.5	LOS D	19.1	136.2	0.89	0.77	0.89	24.7
West: Griffiths Road															
10	L2	All MCs	123	5.1	123	5.1	0.121	14.7	LOS B	2.4	17.8	0.38	0.65	0.38	45.4
11	T1	All MCs	1368	1.8	1368	1.8	* 0.642	36.3	LOS C	24.0	170.6	0.88	0.78	0.88	40.0
12	R2	All MCs	398	5.6	398	5.6	0.508	53.5	LOS D	11.2	82.3	0.92	0.81	0.92	29.4
Approach			1889	2.8	1889	2.8	0.642	38.5	LOS C	24.0	170.6	0.86	0.77	0.86	37.5
All Vehicles			5771	2.8	5771	2.8	1.217	86.1	LOS F	60.7	434.7	0.84	0.96	1.11	23.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Turton Road												
P1	Full	1	1	59.6	LOS E	0.0	0.0	0.95	0.95	226.3	200.0	0.88
East: Griffiths Road												

P2	Full	7	7	59.7	LOS E	0.0	0.0	0.95	0.95	226.3	200.0	0.88
North: Turton Road												
P3	Full	1	1	59.6	LOS E	0.0	0.0	0.95	0.95	226.3	200.0	0.88
West: Griffiths Road												
P4	Full	4	4	59.6	LOS E	0.0	0.0	0.95	0.95	226.3	200.0	0.88
All Pedestrians		13	14	59.7	LOS E	0.0	0.0	0.95	0.95	226.3	200.0	0.88

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: 102 [Turton Road / Young Road - TCS 3322 (Site Folder: 2024 Base PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

1645 - 1745
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 137 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
1	L2	All MCs	139	9.8	139	9.8	0.123	11.3	LOS A	3.0	23.0	0.36	0.65	0.36	31.6
2	T1	All MCs	1443	2.6	1443	2.6	* 0.546	1.7	LOS A	6.4	45.7	0.15	0.13	0.15	55.9
Approach			1582	3.3	1582	3.3	0.546	2.5	LOS A	6.4	45.7	0.16	0.18	0.16	53.0
North: Turton Road															
8	T1	All MCs	1448	3.2	1448	3.2	0.391	10.8	LOS A	22.3	160.1	0.65	0.30	0.65	41.8
9	R2	All MCs	101	4.2	101	4.2	* 0.431	18.4	LOS B	3.2	22.8	0.52	0.73	0.52	38.4
Approach			1549	3.3	1549	3.3	0.431	11.3	LOS A	22.3	160.1	0.64	0.32	0.64	40.3
West: Young Road															
10	L2	All MCs	138	3.1	138	3.1	0.237	70.3	LOS E	7.4	53.5	0.86	0.77	0.86	22.6
12	R2	All MCs	259	3.3	259	3.3	* 0.921	100.3	LOS F	19.7	141.6	1.00	1.02	1.31	10.3
Approach			397	3.2	397	3.2	0.921	89.9	LOS F	19.7	141.6	0.95	0.93	1.16	12.0
All Vehicles			3528	3.3	3528	3.3	0.921	16.2	LOS B	22.3	160.1	0.46	0.33	0.49	34.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Turton Road												
P1	Full	20	21	62.7	LOS F	0.1	0.1	0.96	0.96	229.4	200.0	0.87
North: Turton Road												
P3	Full	16	17	62.7	LOS F	0.1	0.1	0.96	0.96	229.3	200.0	0.87
West: Young Road												
P4	Full	7	7	62.7	LOS F	0.0	0.0	0.96	0.96	229.3	200.0	0.87
All Pedestrians		43	45	62.7	LOS F	0.1	0.1	0.96	0.96	229.3	200.0	0.87

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: 103 [Turton Road / McDonald Jones Stadium Southern Access (Site Folder: 2024 Base PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

1645 - 1745
Site Category: Base Year
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
2	T1	All MCs	1579	3.2	1579	3.2	0.711	23.3	LOS B	29.1	209.0	0.16	0.15	0.49	15.5
3	R2	All MCs	99	2.1	99	2.1	1.440	482.4	LOS F	22.0	157.0	1.00	2.39	7.17	0.9
Approach			1678	3.1	1678	3.1	1.440	50.4	NA	29.1	209.0	0.21	0.29	0.88	8.2
East: McDonald Jones Stadium Southern Access															
4	L2	All MCs	33	3.2	33	3.2	1.047	87.7	LOS F	3.2	22.6	1.00	1.50	1.68	4.3
6	R2	All MCs	4	0.0	4	0.0	1.047	51.5	LOS D	3.2	22.6	1.00	1.50	1.68	3.6
Approach			37	2.9	37	2.9	1.047	83.5	LOS F	3.2	22.6	1.00	1.50	1.68	4.2
North: Turton Road															
7	L2	All MCs	19	5.6	19	5.6	0.307	4.0	LOS A	0.0	0.0	0.00	0.02	0.00	29.0
8	T1	All MCs	1696	3.2	1696	3.2	0.307	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.5
Approach			1715	3.2	1715	3.2	0.307	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.0
All Vehicles			3429	3.2	3429	3.2	1.440	25.6	NA	29.1	209.0	0.11	0.16	0.45	14.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 104 [Turton Road / Monash Road / Newcastle International Hockey Centre Northern Exit (Site Folder: 2024 Base PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

1645 - 1745
Site Category: Base Year
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
1	L2	All MCs	19	0.0	19	0.0	0.426	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	56.4
2	T1	All MCs	1567	3.2	1567	3.2	0.426	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.5
Approach			1586	3.1	1586	3.1	0.426	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.4
East: Newcastle International Hockey Centre Northern Exit															
4	L2	All MCs	1	0.0	1	0.0	1.000	2201.8	LOS F	3.8	26.6	1.00	1.00	1.00	1.8
5	T1	All MCs	1	0.0	1	0.0	1.000	40.1	LOS C	3.8	26.6	1.00	1.00	1.00	2.3
6	R2	All MCs	1	0.0	1	0.0	1.000	40.1	LOS C	3.8	26.6	1.00	1.00	1.00	0.5
Approach			3	0.0	3	0.0	1.000	760.7	LOS F	3.8	26.6	1.00	1.00	1.00	1.5
North: Turton Road															
8	T1	All MCs	1693	4.0	1693	4.0	0.304	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
9	R2	All MCs	49	0.0	49	0.0	0.340	34.1	LOS C	1.1	7.9	0.93	1.01	1.08	25.9
Approach			1742	3.9	1742	3.9	0.340	1.0	NA	1.1	7.9	0.03	0.03	0.03	57.0
West: Monash Road															
10	L2	All MCs	111	1.9	111	1.9	1.629	590.4	LOS F	30.9	219.5	1.00	3.97	10.11	3.0
12	R2	All MCs	8	0.0	8	0.0	1.629	572.2	LOS F	30.9	219.5	1.00	3.97	10.11	4.5
Approach			119	1.8	119	1.8	1.629	589.1	LOS F	30.9	219.5	1.00	3.97	10.11	3.1
All Vehicles			3451	3.5	3451	3.5	1.629	21.6	NA	30.9	219.5	0.05	0.16	0.37	30.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 105 [Turton Road / Lambton Road / Bridges Road - TCS 350 (Site Folder: 2024 Base PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

1645 - 1745
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 123 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lambton Road															
4a	L1	All MCs	303	4.2	303	4.2	0.310	10.1	LOS A	6.6	48.0	0.44	0.67	0.44	49.7
5	T1	All MCs	624	2.2	624	2.2	0.281	29.0	LOS C	12.9	92.3	0.75	0.63	0.75	42.5
6b	R3	All MCs	162	5.8	162	5.8	* 0.374	36.5	LOS C	6.7	49.4	0.84	0.77	0.84	33.5
Approach			1089	3.3	1089	3.3	0.374	24.9	LOS B	12.9	92.3	0.68	0.66	0.68	42.8
NorthEast: Turton Road															
24b	L3	All MCs	598	0.5	598	0.5	0.369	9.0	LOS A	0.0	0.0	0.00	0.58	0.00	50.9
25	T1	All MCs	931	2.7	931	2.7	0.725	18.4	LOS B	17.6	126.4	0.64	0.56	0.64	45.6
26a	R1	All MCs	140	3.0	140	3.0	0.734	67.8	LOS E	8.5	61.4	1.00	0.85	1.09	29.6
Approach			1668	2.0	1668	2.0	0.734	19.2	LOS B	17.6	126.4	0.44	0.59	0.45	43.7
West: Lambton Road															
10a	L1	All MCs	158	10.0	158	10.0	0.198	19.7	LOS B	4.7	35.6	0.58	0.68	0.58	44.1
11	T1	All MCs	674	3.8	674	3.8	* 0.439	33.3	LOS C	14.3	102.3	0.76	0.63	0.76	40.7
Approach			832	5.0	832	5.0	0.439	30.8	LOS C	14.3	102.3	0.73	0.64	0.73	41.3
SouthWest: Bridges Road															
30b	L3	All MCs	20	0.0	20	0.0	1.291	279.7	LOS F	86.7	615.8	1.00	1.73	2.72	11.7
31	T1	All MCs	1262	1.8	1262	1.8	* 1.291	308.1	LOS F	96.2	683.2	1.00	2.04	2.71	8.7
32a	R1	All MCs	616	0.3	616	0.3	* 1.792	809.1	LOS F	66.6	467.3	1.00	2.45	4.27	4.3
Approach			1898	1.3	1898	1.3	1.792	470.4	LOS F	96.2	683.2	1.00	2.17	3.22	6.1
All Vehicles			5488	2.4	5488	2.4	1.792	178.1	LOS F	96.2	683.2	0.72	1.16	1.49	14.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Lambton Road												
P2	Full	27	28	55.7	LOS E	0.1	0.1	0.95	0.95	222.4	200.0	0.90
NorthEast: Turton Road												
P6	Full	14	15	55.7	LOS E	0.0	0.0	0.95	0.95	222.3	200.0	0.90

SouthWest: Bridges Road											
P8 Full	5	5	55.7	LOS E	0.0	0.0	0.95	0.95	222.3	200.0	0.90
All Pedestrians	46	48	55.7	LOS E	0.1	0.1	0.95	0.95	222.4	200.0	0.90

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 [Turton Road / Griffiths Road - TCS 201 (Site Folder: 2024 Base Weekend Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

1115 - 1215
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
1	L2	All MCs	402	1.3	402	1.3	0.359	11.4	LOS A	7.2	51.3	0.41	0.68	0.41	48.3
2	T1	All MCs	498	1.1	498	1.1	0.537	42.9	LOS D	12.8	90.3	0.92	0.78	0.92	26.0
3	R2	All MCs	234	0.9	234	0.9	* 0.702	66.6	LOS E	7.1	50.1	1.00	0.85	1.10	27.2
Approach			1134	1.1	1134	1.1	0.702	36.6	LOS C	12.8	90.3	0.76	0.76	0.78	32.7
East: Griffiths Road															
4	L2	All MCs	332	0.3	332	0.3	0.285	15.4	LOS B	7.8	55.1	0.46	0.69	0.46	46.7
5	T1	All MCs	793	0.7	793	0.7	* 0.730	47.8	LOS D	17.3	121.5	0.97	0.84	1.00	35.8
6	R2	All MCs	87	2.4	87	2.4	* 0.709	69.8	LOS E	5.4	38.8	1.00	0.85	1.14	24.5
Approach			1212	0.7	1212	0.7	0.730	40.5	LOS C	17.3	121.5	0.83	0.80	0.86	36.9
North: Turton Road															
7	L2	All MCs	86	0.0	86	0.0	0.100	11.6	LOS A	1.6	11.5	0.36	0.64	0.36	46.8
8	T1	All MCs	694	0.6	694	0.6	* 0.605	44.7	LOS D	14.8	104.0	0.93	0.78	0.93	25.9
9	R2	All MCs	98	5.4	98	5.4	0.615	68.5	LOS E	5.8	42.7	1.00	0.81	1.04	24.3
Approach			878	1.1	878	1.1	0.615	44.1	LOS D	14.8	104.0	0.88	0.77	0.88	26.8
West: Griffiths Road															
10	L2	All MCs	107	2.0	107	2.0	0.092	8.3	LOS A	1.3	8.9	0.28	0.62	0.28	48.5
11	T1	All MCs	986	0.5	986	0.5	0.462	30.3	LOS C	14.5	102.1	0.81	0.70	0.81	42.0
12	R2	All MCs	463	1.1	463	1.1	0.574	50.7	LOS D	12.2	86.5	0.94	0.82	0.94	30.2
Approach			1557	0.8	1557	0.8	0.574	34.8	LOS C	14.5	102.1	0.81	0.73	0.81	38.5
All Vehicles			4780	0.9	4780	0.9	0.730	38.4	LOS C	17.3	121.5	0.82	0.76	0.83	35.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Turton Road												
P1	Full	1	1	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91
East: Griffiths Road												

P2	Full	9	9	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91
North: Turton Road												
P3	Full	1	1	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91
West: Griffiths Road												
P4	Full	1	1	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91
All Pedestrians		12	13	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91

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: 102 [Turton Road / Young Road - TCS 3322 (Site Folder: 2024 Base Weekend Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

1115 - 1215
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
1	L2	All MCs	63	0.0	63	0.0	0.077	8.8	LOS A	1.6	11.6	0.29	0.48	0.29	36.6
2	T1	All MCs	1019	1.0	1019	1.0	* 0.347	5.9	LOS A	9.9	69.7	0.37	0.34	0.37	48.0
Approach			1082	1.0	1082	1.0	0.347	6.0	LOS A	9.9	69.7	0.37	0.35	0.37	46.9
North: Turton Road															
8	T1	All MCs	1397	0.7	1397	0.7	0.330	8.6	LOS A	16.3	114.4	0.61	0.26	0.61	45.1
9	R2	All MCs	79	4.0	79	4.0	* 0.247	15.5	LOS B	1.6	11.4	0.42	0.68	0.42	40.4
Approach			1476	0.9	1476	0.9	0.330	8.9	LOS A	16.3	114.4	0.60	0.28	0.60	43.1
West: Young Road															
10	L2	All MCs	89	1.2	89	1.2	0.319	55.5	LOS D	4.8	33.7	0.94	0.77	0.94	21.7
12	R2	All MCs	116	2.7	116	2.7	* 0.453	56.7	LOS E	6.4	45.7	0.96	0.79	0.96	13.6
Approach			205	2.1	205	2.1	0.453	56.2	LOS D	6.4	45.7	0.95	0.78	0.95	17.4
All Vehicles			2763	1.0	2763	1.0	0.453	11.3	LOS A	16.3	114.4	0.53	0.35	0.53	39.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Turton Road												
P1	Full	8	8	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91
North: Turton Road												
P3	Full	15	16	54.2	LOS E	0.1	0.1	0.95	0.95	220.9	200.0	0.91
West: Young Road												
P4	Full	1	1	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91
All Pedestrians		24	25	54.2	LOS E	0.1	0.1	0.95	0.95	220.8	200.0	0.91

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: 103 [Turton Road / McDonald Jones Stadium Southern Access (Site Folder: 2024 Base Weekend Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

1115 - 1215
Site Category: Base Year
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
2	T1	All MCs	1031	0.8	1031	0.8	0.271	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	All MCs	48	2.2	48	2.2	0.468	49.1	LOS D	1.5	10.4	0.94	1.04	1.20	7.3
Approach			1079	0.9	1079	0.9	0.468	2.2	NA	1.5	10.4	0.04	0.05	0.05	46.3
East: McDonald Jones Stadium Southern Access															
4	L2	All MCs	41	5.1	41	5.1	1.283	271.6	LOS F	9.1	66.4	1.00	3.15	3.68	1.3
6	R2	All MCs	7	0.0	7	0.0	1.283	454.2	LOS F	9.1	66.4	1.00	3.15	3.68	1.1
Approach			48	4.3	48	4.3	1.283	299.4	LOS F	9.1	66.4	1.00	3.15	3.68	1.3
North: Turton Road															
7	L2	All MCs	17	0.0	17	0.0	0.269	4.0	LOS A	0.0	0.0	0.00	0.02	0.00	29.1
8	T1	All MCs	1520	0.8	1520	0.8	0.269	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.5
Approach			1537	0.8	1537	0.8	0.269	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.0
All Vehicles			2664	0.9	2664	0.9	1.283	6.4	NA	9.1	66.4	0.04	0.08	0.09	32.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 104 [Turton Road / Monash Road / Newcastle International Hockey Centre Northern Exit (Site Folder: 2024 Base Weekend Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

1115 - 1215
Site Category: Base Year
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
1	L2	All MCs	12	0.0	12	0.0	0.294	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	56.6
2	T1	All MCs	1106	1.0	1106	1.0	0.294	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.7
Approach			1118	0.9	1118	0.9	0.294	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.6
East: Newcastle International Hockey Centre Northern Exit															
4	L2	All MCs	1	0.0	1	0.0	1.000	239.9	LOS F	3.7	25.8	1.00	1.01	1.02	1.6
5	T1	All MCs	1	0.0	1	0.0	1.000	1597.0	LOS F	3.7	25.8	1.00	1.01	1.02	2.1
6	R2	All MCs	1	0.0	1	0.0	1.000	690.1	LOS F	3.7	25.8	1.00	1.01	1.02	0.5
Approach			3	0.0	3	0.0	1.000	842.3	LOS F	3.7	25.8	1.00	1.01	1.02	1.4
North: Turton Road															
8	T1	All MCs	1497	1.0	1497	1.0	0.261	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	All MCs	37	0.0	37	0.0	0.101	13.2	LOS A	0.3	2.4	0.77	0.90	0.77	36.3
Approach			1534	1.0	1534	1.0	0.261	0.3	NA	0.3	2.4	0.02	0.02	0.02	58.6
West: Monash Road															
10	L2	All MCs	47	2.2	47	2.2	1.067	97.5	LOS F	4.5	31.8	1.00	1.39	2.05	12.1
12	R2	All MCs	2	0.0	2	0.0	1.067	223.4	LOS F	4.5	31.8	1.00	1.39	2.05	18.1
Approach			49	2.1	49	2.1	1.067	102.9	LOS F	4.5	31.8	1.00	1.39	2.05	12.4
All Vehicles			2704	1.0	2704	1.0	1.067	3.1	NA	4.5	31.8	0.03	0.04	0.05	52.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 105 [Turton Road / Lambton Road / Bridges Road - TCS 350 (Site Folder: 2024 Base Weekend Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

1115 - 1215
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lambton Road															
4a	L1	All MCs	287	2.2	287	2.2	0.313	11.8	LOS A	7.3	51.8	0.50	0.69	0.50	48.6
5	T1	All MCs	412	1.0	412	1.0	0.322	31.9	LOS C	8.9	63.1	0.79	0.66	0.79	41.3
6b	R3	All MCs	198	0.5	198	0.5	*0.569	41.7	LOS C	9.3	65.3	0.91	0.80	0.91	31.7
Approach			897	1.3	897	1.3	0.569	27.6	LOS B	9.3	65.3	0.73	0.70	0.73	41.0
NorthEast: Turton Road															
24b	L3	All MCs	332	0.3	332	0.3	0.194	7.7	LOS A	0.0	0.0	0.00	0.58	0.00	51.0
25	T1	All MCs	1093	0.4	1093	0.4	0.725	23.3	LOS B	22.3	156.6	0.71	0.63	0.71	43.8
26a	R1	All MCs	119	0.0	119	0.0	0.608	71.8	LOS F	7.0	48.7	1.00	0.80	1.02	29.8
Approach			1543	0.3	1543	0.3	0.725	23.7	LOS B	22.3	156.6	0.58	0.63	0.58	40.9
West: Lambton Road															
10a	L1	All MCs	91	1.2	91	1.2	0.109	12.5	LOS A	1.9	13.7	0.43	0.64	0.43	48.5
11	T1	All MCs	407	1.6	407	1.6	*0.348	44.9	LOS D	10.2	72.2	0.91	0.74	0.91	36.7
Approach			498	1.5	498	1.5	0.348	39.0	LOS C	10.2	72.2	0.82	0.72	0.82	38.2
SouthWest: Bridges Road															
30b	L3	All MCs	40	0.0	40	0.0	0.719	8.7	LOS A	13.2	93.0	0.65	0.64	0.65	47.5
31	T1	All MCs	837	0.9	837	0.9	*0.719	21.8	LOS B	18.4	129.8	0.67	0.62	0.68	44.4
32a	R1	All MCs	308	0.7	308	0.7	*0.846	73.8	LOS F	9.9	69.8	1.00	0.97	1.28	27.5
Approach			1185	0.8	1185	0.8	0.846	34.9	LOS C	18.4	129.8	0.76	0.71	0.83	36.2
All Vehicles			4123	0.8	4123	0.8	0.846	29.6	LOS C	22.3	156.6	0.69	0.68	0.71	39.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Lambton Road												
P2	Full	38	40	54.2	LOS E	0.1	0.1	0.95	0.95	220.9	200.0	0.91
NorthEast: Turton Road												
P6	Full	16	17	54.2	LOS E	0.1	0.1	0.95	0.95	220.9	200.0	0.91

SouthWest: Bridges Road											
P8 Full	7	7	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91
All Pedestrians	61	64	54.2	LOS E	0.1	0.1	0.95	0.95	220.9	200.0	0.91

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 [Turton Road / Griffiths Road - TCS 201 (Site Folder: 2024 Project AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

0800-0900
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 132 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
1	L2	All MCs	452	3.5	452	3.5	0.410	15.3	LOS B	8.9	64.4	0.41	0.93	0.41	48.2
2	T1	All MCs	644	3.9	644	3.9	* 0.783	57.8	LOS E	21.7	157.2	0.99	0.97	1.07	22.9
3	R2	All MCs	312	3.0	312	3.0	* 0.965	100.4	LOS F	12.6	90.8	1.00	1.11	1.54	21.8
Approach			1407	3.6	1407	3.6	0.965	53.6	LOS D	21.7	157.2	0.81	0.99	0.96	27.0
East: Griffiths Road															
4	L2	All MCs	221	3.3	221	3.3	0.174	11.2	LOS A	3.9	28.4	0.32	0.64	0.32	48.9
5	T1	All MCs	731	5.6	731	5.6	0.561	43.9	LOS D	15.7	115.3	0.90	0.76	0.90	37.1
6	R2	All MCs	55	3.8	55	3.8	* 0.662	78.5	LOS F	3.8	27.3	1.00	0.81	1.12	22.9
Approach			1006	5.0	1006	5.0	0.662	38.6	LOS C	15.7	115.3	0.78	0.74	0.78	37.8
North: Turton Road															
7	L2	All MCs	100	12.6	100	12.6	0.144	15.5	LOS B	2.7	21.0	0.45	0.67	0.45	43.7
8	T1	All MCs	534	4.1	534	4.1	0.460	44.8	LOS D	12.1	87.5	0.89	0.74	0.89	25.4
9	R2	All MCs	88	16.7	88	16.7	0.624	71.7	LOS F	5.8	46.5	1.00	0.81	1.05	22.9
Approach			722	6.9	722	6.9	0.624	44.0	LOS D	12.1	87.5	0.84	0.74	0.85	27.1
West: Griffiths Road															
10	L2	All MCs	108	9.7	108	9.7	0.101	10.1	LOS A	1.8	13.3	0.33	0.63	0.33	46.5
11	T1	All MCs	1340	3.1	1340	3.1	* 0.589	24.1	LOS B	19.2	137.8	0.72	0.64	0.72	44.7
12	R2	All MCs	313	4.0	313	4.0	0.495	58.7	LOS E	9.2	66.7	0.95	0.80	0.95	28.0
Approach			1761	3.6	1761	3.6	0.589	29.3	LOS C	19.2	137.8	0.74	0.66	0.74	41.3
All Vehicles			4897	4.4	4897	4.4	0.965	40.4	LOS C	21.7	157.2	0.78	0.78	0.83	34.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Turton Road												
P1	Full	1	1	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
East: Griffiths Road												

P2	Full	9	9	60.2	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
North: Turton Road												
P3	Full	1	1	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
West: Griffiths Road												
P4	Full	7	7	60.2	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
All Pedestrians		18	19	60.2	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88

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: 102 [Turton Road / Young Road - TCS 3322 (Site Folder: 2024 Project AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

0800-0900
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 129 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
1	L2	All MCs	108	3.9	108	3.9	0.125	13.6	LOS A	2.9	21.2	0.37	0.59	0.37	28.5
2	T1	All MCs	1334	3.2	1334	3.2	* 0.562	5.5	LOS A	12.1	87.3	0.31	0.29	0.31	49.2
Approach			1442	3.3	1442	3.3	0.562	6.1	LOS A	12.1	87.3	0.32	0.31	0.32	46.2
North: Turton Road															
8	T1	All MCs	959	0.1	959	0.1	0.231	5.7	LOS A	6.4	44.6	0.34	0.30	0.34	48.1
9	R2	All MCs	79	2.7	79	2.7	* 0.314	18.9	LOS B	2.6	18.3	0.58	0.73	0.58	33.6
Approach			1038	0.3	1038	0.3	0.314	6.7	LOS A	6.4	44.6	0.36	0.33	0.36	45.9
West: Young Road															
10	L2	All MCs	68	6.2	68	6.2	0.178	47.7	LOS D	3.6	26.4	0.85	0.71	0.85	22.5
12	R2	All MCs	178	5.3	178	5.3	* 0.594	57.5	LOS E	10.5	77.1	0.97	0.81	0.97	12.8
Approach			246	5.6	246	5.6	0.594	54.8	LOS D	10.5	77.1	0.94	0.78	0.94	15.6
All Vehicles			2726	2.4	2726	2.4	0.594	10.7	LOS A	12.1	87.3	0.39	0.36	0.39	39.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Turton Road												
P1	Full	5	5	58.7	LOS E	0.0	0.0	0.95	0.95	225.3	200.0	0.89
North: Turton Road												
P3	Full	7	7	58.7	LOS E	0.0	0.0	0.95	0.95	225.3	200.0	0.89
West: Young Road												
P4	Full	4	4	58.6	LOS E	0.0	0.0	0.95	0.95	225.3	200.0	0.89
All Pedestrians		16	17	58.7	LOS E	0.0	0.0	0.95	0.95	225.3	200.0	0.89

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: 103 [Turton Road / McDonald Jones Stadium Southern Access (Site Folder: 2024 Project AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

0800-0900
Site Category: Base Year
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
2	T1	All MCs	1457	3.3	1457	3.3	0.392	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
3	R2	All MCs	40	7.9	40	7.9	0.237	26.9	LOS B	0.7	5.2	0.85	0.96	0.94	11.5
Approach			1497	3.4	1497	3.4	0.392	0.7	NA	0.7	5.2	0.02	0.03	0.03	54.3
East: McDonald Jones Stadium Southern Access															
4	L2	All MCs	33	3.2	33	3.2	1.791	725.8	LOS F	14.1	102.6	1.00	4.08	4.59	0.5
6	R2	All MCs	11	10.0	11	10.0	1.791	888.0	LOS F	14.1	102.6	1.00	4.08	4.59	0.5
Approach			43	4.9	43	4.9	1.791	765.4	LOS F	14.1	102.6	1.00	4.08	4.59	0.5
North: Turton Road															
7	L2	All MCs	23	0.0	23	0.0	0.214	4.0	LOS A	0.0	0.0	0.00	0.03	0.00	28.9
8	T1	All MCs	1156	4.7	1156	4.7	0.214	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.3
Approach			1179	4.6	1179	4.6	0.214	0.1	NA	0.0	0.0	0.00	0.01	0.00	58.4
All Vehicles			2719	3.9	2719	3.9	1.791	12.6	NA	14.1	102.6	0.03	0.08	0.09	23.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 104 [Turton Road / Monash Road / Newcastle International Hockey Centre Northern Exit (Site Folder: 2024 Project AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

0800-0900
Site Category: Base Year
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
1	L2	All MCs	11	0.0	11	0.0	0.395	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	56.5
2	T1	All MCs	1456	3.5	1456	3.5	0.395	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.6
Approach			1466	3.4	1466	3.4	0.395	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.6
East: Newcastle International Hockey Centre Northern Exit															
4	L2	All MCs	1	0.0	1	0.0	1.000	273.1	LOS F	4.1	29.0	1.00	1.01	1.01	1.5
5	T1	All MCs	1	0.0	1	0.0	1.000	1966.5	LOS F	4.1	29.0	1.00	1.01	1.01	2.0
6	R2	All MCs	1	0.0	1	0.0	1.000	438.8	LOS F	4.1	29.0	1.00	1.01	1.01	0.5
Approach			3	0.0	3	0.0	1.000	892.8	LOS F	4.1	29.0	1.00	1.01	1.01	1.3
North: Turton Road															
8	T1	All MCs	1157	4.4	1157	4.4	0.208	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	All MCs	36	5.9	36	5.9	0.232	29.4	LOS C	0.7	5.0	0.90	0.98	0.98	25.0
Approach			1193	4.4	1193	4.4	0.232	0.9	NA	0.7	5.0	0.03	0.03	0.03	56.7
West: Monash Road															
10	L2	All MCs	53	0.0	53	0.0	1.096	122.6	LOS F	5.6	39.5	1.00	1.67	2.66	11.0
12	R2	All MCs	5	20.0	5	20.0	1.096	125.9	LOS F	5.6	39.5	1.00	1.67	2.66	15.2
Approach			58	1.8	58	1.8	1.096	122.9	LOS F	5.6	39.5	1.00	1.67	2.66	11.4
All Vehicles			2720	3.8	2720	3.8	1.096	4.1	NA	5.6	39.5	0.03	0.05	0.07	49.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 105 [Turton Road / Lambton Road / Bridges Road - TCS 350 (Site Folder: 2024 Project AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

0800-0900
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 132 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lambton Road															
4a	L1	All MCs	182	9.8	182	9.8	0.189	8.8	LOS A	3.0	23.1	0.34	0.62	0.34	50.5
5	T1	All MCs	475	5.1	475	5.1	0.447	41.2	LOS C	12.5	91.1	0.87	0.73	0.87	37.9
6b	R3	All MCs	238	8.4	238	8.4	* 1.755	759.1	LOS F	51.4	385.4	1.00	2.16	4.00	3.7
Approach			895	6.9	895	6.9	1.755	225.5	LOS F	51.4	385.4	0.80	1.09	1.60	13.0
NorthEast: Turton Road															
24b	L3	All MCs	342	0.3	342	0.3	0.221	8.1	LOS A	0.0	0.0	0.00	0.58	0.00	51.0
25	T1	All MCs	693	4.7	693	4.7	0.551	41.7	LOS C	18.8	137.1	0.86	0.74	0.86	34.9
26a	R1	All MCs	117	6.3	117	6.3	* 0.884	92.7	LOS F	8.5	62.8	1.00	0.99	1.37	25.8
Approach			1152	3.6	1152	3.6	0.884	36.9	LOS C	18.8	137.1	0.62	0.72	0.65	34.8
West: Lambton Road															
10a	L1	All MCs	124	5.9	124	5.9	0.189	18.2	LOS B	3.9	28.5	0.53	0.68	0.53	45.0
11	T1	All MCs	558	4.2	558	4.2	* 0.846	64.4	LOS E	19.0	135.3	1.00	0.97	1.17	31.4
Approach			682	4.5	682	4.5	0.846	56.0	LOS D	19.0	135.3	0.91	0.92	1.05	33.0
SouthWest: Bridges Road															
30b	L3	All MCs	16	13.3	16	13.3	0.874	16.7	LOS B	14.9	106.1	0.42	0.50	0.51	48.5
31	T1	All MCs	1136	1.9	1136	1.9	* 0.874	21.4	LOS B	28.8	205.3	0.57	0.58	0.63	45.6
32a	R1	All MCs	389	2.2	389	2.2	0.807	46.0	LOS D	7.7	55.1	1.00	0.88	1.16	35.0
Approach			1541	2.1	1541	2.1	0.874	27.6	LOS B	28.8	205.3	0.67	0.66	0.76	39.3
All Vehicles			4269	3.9	4269	3.9	1.755	76.1	LOS F	51.4	385.4	0.72	0.81	0.95	25.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Lambton Road												
P2	Full	22	23	60.2	LOS F	0.1	0.1	0.96	0.96	226.9	200.0	0.88
NorthEast: Turton Road												
P6	Full	6	6	60.2	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88

SouthWest: Bridges Road											
P8 Full	1	1	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
All Pedestrians	29	31	60.2	LOS F	0.1	0.1	0.96	0.96	226.9	200.0	0.88

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 [Turton Road / Griffiths Road - TCS 201 (Site Folder: 2024 Project PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

1645 - 1745
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 131 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
1	L2	All MCs	512	2.5	512	2.5	0.439	28.7	LOS C	8.4	60.1	0.37	0.82	0.37	49.4
2	T1	All MCs	874	2.5	874	2.5	* 1.279	339.2	LOS F	69.0	493.6	1.00	2.06	2.64	5.6
3	R2	All MCs	495	1.1	495	1.1	* 1.301	368.4	LOS F	36.9	260.9	1.00	1.76	2.75	8.4
Approach			1880	2.1	1880	2.1	1.301	262.4	LOS F	69.0	493.6	0.83	1.64	2.05	8.7
East: Griffiths Road															
4	L2	All MCs	322	3.3	322	3.3	0.215	14.9	LOS B	7.4	53.1	0.41	0.67	0.41	47.2
5	T1	All MCs	756	3.2	756	3.2	0.467	45.5	LOS D	16.0	114.9	0.90	0.75	0.90	36.6
6	R2	All MCs	106	1.0	106	1.0	* 0.482	64.8	LOS E	6.4	45.3	0.96	0.77	0.96	25.6
Approach			1184	3.0	1184	3.0	0.482	38.9	LOS C	16.0	114.9	0.77	0.73	0.77	37.5
North: Turton Road															
7	L2	All MCs	128	1.6	128	1.6	0.177	19.8	LOS B	4.2	29.9	0.54	0.70	0.54	41.4
8	T1	All MCs	837	2.1	837	2.1	0.597	53.5	LOS D	19.9	141.4	0.94	0.79	0.94	24.3
9	R2	All MCs	117	10.3	117	10.3	0.474	78.7	LOS F	7.2	54.8	0.99	0.78	0.99	24.1
Approach			1083	2.9	1083	2.9	0.597	52.2	LOS D	19.9	141.4	0.90	0.78	0.90	24.5
West: Griffiths Road															
10	L2	All MCs	123	5.1	123	5.1	0.121	14.7	LOS B	2.4	17.8	0.38	0.65	0.38	45.4
11	T1	All MCs	1368	1.8	1368	1.8	* 0.642	36.3	LOS C	24.0	170.6	0.88	0.78	0.88	40.0
12	R2	All MCs	406	5.4	406	5.4	0.518	53.6	LOS D	11.5	84.1	0.93	0.81	0.93	29.3
Approach			1898	2.8	1898	2.8	0.642	38.6	LOS C	24.0	170.6	0.86	0.78	0.86	37.5
All Vehicles			6045	2.6	6045	2.6	1.301	110.7	LOS F	69.0	493.6	0.84	1.04	1.22	19.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Turton Road												
P1	Full	1	1	59.6	LOS E	0.0	0.0	0.95	0.95	226.3	200.0	0.88
East: Griffiths Road												

P2	Full	7	7	59.7	LOS E	0.0	0.0	0.95	0.95	226.3	200.0	0.88
North: Turton Road												
P3	Full	1	1	59.6	LOS E	0.0	0.0	0.95	0.95	226.3	200.0	0.88
West: Griffiths Road												
P4	Full	4	4	59.6	LOS E	0.0	0.0	0.95	0.95	226.3	200.0	0.88
All Pedestrians		13	14	59.7	LOS E	0.0	0.0	0.95	0.95	226.3	200.0	0.88

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: 102 [Turton Road / Young Road - TCS 3322 (Site Folder: 2024 Project PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

1645 - 1745
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 137 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
1	L2	All MCs	139	9.8	139	9.8	0.138	10.3	LOS A	3.1	23.3	0.32	0.60	0.32	33.0
2	T1	All MCs	1669	2.3	1669	2.3	* 0.622	1.8	LOS A	8.5	60.9	0.17	0.16	0.17	55.5
Approach			1808	2.9	1808	2.9	0.622	2.5	LOS A	8.5	60.9	0.18	0.20	0.18	53.3
North: Turton Road															
8	T1	All MCs	1448	3.2	1448	3.2	0.380	14.7	LOS B	20.5	147.3	0.64	0.29	0.64	42.1
9	R2	All MCs	149	2.8	149	2.8	* 0.756	51.4	LOS D	11.4	81.8	1.00	1.02	1.16	24.7
Approach			1598	3.2	1598	3.2	0.756	18.2	LOS B	20.5	147.3	0.67	0.36	0.69	33.7
West: Young Road															
10	L2	All MCs	138	3.1	138	3.1	0.237	70.8	LOS F	7.4	53.5	0.86	0.77	0.86	22.6
12	R2	All MCs	259	3.3	259	3.3	* 0.921	100.3	LOS F	19.7	141.6	1.00	1.02	1.31	10.3
Approach			397	3.2	397	3.2	0.921	90.0	LOS F	19.7	141.6	0.95	0.93	1.16	12.0
All Vehicles			3803	3.0	3803	3.0	0.921	18.2	LOS B	20.5	147.3	0.47	0.34	0.50	33.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Turton Road												
P1	Full	20	21	62.7	LOS F	0.1	0.1	0.96	0.96	229.4	200.0	0.87
North: Turton Road												
P3	Full	16	17	62.7	LOS F	0.1	0.1	0.96	0.96	229.3	200.0	0.87
West: Young Road												
P4	Full	7	7	62.7	LOS F	0.0	0.0	0.96	0.96	229.3	200.0	0.87
All Pedestrians		43	45	62.7	LOS F	0.1	0.1	0.96	0.96	229.3	200.0	0.87

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: 103 [Turton Road / McDonald Jones Stadium Southern Access (Site Folder: 2024 Project PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

1645 - 1745
Site Category: Base Year
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
2	T1	All MCs	1792	2.8	1792	2.8	0.785	30.8	LOS C	45.5	326.3	0.18	0.17	0.67	12.5
3	R2	All MCs	99	2.1	99	2.1	1.440	482.4	LOS F	22.0	157.0	1.00	2.39	7.17	0.9
Approach			1891	2.8	1891	2.8	1.440	54.5	NA	45.5	326.3	0.22	0.29	1.01	7.7
East: McDonald Jones Stadium Southern Access															
4	L2	All MCs	33	3.2	33	3.2	1.047	86.2	LOS F	3.1	22.2	1.00	1.52	1.70	4.3
6	R2	All MCs	4	0.0	4	0.0	1.047	51.2	LOS D	3.1	22.2	1.00	1.52	1.70	3.7
Approach			37	2.9	37	2.9	1.047	82.2	LOS F	3.1	22.2	1.00	1.52	1.70	4.3
North: Turton Road															
7	L2	All MCs	19	5.6	19	5.6	0.307	4.0	LOS A	0.0	0.0	0.00	0.02	0.00	29.0
8	T1	All MCs	1696	3.2	1696	3.2	0.307	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.5
Approach			1715	3.2	1715	3.2	0.307	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.0
All Vehicles			3642	3.0	3642	3.0	1.440	29.1	NA	45.5	326.3	0.13	0.17	0.54	12.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 104 [Turton Road / Monash Road / Newcastle International Hockey Centre Northern Exit (Site Folder: 2024 Project PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

1645 - 1745
Site Category: Base Year
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
1	L2	All MCs	19	0.0	19	0.0	0.467	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	56.4
2	T1	All MCs	1723	2.9	1723	2.9	0.467	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.5
Approach			1742	2.8	1742	2.8	0.467	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.4
East: Newcastle International Hockey Centre Northern Exit															
4	L2	All MCs	1	0.0	1	0.0	1.000	2152.3	LOS F	3.7	26.0	1.00	1.00	1.00	1.8
5	T1	All MCs	1	0.0	1	0.0	1.000	39.4	LOS C	3.7	26.0	1.00	1.00	1.00	2.4
6	R2	All MCs	1	0.0	1	0.0	1.000	39.4	LOS C	3.7	26.0	1.00	1.00	1.00	0.5
Approach			3	0.0	3	0.0	1.000	743.7	LOS F	3.7	26.0	1.00	1.00	1.00	1.6
North: Turton Road															
8	T1	All MCs	1693	4.0	1693	4.0	0.304	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
9	R2	All MCs	49	0.0	49	0.0	0.486	53.4	LOS D	1.6	11.2	0.96	1.04	1.20	20.5
Approach			1742	3.9	1742	3.9	0.486	1.5	NA	1.6	11.2	0.03	0.03	0.03	55.7
West: Monash Road															
10	L2	All MCs	167	1.3	167	1.3	1.794	734.5	LOS F	50.9	359.6	1.00	5.19	14.26	2.4
12	R2	All MCs	8	0.0	8	0.0	1.794	720.8	LOS F	50.9	359.6	1.00	5.19	14.26	3.6
Approach			176	1.2	176	1.2	1.794	733.8	LOS F	50.9	359.6	1.00	5.19	14.26	2.5
All Vehicles			3663	3.3	3663	3.3	1.794	36.7	NA	50.9	359.6	0.06	0.27	0.70	23.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 105 [Turton Road / Lambton Road / Bridges Road - TCS 350 (Site Folder: 2024 Project PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

1645 - 1745
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 123 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lambton Road															
4a	L1	All MCs	303	4.2	303	4.2	0.310	10.1	LOS A	6.6	48.0	0.44	0.67	0.44	49.7
5	T1	All MCs	624	2.2	624	2.2	0.281	29.0	LOS C	12.9	92.3	0.75	0.63	0.75	42.5
6b	R3	All MCs	203	4.7	203	4.7	* 0.464	37.1	LOS C	8.6	62.5	0.86	0.79	0.86	33.3
Approach			1131	3.2	1131	3.2	0.464	25.4	LOS B	12.9	92.3	0.69	0.67	0.69	42.4
NorthEast: Turton Road															
24b	L3	All MCs	598	0.5	598	0.5	0.369	9.0	LOS A	0.0	0.0	0.00	0.58	0.00	50.9
25	T1	All MCs	931	2.7	931	2.7	0.725	18.4	LOS B	17.6	126.4	0.64	0.56	0.64	45.6
26a	R1	All MCs	140	3.0	140	3.0	0.734	67.8	LOS E	8.5	61.4	1.00	0.85	1.09	29.6
Approach			1668	2.0	1668	2.0	0.734	19.2	LOS B	17.6	126.4	0.44	0.59	0.45	43.7
West: Lambton Road															
10a	L1	All MCs	222	7.1	222	7.1	0.286	20.9	LOS B	6.9	51.5	0.62	0.71	0.62	43.6
11	T1	All MCs	674	3.8	674	3.8	* 0.439	33.3	LOS C	14.3	102.3	0.76	0.63	0.76	40.7
Approach			897	4.6	897	4.6	0.439	30.3	LOS C	14.3	102.3	0.73	0.65	0.73	41.3
SouthWest: Bridges Road															
30b	L3	All MCs	20	0.0	20	0.0	1.336	319.4	LOS F	95.0	674.6	1.00	1.81	2.90	10.6
31	T1	All MCs	1313	1.7	1313	1.7	* 1.336	348.7	LOS F	106.5	755.9	1.00	2.15	2.90	7.8
32a	R1	All MCs	616	0.3	616	0.3	* 1.792	809.1	LOS F	66.6	467.3	1.00	2.45	4.27	4.3
Approach			1948	1.2	1948	1.2	1.792	493.9	LOS F	106.5	755.9	1.00	2.24	3.33	5.8
All Vehicles			5644	2.4	5644	2.4	1.792	186.1	LOS F	106.5	755.9	0.73	1.19	1.53	14.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Lambton Road												
P2	Full	27	28	55.7	LOS E	0.1	0.1	0.95	0.95	222.4	200.0	0.90
NorthEast: Turton Road												
P6	Full	14	15	55.7	LOS E	0.0	0.0	0.95	0.95	222.3	200.0	0.90

SouthWest: Bridges Road											
P8 Full	5	5	55.7	LOS E	0.0	0.0	0.95	0.95	222.3	200.0	0.90
All Pedestrians	46	48	55.7	LOS E	0.1	0.1	0.95	0.95	222.4	200.0	0.90

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 [Turton Road / Griffiths Road - TCS 201 (Site Folder: 2024 Project Weekend Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

1115 - 1215
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
1	L2	All MCs	466	1.1	466	1.1	0.416	11.8	LOS A	8.9	62.6	0.44	0.69	0.44	48.1
2	T1	All MCs	513	1.0	513	1.0	0.553	43.1	LOS D	13.2	93.4	0.93	0.78	0.93	25.9
3	R2	All MCs	281	0.7	281	0.7	* 0.843	71.9	LOS F	9.1	63.9	1.00	0.96	1.28	26.1
Approach			1260	1.0	1260	1.0	0.843	37.9	LOS C	13.2	93.4	0.76	0.79	0.83	32.4
East: Griffiths Road															
4	L2	All MCs	339	0.3	339	0.3	0.293	15.5	LOS B	8.1	57.0	0.46	0.69	0.46	46.7
5	T1	All MCs	793	0.7	793	0.7	* 0.730	47.8	LOS D	17.3	121.5	0.97	0.84	1.00	35.8
6	R2	All MCs	87	2.4	87	2.4	* 0.709	69.8	LOS E	5.4	38.8	1.00	0.85	1.14	24.5
Approach			1219	0.7	1219	0.7	0.730	40.4	LOS C	17.3	121.5	0.83	0.80	0.86	37.0
North: Turton Road															
7	L2	All MCs	86	0.0	86	0.0	0.102	12.0	LOS A	1.7	12.0	0.37	0.65	0.37	46.4
8	T1	All MCs	708	0.6	708	0.6	* 0.619	45.1	LOS D	15.1	106.3	0.93	0.78	0.93	25.9
9	R2	All MCs	98	5.4	98	5.4	0.615	69.3	LOS E	5.8	42.7	1.00	0.81	1.04	24.3
Approach			893	1.1	893	1.1	0.619	44.6	LOS D	15.1	106.3	0.88	0.77	0.89	26.7
West: Griffiths Road															
10	L2	All MCs	107	2.0	107	2.0	0.092	8.3	LOS A	1.3	8.9	0.28	0.62	0.28	48.5
11	T1	All MCs	986	0.5	986	0.5	0.462	30.3	LOS C	14.5	102.1	0.81	0.70	0.81	42.0
12	R2	All MCs	468	1.1	468	1.1	0.581	50.8	LOS D	12.4	87.6	0.95	0.82	0.95	30.2
Approach			1562	0.8	1562	0.8	0.581	34.9	LOS C	14.5	102.1	0.81	0.73	0.81	38.5
All Vehicles			4934	0.9	4934	0.9	0.843	38.8	LOS C	17.3	121.5	0.82	0.77	0.84	34.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Turton Road												
P1	Full	1	1	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91
East: Griffiths Road												

P2	Full	9	9	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91
North: Turton Road												
P3	Full	1	1	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91
West: Griffiths Road												
P4	Full	1	1	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91
All Pedestrians		12	13	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91

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: 102 [Turton Road / Young Road - TCS 3322 (Site Folder: 2024 Project Weekend Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

1115 - 1215
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
1	L2	All MCs	63	0.0	63	0.0	0.087	9.5	LOS A	1.9	13.2	0.29	0.45	0.29	36.9
2	T1	All MCs	1145	0.9	1145	0.9	* 0.392	6.5	LOS A	11.7	82.4	0.39	0.36	0.39	47.6
Approach			1208	0.9	1208	0.9	0.392	6.6	LOS A	11.7	82.4	0.38	0.36	0.38	46.1
North: Turton Road															
8	T1	All MCs	1397	0.7	1397	0.7	0.339	8.5	LOS A	16.8	118.6	0.62	0.26	0.62	44.9
9	R2	All MCs	106	3.0	106	3.0	* 0.386	16.9	LOS B	2.6	18.3	0.49	0.70	0.49	39.1
Approach			1503	0.8	1503	0.8	0.386	9.1	LOS A	16.8	118.6	0.61	0.30	0.61	42.9
West: Young Road															
10	L2	All MCs	89	1.2	89	1.2	0.319	55.7	LOS D	4.8	33.7	0.94	0.77	0.94	21.7
12	R2	All MCs	116	2.7	116	2.7	* 0.453	56.7	LOS E	6.4	45.7	0.96	0.79	0.96	13.6
Approach			205	2.1	205	2.1	0.453	56.3	LOS D	6.4	45.7	0.95	0.78	0.95	17.4
All Vehicles			2917	0.9	2917	0.9	0.453	11.4	LOS A	16.8	118.6	0.54	0.36	0.54	39.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Turton Road												
P1	Full	8	8	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91
North: Turton Road												
P3	Full	15	16	54.2	LOS E	0.1	0.1	0.95	0.95	220.9	200.0	0.91
West: Young Road												
P4	Full	1	1	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91
All Pedestrians		24	25	54.2	LOS E	0.1	0.1	0.95	0.95	220.8	200.0	0.91

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: 103 [Turton Road / McDonald Jones Stadium Southern Access (Site Folder: 2024 Project Weekend Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

1115 - 1215
Site Category: Base Year
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
2	T1	All MCs	1157	0.7	1157	0.7	0.304	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	All MCs	48	2.2	48	2.2	0.468	49.1	LOS D	1.5	10.4	0.94	1.04	1.20	7.3
Approach			1205	0.8	1205	0.8	0.468	2.0	NA	1.5	10.4	0.04	0.04	0.05	47.4
East: McDonald Jones Stadium Southern Access															
4	L2	All MCs	41	5.1	41	5.1	1.283	272.0	LOS F	9.0	65.7	1.00	3.17	3.71	1.4
6	R2	All MCs	7	0.0	7	0.0	1.283	421.4	LOS F	9.0	65.7	1.00	3.17	3.71	1.2
Approach			48	4.3	48	4.3	1.283	294.7	LOS F	9.0	65.7	1.00	3.17	3.71	1.3
North: Turton Road															
7	L2	All MCs	17	0.0	17	0.0	0.269	4.0	LOS A	0.0	0.0	0.00	0.02	0.00	29.1
8	T1	All MCs	1520	0.8	1520	0.8	0.269	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.5
Approach			1537	0.8	1537	0.8	0.269	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.0
All Vehicles			2791	0.8	2791	0.8	1.283	6.0	NA	9.0	65.7	0.03	0.08	0.09	33.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 104 [Turton Road / Monash Road / Newcastle International Hockey Centre Northern Exit (Site Folder: 2024 Project Weekend Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

1115 - 1215
Site Category: Base Year
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Turton Road															
1	L2	All MCs	12	0.0	12	0.0	0.318	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	56.6
2	T1	All MCs	1198	0.9	1198	0.9	0.318	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.7
Approach			1209	0.9	1209	0.9	0.318	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.6
East: Newcastle International Hockey Centre Northern Exit															
4	L2	All MCs	1	0.0	1	0.0	1.000	318.2	LOS F	4.2	29.2	1.00	1.01	1.01	1.5
5	T1	All MCs	1	0.0	1	0.0	1.000	1981.7	LOS F	4.2	29.2	1.00	1.01	1.01	2.0
6	R2	All MCs	1	0.0	1	0.0	1.000	433.7	LOS F	4.2	29.2	1.00	1.01	1.01	0.4
Approach			3	0.0	3	0.0	1.000	911.2	LOS F	4.2	29.2	1.00	1.01	1.01	1.3
North: Turton Road															
8	T1	All MCs	1497	1.0	1497	1.0	0.261	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	All MCs	37	0.0	37	0.0	0.117	15.0	LOS B	0.4	2.7	0.80	0.91	0.80	35.0
Approach			1534	1.0	1534	1.0	0.261	0.4	NA	0.4	2.7	0.02	0.02	0.02	58.5
West: Monash Road															
10	L2	All MCs	82	1.3	82	1.3	1.122	136.7	LOS F	8.4	59.4	1.00	1.95	3.55	10.0
12	R2	All MCs	2	0.0	2	0.0	1.122	166.0	LOS F	8.4	59.4	1.00	1.95	3.55	14.9
Approach			84	1.3	84	1.3	1.122	137.4	LOS F	8.4	59.4	1.00	1.95	3.55	10.1
All Vehicles			2831	0.9	2831	0.9	1.122	5.4	NA	8.4	59.4	0.04	0.07	0.12	47.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 105 [Turton Road / Lambton Road / Bridges Road - TCS 350 (Site Folder: 2024 Project Weekend Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

1115 - 1215
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lambton Road															
4a	L1	All MCs	287	2.2	287	2.2	0.313	11.8	LOS A	7.3	51.8	0.50	0.69	0.50	48.6
5	T1	All MCs	412	1.0	412	1.0	0.322	31.9	LOS C	8.9	63.1	0.79	0.66	0.79	41.3
6b	R3	All MCs	221	0.5	221	0.5	*0.635	42.3	LOS C	10.6	74.2	0.92	0.81	0.92	31.5
Approach			920	1.3	920	1.3	0.635	28.1	LOS B	10.6	74.2	0.73	0.71	0.73	40.7
NorthEast: Turton Road															
24b	L3	All MCs	332	0.3	332	0.3	0.194	7.7	LOS A	0.0	0.0	0.00	0.58	0.00	51.0
25	T1	All MCs	1093	0.4	1093	0.4	0.725	23.3	LOS B	22.3	156.6	0.71	0.63	0.71	43.8
26a	R1	All MCs	119	0.0	119	0.0	0.608	71.8	LOS F	7.0	48.7	1.00	0.80	1.02	29.8
Approach			1543	0.3	1543	0.3	0.725	23.7	LOS B	22.3	156.6	0.58	0.63	0.58	40.9
West: Lambton Road															
10a	L1	All MCs	128	0.8	128	0.8	0.161	14.1	LOS A	3.1	21.7	0.48	0.66	0.48	47.5
11	T1	All MCs	407	1.6	407	1.6	*0.348	44.9	LOS D	10.2	72.2	0.91	0.74	0.91	36.7
Approach			536	1.4	536	1.4	0.348	37.5	LOS C	10.2	72.2	0.81	0.72	0.81	38.6
SouthWest: Bridges Road															
30b	L3	All MCs	40	0.0	40	0.0	0.748	9.4	LOS A	14.6	102.6	0.68	0.67	0.69	47.0
31	T1	All MCs	867	0.8	867	0.8	*0.748	23.0	LOS B	19.6	138.0	0.70	0.65	0.70	44.0
32a	R1	All MCs	308	0.7	308	0.7	*0.846	74.3	LOS F	9.9	69.8	1.00	0.97	1.28	27.5
Approach			1216	0.8	1216	0.8	0.846	35.6	LOS C	19.6	138.0	0.77	0.73	0.85	35.9
All Vehicles			4215	0.8	4215	0.8	0.846	29.8	LOS C	22.3	156.6	0.70	0.69	0.72	39.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Lambton Road												
P2	Full	38	40	54.2	LOS E	0.1	0.1	0.95	0.95	220.9	200.0	0.91
NorthEast: Turton Road												
P6	Full	16	17	54.2	LOS E	0.1	0.1	0.95	0.95	220.9	200.0	0.91

SouthWest: Bridges Road											
P8 Full	7	7	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91
All Pedestrians	61	64	54.2	LOS E	0.1	0.1	0.95	0.95	220.9	200.0	0.91

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.

Attachment D: SIDRA Model Validation

Approach	Turn/s	Observed (veh)	Observed (m)	Acceptable Queue Range (m)	Modelled (m)	Within Acceptable Range?	Difference if Outside Acceptable Range (m)
AM Peak							
Turton Road / Griffiths Road							
Turton Road (N)	T	15	90	70-110	87	Yes	-
	R	NA	NA	NA	47	NA	-
Griffiths Road (E)	T	16	96	76-116	115	Yes	-
	R	7	42	27-57	27	Yes	-
Turton Road (S)	T	NA	NA	NA	156	NA	-
	R	11	66	46-86	85	Yes	-
Griffiths Road (W)	T	21	126	101-151	138	Yes	-
	R	13	78	58-98	66	Yes	-
Turton Road / Young Road							
Turton Road (N)	T	8	48	33-63	45	Yes	-
	R	3	18	8-28	15	Yes	-
Turton Road (S)	L/T	11	66	46-86	85	Yes	-
Young Road (W)	L	NA	NA	NA	26	NA	-
	R	NA	NA	NA	77	NA	-
Turton Road / Lambton Road / Bridges Road							
Turton Road (N)	T	21	126	101-151	137	Yes	-
	R	8	48	33-63	63	Yes	-
Lambton Road (E)	T	11	66	46-86	91	No	5
	R	NA	NA	NA	362	NA	-
Bridges Road (S)	T	NA	NA	NA	199	NA	-
	R	NA	NA	NA	55	NA	-
Lambton Road (W)	T	NA	NA	NA	135	NA	-
PM Peak							
Turton Road / Griffiths Road							
Turton Road (N)	T	21	126	101-151	136	Yes	-
	R	NA	NA	NA	199	NA	-
Griffiths Road (E)	T	19	114	89-139	115	Yes	-
	R	4	24	9-39	45	No	6
Turton Road (S)	T	NA	NA	NA	435	NA	-
	R	22	132	107-157	149	Yes	-
Griffiths Road (W)	T	23	138	113-163	171	No	8
	R	18	108	83-133	82	No	1
Turton Road / Young Road							
Turton Road (N)	T	20	120	95-145	160	No	15
	R	3	18	8-28	23	Yes	-
Turton Road (S)	L/T	11	66	46-86	45.70	No	0
Young Road (W)	L	NA	NA	NA	54	NA	-
	R	NA	NA	NA	142	NA	-

Table 28: Queue definition parameters

Observed Queue Range (m)	Acceptable Validation Error (m)	Example Observed Queue (m)	Demonstration Range (m)
1-20	10	15	5-25
21-50	15	45	30-60
51-100m	20	95	75-115
101-151m	25	145	120-170
151-200m	30	195	165-225
201-250m	35	245	210-280
251-500m	100	495	395-595
501-1000m	150	990	840-1140
1000m+	200	1240	1040-1440

Table 28: Queue definition parameters

Observed Queue Range (m)	Acceptable Validation Error (m)	Example Observed Queue (m)	Demonstration Range (m)
1-20	10	15	5-25
21-50	15	45	30-60
51-100m	20	95	75-115
101-151m	25	145	120-170
151-200m	30	195	165-225
201-250m	35	245	210-280
251-500m	100	495	395-595

Turton Road / Lambton Road / Bridges Road							
Turton Road (N)	T	25	150	125-175	126	Yes	-
	R	8	48	33-63	61	Yes	-
Lambton Road (E)	T	10	60	40-80	92	No	12
	R	NA	NA	NA	49	NA	-
Bridges Road (S)	T	NA	NA	NA	683	NA	-
	R	NA	NA	NA	467	NA	-
Lambton Road (W)	T	NA	NA	NA	102	NA	-
Weekend Peak							
Turton Road / Griffiths Road							
Turton Road (N)	T	14	84	64-104	104	Yes	-
	R	NA	NA	NA	43	NA	-
Griffiths Road (E)	T	19	114	89-139	122	Yes	-
	R	5	30	15-45	39	Yes	-
Turton Road (S)	T	NA	NA	NA	90	NA	-
	R	6	36	21-51	50	Yes	-
Griffiths Road (W)	T	18	108	83-133	102	Yes	-
	R	15	90	70-110	87	Yes	-
Turton Road / Young Road							
Turton Road (N)	T	21	126	101-151	114	Yes	-
	R	2	12	2-22	11	Yes	-
Turton Road (S)	L/T	12	72	52-92	70	Yes	-
Young Road (W)	L	NA	NA	NA	34	NA	-
	R	NA	NA	NA	46	NA	-
Turton Road / Lambton Road / Bridges Road							
Turton Road (N)	T	23	138	113-163	157	Yes	-
	R	7	42	27-57	49	Yes	-
Lambton Road (E)	T	9	54	34-74	63	Yes	-
	R	10	60	40-80	65	Yes	-
Bridges Road (S)	T	NA	NA	NA	130	NA	-
	R	NA	NA	NA	70	NA	-
Lambton Road (W)	T	8	48	33-63	72	No	9

501-1000m	150	990	840-1140
1000m+	200	1240	1040-1440

Table 28: Queue definition parameters

Observed Queue Range (m)	*Acceptable Validation Error (m)*	*Example Observed Queue (m)*	*Demonstration Range (m)*
1-20	10	15	5-25
21-50	15	45	30-60
51-100m	20	95	75-115
101-151m	25	145	120-170
151-200m	30	195	165-225
201-250m	35	245	210-280
251-500m	100	495	395-595
501-1000m	150	990	840-1140
1000m+	200	1240	1040-1440

Attachment E: SIDRA Model Intersection Performance

	2024 Base					2024 Project					
Intersection	Traffic Volume (veh/h)	DoS (v/c)	Average Delay (s)	LoS	95th Percentile Queue (m)	Traffic Volume (veh/h)	DoS (v/c)	Average Delay (s)	LoS	95th Percentile Queue (m)	Average Delay Difference
AM Peak											**Project - Base**
Turton Road / Griffiths Road	4,869	0.94	39.8	LOS C	156	4,897	0.97	40.4	LOS C	157	0.6
Turton Road / Young Road	2,697	0.59	10.7	LOS A	85	2,726	0.59	10.7	LOS A	87	0.0
Turton Road / McDonald's Jones Stadium	2,675	1.79	896.8	LOS F	103	2,719	1.79	888.0	LOS F	103	-8.8
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit	2,676	1.07	1,885.7	LOS F	31	2,720	1.10	1,966.5	LOS F	40	80.8
Turton Road / Lambton Road / Bridges Road	4,234	1.70	72.0	LOS F	362	4,269	1.76	76.1	LOS F	385	4.1
PM Peak											
Turton Road / Griffiths Road	5,771	1.22	86.1	LOS F	435	6,045	1.30	110.7	LOS F	494	24.6
Turton Road / Young Road	3,528	0.92	16.2	LOS B	160	3,803	0.92	18.2	LOS B	147	2.0
Turton Road / McDonald's Jones Stadium	3,429	1.44	482.4	LOS F	209	3,642	1.44	482.4	LOS F	326	0.0
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit	3,451	1.63	2,201.8	LOS F	220	3,663	1.79	2,152.3	LOS F	360	-49.5
Turton Road / Lambton Road / Bridges Road	5,488	1.79	178.1	LOS F	683	5,644	1.79	186.1	LOS F	756	8.0
Weekend Peak											
Turton Road / Griffiths Road	4,780	0.73	38.4	LOS C	17	4,934	0.84	38.8	LOS C	122	0.4
Turton Road / Young Road	2,763	0.45	11.3	LOS A	16	2,917	0.45	11.4	LOS A	119	0.1
Turton Road / McDonald's Jones Stadium	2,664	1.28	454.2	LOS F	9	2,791	1.28	421.4	LOS F	66	-32.8
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit	2,704	1.07	1,597.0	LOS F	5	2,831	1.12	1,981.7	LOS F	59	384.7
Turton Road / Lambton Road / Bridges Road	4,123	0.85	29.6	LOS C	22	4,215	0.85	29.8	LOS C	157	0.2