Issue History

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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
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Newcastle Indoor Sports Facility

SIDRA Intersection Modelling Technical Note

1. Introduction

1.1 Background

The Basketball Association of Newcastle Limited has engaged Bitzios Consulting 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. The subject intersections were modelled in SIDRA 9.1 Plus to understand these impacts. 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.

Notably, both the 'Project Case' and 'Project Case with Upgrades' account for zero growth for the 10-year horizon/future year scenarios, 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 according to Report P2614 Newcastle Indoor Sports Centre Traffic Generation and Assignment by SECAsolution for Weekdays and Weekends.*

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.

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

Bitzios Consulting commissioned TDC to undertake the Intersection Counts Survey for all modelled intersections. 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:

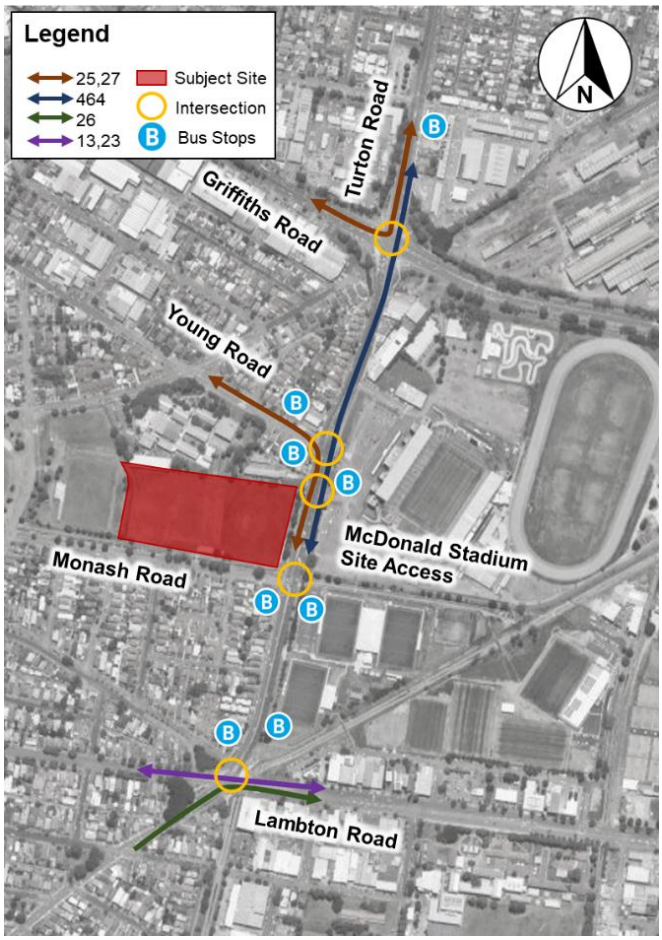
- Buses were treated as Heavy Vehicles, so the volumes for Heavy Vehicles included the identified Buses for all scenarios. An exception applies to Turton Road / Lambton Road. Due to having a bus queue jump lane at the intersection, buses were exclusively classified in terms of volume and vehicle class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

The classified bus movement for Weekday AM, PM and Weekend peaks 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 are shown in Figure 3.2.

Adapted from SIX Maps

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

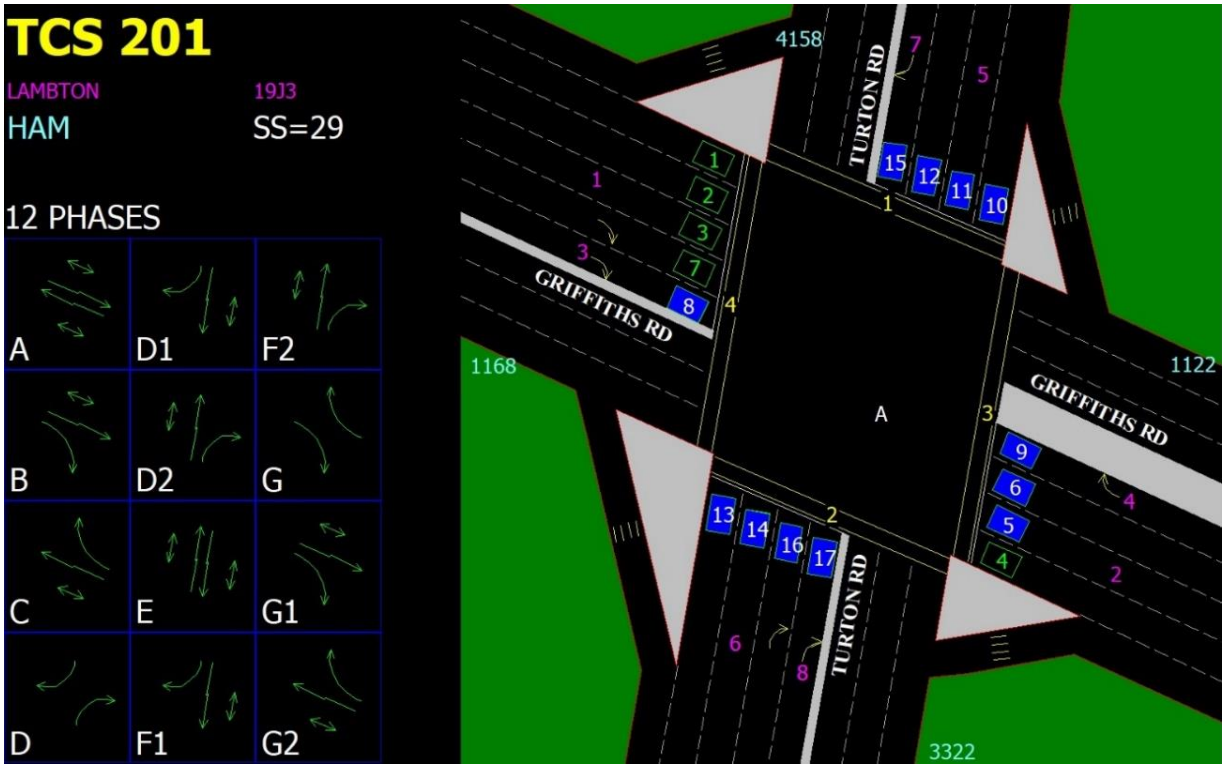
3.4 SCATS Data

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, the 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 abovementioned intersections are shown in **Error! Reference source not found.**, Figure 3.4 and Figure 3.5 respectively.

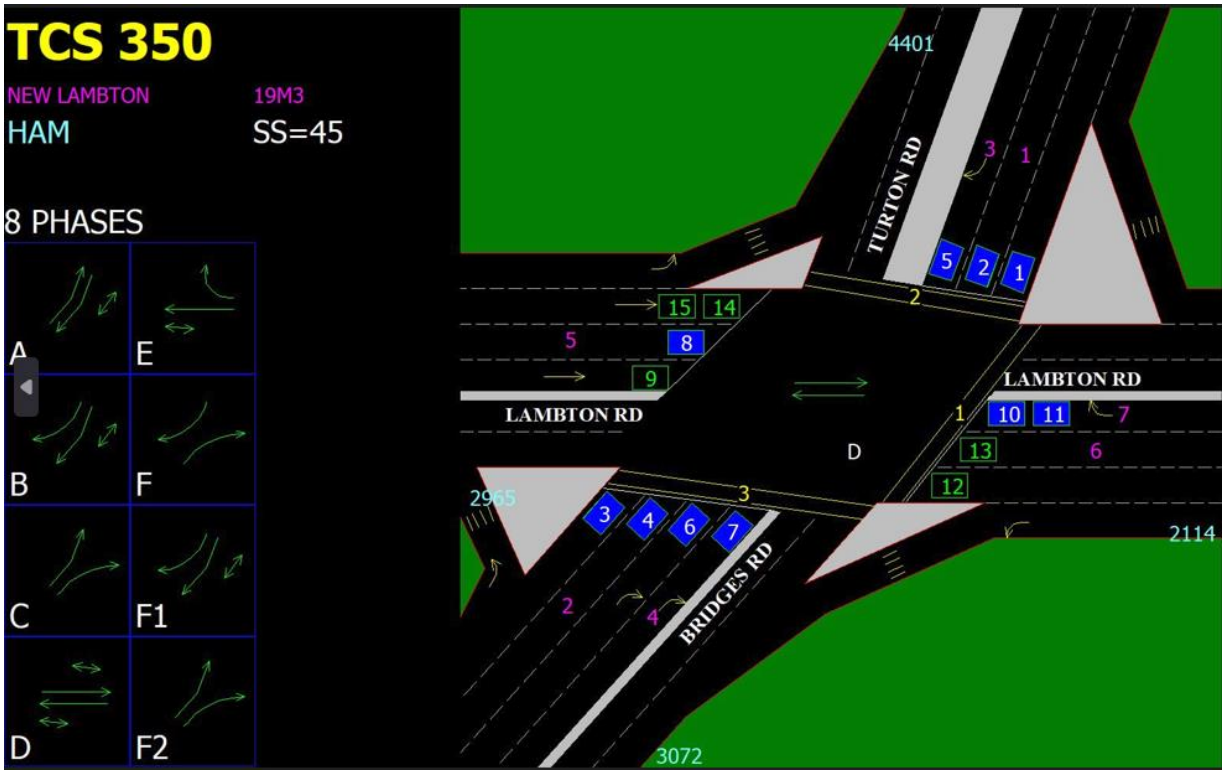


Adapted from TfNSW

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 on Thursday, 4th April and Friday, 6th April, for each approach. Due to limitations in 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	Turn	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	91	1	126	175	49
	R	NA	47	NA	NA	61	NA
Griffiths Road (E)	T	96	113	17	114	123	9
	R	42	27	-15	24	57	33
Turton Road (S)	T	NA	97	NA	NA	291	NA
	R	66	75	9	132	111	-21
Griffiths Road (W)	T	126	149	23	138	164	33
	R	78	65	-13	108	85	-23
Turton Road / Young Road							
Turton Road (N)	T	48	22	-26	120	24	-96
	R	18	5	-13	18	42	24
Turton Road (S)	L/T	66	63	-3	66	82	16
Young Road (W)	L	NA	23	NA	NA	51	NA
	R	NA	78	NA	NA	177	NA
Turton Road / Lambton Road / Bridges Road							
Turton Road (N)	T	126	136	10	150	182	32
	R	48	57	9	48	54	6
Lambton Road (E)	T	66	81	15	60	104	44
	R	NA	115	NA	NA	56	NA
Bridges Road (S)	T	NA	254	NA	NA	411	NA
	R	NA	44	NA	NA	206	NA
Lambton Road (W)	T	NA	151	NA	NA	205	NA

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

Table 3.3: Weekend Peak Comparison of Back of Queue Lengths

Approach	Turn	Weekend Peak		
		Observed (veh)	Modelled (veh)	Difference (veh)
Turton Road / Bridges Road				
Turton Road (N)	T	84	113	29
	R	NA	43	NA
Griffiths Road (E)	T	114	117	3
	R	30	39	9
Turton Road (S)	T	NA	54	NA
	R	36	50	14
Griffiths Road (W)	T	108	97	-11
	R	90	85	-5
Turton Road / Young Road				
Turton Road (N)	T	126	28	-98
	R	12	3	-9
Turton Road (S)	L/T	72	82	10
Young Road (W)	L	NA	28	NA
	R	NA	46	NA
Turton Road / Lambton Road / Bridges Road				
Turton Road (N)	T	138	151	13
	R	42	50	8
Lambton Road (E)	T	54	61	7
	R	NA	62	NA
Bridges Road (S)	T	NA	159	NA
	R	NA	62	NA
Lambton Road (W)	T	NA	79	NA

In some scenarios, the modelled queue lengths or their differences (highlighted in red or marked as NA) did not meet the acceptable queue range. The following section investigates these 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
- **PM Peak:** Queues for this peak may not be validated due to the Degree of Saturation constraints, as if these are not met, modelled flows do not match those observed.

Turton Road / Young Road

- **Young Road West:** The queues could not be verified due to camera setup angle camera set-up.
- **Tuton Road North:** This queue discrepancy during all peaks may be attributed to the unmodelled midblock traffic signals (TCS 4401) to the south of this intersection.

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.

Priority Intersections:

- DoS and delays on sideroads are unrealistic as drivers are likely to become impatient or merging cooperation occurs. Gap acceptance or other variables may be modified to simulate these effects; however, these are minor accesses with negligible impacts on network performance. Relevant variables have thus been left as default.
- **McDonald Stadium Site Access:** Right turners in the model cannot find acceptable gaps to turn out onto Turton Road. As this is a one-lane approach, this right-turn movement blocks all left-turners. Flows are too high during the A phase of the Turton Road / Young Road intersection. During the interphases between phases B to C and C to A, there is an acceptable merge gap; however, the northbound queue has no space to merge into. In reality, a one-vehicle storage space exists in the median, allowing the right-turner to exit. This may be modelled as a short exit lane in SIDRA. However, no road markings indicate its existence, and thus, we have opted not to include it. DoS and other performance issues are expected due to the limitations of the model.
- **Monash Road:** A "Keep Clear" area is marked at this intersection, allowing vehicles to readily turn in and out of Monash Road during the pedestrian phase of the unmodelled midblock crossing. This "Keep Clear" area cannot be modelled without signalising the Monash Road / Turton Road intersection and modelling the midblock crossing. Due to the complex and inaccurate nature of this method and the fact that Monash Road is a minor road with no implications to network performance, this modelling approach has not been taken.
- **Newcastle Hockey Centre Northern Exit:** No vehicles have been recorded to exit this carpark during the survey. Volumes here are the minimum SIDRA requires to run. For scenarios where vehicles will exit this intersection, the pedestrian phase of the unmodelled midblock crossing and the "Keep Clear" area will allow vehicles to exit this approach readily. For similar reasoning to the model issue at Monash Road, these have not been addressed.

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

Intersection	Weekday: AM Peak			
	DoS	Delay (s)	LoS	95% Queue (m)
Turton Road / Griffiths Road	0.853	35.4	LOS C	148.9
Turton Road / Young Road	0.581	7.3	LOS A	78.4
Turton Road / McDonald Stadium Site Access	1.791	766.2	LOS F	102.9
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit[1]	1.065	263.4	LOS F	32.1
Turton Road / Lambton Road / Bridges Road	0.931	44.9	LOS D	253.7

[1]*Though the Newcastle International Hockey Centre Northern Exit shows worse performance, volumes here are minimal (1 vehicle). The next worst movement has instead been used.*

Table 3.5: Base Case Weekday PM Intersection Performance

Intersection	Weekday: PM Peak			
	DoS	Delay (s)	LoS	95% Queue (m)
Turton Road / Griffiths Road	1.035	61.9	LOS E	291.3
Turton Road / Young Road	1.036	27.4	LOS B	177.3
Turton Road / McDonald Stadium Site Access	1.111	211.5	LOS F	75.3
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit[1]	3.077	1893.1	LOS F	363.8
Turton Road / Lambton Road / Bridges Road	1.048	69.2	LOS E	57.8

[1]Though the Newcastle International Hockey Centre Northern Exit shows worse performance, volumes here are minimal (1 vehicle). The next worst movement has instead been used.

Table 3.6: Base Case Weekend Intersection Performance

Intersection	Weekend Peak			
	DoS	Delay (s)	LoS	95% Queue (m)
Turton Road / Griffiths Road	0.709	36.2	LOS C	116.7
Turton Road / Young Road	0.453	12.8	LOS A	81.6
Turton Road / McDonald Stadium Site Access	1.477	638.7	LOS F	86.4
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit[1]	1.062	424.6	LOS F	32.8
Turton Road / Lambton Road / Bridges Road	0.724	32.7	LOS C	159.1

[1]Though the Newcastle International Hockey Centre Northern Exit shows worse performance; volumes here are minimal (1 vehicle). The next worst movement has instead been used.

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 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 north along Turton Road and then turn left to access the site entrance.

Traffic travelling from the west can access the site from Monash Road or Lambton Road.

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 to 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 was distributed as per 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 utilised to form the final volumes of the 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

Intersection	Weekday: AM Peak			
	DoS	Delay (s)	LoS	95% Queue (m)
Turton Road / Griffiths Road	0.872	35.7	LOS C	148.9
Turton Road / Young Road	0.588	7.2	LOS A	78.5
Turton Road / McDonald Stadium Site Access	1.791	894.8	LOS F	102.7
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit[1]	1.085	253.0	LOS F	39.8
Turton Road / Lambton Road / Bridges Road	0.931	45.1	LOS D	257.0

[1]*Though the Newcastle International Hockey Centre Northern Exit shows worse performance, volumes here are minimal (1 vehicle). The next worst movement has instead been used.*

Table 4.3: Project Case Weekday PM Intersection Performance

Intersection	Weekday: PM Peak			
	DoS	Delay (s)	LoS	95% Queue (m)
Turton Road / Griffiths Road	1.148	73.3	LOS F	301.2
Turton Road / Young Road	1.036	33.3	LOS C	177.3
Turton Road / McDonald Stadium Site Access	1.165	187.7	LOS F	36.8
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit[1]	3.347	2116.6	LOS F	551.5
Turton Road / Lambton Road / Bridges Road	1.048	74.2	LOS F	490.8

[1]Though the Newcastle International Hockey Centre Northern Exit shows worse performance, volumes here are minimal (1 vehicle). The next worst movement has instead been used.

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

Table 4.4: Project Case Weekend Intersection Performance

Intersection	Weekend Peak			
	DoS	Delay (s)	LoS	95% Queue (m)
Turton Road / Griffiths Road	0.709	36.2	LOS C	116.7
Turton Road / Young Road	0.453	12.8	LOS A	81.6
Turton Road / McDonald Stadium Site Access	1.477	638.7	LOS F	86.4
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit[1]	1.062	424.6	LOS F	32.8
Turton Road / Lambton Road / Bridges Road	0.724	32.7	LOS C	159.1

[1]Though the Newcastle International Hockey Centre Northern Exit shows worse performance, volumes here are minimal (1 vehicle). The next worst movement has instead been used.

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

4.4 Base Case vs Project Case Performance

A comparison of the intersection performance results is illustrated in Table 4.5. Most intersection performance results show 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 per the 2024 peak hour surveys for weekdays or weekends. However, due to SIDRA software's inability 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, leading to no delays. Therefore, the modelled LoS for this approach 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 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					
	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	0.85	35.4	LOS C	149	4,897	0.87	35.7	LOS C	149	0.3
Turton Road / Young Road	2,697	0.58	7.3	LOS A	78	2,726	0.59	7.2	LOS A	78	-0.1
Turton Road / McDonald's Jones Stadium	2,675	1.79	902.8	LOS F	103	2,719	1.79	894.8	LOS F	103	-8.0
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit	2,676	1.07	1,128.7	LOS F	32	2,720	1.09	1,311.1	LOS F	40	182.4
Turton Road / Lambton Road / Bridges Road	4,234	0.93	44.9	LOS D	254	4,269	0.93	45.1	LOS D	257	0.2
PM Peak											
Turton Road / Griffiths Road	5,816	1.04	61.9	LOS E	291	6,091	1.15	73.3	LOS F	301	11.4
Turton Road / Young Road	3,528	1.04	27.4	LOS B	177	3,803	1.04	33.3	LOS C	177	5.9
Turton Road / McDonald's Jones Stadium	3,429	1.17	211.5	LOS F	113	3,642	1.17	187.7	LOS F	113	-23.8
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit	3,451	3.08	1,893.1	LOS F	364	3,663	3.35	2,130.5	LOS F	552	237.4
Turton Road / Lambton Road / Bridges Road	5,509	1.05	69.2	LOS E	411	5,665	1.05	74.2	LOS F	491	5.0
Weekend Peak											
Turton Road / Griffiths Road	4,780	0.71	36.2	LOS C	17	4,934	1.42	80.8	LOS F	517	44.6
Turton Road / Young Road	2,763	0.45	12.8	LOS A	12	2,917	0.59	13.9	LOS A	82	1.1
Turton Road / McDonald's Jones Stadium	2,664	1.48	638.7	LOS F	12	2,791	1.48	595.7	LOS F	113	-43.0
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit	2,704	1.06	1,043.6	LOS F	5	2,831	1.33	1,677.2	LOS F	64	633.6
Turton Road / Lambton Road / Bridges Road	4,123	0.72	32.7	LOS C	23	4,215	0.70	37.4	LOS C	177	4.7

5. Project Case Upgrade

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

5.1 Development Traffic

The same traffic demand and distribution were applied in 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 the impact upon additional development traffic would be negligible for most intersections, for which no particular upgrades would be required.

For Turton Road / Griffiths Road, the average delay denotes that the performance deteriorated considerably at the Turton Road right turn bay, which required 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, when in reality, there isn't any vehicle waiting, and the single vehicle coded for the approach is due to SIDRA limitations.

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

5.3 Modelling Results

The modelled performance of the Project Case Upgrades/Signal Optimisation for Weekday PM peak is 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

Intersection	Weekday: PM Peak			
	DoS	Delay (s)	LoS	95% Queue (m)
Turton Road / Griffiths Road	1.062	63.6	LOS E	263.0
Turton Road / Young Road	0.737	28.1	LOS B	121.3
Turton Road / McDonald Stadium Site Access	1.165	188.9	LOS F	37.2
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit[1]	1.711	659.9	LOS F	340.8
Turton Road / Lambton Road / Bridges Road	1.047	80.9	LOS F	503.2

[1]*Though the Newcastle International Hockey Centre Northern Exit shows worse performance, volumes here are minimal (1 vehicle). The next worst movement has instead been used.*

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

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

6. Conclusion

The findings of the modelling are summarised below:

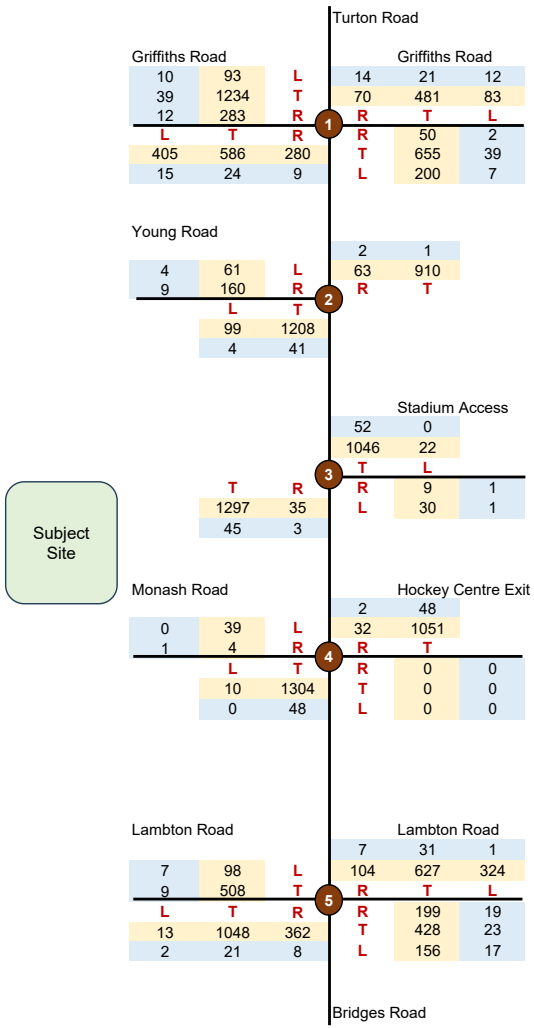
- SCATS traffic lights optimisation is mainly required for Turton Road / Griffiths Road due to the development traffic assigned to the northbound right turn lane at this intersection, causing an extra 24.6 seconds of delay at this approach
- No geometrical upgrades are seemingly required across any of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

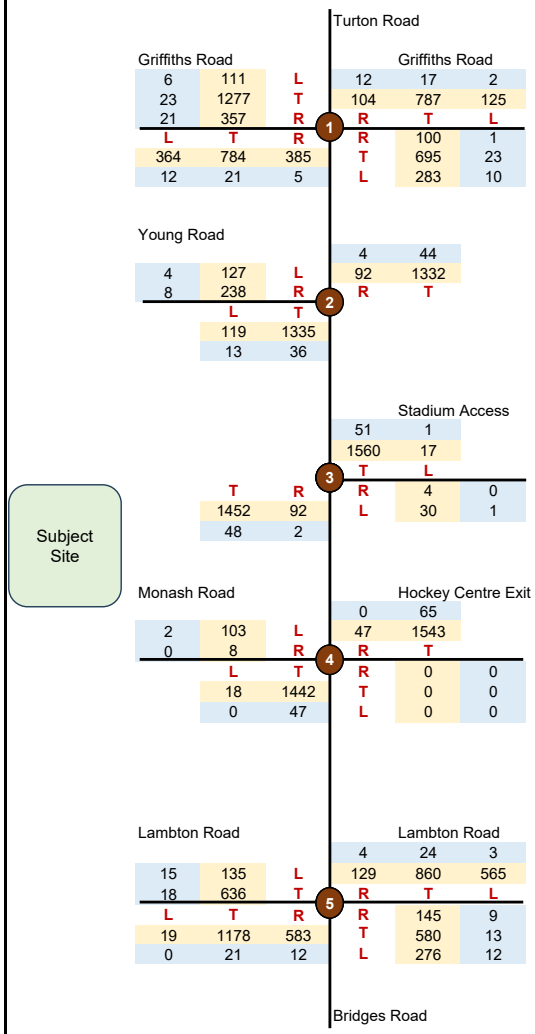
Attachment A: Traffic Flow Diagrams & Trip Generation

EXISTING TRAFFIC VOLUMES | TRAFFIC SURVEY DATA 2024

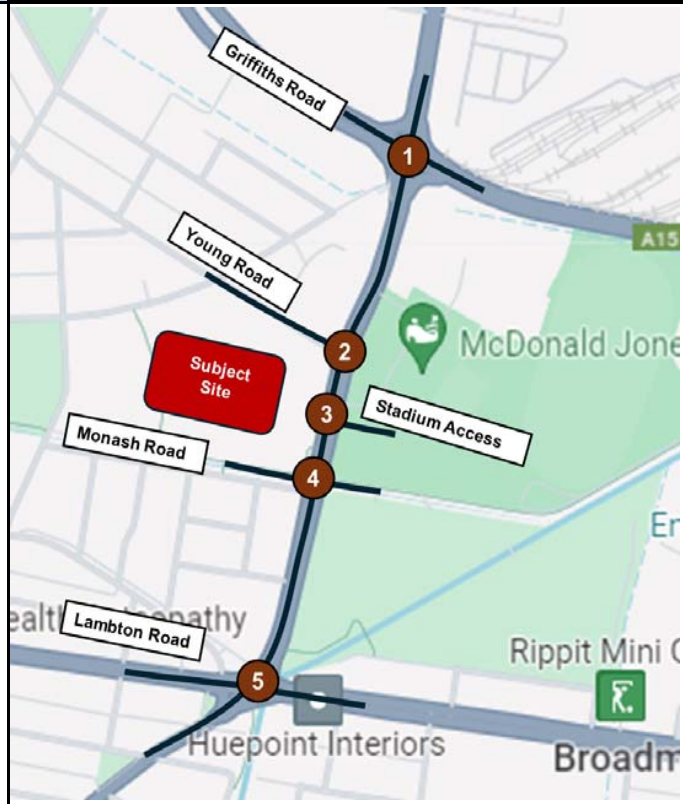
AM Peak 08:00-09:00



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

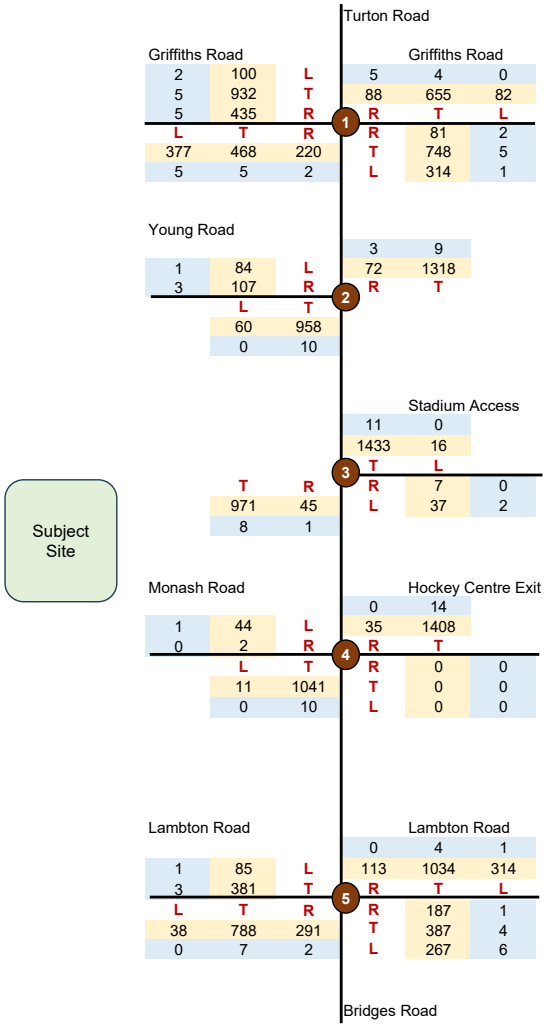
Job Number:	P6458	Job Name:	Newcastle Indoor Sports Facility TIA Modelling
Prepared By:	Tahmim Islam		
Reviewed By:	Alex Grey		

Legend

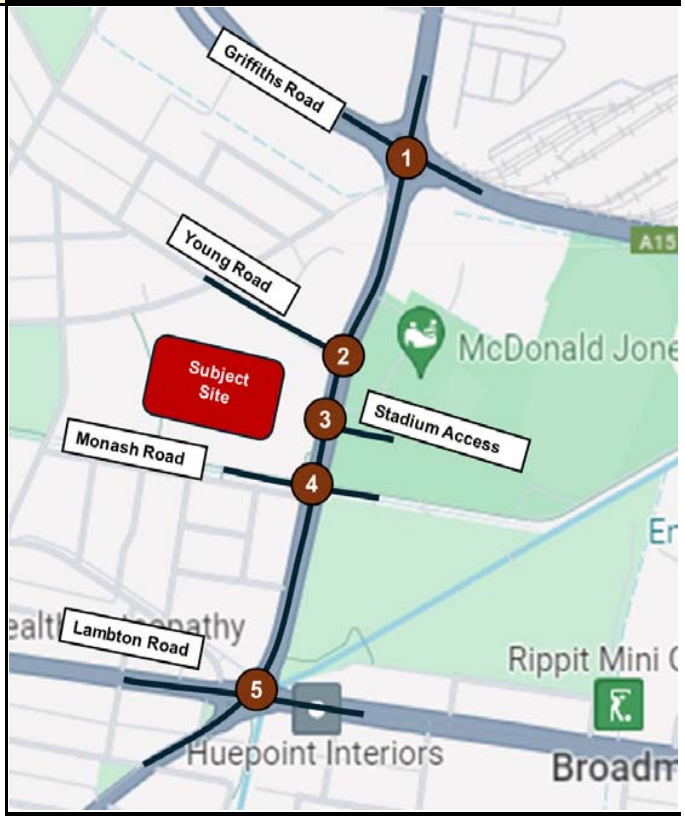
XX	Light Vehicle (LV) Volumes	L	Left Turn Movement
XX	Heavy Vehicle (HV) Volumes	T	Through Turn Movement
X	Intersection ID	R	Right Turn Movement

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		

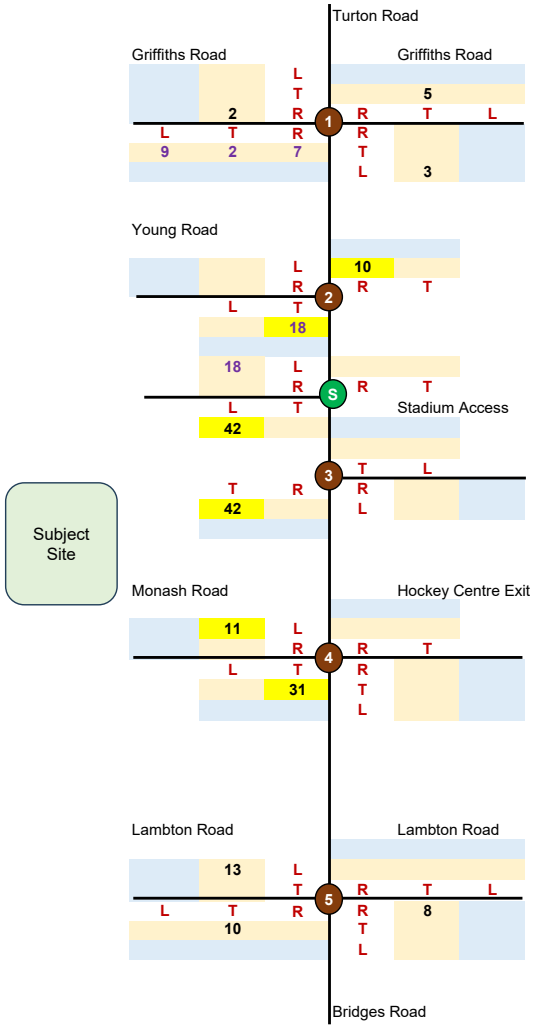
Legend

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

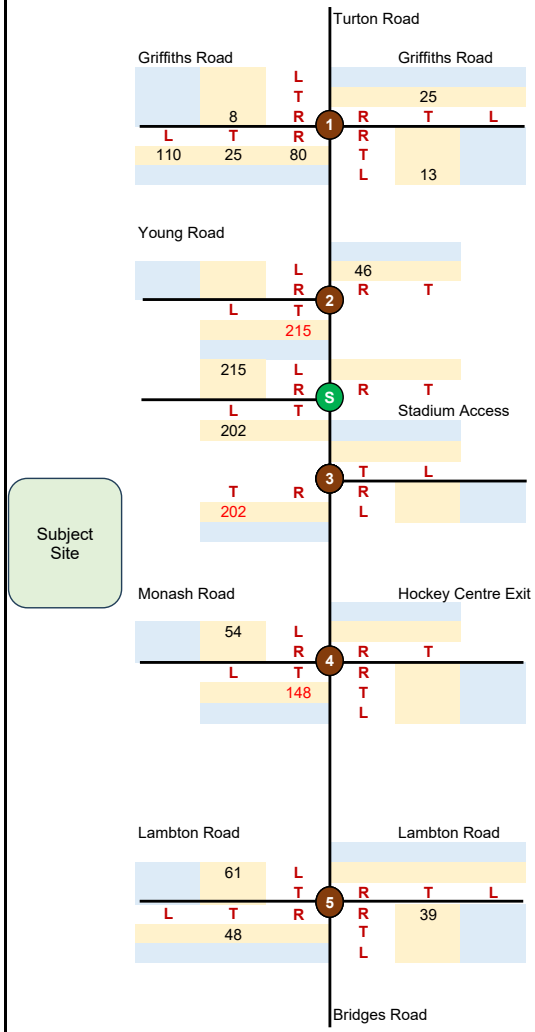
DEVELOPMENT TRAFFIC VOLUMES | TRAFFIC SURVEY DATA 2024

AM Peak 08:00-09:00

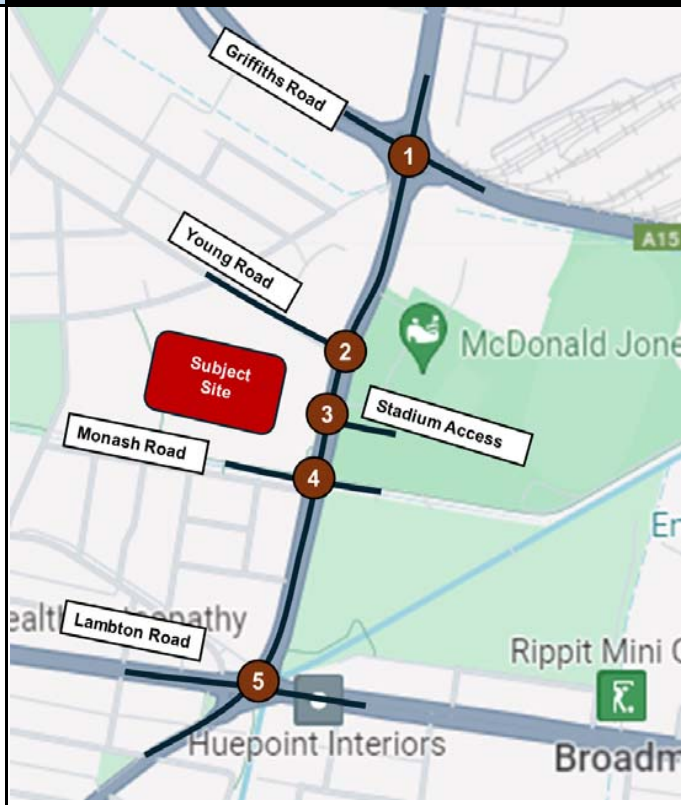
Inbound 42
Outboun 18



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		

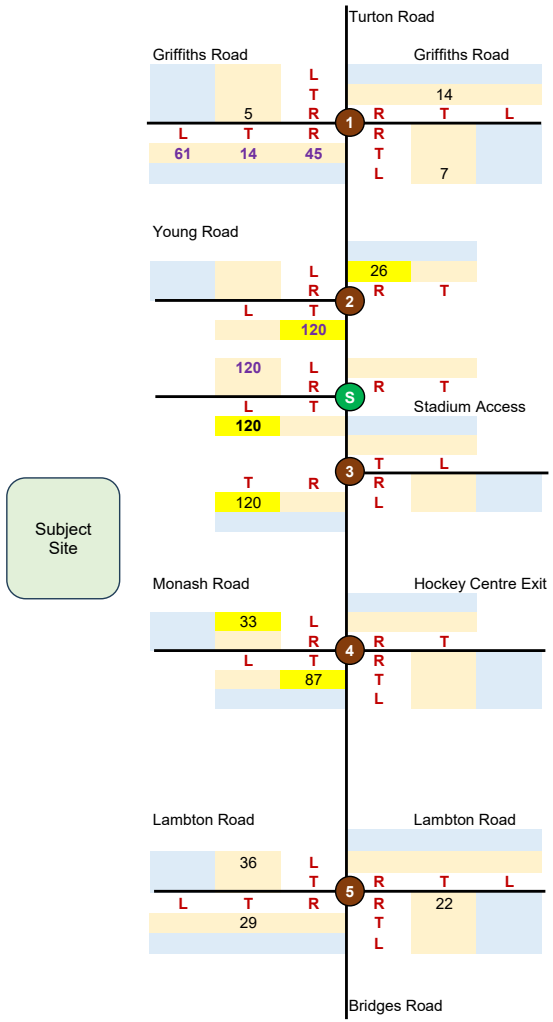
Legend

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

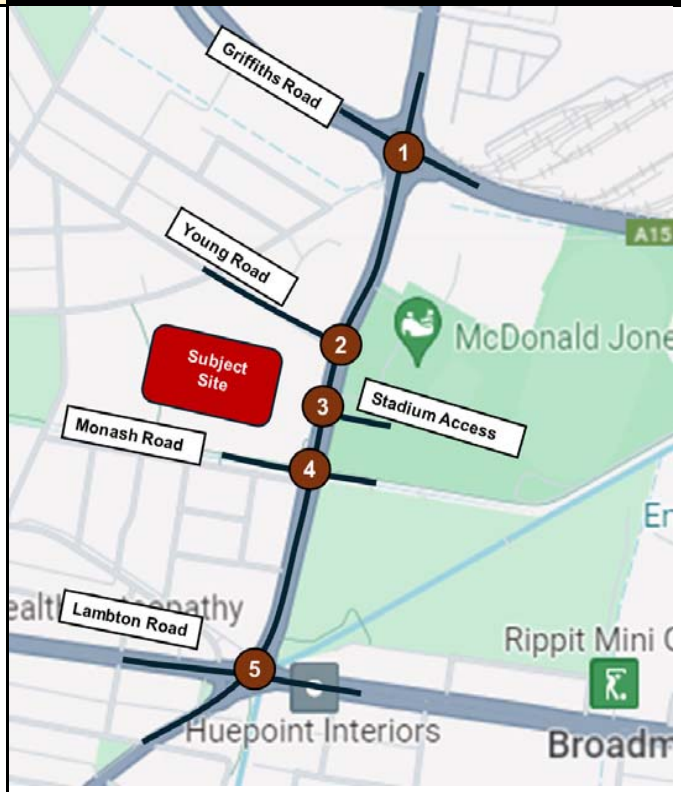
DEVELOPMENT TRAFFIC VOLUMES | TRAFFIC SURVEY DATA 2024

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

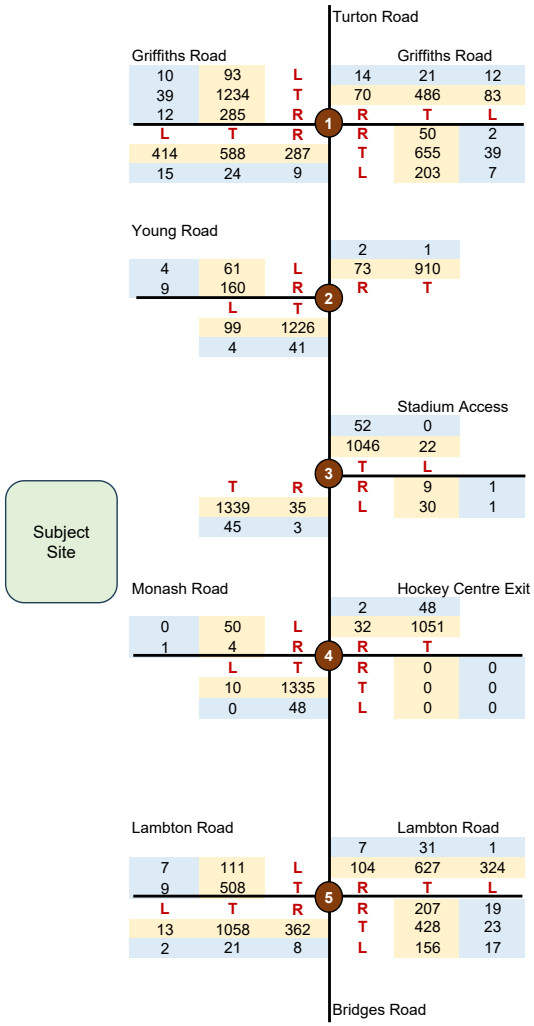
Job Number:	P6458	Job Name:	Newcastle Indoor Sports Facility TIA Modelling
Prepared By:	Tahmim Islam		
Reviewed By:	Alex Grey		

Legend

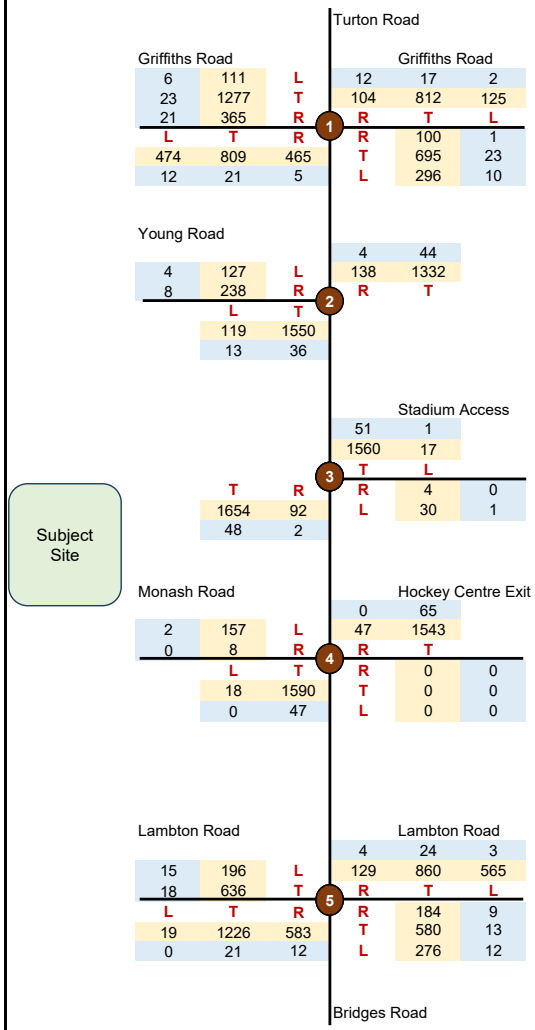
XX	Light Vehicle (LV) Volumes	L	Left Turn Movement
XX	Heavy Vehicle (HV) Volumes	T	Through Turn Movement
X	Intersection ID	R	Right Turn Movement

PROJECT TRAFFIC VOLUMES | TRAFFIC SURVEY DATA 2024

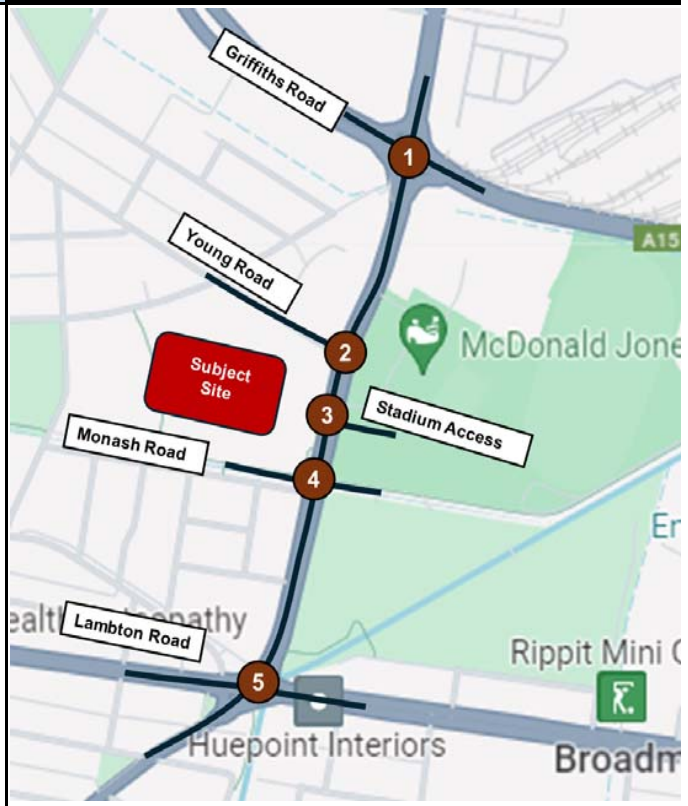
AM Peak 08:00-09:00



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

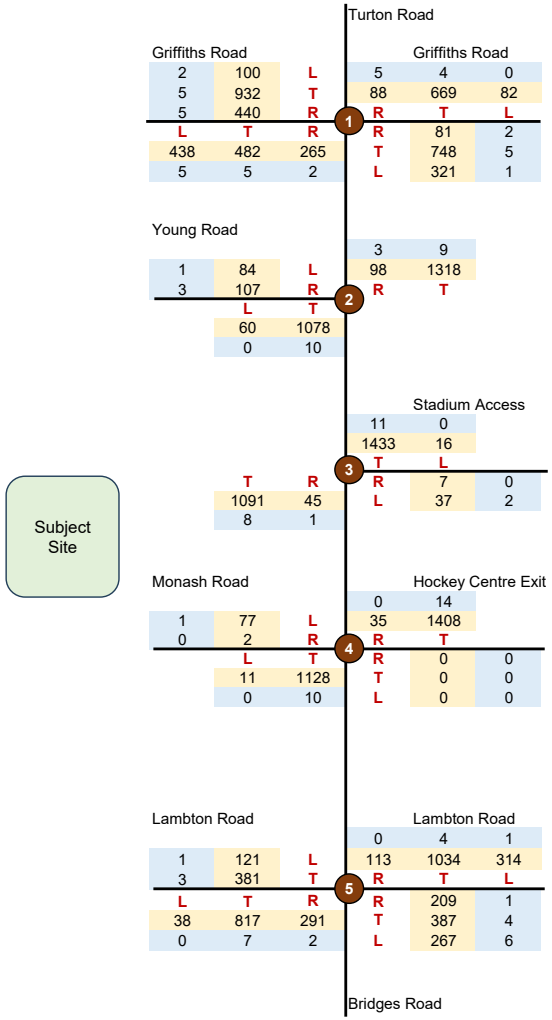
Job Number:	P6458	Job Name:	Newcastle Indoor Sports Facility TIA Modelling
Prepared By:	Tahmim Islam		
Reviewed By:	Alex Grey		

Legend

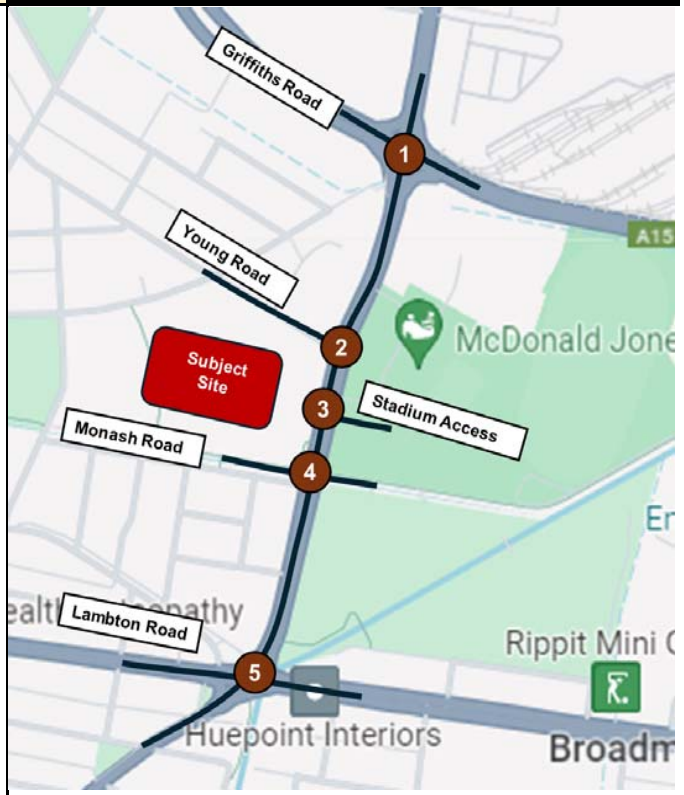
XX	Light Vehicle (LV) Volumes	L	Left Turn Movement
XX	Heavy Vehicle (HV) Volumes	T	Through Turn Movement
X	Intersection ID	R	Right Turn Movement

PROJECT TRAFFIC VOLUMES | TRAFFIC SURVEY DATA 2024

Weekend Peak 11:15-12:15



Locality Plan



Details

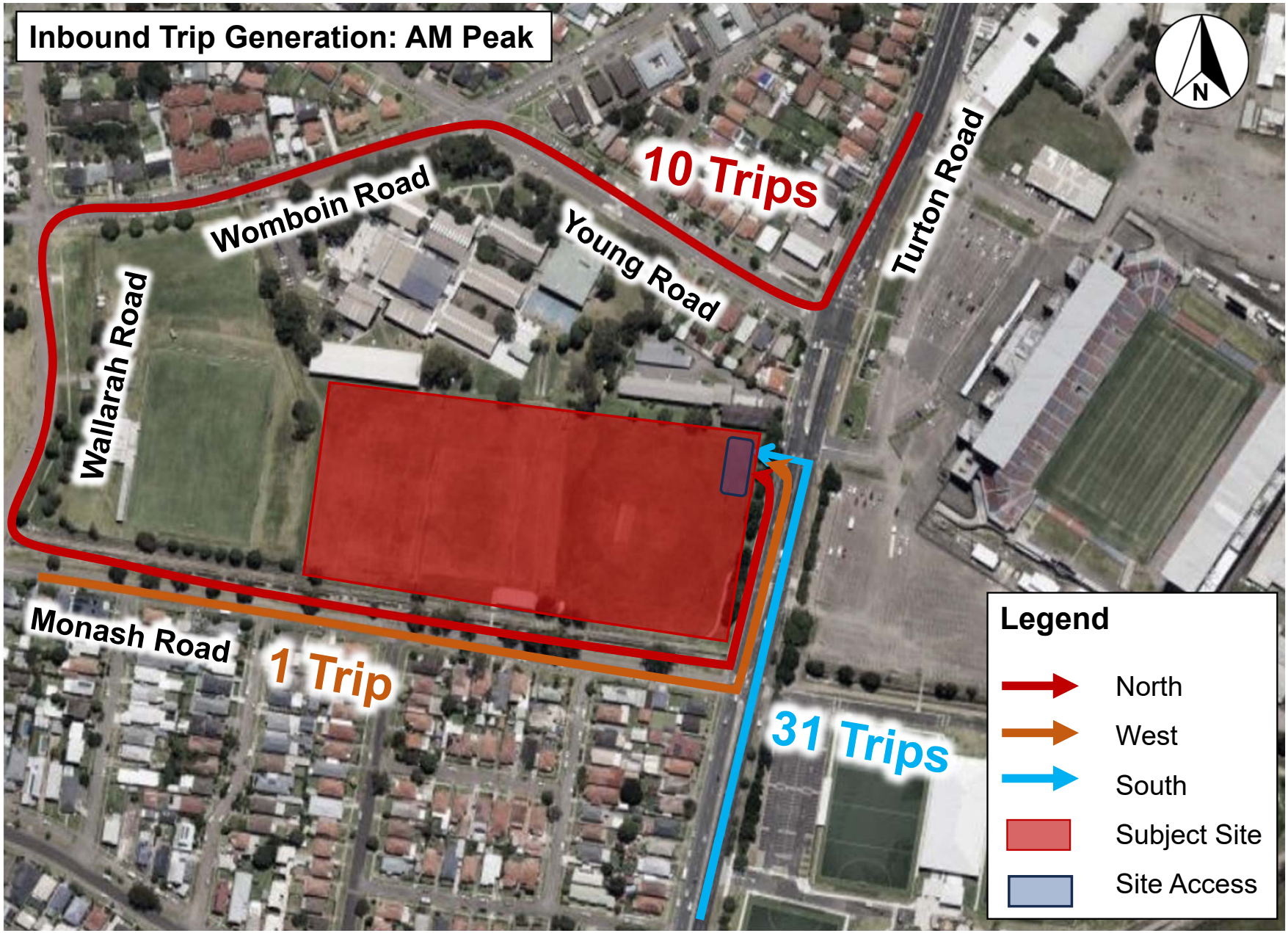
Date of Surveys:	Sat 6/04/2024
Weekend Peak:	11:15am-12:15pm
Base Year:	2024

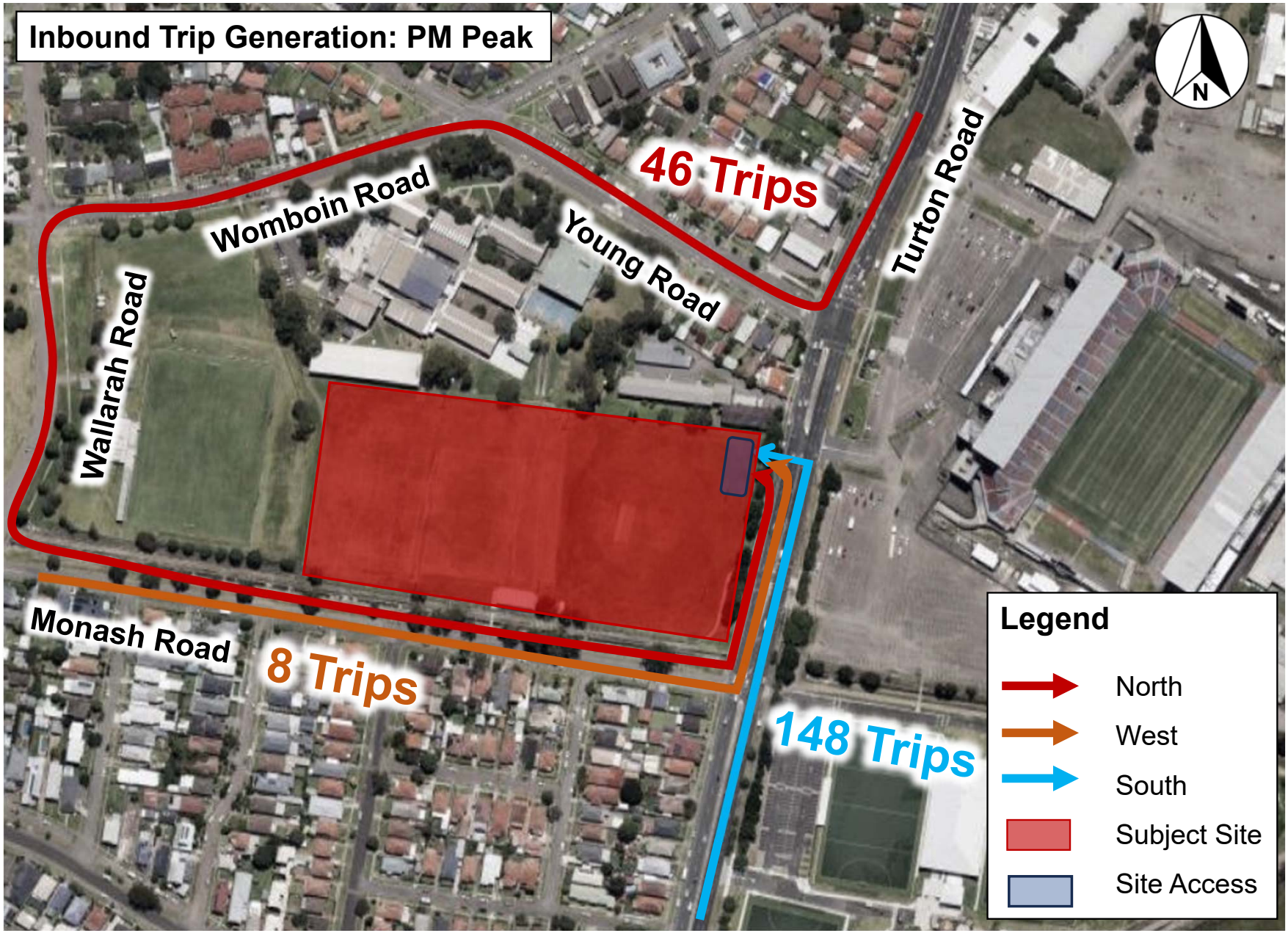
Document Control

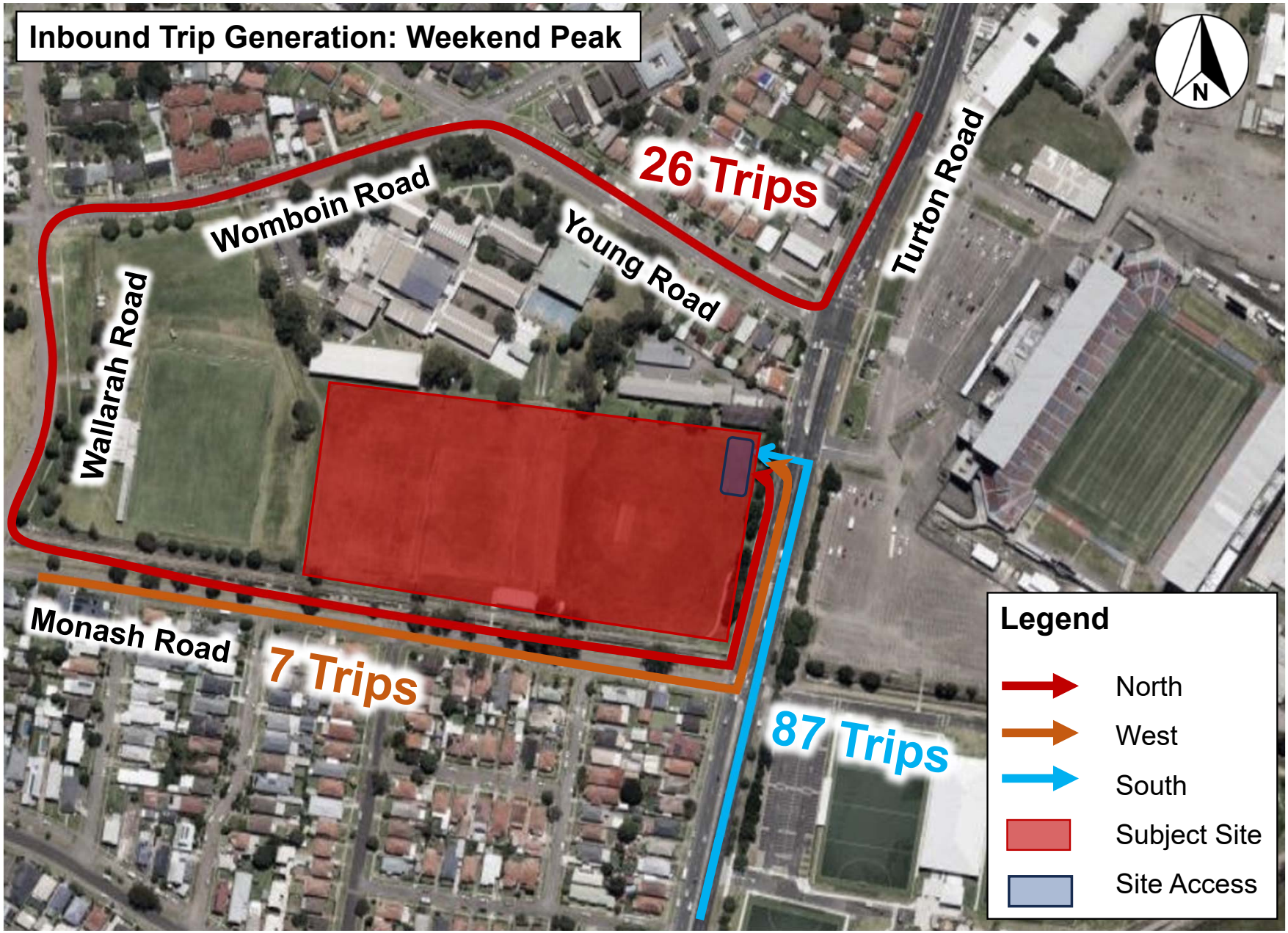
Job Number:	P6458	Job Name:	Newcastle Indoor Sports Facility TIA Modelling
Prepared By:	Tahmim Islam		
Reviewed By:	Alex Grey		

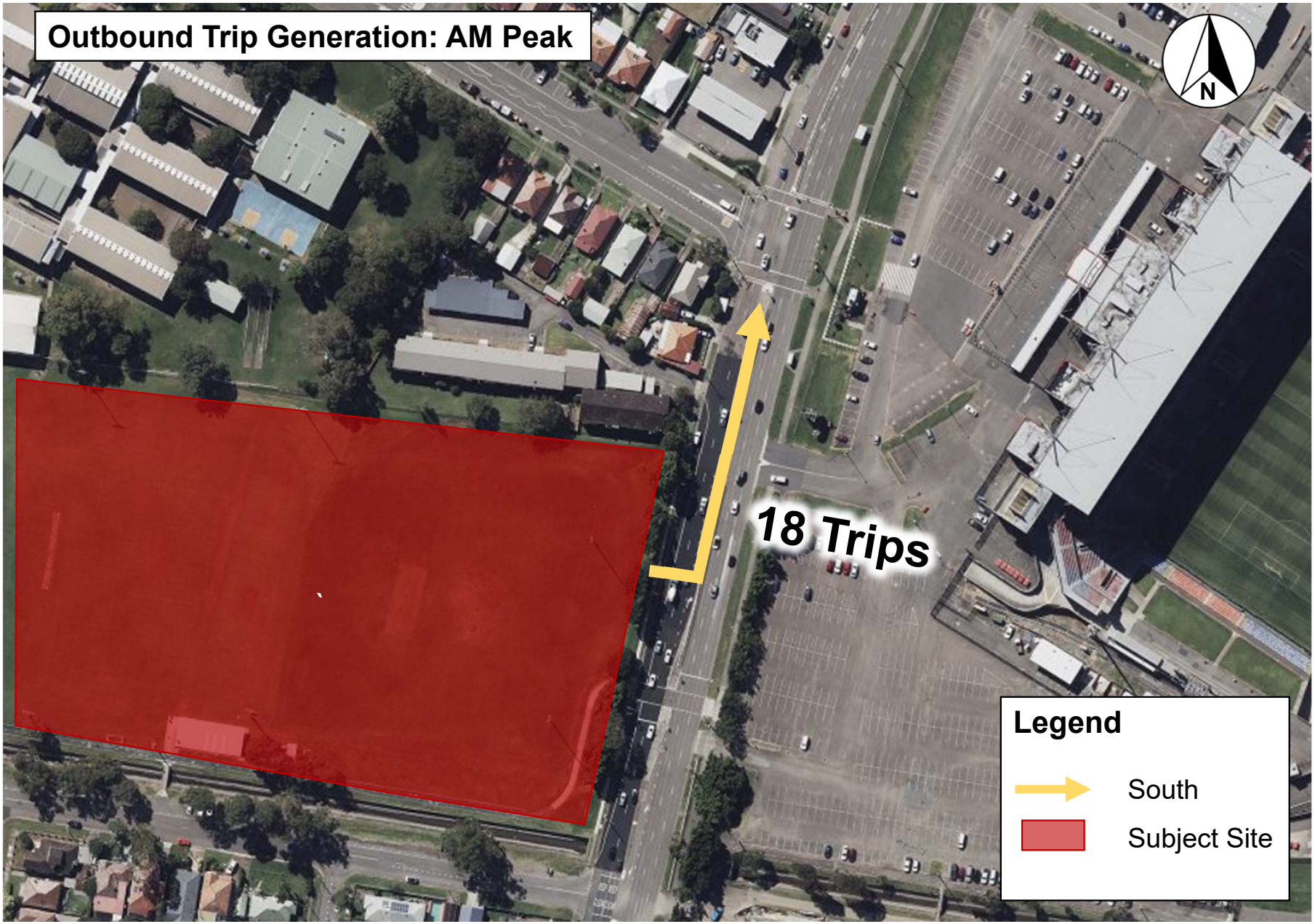
Legend

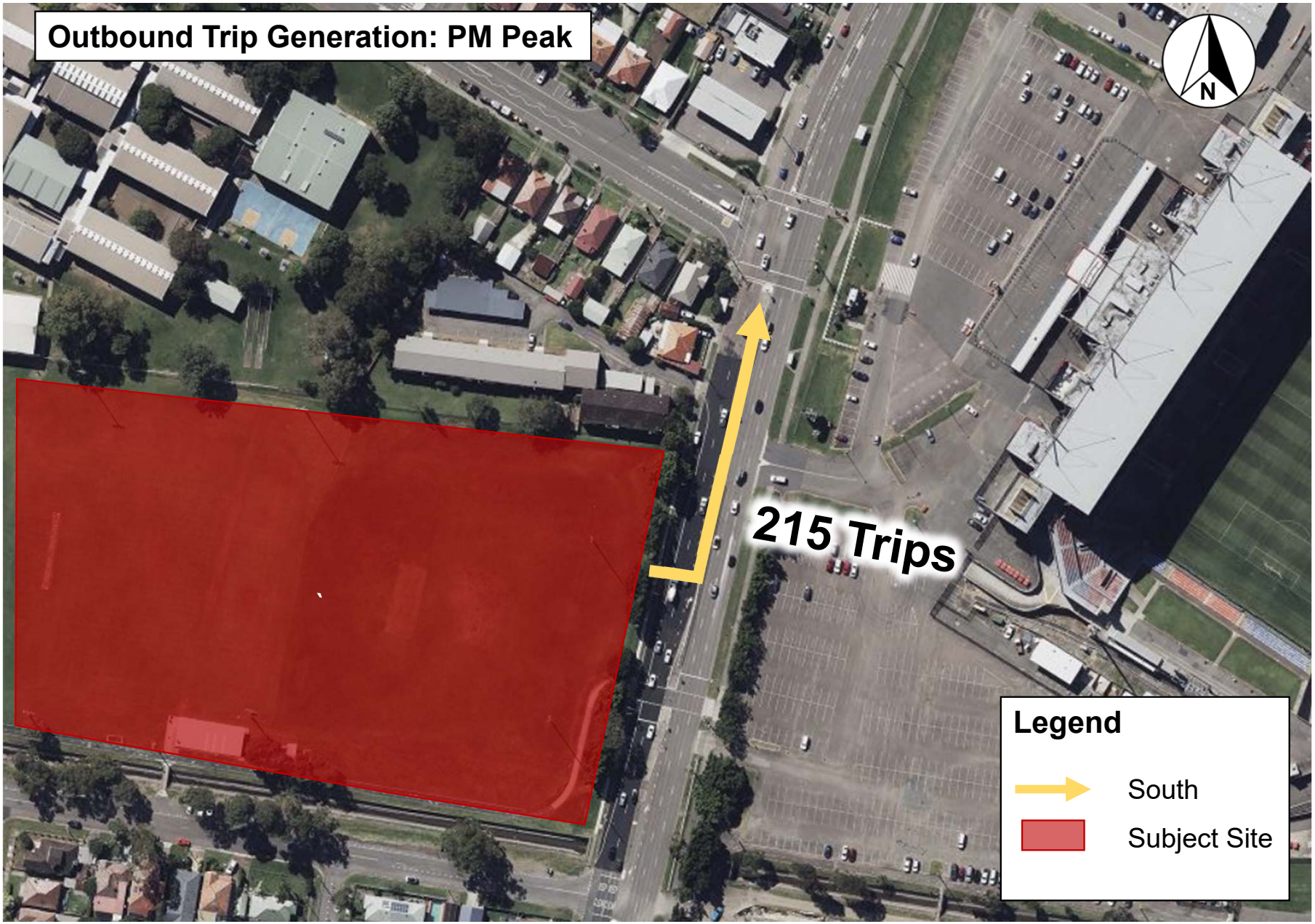
XX	Light Vehicle (LV) Volumes	L	Left Turn Movement
XX	Heavy Vehicle (HV) Volumes	T	Through Turn Movement
X	Intersection ID	R	Right Turn Movement

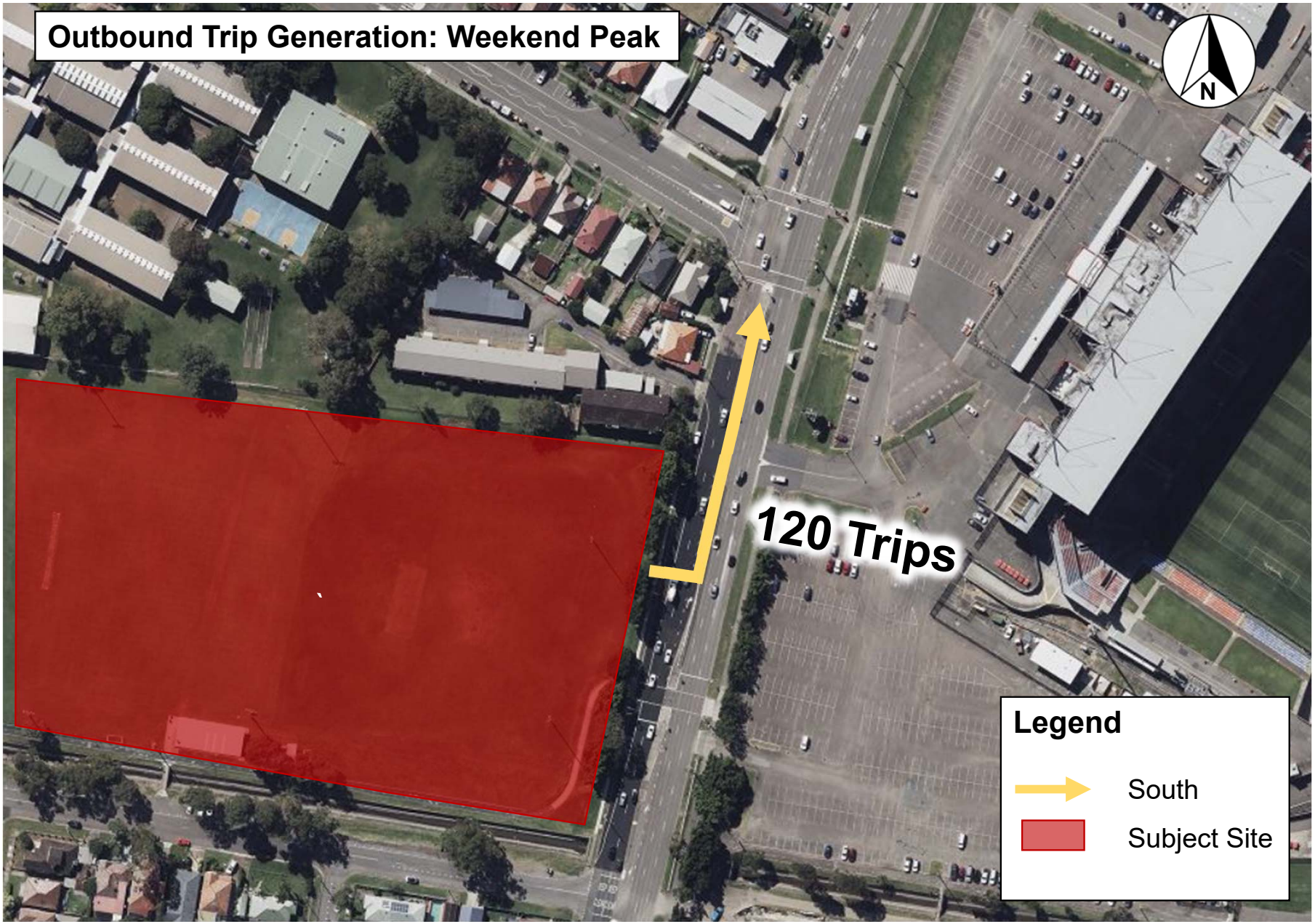

Inbound Trip Generation: AM Peak
N
10 Trips
Womboin Road
Young Road
Turton Road
Wallarah Road
Monash Road
1 Trip
31 Trips
Legend
North
West
South
Subject Site
Site Access


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

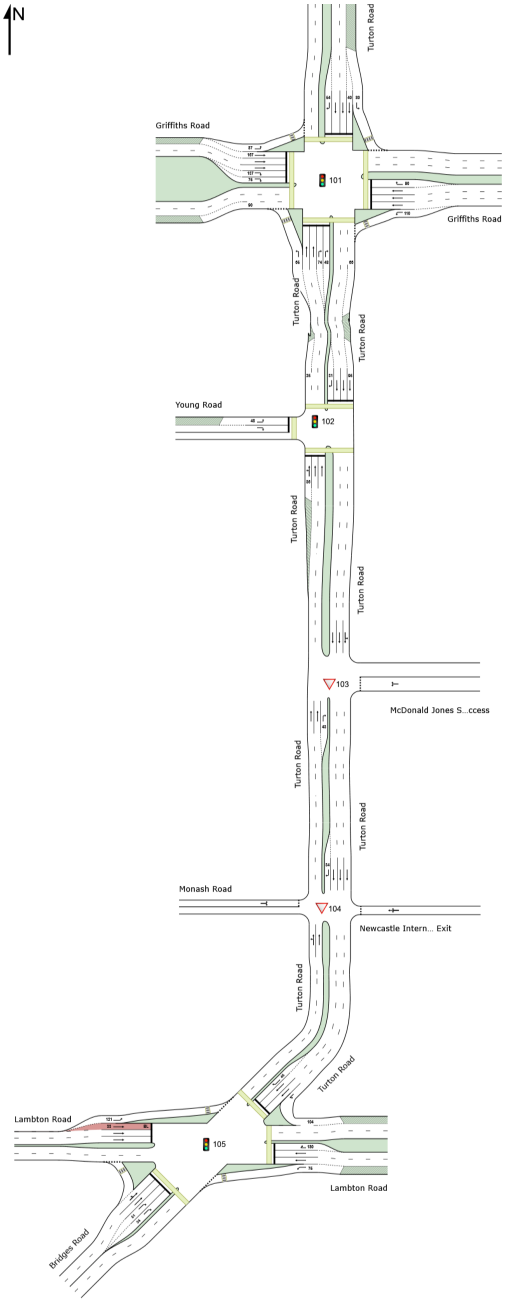
Attachment B: SIDRA Geometric Layouts

NETWORK LAYOUT

Network: N101 [Newcastle Indoor Sports Facility - AM Peak (Network Folder: 2024 Base)]

New Network
Network Category: (None)

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



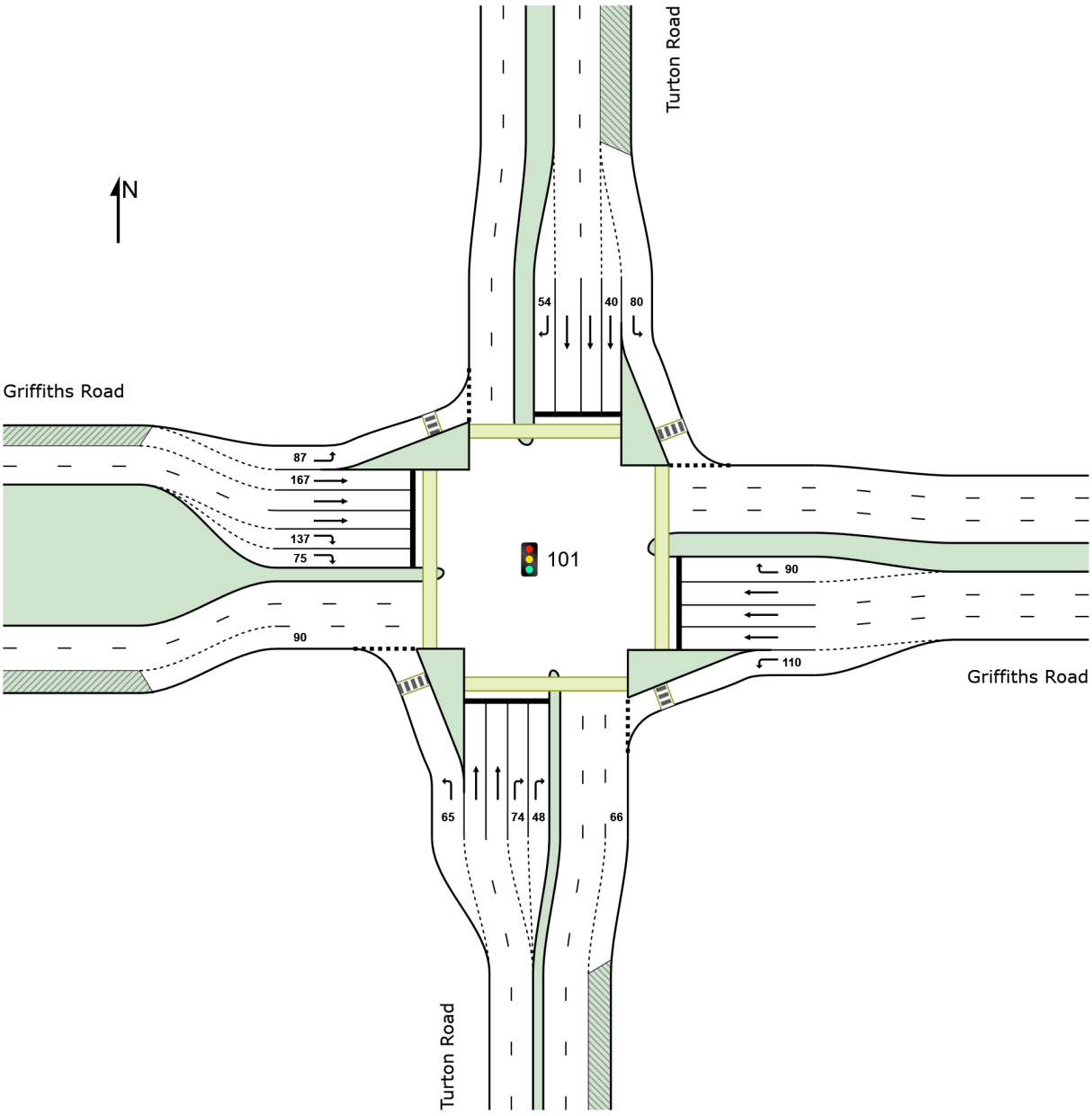
SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
101	NA	Turton Road / Griffiths Road - TCS 201
102	NA	Turton Road / Young Road - TCS 3322
▽103	NA	Turton Road / McDonald Jones Stadium Southern Access
▽104	NA	Turton Road / Monash Road / Newcastle International Hockey Centre Northern Exit
105	NA	Turton Road / Lambton Road / Bridges Road - TCS 350

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) Isolated

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



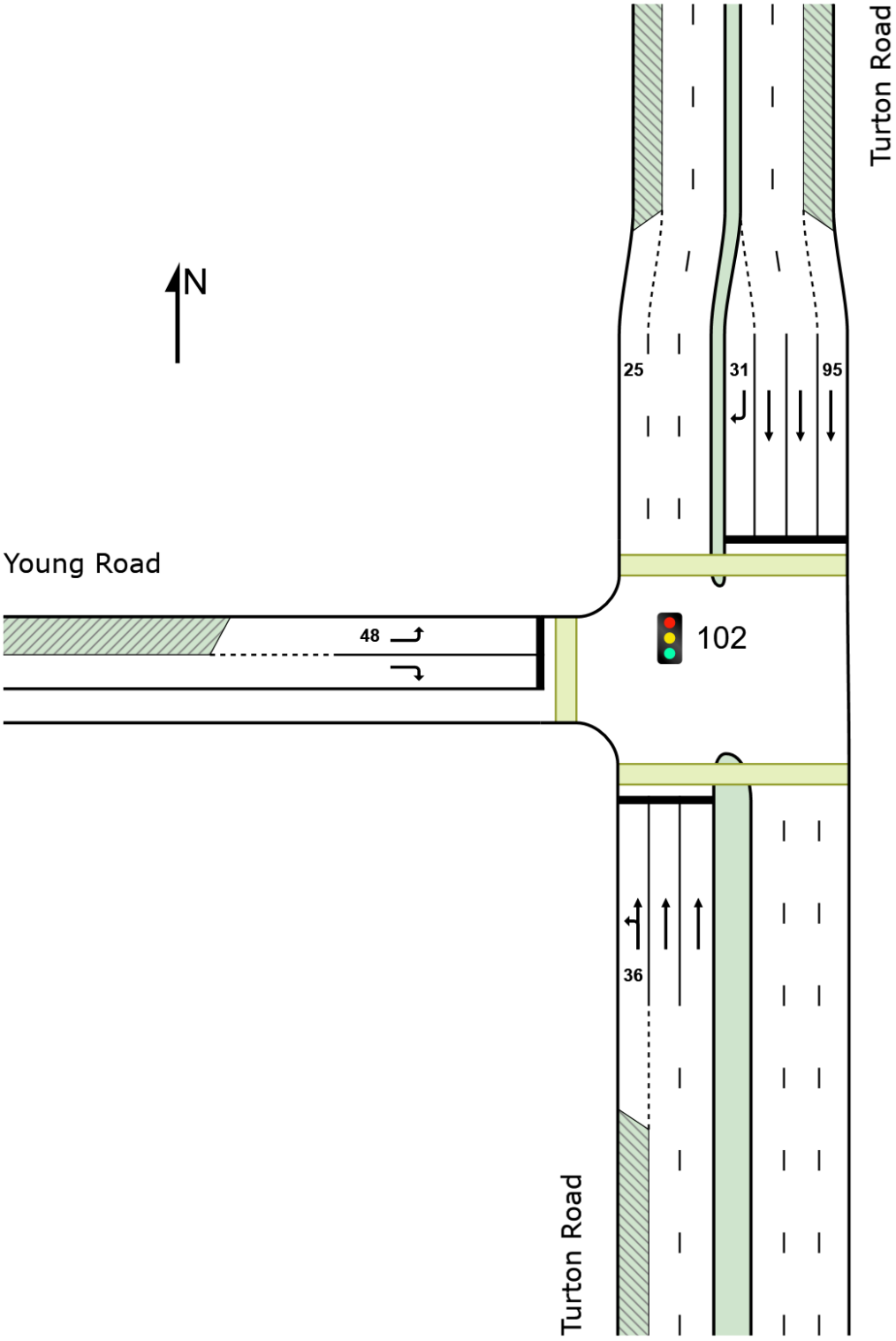
Organisation: BITZIOS CONSULTING | Licence: NETWORK / 1PC | Created: Wednesday, 23 April 2025 3:02:17 PM
Project: P:\P6458 Newcastle Indoor Sports Facility TIA Modelling\Technical\Models\P6458.004M Newcastle Indoor Sports Facility TIA SIDRA Models.sip9

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) Isolated

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

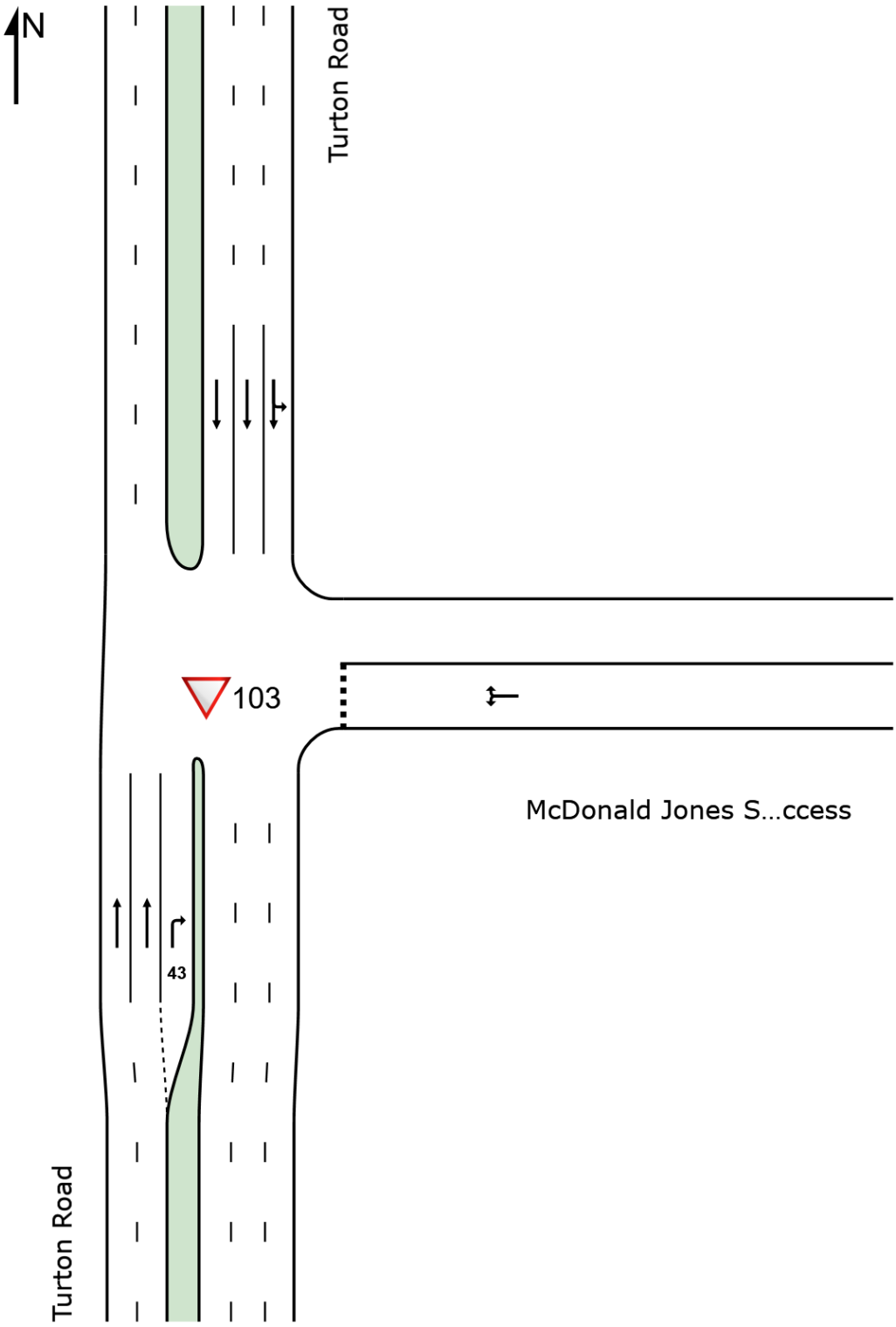


SITE LAYOUT

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.

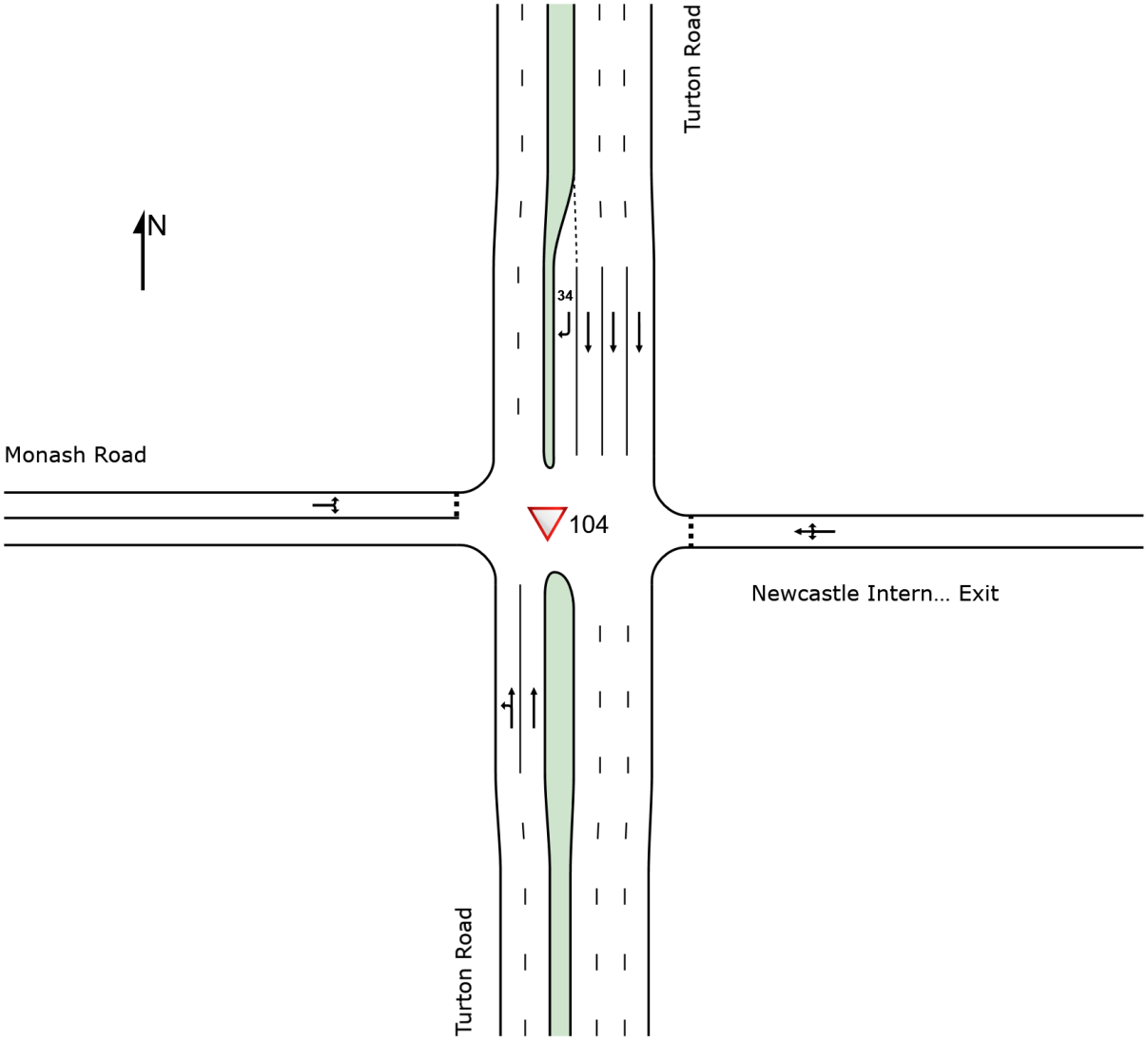


SITE LAYOUT

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.



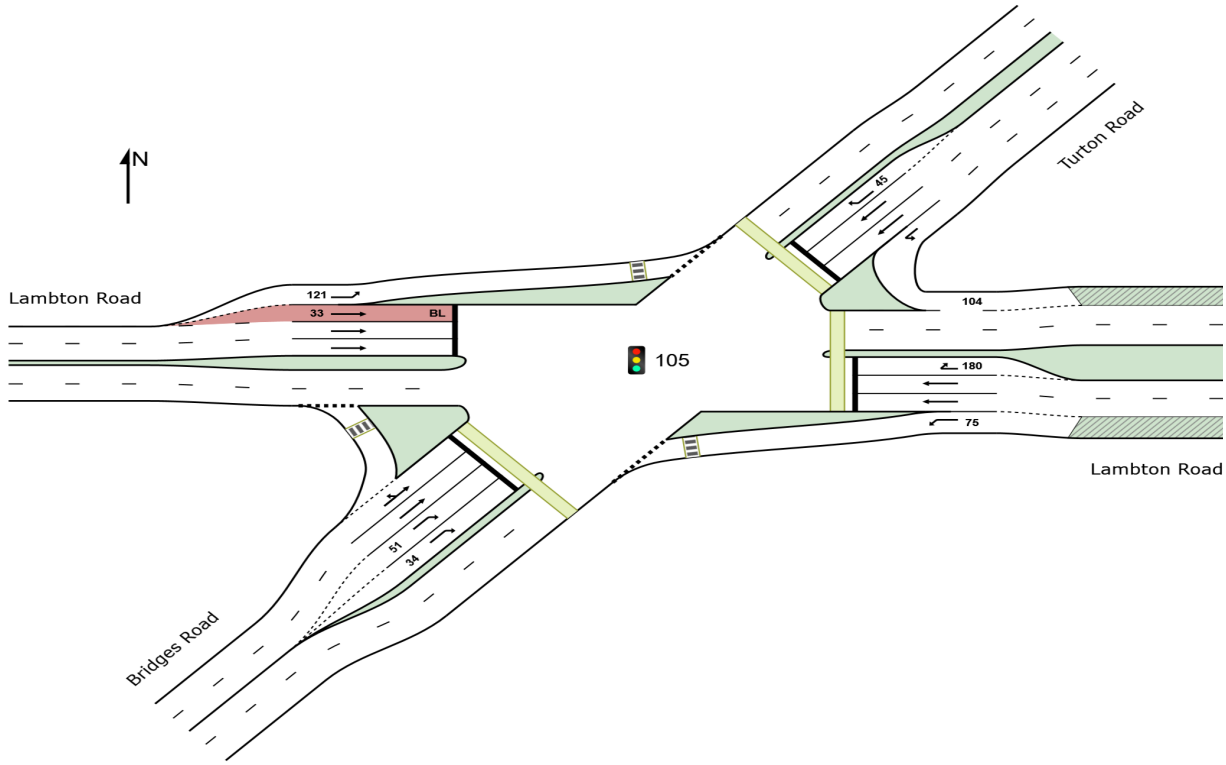
Organisation: BITZIOS CONSULTING | Licence: NETWORK / 1PC | Created: Wednesday, 23 April 2025 3:02:21 PM
Project: P:\P6458 Newcastle Indoor Sports Facility TIA Modelling\Technical\Models\P6458.004M Newcastle Indoor Sports Facility TIA SIDRA Models.sip9

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) Isolated

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



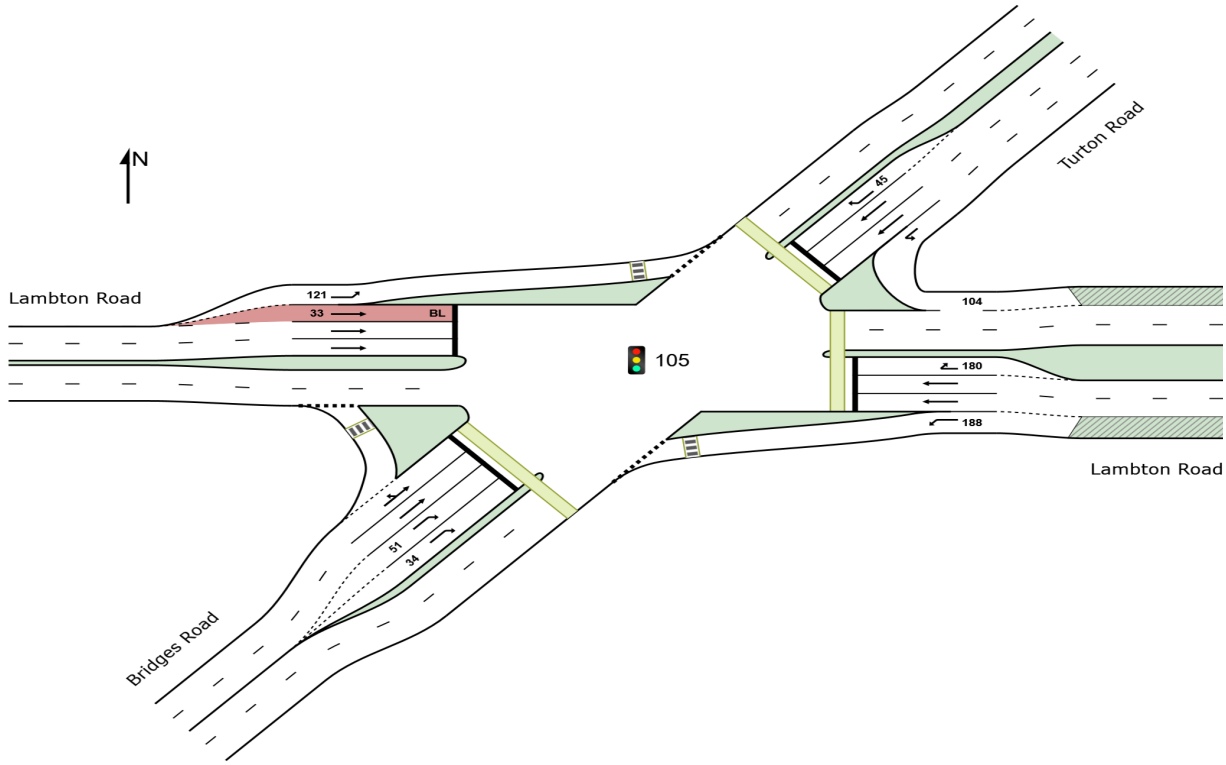
Organisation: BITZIOS CONSULTING | Licence: NETWORK / 1PC | Created: Wednesday, 23 April 2025 3:02:22 PM
Project: P:\P6458 Newcastle Indoor Sports Facility TIA Modelling\Technical\Models\P6458.004M Newcastle Indoor Sports Facility TIA SIDRA Models.sip9

SITE LAYOUT

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

1645 - 1745
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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



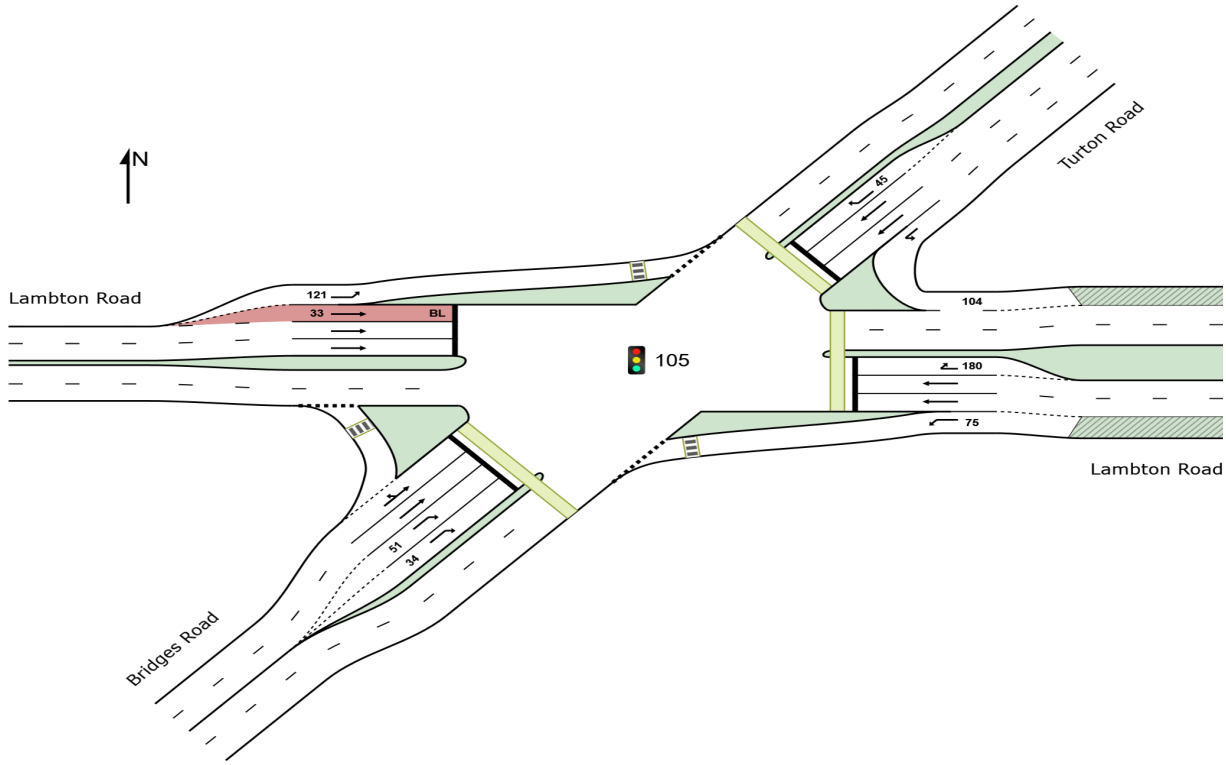
Organisation: BITZIOS CONSULTING | Licence: NETWORK / 1PC | Created: Wednesday, 23 April 2025 3:02:25 PM
Project: P:\P6458 Newcastle Indoor Sports Facility TIA Modelling\Technical\Models\P6458.004M Newcastle Indoor Sports Facility TIA SIDRA Models.sip9

SITE LAYOUT

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

1115 - 1215
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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



Organisation: BITZIOS CONSULTING | Licence: NETWORK / 1PC | Created: Wednesday, 23 April 2025 3:02:26 PM
Project: P:\P6458 Newcastle Indoor Sports Facility TIA Modelling\Technical\Models\P6458.004M 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: 9.1.6.228

Network: N101 [Newcastle Indoor Sports Facility - AM Peak (Network Folder: 2024 Base)]

0800-0900
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 132 seconds (Network 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	440	3.6	0.397	9.2	LOS A	5.6	40.6	0.27	0.64	0.27	49.9
2	T1	All MCs	642	3.9	639	3.9	* 0.662	23.1	LOS B	13.3	96.5	0.68	0.58	0.68	35.2
3	R2	All MCs	304	3.1	303	3.1	* 0.853	80.3	LOS F	10.5	75.3	1.00	0.92	1.15	24.6
Approach			1388	3.6	1381	3.6	0.853	31.2	LOS C	13.3	96.5	0.62	0.67	0.65	34.8
East: Griffiths Road															
4	L2	All MCs	220	3.3	220	3.3	0.171	10.9	LOS A	3.8	27.4	0.31	0.64	0.31	47.3
5	T1	All MCs	731	5.6	731	5.6	* 0.532	42.0	LOS C	15.4	112.7	0.88	0.75	0.88	37.7
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	37.2	LOS C	15.4	112.7	0.76	0.73	0.77	37.6
North: Turton Road															
7	L2	All MCs	100	12.6	100	12.6	0.145	14.6	LOS B	2.6	19.9	0.43	0.67	0.43	44.3
8	T1	All MCs	528	4.2	528	4.2	0.498	50.1	LOS D	12.6	91.2	0.91	0.75	0.91	13.7
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	47.8	LOS D	12.6	91.2	0.85	0.75	0.86	19.1
West: Griffiths Road															
10	L2	All MCs	108	9.7	108	9.7	0.092	7.7	LOS A	1.2	8.8	0.23	0.61	0.23	48.4
11	T1	All MCs	1340	3.1	1340	3.1	0.508	28.9	LOS C	20.7	148.9	0.78	0.69	0.78	42.6
12	R2	All MCs	311	4.1	311	4.1	0.447	57.9	LOS E	9.0	65.3	0.94	0.80	0.94	22.3
Approach			1759	3.7	1759	3.7	0.508	32.8	LOS C	20.7	148.9	0.78	0.70	0.78	39.3
All Vehicles			4869	4.4	4862	4.4	0.853	35.4	LOS C	20.7	148.9	0.74	0.71	0.75	35.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
East: Griffiths Road										
P2 Full	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	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
West: Griffiths Road										
P4 Full	7	60.2	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
All Pedestrians	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: 9.1.6.228

Network: N101 [Newcastle Indoor Sports Facility - AM Peak (Network Folder: 2024 Base)]

0800-0900
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 132 seconds (Network 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	0.129	6.9	LOS A	1.0	7.0	0.12	0.51	0.12	33.4
2	T1	All MCs	1315	3.3	1307	3.3	* 0.580	2.6	LOS A	8.7	62.5	0.18	0.17	0.18	35.4
Approach			1423	3.3	1415	3.3	0.580	3.0	LOS A	8.7	62.5	0.18	0.20	0.18	34.8
North: Turton Road															
8	T1	All MCs	959	0.1	959	0.1	0.295	1.9	LOS A	3.1	22.0	0.13	0.12	0.13	54.7
9	R2	All MCs	68	3.1	68	3.1	* 0.248	8.8	LOS A	0.7	4.8	0.17	0.61	0.17	40.3
Approach			1027	0.3	1027	0.3	0.295	2.4	LOS A	3.1	22.0	0.13	0.15	0.13	52.6
West: Young Road															
10	L2	All MCs	68	6.2	68	6.2	0.127	40.6	LOS C	3.2	23.3	0.76	0.71	0.76	14.6
12	R2	All MCs	178	5.3	178	5.3	* 0.581	58.2	LOS E	10.7	78.4	0.97	0.81	0.97	11.3
Approach			246	5.6	246	5.6	0.581	53.3	LOS D	10.7	78.4	0.91	0.78	0.91	12.0
All Vehicles			2697	2.4	2689	2.4	0.581	7.3	LOS A	10.7	78.4	0.23	0.23	0.23	35.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
North: Turton Road											
P3	Full	7	60.2	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
West: Young Road											
P4	Full	4	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
All Pedestrians		17	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: 103 [Turton Road / McDonald Jones Stadium Southern Access (Site Folder: 2024 Base AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [Newcastle Indoor Sports Facility - AM Peak (Network Folder: 2024 Base)]

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	1409	3.4	0.434	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.6
3	R2	All MCs	40	7.9	40	7.9	0.205	23.4	LOS B	0.6	4.6	0.82	0.94	0.88	12.7
Approach			1453	3.5	1449	3.5	0.434	0.7	NA	0.6	4.6	0.02	0.03	0.02	52.1
East: McDonald Jones Stadium Southern Access															
4	L2	All MCs	33	3.2	33	3.2	1.791	722.2	LOS F	14.1	102.9	1.00	4.08	4.55	0.2
6	R2	All MCs	11	10.0	11	10.0	1.791	902.8	LOS F	14.1	102.9	1.00	4.08	4.55	0.2
Approach			43	4.9	43	4.9	1.791	766.2	LOS F	14.1	102.9	1.00	4.08	4.55	0.2
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	58.7
Approach			1179	4.6	1179	4.6	0.214	0.1	NA	0.0	0.0	0.00	0.01	0.00	57.0
All Vehicles			2675	4.0	2671	4.0	1.791	12.8	NA	14.1	102.9	0.03	0.09	0.09	15.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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: 9.1.6.228

Network: N101 [Newcastle Indoor Sports Facility - AM Peak (Network Folder: 2024 Base)]

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	203.6	LOS F	2.6	18.0	1.00	1.04	1.06	0.3
5	T1	All MCs	1	0.0	1	0.0	1.000	1128.7	LOS F	2.6	18.0	1.00	1.04	1.06	2.6
6	R2	All MCs	1	0.0	1	0.0	1.000	658.8	LOS F	2.6	18.0	1.00	1.04	1.06	0.3
Approach			3	0.0	3	0.0	1.000	663.7	LOS F	2.6	18.0	1.00	1.04	1.06	1.1
North: Turton Road															
8	T1	All MCs	1157	4.4	1143	4.4	0.206	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	All MCs	36	5.9	35	5.9	0.134	18.4	LOS B	0.4	3.2	0.82	0.92	0.82	29.6
Approach			1193	4.4	1178	4.4	0.206	0.6	NA	0.4	3.2	0.02	0.03	0.02	50.8
West: Monash Road															
10	L2	All MCs	41	0.0	41	0.0	1.065	99.4	LOS F	4.5	32.1	1.00	1.49	2.16	10.6
12	R2	All MCs	5	20.0	5	20.0	1.065	263.4	LOS F	4.5	32.1	1.00	1.49	2.16	10.6
Approach			46	2.3	46	2.3	1.065	118.0	LOS F	4.5	32.1	1.00	1.49	2.16	10.6
All Vehicles			2676	3.9	2661	3.9	1.065	3.2	NA	4.5	32.1	0.03	0.04	0.05	47.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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

Network: N101 [Newcastle Indoor Sports Facility - AM Peak (Network Folder: 2024 Base)]

0800-0900
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 132 seconds (Network 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	0.184	8.8	LOS A	3.0	22.9	0.34	0.62	0.34	50.5
5	T1	All MCs	475	5.1	475	5.1	0.263	34.6	LOS C	11.0	80.7	0.78	0.65	0.78	40.3
6b	R3	All MCs	229	8.7	229	8.7	* 0.799	71.2	LOS F	15.2	114.5	1.00	0.90	1.12	17.8
Approach			886	7.0	886	7.0	0.799	38.8	LOS C	15.2	114.5	0.75	0.71	0.78	35.7
NorthEast: Turton Road															
24b	L3	All MCs	342	0.3	338	0.3	0.219	8.0	LOS A	0.0	0.0	0.00	0.58	0.00	51.0
25	T1	All MCs	693	4.7	684	4.7	0.610	42.3	LOS C	18.6	135.6	0.86	0.74	0.86	34.8
26a	R1	All MCs	117	6.3	115	6.3	* 0.873	77.0	LOS F	7.8	57.3	1.00	0.85	1.12	29.1
Approach			1152	3.6	1137	3.6	0.873	35.7	LOS C	18.6	135.6	0.62	0.70	0.63	35.3
West: Lambton Road															
10a	L1	All MCs	111	6.7	111	6.7	0.172	19.4	LOS B	3.5	26.2	0.55	0.69	0.55	41.1
11	T1	All MCs	555	3.6	555	3.6	* 0.931	77.7	LOS F	21.3	151.2	1.00	1.09	1.34	28.6
Approach			665	4.1	665	4.1	0.931	68.0	LOS E	21.3	151.2	0.92	1.02	1.21	29.5
SouthWest: Bridges Road															
30b	L3	All MCs	16	13.3	16	13.3	0.683	11.0	LOS A	22.6	161.3	0.87	0.81	0.87	38.9
31	T1	All MCs	1125	2.0	1125	2.0	* 0.683	46.3	LOS D	35.6	253.7	0.87	0.79	0.87	28.7
32a	R1	All MCs	389	2.2	389	2.2	0.538	43.9	LOS D	6.1	43.7	0.98	0.79	0.98	37.7
Approach			1531	2.1	1531	2.1	0.683	45.3	LOS D	35.6	253.7	0.90	0.79	0.90	27.5
All Vehicles			4234	3.9	4220	3.9	0.931	44.9	LOS D	35.6	253.7	0.80	0.79	0.85	31.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	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	60.2	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
SouthWest: Bridges Road										
P8 Full	1	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
All Pedestrians	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 Base PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [Newcastle Indoor Sports Facility - PM Peak (Network Folder: 2024 Base)]

1645 - 1745
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 132 seconds (Network 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	381	3.2	0.348	22.2	LOS B	5.3	38.4	0.29	0.69	0.29	49.4
2	T1	All MCs	847	2.6	815	2.6	* 1.035	131.2	LOS F	40.7	291.3	1.00	1.34	1.50	13.0
3	R2	All MCs	411	1.3	395	1.3	* 0.993	96.4	LOS F	15.7	110.9	1.00	1.07	1.42	23.1
Approach			1654	2.4	1590	2.5	1.035	96.5	LOS F	40.7	291.3	0.83	1.11	1.19	18.6
East: Griffiths Road															
4	L2	All MCs	308	3.4	308	3.4	0.283	18.8	LOS B	9.0	65.0	0.50	0.70	0.50	41.3
5	T1	All MCs	756	3.2	756	3.2	* 0.638	47.8	LOS D	17.0	122.5	0.94	0.79	0.94	35.8
6	R2	All MCs	106	1.0	106	1.0	* 0.935	90.3	LOS F	8.1	57.3	1.00	1.03	1.51	21.0
Approach			1171	3.1	1171	3.1	0.935	44.0	LOS D	17.0	122.5	0.83	0.79	0.87	34.7
North: Turton Road															
7	L2	All MCs	134	1.6	134	1.6	0.182	17.8	LOS B	4.1	29.4	0.51	0.70	0.51	42.5
8	T1	All MCs	846	2.1	846	2.1	0.866	78.3	LOS F	24.5	174.5	0.98	0.95	1.12	11.5
9	R2	All MCs	122	10.3	122	10.3	0.696	88.8	LOS F	8.0	61.3	1.00	0.85	1.08	23.2
Approach			1102	3.0	1102	3.0	0.866	72.1	LOS F	24.5	174.5	0.92	0.91	1.04	13.8
West: Griffiths Road															
10	L2	All MCs	123	5.1	123	5.1	0.125	16.0	LOS B	2.8	20.5	0.42	0.65	0.42	43.9
11	T1	All MCs	1368	1.8	1368	1.8	0.575	34.7	LOS C	23.1	164.3	0.85	0.74	0.85	40.5
12	R2	All MCs	398	5.6	398	5.6	0.517	56.3	LOS D	11.5	84.5	0.94	0.81	0.94	22.7
Approach			1889	2.8	1889	2.8	0.575	38.0	LOS C	23.1	164.3	0.84	0.75	0.84	37.0
All Vehicles			5816	2.8	5752	2.8	1.035	61.9	LOS E	40.7	291.3	0.85	0.89	0.98	26.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88

East: Griffiths Road										
P2 Full	7	60.2	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
North: Turton Road										
P3 Full	1	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
West: Griffiths Road										
P4 Full	4	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
All Pedestrians	14	60.1	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 PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [Newcastle Indoor Sports Facility - PM Peak (Network Folder: 2024 Base)]

1645 - 1745
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 132 seconds (Network 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	133	10.0	0.136	31.7	LOS C	5.5	41.4	0.64	0.57	0.64	25.8
2	T1	All MCs	1443	2.6	1379	2.7	* 0.612	27.5	LOS B	11.4	81.6	0.83	0.59	0.83	8.9
Approach			1582	3.3	1512	3.3	0.612	27.9	LOS B	11.4	81.6	0.81	0.59	0.81	9.1
North: Turton Road															
8	T1	All MCs	1448	3.2	1448	3.2	0.438	1.0	LOS A	3.4	24.4	0.09	0.08	0.09	57.1
9	R2	All MCs	101	4.2	101	4.2	* 0.574	42.4	LOS C	5.8	42.3	0.93	0.84	0.93	25.3
Approach			1549	3.3	1549	3.3	0.574	3.7	LOS A	5.8	42.3	0.15	0.13	0.15	50.3
West: Young Road															
10	L2	All MCs	138	3.1	138	3.1	0.292	64.2	LOS E	7.1	51.1	0.85	0.77	0.85	13.9
12	R2	All MCs	259	3.3	259	3.3	* 1.036	146.2	LOS F	24.6	177.3	1.00	1.25	1.71	6.1
Approach			397	3.2	397	3.2	1.036	117.7	LOS F	24.6	177.3	0.95	1.08	1.41	6.7
All Vehicles			3528	3.3	3459	3.3	1.036	27.4	LOS B	24.6	177.3	0.53	0.44	0.58	19.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	21	60.2	LOS F	0.1	0.1	0.96	0.96	226.9	200.0	0.88
North: Turton Road											
P3	Full	17	60.2	LOS F	0.1	0.1	0.96	0.96	226.8	200.0	0.88
West: Young Road											
P4	Full	7	60.2	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
All Pedestrians		45	60.2	LOS F	0.1	0.1	0.96	0.96	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: 103 [Turton Road / McDonald Jones Stadium Southern Access (Site Folder: 2024 Base PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [Newcastle Indoor Sports Facility - PM Peak (Network Folder: 2024 Base)]

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	1509	3.3	0.677	5.8	LOS A	15.6	112.6	0.17	0.15	0.26	28.2
3	R2	All MCs	99	2.1	95	2.2	1.111	211.5	LOS F	10.6	75.3	1.00	1.79	4.42	2.0
Approach			1678	3.1	1604	3.2	1.111	17.9	NA	15.6	112.6	0.22	0.25	0.51	13.5
East: McDonald Jones Stadium Southern Access															
4	L2	All MCs	33	3.2	33	3.2	1.165	188.4	LOS F	5.2	37.0	1.00	2.42	2.79	0.9
6	R2	All MCs	4	0.0	4	0.0	1.165	151.2	LOS F	5.2	37.0	1.00	2.42	2.79	0.9
Approach			37	2.9	37	2.9	1.165	184.2	LOS F	5.2	37.0	1.00	2.42	2.79	0.9
North: Turton Road															
7	L2	All MCs	19	5.6	19	5.6	0.306	4.0	LOS A	0.0	0.0	0.00	0.02	0.00	29.0
8	T1	All MCs	1696	3.2	1687	3.2	0.306	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.2
Approach			1715	3.2	1706	3.2	0.306	0.1	NA	0.0	0.0	0.00	0.01	0.00	58.2
All Vehicles			3429	3.2	3347	3.2	1.165	10.6	NA	15.6	112.6	0.11	0.15	0.27	17.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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: 9.1.6.228

Network: N101 [Newcastle Indoor Sports Facility - PM Peak (Network Folder: 2024 Base)]

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	6.7	47.8	0.00	0.01	0.00	56.4
2	T1	All MCs	1567	3.2	1567	3.2	0.426	0.1	LOS A	10.5	75.3	0.00	0.01	0.00	59.5
Approach			1586	3.1	1586	3.1	0.426	0.2	NA	10.5	75.3	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	1.333	1164.0	LOS F	3.5	24.2	1.00	0.98	1.15	0.2
5	T1	All MCs	1	0.0	1	0.0	1.333	1718.9	LOS F	3.5	24.2	1.00	0.98	1.15	1.7
6	R2	All MCs	1	0.0	1	0.0	1.333	309.3	LOS F	3.5	24.2	1.00	0.98	1.15	0.2
Approach			3	0.0	3	0.0	1.333	1064.1	LOS F	3.5	24.2	1.00	0.98	1.15	0.7
North: Turton Road															
8	T1	All MCs	1693	4.0	1680	4.0	0.301	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	0.195	20.1	LOS B	0.7	4.8	0.85	0.95	0.89	32.5
Approach			1742	3.9	1729	3.9	0.301	0.6	NA	0.7	4.8	0.02	0.03	0.03	52.4
West: Monash Road															
10	L2	All MCs	111	1.9	111	1.9	3.077	1893.1	LOS F	51.2	363.8	1.00	6.43	15.86	0.9
12	R2	All MCs	8	0.0	8	0.0	3.077	1874.3	LOS F	51.2	363.8	1.00	6.43	15.86	0.9
Approach			119	1.8	119	1.8	3.077	1891.8	LOS F	51.2	363.8	1.00	6.43	15.86	0.9
All Vehicles			3451	3.5	3437	3.5	3.077	66.8	NA	51.2	363.8	0.05	0.24	0.56	9.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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: 9.1.6.228

Network: N101 [Newcastle Indoor Sports Facility - PM Peak (Network Folder: 2024 Base)]

1645 - 1745
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 132 seconds (Network 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	0.315	13.6	LOS A	8.4	60.7	0.49	0.69	0.49	47.4
5	T1	All MCs	624	2.2	624	2.2	0.322	33.9	LOS C	14.6	103.9	0.79	0.67	0.79	40.5
6b	R3	All MCs	162	5.8	162	5.8	* 0.509	44.1	LOS D	7.6	55.6	0.97	0.79	0.97	24.3
Approach			1089	3.3	1089	3.3	0.509	29.8	LOS C	14.6	103.9	0.73	0.69	0.73	40.1
NorthEast: Turton Road															
24b	L3	All MCs	598	0.5	591	0.5	0.365	9.9	LOS A	0.0	0.0	0.00	0.58	0.00	50.9
25	T1	All MCs	931	2.7	920	2.7	0.783	41.7	LOS C	25.4	181.8	0.87	0.79	0.90	36.4
26a	R1	All MCs	140	3.0	138	3.0	0.482	70.0	LOS E	7.5	53.8	0.87	0.76	0.87	32.8
Approach			1668	2.0	1650	2.0	0.783	32.7	LOS C	25.4	181.8	0.56	0.71	0.57	36.8
West: Lambton Road															
10a	L1	All MCs	158	10.0	158	10.0	0.204	19.9	LOS B	5.0	38.3	0.56	0.68	0.56	40.8
11	T1	All MCs	696	3.8	696	3.8	* 0.973	88.7	LOS F	28.6	204.9	1.00	1.19	1.43	26.6
Approach			854	4.9	854	4.9	0.973	76.0	LOS F	28.6	204.9	0.92	1.10	1.27	27.7
SouthWest: Bridges Road															
30b	L3	All MCs	20	0.0	20	0.0	0.977	51.6	LOS D	49.4	350.5	1.00	1.26	1.37	26.3
31	T1	All MCs	1262	1.8	1262	1.8	* 0.977	100.1	LOS F	57.8	410.8	1.00	1.22	1.34	16.4
32a	R1	All MCs	616	0.3	616	0.3	* 1.048	164.6	LOS F	29.4	206.1	1.00	1.35	1.72	18.4
Approach			1898	1.3	1898	1.3	1.048	120.5	LOS F	57.8	410.8	1.00	1.27	1.46	15.1
All Vehicles			5509	2.4	5491	2.5	1.048	69.2	LOS E	57.8	410.8	0.80	0.96	1.02	25.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	28	60.2	LOS F	0.1	0.1	0.96	0.96	226.9	200.0	0.88
NorthEast: Turton Road											

P6 Full	15	60.2	LOS F	0.1	0.1	0.96	0.96	226.8	200.0	0.88
SouthWest: Bridges Road										
P8 Full	5	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
All Pedestrians	48	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 Base Weekend Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [Newcastle Indoor Sports Facility - WE Peak (Network Folder: 2024 Base)]

1115 - 1215
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Network 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	401	1.3	0.355	8.6	LOS A	3.9	27.4	0.22	0.62	0.22	50.4
2	T1	All MCs	498	1.1	496	1.1	0.522	17.7	LOS B	7.7	54.1	0.54	0.45	0.54	38.9
3	R2	All MCs	234	0.9	233	0.9	* 0.636	69.5	LOS E	7.1	50.0	1.00	0.83	1.02	26.6
Approach			1134	1.1	1129	1.1	0.636	25.2	LOS B	7.7	54.1	0.52	0.59	0.53	38.0
East: Griffiths Road															
4	L2	All MCs	332	0.3	332	0.3	0.284	15.3	LOS B	7.9	55.4	0.46	0.69	0.46	43.8
5	T1	All MCs	793	0.7	793	0.7	* 0.678	44.9	LOS D	16.6	116.7	0.95	0.80	0.95	36.7
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	0.709	38.6	LOS C	16.6	116.7	0.82	0.78	0.83	36.7
North: Turton Road															
7	L2	All MCs	86	0.0	86	0.0	0.100	10.6	LOS A	1.5	10.5	0.33	0.64	0.33	47.5
8	T1	All MCs	694	0.6	694	0.6	* 0.692	55.1	LOS D	16.1	113.0	0.96	0.81	0.97	13.9
9	R2	All MCs	98	5.4	98	5.4	0.615	71.4	LOS F	5.8	42.7	1.00	0.81	1.04	24.3
Approach			878	1.1	878	1.1	0.692	52.5	LOS D	16.1	113.0	0.90	0.79	0.91	17.0
West: Griffiths Road															
10	L2	All MCs	107	2.0	107	2.0	0.086	7.0	LOS A	0.9	6.1	0.22	0.61	0.22	49.7
11	T1	All MCs	986	0.5	986	0.5	0.402	28.0	LOS B	13.8	97.1	0.77	0.66	0.77	43.0
12	R2	All MCs	463	1.1	463	1.1	0.522	49.9	LOS D	12.0	85.0	0.93	0.81	0.93	24.5
Approach			1557	0.8	1557	0.8	0.522	33.1	LOS C	13.8	97.1	0.78	0.70	0.78	38.2
All Vehicles			4780	0.9	4776	0.9	0.709	36.2	LOS C	16.6	116.7	0.75	0.71	0.76	34.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91
East: Griffiths Road										
P2 Full	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	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91
West: Griffiths Road										
P4 Full	1	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91
All Pedestrians	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

Network: N101 [Newcastle Indoor Sports Facility - WE Peak (Network Folder: 2024 Base)]

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

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	0.099	25.5	LOS B	3.4	23.9	0.57	0.56	0.57	27.8
2	T1	All MCs	1019	1.0	1014	1.0	* 0.445	20.8	LOS B	11.6	81.6	0.68	0.55	0.68	11.0
Approach			1082	1.0	1077	1.0	0.445	21.1	LOS B	11.6	81.6	0.68	0.55	0.68	10.7
North: Turton Road															
8	T1	All MCs	1397	0.7	1397	0.7	0.390	1.3	LOS A	4.0	28.2	0.13	0.12	0.13	56.3
9	R2	All MCs	79	4.0	79	4.0	* 0.202	7.7	LOS A	0.4	3.2	0.11	0.59	0.11	44.1
Approach			1476	0.9	1476	0.9	0.390	1.6	LOS A	4.0	28.2	0.13	0.14	0.13	55.0
West: Young Road															
10	L2	All MCs	89	1.2	89	1.2	0.169	40.2	LOS C	3.9	27.7	0.79	0.74	0.79	15.7
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	12.2
Approach			205	2.1	205	2.1	0.453	49.5	LOS D	6.4	45.7	0.89	0.77	0.89	13.5
All Vehicles			2763	1.0	2758	1.0	0.453	12.8	LOS A	11.6	81.6	0.40	0.35	0.40	30.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91
North: Turton Road											
P3	Full	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	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91
All Pedestrians		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: 9.1.6.228

Network: N101 [Newcastle Indoor Sports Facility - WE Peak (Network Folder: 2024 Base)]

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	1028	0.8	0.270	0.0	LOS A	6.7	47.2	0.00	0.00	0.00	59.8
3	R2	All MCs	48	2.2	48	2.2	0.407	41.8	LOS C	1.3	9.1	0.92	1.02	1.14	8.3
Approach			1079	0.9	1076	0.9	0.407	1.9	NA	6.7	47.2	0.04	0.05	0.05	43.0
East: McDonald Jones Stadium Southern Access															
4	L2	All MCs	41	5.1	41	5.1	1.477	441.0	LOS F	11.9	86.4	1.00	4.12	4.79	0.4
6	R2	All MCs	7	0.0	7	0.0	1.477	638.7	LOS F	11.9	86.4	1.00	4.12	4.79	0.4
Approach			48	4.3	48	4.3	1.477	471.1	LOS F	11.9	86.4	1.00	4.12	4.79	0.4
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	59.2
Approach			1537	0.8	1537	0.8	0.269	0.1	NA	0.0	0.0	0.00	0.01	0.00	58.2
All Vehicles			2664	0.9	2662	0.9	1.477	9.4	NA	11.9	86.4	0.03	0.10	0.11	19.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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: 9.1.6.228

Network: N101 [Newcastle Indoor Sports Facility - WE Peak (Network Folder: 2024 Base)]

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	190.7	LOS F	2.4	16.7	1.00	1.03	1.05	0.4
5	T1	All MCs	1	0.0	1	0.0	1.000	1043.6	LOS F	2.4	16.7	1.00	1.03	1.05	2.9
6	R2	All MCs	1	0.0	1	0.0	1.000	596.3	LOS F	2.4	16.7	1.00	1.03	1.05	0.4
Approach			3	0.0	3	0.0	1.000	610.2	LOS F	2.4	16.7	1.00	1.03	1.05	1.2
North: Turton Road															
8	T1	All MCs	1497	1.0	1484	0.9	0.258	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	0.079	11.6	LOS A	0.3	2.0	0.70	0.87	0.70	37.8
Approach			1534	1.0	1521	0.9	0.258	0.3	NA	0.3	2.0	0.02	0.02	0.02	55.2
West: Monash Road															
10	L2	All MCs	47	2.2	47	2.2	1.062	90.7	LOS F	4.6	32.8	1.00	1.43	2.03	12.3
12	R2	All MCs	2	0.0	2	0.0	1.062	424.6	LOS F	4.6	32.8	1.00	1.43	2.03	12.3
Approach			49	2.1	49	2.1	1.062	104.9	LOS F	4.6	32.8	1.00	1.43	2.03	12.3
All Vehicles			2704	1.0	2691	1.0	1.062	2.9	NA	4.6	32.8	0.03	0.04	0.05	47.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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: 9.1.6.228

Network: N101 [Newcastle Indoor Sports Facility - WE Peak (Network Folder: 2024 Base)]

1115 - 1215
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Network 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	0.318	11.9	LOS A	7.4	52.6	0.51	0.70	0.51	48.5
5	T1	All MCs	412	1.0	412	1.0	0.226	31.9	LOS C	8.7	61.4	0.78	0.64	0.78	41.3
6b	R3	All MCs	198	0.5	198	0.5	* 0.528	41.6	LOS C	8.9	62.3	0.94	0.80	0.94	25.1
Approach			897	1.3	897	1.3	0.528	27.6	LOS B	8.9	62.3	0.73	0.69	0.73	40.3
NorthEast: Turton Road															
24b	L3	All MCs	332	0.3	329	0.3	0.202	7.7	LOS A	0.0	0.0	0.00	0.58	0.00	51.0
25	T1	All MCs	1093	0.4	1084	0.4	* 0.724	22.9	LOS B	21.5	150.7	0.71	0.63	0.71	44.1
26a	R1	All MCs	119	0.0	118	0.0	* 0.634	77.6	LOS F	7.2	50.2	1.00	0.83	1.02	28.5
Approach			1543	0.3	1531	0.3	0.724	23.8	LOS B	21.5	150.7	0.58	0.63	0.58	40.8
West: Lambton Road															
10a	L1	All MCs	91	1.2	91	1.2	0.117	12.4	LOS A	2.0	13.8	0.44	0.65	0.44	46.3
11	T1	All MCs	407	1.6	407	1.6	* 0.610	50.1	LOS D	11.2	78.9	0.98	0.80	0.98	35.1
Approach			498	1.5	498	1.5	0.610	43.2	LOS D	11.2	78.9	0.88	0.78	0.88	36.1
SouthWest: Bridges Road															
30b	L3	All MCs	40	0.0	40	0.0	0.512	9.5	LOS A	14.5	101.9	0.80	0.75	0.80	42.2
31	T1	All MCs	837	0.9	837	0.9	0.512	36.7	LOS C	22.6	159.1	0.80	0.72	0.80	31.3
32a	R1	All MCs	308	0.7	308	0.7	0.547	66.6	LOS E	8.8	61.8	1.00	0.79	1.00	29.5
Approach			1185	0.8	1185	0.8	0.547	43.5	LOS D	22.6	159.1	0.86	0.74	0.86	28.5
All Vehicles			4123	0.8	4111	0.8	0.724	32.7	LOS C	22.6	159.1	0.73	0.69	0.73	36.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	40	54.2	LOS E	0.1	0.1	0.95	0.95	220.9	200.0	0.91

NorthEast: Turton Road										
P6 Full	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	54.2	LOS E	0.0	0.0	0.95	0.95	220.8	200.0	0.91
All Pedestrians	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: 9.1.6.228

Network: N101 [Project - AM Peak (Network Folder: 2024 Project)]

0800-0900
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 132 seconds (Network 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	449	3.5	0.405	9.4	LOS A	6.0	43.5	0.28	0.64	0.28	49.7
2	T1	All MCs	644	3.9	640	3.9	* 0.664	23.6	LOS B	13.5	97.9	0.69	0.59	0.69	34.9
3	R2	All MCs	312	3.0	310	3.0	* 0.872	81.2	LOS F	10.8	77.5	1.00	0.93	1.17	24.4
Approach			1407	3.6	1398	3.6	0.872	31.8	LOS C	13.5	97.9	0.63	0.68	0.67	34.6
East: Griffiths Road															
4	L2	All MCs	221	3.3	221	3.3	0.173	11.2	LOS A	3.9	28.4	0.32	0.64	0.32	47.0
5	T1	All MCs	731	5.6	731	5.6	* 0.532	42.0	LOS C	15.4	112.7	0.88	0.75	0.88	37.7
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	37.2	LOS C	15.4	112.7	0.76	0.73	0.77	37.6
North: Turton Road															
7	L2	All MCs	100	12.6	100	12.6	0.145	14.6	LOS B	2.6	20.0	0.43	0.67	0.43	44.3
8	T1	All MCs	534	4.1	534	4.1	0.504	50.3	LOS D	12.7	92.4	0.91	0.75	0.91	13.6
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	48.0	LOS D	12.7	92.4	0.85	0.75	0.86	19.1
West: Griffiths Road															
10	L2	All MCs	108	9.7	108	9.7	0.092	7.7	LOS A	1.2	8.8	0.23	0.61	0.23	48.4
11	T1	All MCs	1340	3.1	1340	3.1	0.508	28.9	LOS C	20.7	148.9	0.78	0.69	0.78	42.6
12	R2	All MCs	313	4.0	313	4.0	0.450	58.0	LOS E	9.1	65.8	0.94	0.80	0.94	22.3
Approach			1761	3.6	1761	3.6	0.508	32.8	LOS C	20.7	148.9	0.78	0.70	0.78	39.3
All Vehicles			4897	4.4	4888	4.4	0.872	35.7	LOS C	20.7	148.9	0.74	0.71	0.76	35.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88

East: Griffiths Road										
P2 Full	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	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
West: Griffiths Road										
P4 Full	7	60.2	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
All Pedestrians	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: 9.1.6.228

Network: N101 [Project - AM Peak (Network Folder: 2024 Project)]

0800-0900
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 132 seconds (Network 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	0.131	6.9	LOS A	1.0	7.0	0.12	0.50	0.12	33.4
2	T1	All MCs	1334	3.2	1325	3.2	* 0.588	2.4	LOS A	8.8	63.1	0.17	0.16	0.17	36.8
Approach			1442	3.3	1432	3.3	0.588	2.7	LOS A	8.8	63.1	0.16	0.18	0.16	35.7
North: Turton Road															
8	T1	All MCs	959	0.1	959	0.1	0.295	1.9	LOS A	3.1	22.0	0.13	0.12	0.13	54.7
9	R2	All MCs	79	2.7	79	2.7	* 0.288	8.9	LOS A	0.8	5.9	0.18	0.62	0.18	40.2
Approach			1038	0.3	1038	0.3	0.295	2.5	LOS A	3.1	22.0	0.14	0.15	0.14	52.3
West: Young Road															
10	L2	All MCs	68	6.2	68	6.2	0.127	40.6	LOS C	3.2	23.3	0.76	0.71	0.76	14.6
12	R2	All MCs	178	5.3	178	5.3	* 0.581	58.2	LOS E	10.7	78.4	0.97	0.81	0.97	11.3
Approach			246	5.6	246	5.6	0.581	53.3	LOS D	10.7	78.4	0.91	0.78	0.91	12.0
All Vehicles			2726	2.4	2717	2.4	0.588	7.2	LOS A	10.7	78.4	0.22	0.23	0.22	35.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
North: Turton Road											
P3	Full	7	60.2	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
West: Young Road											
P4	Full	4	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
All Pedestrians		17	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: 103 [Turton Road / McDonald Jones Stadium Southern Access (Site Folder: 2024 Project AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [Project - AM Peak (Network Folder: 2024 Project)]

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	1452	3.3	0.449	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.6
3	R2	All MCs	40	7.9	40	7.9	0.205	23.4	LOS B	0.6	4.6	0.82	0.94	0.88	12.7
Approach			1497	3.4	1492	3.4	0.449	0.7	NA	0.6	4.6	0.02	0.03	0.02	52.3
East: McDonald Jones Stadium Southern Access															
4	L2	All MCs	33	3.2	33	3.2	1.791	723.4	LOS F	14.1	102.7	1.00	4.10	4.57	0.2
6	R2	All MCs	11	10.0	11	10.0	1.791	894.8	LOS F	14.1	102.7	1.00	4.10	4.57	0.2
Approach			43	4.9	43	4.9	1.791	765.2	LOS F	14.1	102.7	1.00	4.10	4.57	0.2
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	58.7
Approach			1179	4.6	1179	4.6	0.214	0.1	NA	0.0	0.0	0.00	0.01	0.00	57.0
All Vehicles			2719	3.9	2714	4.0	1.791	12.6	NA	14.1	102.7	0.03	0.08	0.09	16.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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)]

Network: N101 [Project - AM Peak (Network Folder: 2024 Project)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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	59.5
East: Newcastle International Hockey Centre Northern Exit															
4	L2	All MCs	1	0.0	1	0.0	1.000	217.6	LOS F	3.0	20.8	1.00	1.03	1.05	0.3
5	T1	All MCs	1	0.0	1	0.0	1.000	1311.1	LOS F	3.0	20.8	1.00	1.03	1.05	2.3
6	R2	All MCs	1	0.0	1	0.0	1.000	714.8	LOS F	3.0	20.8	1.00	1.03	1.05	0.3
Approach			3	0.0	3	0.0	1.000	747.8	LOS F	3.0	20.8	1.00	1.03	1.05	1.0
North: Turton Road															
8	T1	All MCs	1157	4.4	1143	4.4	0.206	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	All MCs	36	5.9	35	5.9	0.141	19.3	LOS B	0.5	3.4	0.83	0.93	0.83	29.2
Approach			1193	4.4	1178	4.4	0.206	0.6	NA	0.5	3.4	0.02	0.03	0.02	50.6
West: Monash Road															
10	L2	All MCs	53	0.0	53	0.0	1.085	110.3	LOS F	5.6	39.8	1.00	1.69	2.58	10.3
12	R2	All MCs	5	20.0	5	20.0	1.085	253.0	LOS F	5.6	39.8	1.00	1.69	2.58	10.3
Approach			58	1.8	58	1.8	1.085	123.3	LOS F	5.6	39.8	1.00	1.69	2.58	10.3
All Vehicles			2720	3.8	2706	3.9	1.085	3.8	NA	5.6	39.8	0.03	0.05	0.07	45.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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: 9.1.6.228

Network: N101 [Project - AM Peak (Network Folder: 2024 Project)]

0800-0900
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 132 seconds (Network 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	0.184	8.8	LOS A	3.0	23.0	0.34	0.62	0.34	50.5
5	T1	All MCs	475	5.1	475	5.1	0.263	34.6	LOS C	11.0	80.7	0.78	0.65	0.78	40.3
6b	R3	All MCs	238	8.4	238	8.4	* 0.826	72.6	LOS F	16.0	120.3	1.00	0.92	1.16	17.6
Approach			895	6.9	895	6.9	0.826	39.4	LOS C	16.0	120.3	0.75	0.72	0.79	35.4
NorthEast: Turton Road															
24b	L3	All MCs	342	0.3	338	0.3	0.219	8.1	LOS A	0.0	0.0	0.00	0.58	0.00	51.0
25	T1	All MCs	693	4.7	684	4.7	0.610	42.5	LOS D	18.7	136.0	0.86	0.74	0.86	34.7
26a	R1	All MCs	117	6.3	115	6.3	* 0.873	77.0	LOS F	7.8	57.2	1.00	0.85	1.12	29.1
Approach			1152	3.6	1137	3.6	0.873	35.8	LOS C	18.7	136.0	0.62	0.70	0.63	35.3
West: Lambton Road															
10a	L1	All MCs	124	5.9	124	5.9	0.194	19.7	LOS B	4.1	30.0	0.56	0.69	0.56	40.9
11	T1	All MCs	558	4.2	558	4.2	* 0.931	77.5	LOS F	21.3	151.2	1.00	1.09	1.34	28.6
Approach			682	4.5	682	4.5	0.931	67.0	LOS E	21.3	151.2	0.92	1.02	1.20	29.6
SouthWest: Bridges Road															
30b	L3	All MCs	16	13.3	16	13.3	0.689	11.0	LOS A	22.9	163.3	0.87	0.81	0.87	38.9
31	T1	All MCs	1136	1.9	1136	1.9	* 0.689	46.6	LOS D	36.1	257.0	0.88	0.79	0.88	28.6
32a	R1	All MCs	389	2.2	389	2.2	0.538	44.0	LOS D	6.1	43.7	0.98	0.79	0.98	37.7
Approach			1541	2.1	1541	2.1	0.689	45.5	LOS D	36.1	257.0	0.90	0.79	0.90	27.4
All Vehicles			4269	3.9	4255	3.9	0.931	45.1	LOS D	36.1	257.0	0.80	0.79	0.85	31.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	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	60.2	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
SouthWest: Bridges Road										
P8 Full	1	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
All Pedestrians	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: 9.1.6.228

Network: N101 [Project - PM Peak (Network Folder: 2024 Project)]

1645 - 1745
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 132 seconds (Network 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	471	2.6	0.429	22.5	LOS B	9.0	64.1	0.39	0.94	0.39	48.3
2	T1	All MCs	874	2.5	805	2.6	* 1.050	142.0	LOS F	42.1	301.2	1.00	1.39	1.57	12.1
3	R2	All MCs	495	1.1	455	1.1	* 1.148	217.5	LOS F	26.1	184.1	1.00	1.40	2.05	12.9
Approach			1880	2.1	1731	2.2	1.148	129.3	LOS F	42.1	301.2	0.83	1.27	1.37	15.3
East: Griffiths Road															
4	L2	All MCs	322	3.3	322	3.3	0.300	20.0	LOS B	9.9	71.4	0.53	0.71	0.53	40.5
5	T1	All MCs	756	3.2	756	3.2	* 0.638	47.8	LOS D	17.0	122.5	0.94	0.79	0.94	35.8
6	R2	All MCs	106	1.0	106	1.0	* 0.935	90.3	LOS F	8.1	57.3	1.00	1.03	1.51	21.0
Approach			1184	3.0	1184	3.0	0.935	44.1	LOS D	17.0	122.5	0.83	0.79	0.88	34.7
North: Turton Road															
7	L2	All MCs	134	1.6	134	1.6	0.183	18.4	LOS B	4.3	30.2	0.52	0.70	0.52	42.2
8	T1	All MCs	873	2.1	873	2.1	0.901	84.3	LOS F	26.7	190.4	0.98	0.99	1.17	10.8
9	R2	All MCs	122	10.3	122	10.3	0.696	90.3	LOS F	8.0	61.3	1.00	0.85	1.08	23.2
Approach			1128	2.9	1128	2.9	0.901	77.1	LOS F	26.7	190.4	0.93	0.94	1.08	13.0
West: Griffiths Road															
10	L2	All MCs	123	5.1	123	5.1	0.125	16.0	LOS B	2.8	20.5	0.42	0.65	0.42	43.9
11	T1	All MCs	1368	1.8	1368	1.8	0.575	34.7	LOS C	23.1	164.3	0.85	0.74	0.85	40.5
12	R2	All MCs	406	5.4	406	5.4	0.527	56.5	LOS D	11.8	86.4	0.94	0.81	0.94	22.7
Approach			1898	2.8	1898	2.8	0.575	38.1	LOS C	23.1	164.3	0.84	0.75	0.84	36.9
All Vehicles			6091	2.6	5942	2.7	1.148	73.3	LOS F	42.1	301.2	0.85	0.95	1.05	23.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88

East: Griffiths Road										
P2 Full	7	60.2	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
North: Turton Road										
P3 Full	1	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
West: Griffiths Road										
P4 Full	4	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
All Pedestrians	14	60.1	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 PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [Project - PM Peak (Network Folder: 2024 Project)]

1645 - 1745
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 132 seconds (Network 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	127	10.3	0.148	32.7	LOS C	6.1	46.2	0.65	0.55	0.65	25.9
2	T1	All MCs	1669	2.3	1521	2.4	* 0.668	29.5	LOS C	11.4	81.6	0.86	0.62	0.86	8.4
Approach			1808	2.9	1648	3.0	0.668	29.7	LOS C	11.4	81.6	0.85	0.62	0.85	8.4
North: Turton Road															
8	T1	All MCs	1448	3.2	1448	3.2	0.438	5.7	LOS A	3.4	24.7	0.09	0.08	0.09	57.0
9	R2	All MCs	149	2.8	149	2.8	* 0.937	116.5	LOS F	12.8	91.5	1.00	1.12	1.46	14.5
Approach			1598	3.2	1598	3.2	0.937	16.1	LOS B	12.8	91.5	0.18	0.18	0.22	33.7
West: Young Road															
10	L2	All MCs	138	3.1	138	3.1	0.292	64.5	LOS E	7.1	51.1	0.85	0.77	0.85	13.9
12	R2	All MCs	259	3.3	259	3.3	* 1.036	146.2	LOS F	24.6	177.3	1.00	1.25	1.71	6.1
Approach			397	3.2	397	3.2	1.036	117.8	LOS F	24.6	177.3	0.95	1.08	1.41	6.7
All Vehicles			3803	3.0	3643	3.1	1.036	33.3	LOS C	24.6	177.3	0.56	0.48	0.63	16.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	21	60.2	LOS F	0.1	0.1	0.96	0.96	226.9	200.0	0.88
North: Turton Road											
P3	Full	17	60.2	LOS F	0.1	0.1	0.96	0.96	226.8	200.0	0.88
West: Young Road											
P4	Full	7	60.2	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
All Pedestrians		45	60.2	LOS F	0.1	0.1	0.96	0.96	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: 103 [Turton Road / McDonald Jones Stadium Southern Access (Site Folder: 2024 Project PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [Project - PM Peak (Network Folder: 2024 Project)]

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	1633	3.0	0.713	5.6	LOS A	15.7	112.6	0.19	0.17	0.28	28.5
3	R2	All MCs	99	2.1	90	2.2	1.061	180.8	LOS F	8.5	60.6	1.00	1.65	3.81	2.3
Approach			1891	2.8	1723	2.9	1.061	14.8	NA	15.7	112.6	0.23	0.25	0.46	15.5
East: McDonald Jones Stadium Southern Access															
4	L2	All MCs	33	3.2	33	3.2	1.165	187.7	LOS F	5.1	36.8	1.00	2.44	2.82	0.9
6	R2	All MCs	4	0.0	4	0.0	1.165	151.1	LOS F	5.1	36.8	1.00	2.44	2.82	0.9
Approach			37	2.9	37	2.9	1.165	183.5	LOS F	5.1	36.8	1.00	2.44	2.82	0.9
North: Turton Road															
7	L2	All MCs	19	5.6	19	5.6	0.306	4.0	LOS A	0.0	0.0	0.00	0.02	0.00	29.0
8	T1	All MCs	1696	3.2	1687	3.2	0.306	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.2
Approach			1715	3.2	1706	3.2	0.306	0.1	NA	0.0	0.0	0.00	0.01	0.00	58.2
All Vehicles			3642	3.0	3466	3.1	1.165	9.3	NA	15.7	112.6	0.12	0.15	0.26	19.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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)]

Network: N101 [Project - PM Peak (Network Folder: 2024 Project)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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	18	0.0	0.453	5.6	LOS A	13.6	97.6	0.00	0.01	0.00	56.4
2	T1	All MCs	1723	2.9	1673	2.9	0.453	0.1	LOS A	17.0	121.7	0.00	0.01	0.00	59.5
Approach			1742	2.8	1691	2.9	0.453	0.2	NA	17.0	121.7	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	1.333	2113.8	LOS F	3.4	23.9	1.00	0.99	1.15	0.2
5	T1	All MCs	1	0.0	1	0.0	1.333	724.7	LOS F	3.4	23.9	1.00	0.99	1.15	1.7
6	R2	All MCs	1	0.0	1	0.0	1.333	304.3	LOS F	3.4	23.9	1.00	0.99	1.15	0.2
Approach			3	0.0	3	0.0	1.333	1047.6	LOS F	3.4	23.9	1.00	0.99	1.15	0.7
North: Turton Road															
8	T1	All MCs	1693	4.0	1680	4.0	0.301	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	0.231	23.9	LOS B	0.8	5.7	0.88	0.97	0.96	30.5
Approach			1742	3.9	1729	3.9	0.301	0.7	NA	0.8	5.7	0.03	0.03	0.03	51.5
West: Monash Road															
10	L2	All MCs	167	1.3	167	1.3	3.347	2130.5	LOS F	78.0	551.5	1.00	8.06	20.69	0.8
12	R2	All MCs	8	0.0	8	0.0	3.347	2116.6	LOS F	78.0	551.5	1.00	8.06	20.69	0.8
Approach			176	1.2	176	1.2	3.347	2129.9	LOS F	78.0	551.5	1.00	8.06	20.69	0.8
All Vehicles			3663	3.3	3599	3.3	3.347	105.4	NA	78.0	551.5	0.06	0.41	1.02	6.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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: 9.1.6.228

Network: N101 [Project - PM Peak (Network Folder: 2024 Project)]

1645 - 1745
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 132 seconds (Network 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	0.314	13.2	LOS A	8.4	60.6	0.49	0.68	0.49	47.7
5	T1	All MCs	624	2.2	624	2.2	0.322	33.9	LOS C	14.6	103.9	0.79	0.67	0.79	40.5
6b	R3	All MCs	203	4.7	203	4.7	* 0.653	45.1	LOS D	9.7	70.8	1.00	0.81	1.00	24.0
Approach			1131	3.2	1131	3.2	0.653	30.4	LOS C	14.6	103.9	0.75	0.70	0.75	39.6
NorthEast: Turton Road															
24b	L3	All MCs	598	0.5	591	0.5	0.365	9.9	LOS A	0.0	0.0	0.00	0.58	0.00	50.9
25	T1	All MCs	931	2.7	920	2.7	0.782	40.6	LOS C	25.4	181.9	0.87	0.78	0.88	36.8
26a	R1	All MCs	140	3.0	138	3.0	0.482	69.4	LOS E	7.5	53.8	0.87	0.76	0.87	32.8
Approach			1668	2.0	1649	2.0	0.782	32.0	LOS C	25.4	181.9	0.56	0.70	0.57	37.1
West: Lambton Road															
10a	L1	All MCs	222	7.1	222	7.1	0.298	22.3	LOS B	7.7	57.5	0.61	0.71	0.61	39.3
11	T1	All MCs	696	3.8	696	3.8	* 0.973	88.7	LOS F	28.6	204.9	1.00	1.19	1.43	26.6
Approach			918	4.6	918	4.6	0.973	72.6	LOS F	28.6	204.9	0.91	1.08	1.23	28.0
SouthWest: Bridges Road															
30b	L3	All MCs	20	0.0	20	0.0	1.036	82.2	LOS F	58.4	414.2	1.00	1.26	1.58	22.1
31	T1	All MCs	1313	1.7	1313	1.7	* 1.036	123.5	LOS F	69.1	490.8	1.00	1.34	1.55	12.7
32a	R1	All MCs	616	0.3	616	0.3	* 1.048	165.1	LOS F	29.4	206.1	1.00	1.35	1.72	18.4
Approach			1948	1.2	1948	1.2	1.048	136.2	LOS F	69.1	490.8	1.00	1.34	1.61	13.2
All Vehicles			5665	2.4	5646	2.4	1.048	74.2	LOS F	69.1	490.8	0.80	0.98	1.07	24.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	28	60.2	LOS F	0.1	0.1	0.96	0.96	226.9	200.0	0.88
NorthEast: Turton Road											

P6 Full	15	60.2	LOS F	0.1	0.1	0.96	0.96	226.8	200.0	0.88
SouthWest: Bridges Road										
P8 Full	5	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
All Pedestrians	48	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 Weekend Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [Project - WE Peak (Network Folder: 2024 Project)]

1115 - 1215
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 132 seconds (Network User-Given Cycle Time)

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	463	1.1	1.420	422.9	LOS F	73.2	517.3	1.00	1.83	3.06	6.2
2	T1	All MCs	513	1.0	509	1.0	0.419	20.9	LOS B	7.8	54.8	0.45	0.38	0.45	40.2
3	R2	All MCs	281	0.7	279	0.8	* 0.767	77.5	LOS F	9.4	66.6	1.00	0.87	1.08	25.1
Approach			1260	1.0	1250	1.0	1.420	182.3	LOS F	73.2	517.3	0.78	1.02	1.56	11.1
East: Griffiths Road															
4	L2	All MCs	339	0.3	339	0.3	0.223	7.7	LOS A	1.8	12.8	0.09	0.58	0.09	51.7
5	T1	All MCs	793	0.7	793	0.7	* 0.803	57.1	LOS E	20.1	141.2	0.99	0.89	1.06	33.2
6	R2	All MCs	87	2.4	87	2.4	0.390	64.6	LOS E	5.3	38.0	0.97	0.77	0.97	25.6
Approach			1219	0.7	1219	0.7	0.803	43.9	LOS D	20.1	141.2	0.74	0.80	0.79	34.8
North: Turton Road															
7	L2	All MCs	86	0.0	86	0.0	0.099	14.7	LOS B	2.1	14.9	0.45	0.66	0.45	44.6
8	T1	All MCs	708	0.6	708	0.6	* 0.557	51.7	LOS D	16.4	115.4	0.88	0.75	0.88	14.8
9	R2	All MCs	98	5.4	98	5.4	0.620	77.9	LOS F	6.4	46.7	1.00	0.81	1.03	23.2
Approach			893	1.1	893	1.1	0.620	51.0	LOS D	16.4	115.4	0.85	0.75	0.86	17.3
West: Griffiths Road															
10	L2	All MCs	107	2.0	107	2.0	0.091	7.8	LOS A	1.2	8.4	0.25	0.62	0.25	48.9
11	T1	All MCs	986	0.5	986	0.5	0.611	46.4	LOS D	18.7	131.7	0.94	0.80	0.94	36.2
12	R2	All MCs	468	1.1	468	1.1	* 0.490	51.9	LOS D	13.0	92.0	0.91	0.81	0.91	23.9
Approach			1562	0.8	1562	0.8	0.611	45.4	LOS D	18.7	131.7	0.88	0.79	0.88	33.6
All Vehicles			4934	0.9	4924	0.9	1.420	80.8	LOS F	73.2	517.3	0.81	0.84	1.03	21.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88

East: Griffiths Road										
P2 Full	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	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
West: Griffiths Road										
P4 Full	1	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
All Pedestrians	13	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 Weekend Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [Project - WE Peak (Network Folder: 2024 Project)]

1115 - 1215
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 132 seconds (Network User-Given Cycle Time)

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	0.132	18.9	LOS B	5.5	38.9	0.61	0.50	0.61	27.5
2	T1	All MCs	1145	0.9	1136	0.9	* 0.594	22.0	LOS B	11.6	81.6	0.80	0.58	0.80	8.8
Approach			1208	0.9	1198	0.9	0.594	21.8	LOS B	11.6	81.6	0.79	0.58	0.79	10.3
North: Turton Road															
8	T1	All MCs	1397	0.7	1397	0.7	0.377	1.2	LOS A	4.1	28.6	0.13	0.12	0.13	56.5
9	R2	All MCs	106	3.0	106	3.0	* 0.312	8.8	LOS A	0.9	6.3	0.14	0.60	0.14	43.1
Approach			1503	0.8	1503	0.8	0.377	1.8	LOS A	4.1	28.6	0.13	0.15	0.13	54.6
West: Young Road															
10	L2	All MCs	89	1.2	89	1.2	0.180	45.2	LOS D	4.4	31.2	0.81	0.74	0.81	14.4
12	R2	All MCs	116	2.7	116	2.7	* 0.529	64.9	LOS E	7.2	51.6	0.99	0.79	0.99	11.0
Approach			205	2.1	205	2.1	0.529	56.3	LOS D	7.2	51.6	0.91	0.77	0.91	12.2
All Vehicles			2917	0.9	2907	0.9	0.594	13.9	LOS A	11.6	81.6	0.45	0.37	0.45	29.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	60.2	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
North: Turton Road											
P3	Full	16	60.2	LOS F	0.1	0.1	0.96	0.96	226.8	200.0	0.88
West: Young Road											
P4	Full	1	60.1	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
All Pedestrians		25	60.2	LOS F	0.1	0.1	0.96	0.96	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: 103 [Turton Road / McDonald Jones Stadium Southern Access (Site Folder: 2024 Project Weekend Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [Project - WE Peak (Network Folder: 2024 Project)]

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	1149	0.7	0.402	0.0	LOS A	16.0	112.6	0.00	0.00	0.00	59.6
3	R2	All MCs	48	2.2	48	2.2	0.406	41.8	LOS C	1.3	9.1	0.92	1.02	1.14	8.3
Approach			1205	0.8	1197	0.8	0.406	1.7	NA	16.0	112.6	0.04	0.04	0.05	44.2
East: McDonald Jones Stadium Southern Access															
4	L2	All MCs	41	5.1	41	5.1	1.477	443.0	LOS F	11.8	85.6	1.00	4.21	4.90	0.4
6	R2	All MCs	7	0.0	7	0.0	1.477	595.7	LOS F	11.8	85.6	1.00	4.21	4.90	0.4
Approach			48	4.3	48	4.3	1.477	466.3	LOS F	11.8	85.6	1.00	4.21	4.90	0.4
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	59.2
Approach			1537	0.8	1537	0.8	0.269	0.1	NA	0.0	0.0	0.00	0.01	0.00	58.2
All Vehicles			2791	0.8	2782	0.8	1.477	8.9	NA	16.0	112.6	0.03	0.09	0.11	19.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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)]

Network: N101 [Project - WE Peak (Network Folder: 2024 Project)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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	9.1	64.1	0.00	0.01	0.00	59.7
Approach			1209	0.9	1209	0.9	0.318	0.1	NA	9.1	64.1	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	1.333	407.7	LOS F	2.9	20.4	1.00	1.00	1.19	0.2
5	T1	All MCs	1	0.0	1	0.0	1.333	1677.2	LOS F	2.9	20.4	1.00	1.00	1.19	1.8
6	R2	All MCs	1	0.0	1	0.0	1.333	856.5	LOS F	2.9	20.4	1.00	1.00	1.19	0.2
Approach			3	0.0	3	0.0	1.333	980.5	LOS F	2.9	20.4	1.00	1.00	1.19	0.8
North: Turton Road															
8	T1	All MCs	1497	1.0	1484	0.9	0.258	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	0.090	12.9	LOS A	0.3	2.2	0.74	0.89	0.74	36.9
Approach			1534	1.0	1521	0.9	0.258	0.3	NA	0.3	2.2	0.02	0.02	0.02	54.9
West: Monash Road															
10	L2	All MCs	82	1.3	82	1.3	1.113	127.2	LOS F	8.3	58.7	1.00	1.94	3.31	10.3
12	R2	All MCs	2	0.0	2	0.0	1.113	304.4	LOS F	8.3	58.7	1.00	1.94	3.31	10.3
Approach			84	1.3	84	1.3	1.113	131.6	LOS F	8.3	58.7	1.00	1.94	3.31	10.3
All Vehicles			2831	0.9	2817	0.9	1.333	5.3	NA	9.1	64.1	0.04	0.07	0.11	41.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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: 9.1.6.228

Network: N101 [Project - WE Peak (Network Folder: 2024 Project)]

1115 - 1215
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 132 seconds (Network User-Given Cycle Time)

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	0.328	13.7	LOS A	8.8	62.5	0.54	0.71	0.54	47.3
5	T1	All MCs	412	1.0	412	1.0	0.225	34.8	LOS C	9.5	67.2	0.78	0.64	0.78	40.2
6b	R3	All MCs	221	0.5	221	0.5	* 0.634	45.9	LOS D	10.9	77.0	0.98	0.81	0.98	23.7
Approach			920	1.3	920	1.3	0.634	30.9	LOS C	10.9	77.0	0.75	0.70	0.75	38.7
NorthEast: Turton Road															
24b	L3	All MCs	332	0.3	329	0.3	0.202	7.7	LOS A	0.0	0.0	0.00	0.58	0.00	51.0
25	T1	All MCs	1093	0.4	1084	0.4	* 0.691	30.2	LOS C	25.2	177.3	0.75	0.67	0.75	40.9
26a	R1	All MCs	119	0.0	118	0.0	* 0.697	89.2	LOS F	7.9	55.5	1.00	0.85	1.05	27.0
Approach			1543	0.3	1530	0.3	0.697	29.9	LOS C	25.2	177.3	0.61	0.67	0.61	37.7
West: Lambton Road															
10a	L1	All MCs	128	0.8	128	0.8	0.166	11.6	LOS A	2.8	19.6	0.44	0.65	0.44	47.1
11	T1	All MCs	407	1.6	407	1.6	* 0.671	57.5	LOS E	12.6	88.9	0.99	0.83	1.01	33.1
Approach			536	1.4	536	1.4	0.671	46.5	LOS D	12.6	88.9	0.86	0.79	0.87	34.7
SouthWest: Bridges Road															
30b	L3	All MCs	40	0.0	40	0.0	0.508	9.7	LOS A	15.9	112.1	0.78	0.74	0.78	41.8
31	T1	All MCs	867	0.8	867	0.8	0.508	38.7	LOS C	25.0	176.5	0.78	0.71	0.78	30.9
32a	R1	All MCs	308	0.7	308	0.7	0.664	78.1	LOS F	9.9	69.4	1.00	0.82	1.03	27.8
Approach			1216	0.8	1216	0.8	0.664	47.7	LOS D	25.0	176.5	0.84	0.74	0.85	27.1
All Vehicles			4215	0.8	4202	0.8	0.697	37.4	LOS C	25.2	177.3	0.74	0.71	0.74	34.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	40	60.2	LOS F	0.1	0.1	0.96	0.96	226.9	200.0	0.88
NorthEast: Turton Road											

P6 Full	17	60.2	LOS F	0.1	0.1	0.96	0.96	226.8	200.0	0.88
SouthWest: Bridges Road										
P8 Full	7	60.2	LOS F	0.0	0.0	0.95	0.95	226.8	200.0	0.88
All Pedestrians	64	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: 102 [Turton Road / Young Road - TCS 3322 (Site Folder: 2024 Project PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [Upgrades - PM Peak (Network Folder: 2024 Project)]

1645 - 1745
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network Practical Cycle Time)

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	101	10.2	0.161	46.5	LOS D	4.8	36.0	0.61	0.68	0.61	22.3
2	T1	All MCs	1669	2.3	1214	2.4	* 0.724	40.6	LOS C	11.4	81.6	0.86	0.78	0.86	6.5
Approach			1808	2.9	1315	3.0	0.724	41.1	LOS C	11.4	81.6	0.84	0.77	0.84	6.4
North: Turton Road															
8	T1	All MCs	1448	3.2	1448	3.2	0.489	3.8	LOS A	5.4	38.5	0.13	0.12	0.13	54.7
9	R2	All MCs	149	2.8	149	2.8	* 0.493	54.7	LOS D	9.0	64.3	0.93	0.88	0.93	23.3
Approach			1598	3.2	1598	3.2	0.493	8.6	LOS A	9.0	64.3	0.21	0.19	0.21	42.1
West: Young Road															
10	L2	All MCs	138	3.1	138	3.1	0.175	45.2	LOS D	5.7	41.0	0.65	0.72	0.65	18.5
12	R2	All MCs	259	3.3	259	3.3	* 0.737	73.6	LOS F	16.9	121.3	0.99	0.86	1.03	11.6
Approach			397	3.2	397	3.2	0.737	63.8	LOS E	16.9	121.3	0.87	0.81	0.90	11.1
All Vehicles			3803	3.0	3310	3.5	0.737	28.1	LOS B	16.9	121.3	0.54	0.50	0.54	19.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	21	64.2	LOS F	0.1	0.1	0.96	0.96	230.9	200.0	0.87
North: Turton Road											
P3	Full	17	64.2	LOS F	0.1	0.1	0.96	0.96	230.8	200.0	0.87
West: Young Road											
P4	Full	7	64.1	LOS F	0.0	0.0	0.96	0.96	230.8	200.0	0.87
All Pedestrians		45	64.2	LOS F	0.1	0.1	0.96	0.96	230.8	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: 9.1.6.228

Network: N101 [Upgrades - PM Peak (Network Folder: 2024 Project)]

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	1666	2.9	0.960	34.2	LOS C	15.7	112.6	0.46	0.45	1.42	7.8
3	R2	All MCs	99	2.1	92	2.2	1.062	182.6	LOS F	8.7	61.7	1.00	1.66	3.86	2.3
Approach			1891	2.8	1758	2.9	1.062	43.1	NA	15.7	112.6	0.49	0.51	1.55	6.5
East: McDonald Jones Stadium Southern Access															
4	L2	All MCs	33	3.2	33	3.2	1.165	188.9	LOS F	5.2	37.2	1.00	2.40	2.77	0.9
6	R2	All MCs	4	0.0	4	0.0	1.165	151.2	LOS F	5.2	37.2	1.00	2.40	2.77	0.9
Approach			37	2.9	37	2.9	1.165	184.6	LOS F	5.2	37.2	1.00	2.40	2.77	0.9
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	59.2
Approach			1715	3.2	1715	3.2	0.307	0.1	NA	0.0	0.0	0.00	0.01	0.00	58.2
All Vehicles			3642	3.0	3509	3.1	1.165	23.0	NA	15.7	112.6	0.26	0.28	0.80	9.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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)]

Network: N101 [Upgrades - PM Peak (Network Folder: 2024 Project)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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	18	0.0	0.450	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	56.4
2	T1	All MCs	1723	2.9	1661	2.9	0.450	0.1	LOS A	41.3	296.0	0.00	0.01	0.00	59.5
Approach			1742	2.8	1679	2.9	0.450	0.2	NA	41.3	296.0	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	1.333	2021.0	LOS F	3.4	23.9	1.00	0.99	1.15	0.2
5	T1	All MCs	1	0.0	1	0.0	1.333	819.8	LOS F	3.4	23.9	1.00	0.99	1.15	1.7
6	R2	All MCs	1	0.0	1	0.0	1.333	304.6	LOS F	3.4	23.9	1.00	0.99	1.15	0.2
Approach			3	0.0	3	0.0	1.333	1048.5	LOS F	3.4	23.9	1.00	0.99	1.15	0.7
North: Turton Road															
8	T1	All MCs	1693	4.0	1688	4.0	0.303	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	0.227	23.4	LOS B	0.8	5.6	0.88	0.97	0.95	30.8
Approach			1742	3.9	1737	3.9	0.303	0.7	NA	0.8	5.6	0.02	0.03	0.03	51.7
West: Monash Road															
10	L2	All MCs	167	1.3	167	1.3	1.711	659.9	LOS F	48.2	340.8	1.00	5.22	12.72	2.5
12	R2	All MCs	8	0.0	8	0.0	1.711	646.1	LOS F	48.2	340.8	1.00	5.22	12.72	2.5
Approach			176	1.2	176	1.2	1.711	659.3	LOS F	48.2	340.8	1.00	5.22	12.72	2.5
All Vehicles			3663	3.3	3596	3.3	1.711	33.6	NA	48.2	340.8	0.06	0.27	0.64	17.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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: 9.1.6.228

Network: N101 [Upgrades - PM Peak (Network Folder: 2024 Project)]

1645 - 1745
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network Practical Cycle Time)

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	0.318	13.8	LOS A	9.1	65.8	0.50	0.69	0.50	47.3
5	T1	All MCs	624	2.2	624	2.2	0.334	37.3	LOS C	15.7	112.2	0.80	0.68	0.80	39.2
6b	R3	All MCs	203	4.7	203	4.7	* 0.827	54.7	LOS D	11.5	83.6	1.00	0.88	1.17	21.3
Approach			1131	3.2	1131	3.2	0.827	34.1	LOS C	15.7	112.2	0.76	0.72	0.79	38.1
NorthEast: Turton Road															
24b	L3	All MCs	598	0.5	595	0.5	0.367	9.8	LOS A	0.0	0.0	0.00	0.58	0.00	50.9
25	T1	All MCs	931	2.7	926	2.7	0.752	40.0	LOS C	24.9	178.1	0.83	0.73	0.83	37.3
26a	R1	All MCs	140	3.0	139	3.0	0.470	79.2	LOS F	8.5	61.0	0.93	0.78	0.93	30.5
Approach			1668	2.0	1660	2.0	0.752	32.5	LOS C	24.9	178.1	0.54	0.68	0.54	36.9
West: Lambton Road															
10a	L1	All MCs	222	7.1	222	7.1	0.328	27.1	LOS B	8.6	64.2	0.65	0.72	0.65	37.4
11	T1	All MCs	696	3.8	696	3.8	* 1.032	123.3	LOS F	33.7	241.1	1.00	1.32	1.60	21.8
Approach			918	4.6	918	4.6	1.032	100.0	LOS F	33.7	241.1	0.91	1.17	1.37	23.3
SouthWest: Bridges Road															
30b	L3	All MCs	20	0.0	20	0.0	1.047	89.9	LOS F	65.4	463.9	1.00	1.27	1.58	21.2
31	T1	All MCs	1313	1.7	1313	1.7	* 1.047	130.4	LOS F	70.9	503.2	1.00	1.35	1.57	11.9
32a	R1	All MCs	616	0.3	616	0.3	* 1.035	163.0	LOS F	29.9	209.7	1.00	1.31	1.63	18.8
Approach			1948	1.2	1948	1.2	1.047	140.3	LOS F	70.9	503.2	1.00	1.33	1.59	12.9
All Vehicles			5665	2.4	5657	2.4	1.047	80.9	LOS F	70.9	503.2	0.80	0.99	1.09	22.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	28	64.2	LOS F	0.1	0.1	0.96	0.96	230.9	200.0	0.87
NorthEast: Turton Road											

P6 Full	15	64.2	LOS F	0.1	0.1	0.96	0.96	230.8	200.0	0.87
SouthWest: Bridges Road										
P8 Full	5	64.1	LOS F	0.0	0.0	0.96	0.96	230.8	200.0	0.87
All Pedestrians	48	64.2	LOS F	0.1	0.1	0.96	0.96	230.9	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: 101 [Sig Opt: Turton Road / Griffiths Road - TCS 201 (Site Folder: 2024 Project PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [Upgrades - PM Peak (Network Folder: 2024 Project)]

1645 - 1745
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network Practical Cycle Time)

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	388	2.5	1.062	121.0	LOS F	36.8	263.0	1.00	1.29	1.71	15.1
2	T1	All MCs	874	2.5	662	2.6	0.739	75.0	LOS F	26.1	186.5	1.00	0.96	1.01	19.9
3	R2	All MCs	495	1.1	375	1.1	* 0.778	87.5	LOS F	13.3	94.3	1.00	0.90	1.06	24.6
Approach			1880	2.1	1425	2.2	1.062	90.8	LOS F	36.8	263.0	1.00	1.03	1.21	18.1
East: Griffiths Road															
4	L2	All MCs	322	3.3	322	3.3	0.215	8.0	LOS A	1.7	12.4	0.09	0.58	0.09	51.7
5	T1	All MCs	756	3.2	756	3.2	0.637	50.5	LOS D	18.0	129.5	0.94	0.79	0.94	35.0
6	R2	All MCs	106	1.0	106	1.0	* 0.721	78.1	LOS F	7.5	53.3	1.00	0.86	1.11	23.0
Approach			1184	3.0	1184	3.0	0.721	41.4	LOS C	18.0	129.5	0.71	0.74	0.72	35.6
North: Turton Road															
7	L2	All MCs	134	1.6	134	1.6	0.178	22.8	LOS B	4.9	34.5	0.58	0.71	0.58	39.7
8	T1	All MCs	873	2.1	873	2.1	* 0.788	72.3	LOS F	24.2	172.1	0.96	0.86	1.01	12.7
9	R2	All MCs	122	10.3	122	10.3	0.574	88.0	LOS F	8.1	61.5	0.99	0.80	0.99	23.5
Approach			1128	2.9	1128	2.9	0.788	68.1	LOS E	24.2	172.1	0.92	0.84	0.96	14.3
West: Griffiths Road															
10	L2	All MCs	123	5.1	123	5.1	0.128	24.6	LOS B	3.0	22.2	0.44	0.66	0.44	43.3
11	T1	All MCs	1368	1.8	1368	1.8	* 0.790	54.2	LOS D	30.0	213.3	0.99	0.89	1.02	34.8
12	R2	All MCs	406	5.4	406	5.4	0.604	63.3	LOS E	13.0	94.9	0.97	0.82	0.97	21.1
Approach			1898	2.8	1898	2.8	0.790	54.2	LOS D	30.0	213.3	0.95	0.86	0.97	31.8
All Vehicles			6091	2.6	5635	2.9	1.062	63.6	LOS E	36.8	263.0	0.91	0.87	0.98	25.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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	64.1	LOS F	0.0	0.0	0.96	0.96	230.8	200.0	0.87

East: Griffiths Road										
P2 Full	7	64.1	LOS F	0.0	0.0	0.96	0.96	230.8	200.0	0.87
North: Turton Road										
P3 Full	1	64.1	LOS F	0.0	0.0	0.96	0.96	230.8	200.0	0.87
West: Griffiths Road										
P4 Full	4	64.1	LOS F	0.0	0.0	0.96	0.96	230.8	200.0	0.87
All Pedestrians	14	64.1	LOS F	0.0	0.0	0.96	0.96	230.8	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.

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	91	Yes	-
	R	7	42	27-57	47	Yes	-
Griffiths Road (E)	T	16	96	76-116	113	Yes	-
	R	7	42	27-57	27	Yes	-
Turton Road (S)	T	22	132	107-157	97	No	11
	R	11	66	46-86	75	Yes	-
Griffiths Road (W)	T	21	126	101-151	149	Yes	-
	R	13	78	58-98	65	Yes	-
Turton Road / Young Road							
Turton Road (N)	T	8	48	33-63	22	No	11
	R	3	18	8-28	5	No	3
Turton Road (S)	L/T	11	66	46-86	63	Yes	-
Young Road (W)	L	5	30	15-45	23	Yes	-
	R	10	60	40-80	78	Yes	-
Turton Road / Lambton Road / Bridges Road							
Turton Road (N)	T	21	126	101-151	136	Yes	-
	R	8	48	33-63	57	Yes	-
Lambton Road (E)	T	11	66	46-86	81	Yes	-
	R	10	60	40-80	115	No	35
Bridges Road (S)	T	29	174	144-204	254	No	50
	R	10	60	40-80	44	Yes	-
Lambton Road (W)	T	19	114	89-139	151	No	12
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit							
Turton Road (N)	T						
	R						
Hockey Centre (E)	R/L/T						
Turton Road (S)	L/T						
	T						
Monash Road (W)	R						
	L						
PM Peak							
Turton Road / Griffiths Road							
Turton Road (N)	T	21	126	101-151	175	No	24
	R	4	24	9-39	61	No	22
Griffiths Road (E)	T	19	114	89-139	123	Yes	-
	R	4	24	9-39	57	No	18
Turton Road (S)	T	18	108	83-133	291	No	158
	R	22	132	107-157	111	Yes	-
Griffiths Road (W)	T	23	138	113-163	164	No	1
	R	18	108	83-133	85	Yes	-
Turton Road / Young Road							
Turton Road (N)	T	20	120	95-145	24	No	71
	R	3	18	8-28	42	No	14
Turton Road (S)	L/T	11	66	46-86	81.60	Yes	-
Young Road (W)	L	2	12	2-22	51	No	29
	R	11	66	46-86	177	No	91
Turton Road / Lambton Road / Bridges Road							
Turton Road (N)	T	25	150	125-175	182	No	7
	R	8	48	33-63	54	Yes	-
Lambton Road (E)	T	10	60	40-80	104	No	24
	R	11	66	46-86	56	Yes	-
Bridges Road (S)	T	23	138	113-163	411	No	248
	R	10	60	40-80	206	No	126
Lambton Road (W)	T	12	86.16	66.16-106.16	205	No	99
Weekend Peak							
Turton Road / Griffiths Road							
Turton Road (N)	T	14	84	64-104	113	No	9
	R	5	30	15-45	43	Yes	-
Griffiths Road (E)	T	19	114	89-139	117	Yes	-
	R	5	30	15-45	39	Yes	-
Turton Road (S)	T	18	108	83-133	54	No	29
	R	6	36	21-51	50	Yes	-
Griffiths Road (W)	T	18	108	83-133	97	Yes	-
	R	15	90	70-110	85	Yes	-
Turton Road / Young Road							
Turton Road (N)	T	21	126	101-151	28	No	73
	R	2	12	2-22	3	Yes	-
Turton Road (S)	L/T	12	72	52-92	82	Yes	-
Young Road (W)	L	4	24	9-39	28	Yes	-
	R	6	36	21-51	46	Yes	-
Turton Road / Lambton Road / Bridges Road							
Turton Road (N)	T	23	138	113-163	151	Yes	-
	R	7	42	27-57	50	Yes	-
Lambton Road (E)	T	9	54	34-74	61	Yes	-
	R	10	60	40-80	62	Yes	-
Bridges Road (S)	T	19	114	89-139	159	No	20
	R	11	66	46-86	62	Yes	-
Lambton Road (W)	T	8	48	33-63	79	No	16

Attachment E: SIDRA Model Intersection Performance

	2024 Base					2024 Project					2024 Project Upgrades					
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)**	**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	0.85	35.4	LOS C	149	4,897	0.87	35.7	LOS C	149						0.3
Turton Road / Young Road	2,697	0.58	7.3	LOS A	78	2,726	0.59	7.2	LOS A	78						-0.1
Turton Road / McDonald's Jones Stadium	2,675	1.79	902.8	LOS F	103	2,719	1.79	894.8	LOS F	103						-8.0
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit	2,676	1.07	1,128.7	LOS F	32	2,720	1.09	1,311.1	LOS F	40						182.4
Turton Road / Lambton Road / Bridges Road	4,234	0.93	44.9	LOS D	254	4,269	0.93	45.1	LOS D	257						0.2
PM Peak																
Turton Road / Griffiths Road	5,816	1.04	61.9	LOS E	291	6,091	1.15	73.3	LOS F	301	6,091	1.06	63.6	LOS E	263	11.4
Turton Road / Young Road	3,528	1.04	27.4	LOS B	177	3,803	1.04	33.3	LOS C	177						5.9
Turton Road / McDonald's Jones Stadium	3,429	1.17	211.5	LOS F	113	3,642	1.17	187.7	LOS F	113						-23.8
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit	3,451	3.08	1,893.1	LOS F	364	3,663	3.35	2,130.5	LOS F	552						237.4
Turton Road / Lambton Road / Bridges Road	5,509	1.05	69.2	LOS E	411	5,665	1.05	74.2	LOS F	491						5.0
Weekend Peak																
Turton Road / Griffiths Road	4,780	0.71	36.2	LOS C	17	4,934	1.42	80.8	LOS F	517						44.6
Turton Road / Young Road	2,763	0.45	12.8	LOS A	12	2,917	0.59	13.9	LOS A	82						1.1
Turton Road / McDonald's Jones Stadium	2,664	1.48	638.7	LOS F	12	2,791	1.48	595.7	LOS F	113						-43.0
Turton Road / Monash Road / Newcastle Hockey Centre Northern Exit	2,704	1.06	1,043.6	LOS F	5	2,831	1.33	1,677.2	LOS F	64						633.6
Turton Road / Lambton Road / Bridges Road	4,123	0.72	32.7	LOS C	23	4,215	0.70	37.4	LOS C	177						4.7