Appendix J

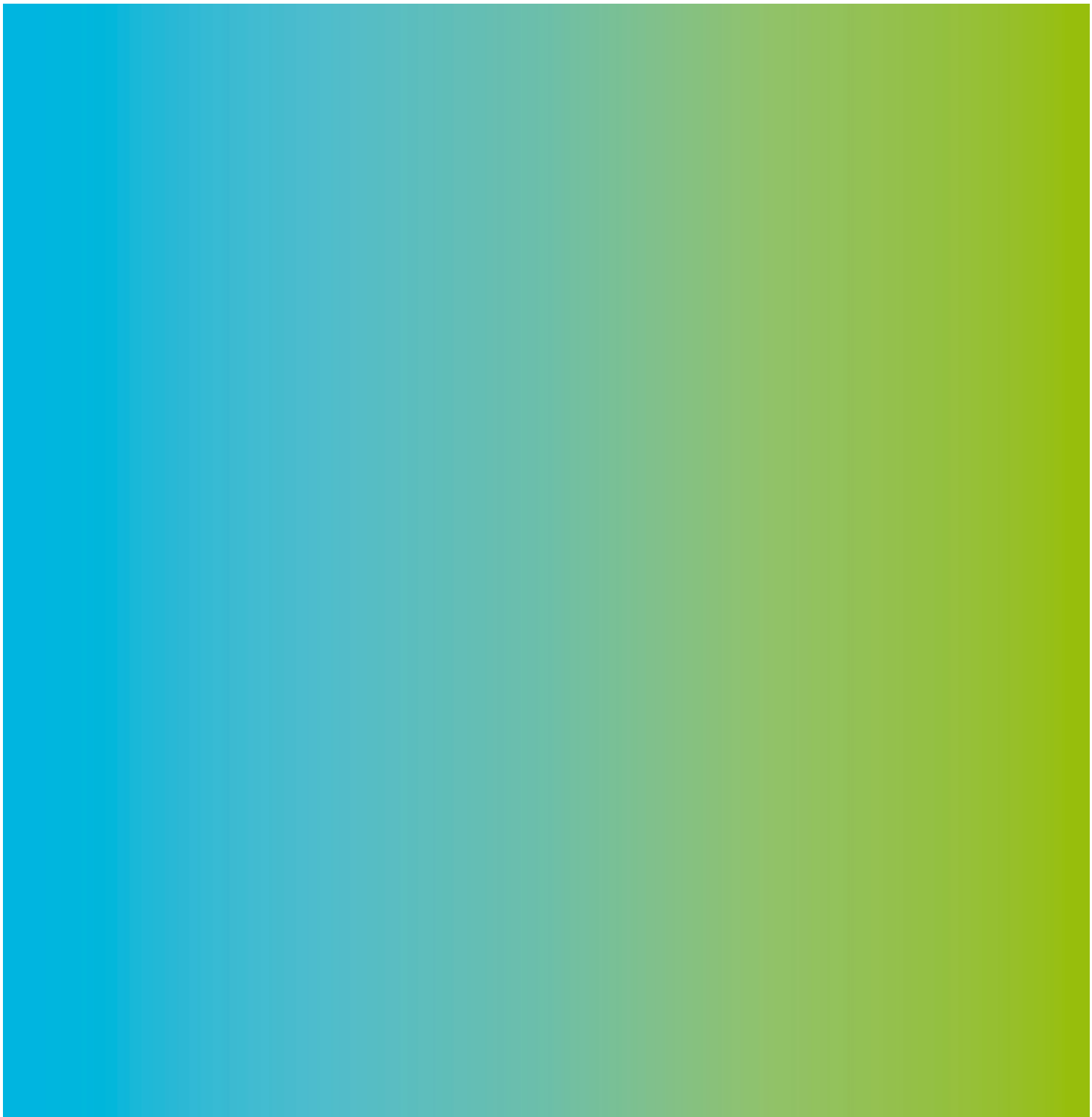
Traffic Assessment

Lake Macquarie City Council

22 June 2010

Proposed Recycling Facility

Traffic Impact Assessment



Proposed Recycling Facility

Traffic Impact Assessment

Prepared for

Lake Macquarie City Council

Prepared by

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A	28-Aug-2009	Draft Report	Andy Yung Principal Transport Planner	Original Signed
B	18-Sep-2009	Draft Report for Council to comment	Andy Yung Principal Transport Planner	Original Signed
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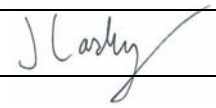
2	22-Jun-2010	Final Report	Josh Lasky Project Manager	

Table of Contents

1.0 Introduction

AECOM has been commissioned by Lake Macquarie City Council, trading as CiviLake to undertake a Traffic Impact Assessment (TIA) as part of an Environmental Assessment (EA) for a proposed recycling facility (the Facility) at Teralba, New South Wales. CiviLake is a business unit of Council that will own and operate the facility. CiviLake carry out road and drainage maintenance and construction, building and demolition and parks and gardens maintenance.

The TIA was prepared in accordance with the RTA's Guide to Traffic Generating Developments and has considered all comments raised by the RTA in letter dated 10 September 2009.

The project has been declared a Major Project under Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act) and Director General's Requirements for the EA have been issued by the Department of Planning (DoP), the consent authority.

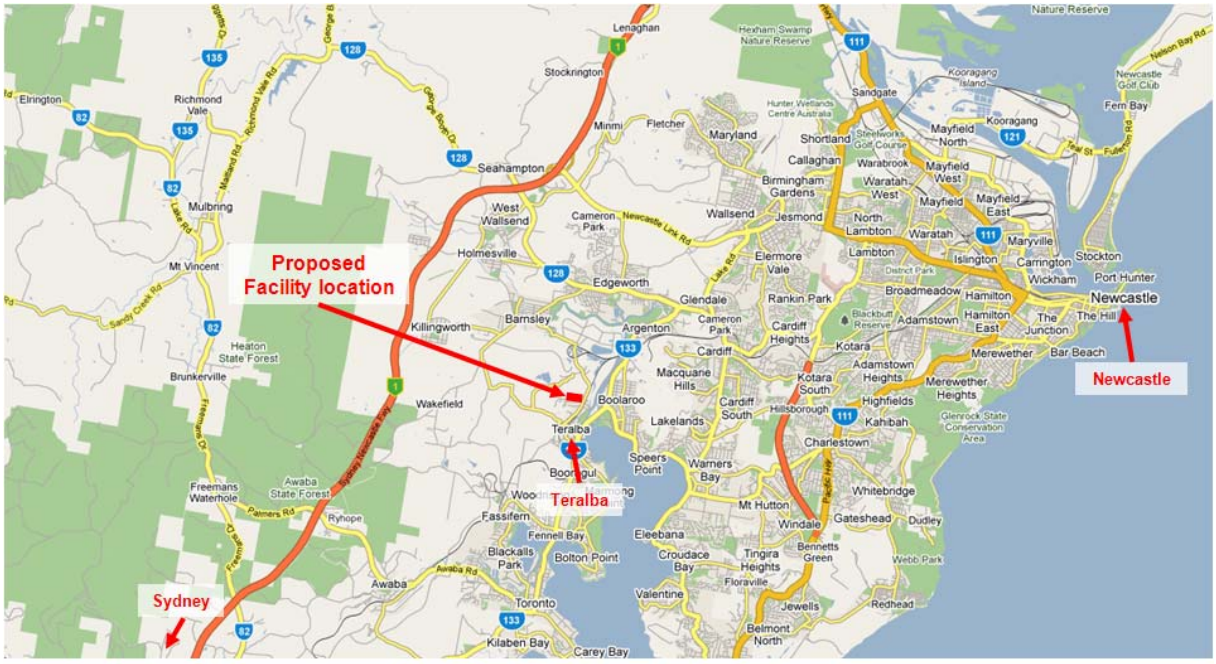
The Facility will be a crushing, grinding and separating operation for hard waste/construction and demolition materials including concrete, bricks, gravel and crushed rock road base asphalt, soils, green waste and tiles. It is understood that the Facility is expected to receive waste volumes of up to 200,000 tonnes per annum (tpa).

The transport input into the EA consists of:

- A review of the existing traffic conditions;
- An evaluation of potential impacts from a future development scenario; and
- The development of criteria for future development and potential mitigation measures to be adopted.

The Facility will be located on approximately 7ha of land at 80, The Weir Road approximately 2km north of Teralba and 20km west of Newcastle in the Lake Macquarie Local Government Area (LGA) (see **Figure 1.1**)

Figure 1.1: Regional Context of Location of Proposed Recycling Facility



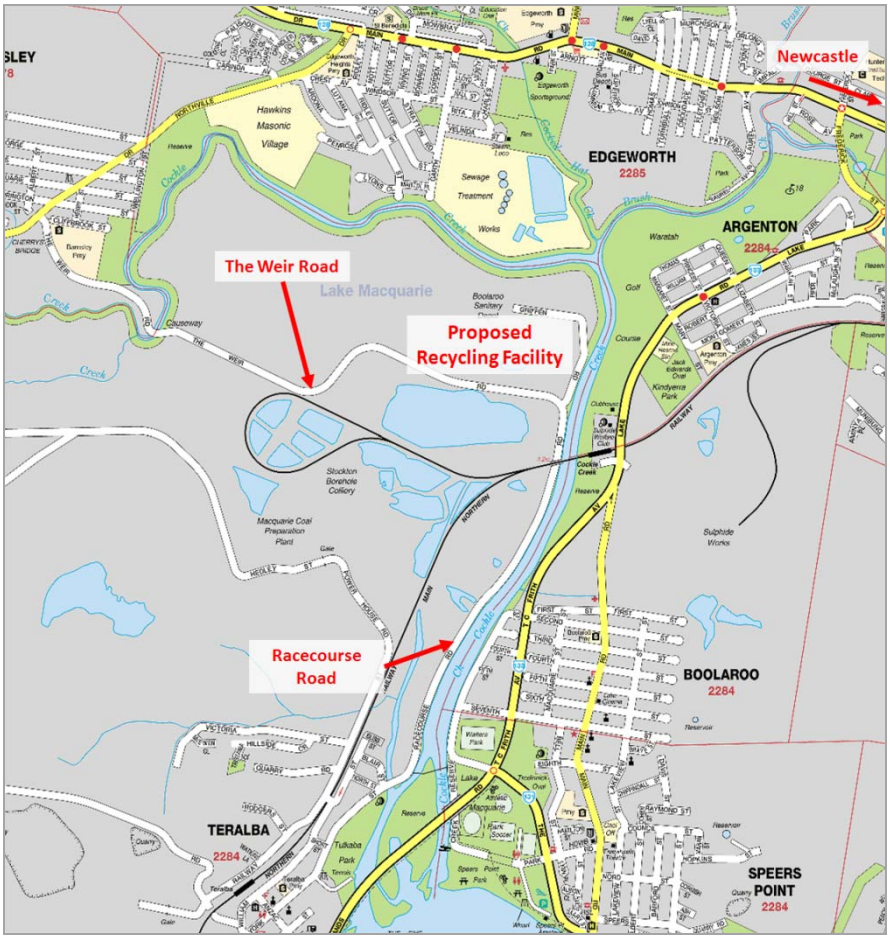
Source: AECOM, 2009 adapted from UBD

2.0 Existing Conditions

2.1 Site Description

The site for the proposed Facility is located at 80, The Weir Road, Teralba on lots 42, 43, 53 and 54. Cockle Creek bounds the study area to the north and east and The Weir Road forms the southern boundary (see **Figure 2.1**).

Figure 2.1: Site Location



Source: AECOM, 2009

At present the site is used for light agriculture with no development on it. It is accessed from two directions, Barnsley to the west via The Weir Road and Teralba to the southeast, via The Weir Road and Racecourse Road.

2.2 Public Transport, Pedestrian and Cycle Facilities

2.2.1 Bus and Rail Facilities

The closest railway station is located approximately 2km south of the site at Teralba. Teralba is serviced by the Newcastle and Central Coast Line which runs between Sydney and Newcastle. The frequency of trains servicing Teralba station is shown in **Table 2.1**.

Table 2.1: Frequency of train services at Teralba Station

Direction	AM Peak (0700-0900)	PM Peak (1600-1800)	Off Peak (1000-1500)
Newcastle to Sydney	3	3	4
Sydney to Newcastle	3	4	5

Source: Cityrail.info, 2009

There are no bus services that service the site directly; however Toronto Bus Services operate a service that links Toronto with Teralba.

2.2.2 Cycle and Pedestrian Facilities

There are two cycleways in the vicinity of the site. One cycleway extends from Macquarie Drive in Warners Bay, along the esplanade to Speers Point Park (Speers Point Park is located approximately 4km from the site on the eastern side of Five Islands Road). A second cycleway extends from Edwards Park in Booragul and follows the foreshore to Five Islands Road, where it joins the Warners Bay cycleway (Edwards Park is located approximately 5km from the site on the eastern side of Five Islands Road).

2.3 Strategic Road Network

The two major regional roads in the vicinity of the site are the Sydney-Newcastle Freeway (F3) and the Pacific Highway.

2.3.1 F3 (Sydney – Newcastle Freeway)

The F3 Freeway is a 127km motorway linking Sydney to the Central Coast, Newcastle and Hunter Regions. The freeway alternates between 2 and 3 lanes in each direction for its length. The northern section of the freeway to the west of the site, from north of Wyong to its terminus at John Renshaw Drive, has 2 lanes in each direction. The freeway has a speed limit varying between 80 and 110km/h. Traffic on the F3 can access the site via the West Wallsend Interchange (from the south only) or the Newcastle Interchange.

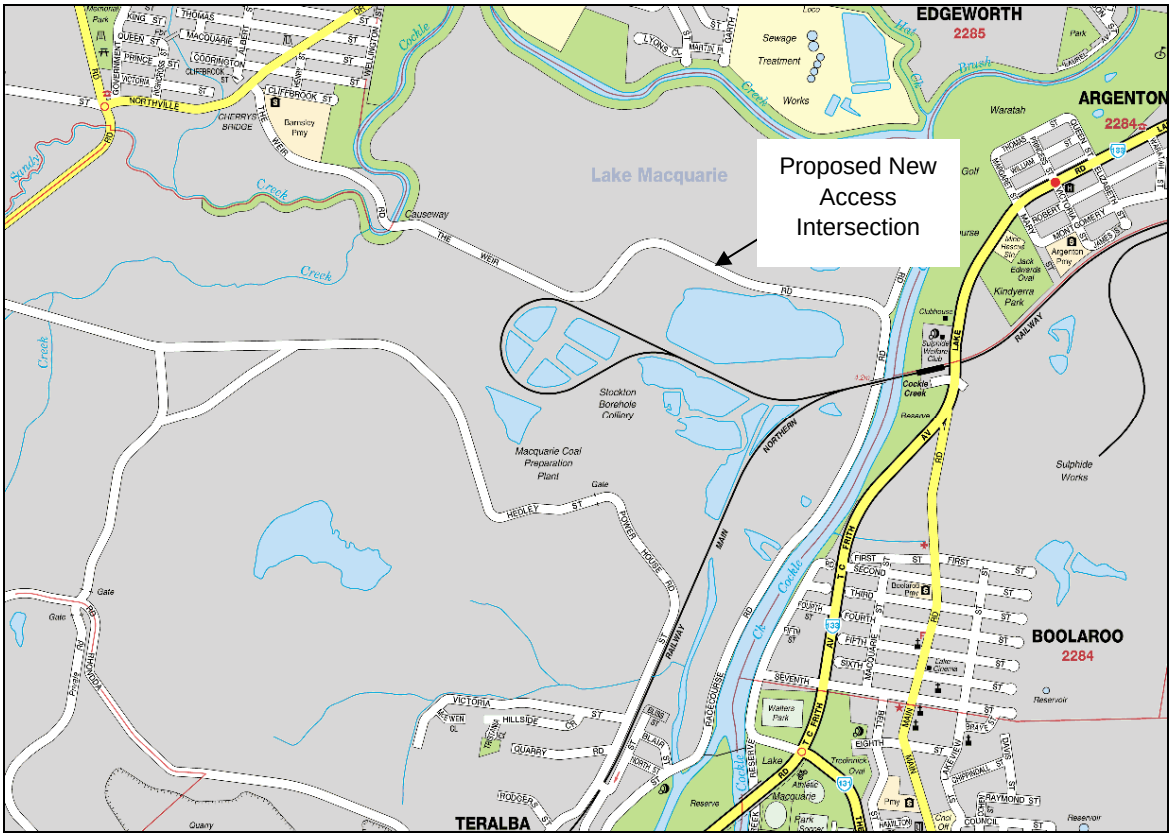
2.3.2 Pacific Highway

The Pacific Highway is a 1,025km major transport route which links Sydney and Brisbane along the east coast of Australia. The section of the Pacific Highway to the east of Teralba, has 2 lanes in each direction and a speed limit that varies between 60km/h and 80km/h.

2.4 Local Road Network

The local road network in the vicinity of the site consists of The Weir Road, Griffen Road and Racecourse Road as shown in **Figure 2.2**.

Figure 2.2: Local Road Context



Source: UBD, 2008.

2.4.1 The Weir Road

The Weir Road is a sealed road that runs in an east-west direction and has a single lane in each direction. The shoulder of The Weir Road is unsealed and there is no kerb or gutter. The Weir Road connects the proposed facility to the suburb of Barnsley.

Figure 2.3: The Weir Road looking west from the proposed entry to the site

Source: AECOM, 2009

Figure 2.4: The Weir Road looking east

Source: AECOM, 2009

2.4.2 Racecourse Road

Racecourse Road connects to The Weir Road and runs in a north-south direction parallel to Cockle Creek. The road is also sealed and has a single lane in each direction. The Racecourse Road provides connection between the proposed facility and the suburb of Teralba.

2.4.3 Griffen Road

Griffen Road connects to Racecourse Road at a priority controlled T intersection. It is a two-way, undivided sealed road with a single lane in each direction.

2.5 Traffic Volumes

2.5.1 Daily Traffic Counts

RTA Traffic Volume Data has been obtained to determine the historical traffic growth and current mid-block traffic flows in the surrounding area. **Table 2.2** shows historical Average Annual Daily Traffic (AADT) volumes at a station in the vicinity of the proposed development. The location of the station is on Five Islands Road in Teralba.

Table 2.2: Historical Traffic Volumes and Growth

Station Number	Location	1995	1998	2001	2004	Ave % growth /yr
05.976	Five Islands Rd, Teralba, N of Anzac Parade	30,608	31,878	31,919	33,273	**0.9%**

Source: RTA Traffic Volume Data

2.5.2 Peak Hour Traffic Counts

Based on the forecast operation pattern of the proposed facility, the peak operation period will occur during the morning hours which coincide with the morning 'journey to work' peak hour. Therefore it is expected that the proposed facility will have the greatest impact on the road network during the weekday AM peak hour. The traffic impact assessment will only focus the analysis on the morning peak hour on this basis.

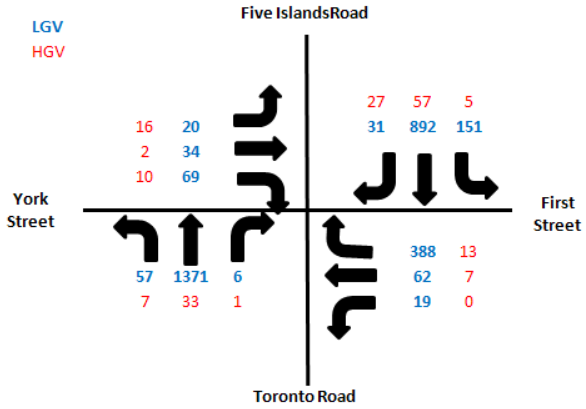
Manual traffic counts were also undertaken by Australasian Traffic Surveys (ATS) during the AM (7am – 9am) peak period on 30th July 2009 at the following intersections:

- Five Islands Road / Toronto Road;
- Racecourse Road / Griffen Road; and
- Northville Drive / The Weir Road.

These intersections are considered to be major intersections in the vicinity of the proposed development that might be impacted from additional traffic generated by the proposal. Analysis of the data shows that the AM peak period for the network was between 8am and 9am.

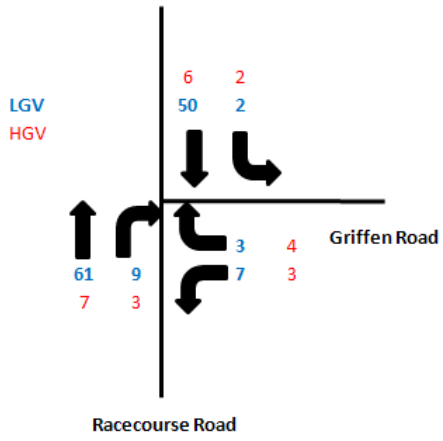
The surveyed traffic data for the AM peak hour at the three intersections are shown in **Figure 2.5**, **Figure 2.6** and **Figure 2.7**.

Figure 2.5: 2009 AM Peak Five Islands Road / Toronto Road Intersection



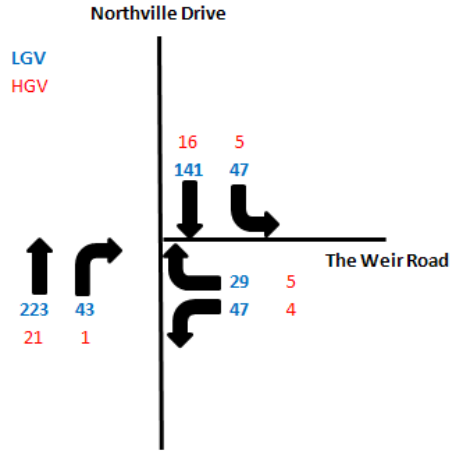
Source: AECOM, 2009
LGV – Light Goods Vehicles including Cars and Motorcycles
HGV – Heavy Goods Vehicles

Figure 2.6: 2009 AM Peak Racecourse Road / Griffen Road Intersection



Source: AECOM, 2009
LGV – Light Goods Vehicles including Cars and Motorcycles
HGV – Heavy Goods Vehicles

Figure 2.7: 2009 AM Peak Northville Drive / The Weir Road Intersection



Source: AECOM, 2009
LGV – Light Goods Vehicles including Cars and Motorcycles
HGV – Heavy Goods Vehicles

It is understood that traffic from some existing Council recycling operations (Metromix site) located at Rhondda Road is using the intersection of Five Islands Road and Toronto Road, which will cease when the proposed recycling facility is opened. However, the actual amount of traffic from the existing Council operations is unknown

and cannot be isolated from the collected traffic data for further assessment. Therefore, the traffic volumes that have been modelled would represent a worst case scenario.

2.6 Intersection Performance

Intersection assessment based on the surveyed traffic data has been carried out using SIDRA 3.2, a computer based modelling package which calculates isolated intersection performance.

The main performance indicators for SIDRA 3.2 include:

- Degree of saturation (DoS) – a measure of the ratio between traffic volumes and the capacity of the intersection;
- Average delay – how long in seconds the average vehicle waits at the intersection; and
- Level of service (LoS) – a measure of the overall performance of the intersection.

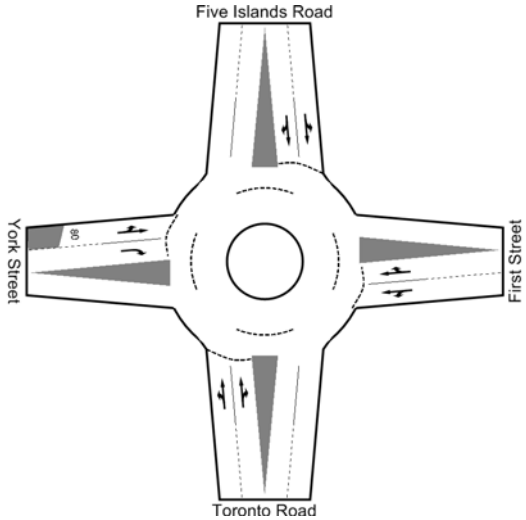
Table 2.3: Performance Criteria for Intersections

Level of Service	Average Delay (secs/veh)	Traffic Signals and Roundabouts	Give Way and Stop Signs
A	Less than 14	Good Operation	Good Operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays	At capacity; requires other control mode
F	>70	Roundabouts require other control mode	At capacity; requires other control mode

Source: Guide to Traffic Generating Developments, RTA, 2002

Figure 2.8, **Figure 2.9** and **Figure 2.10** show the geometric layout of each intersection that has been modelled.

Figure 2.8: Layout of Five Islands Road / Toronto Road Intersection



Source: AECOM, 2009

Figure 2.9: Layout of Racecourse Road / Griffen Road Intersection

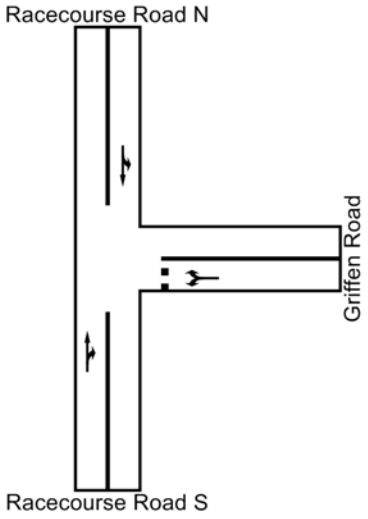
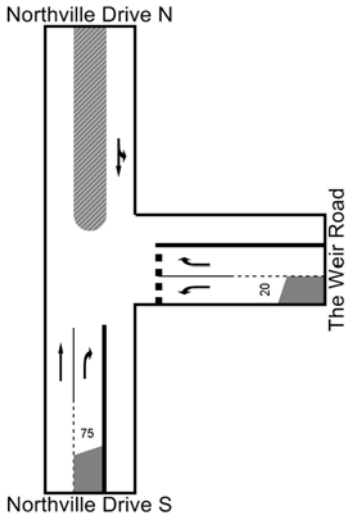


Figure 2.10: Layout of Northville Drive / The Weir Road Intersection



Source: AECOM, 2009

Table 2.4 summarises the existing intersection operation in the AM peak hour. More detailed results are presented as **Appendix A**.

Table 2.4: AM Peak Hour Intersection Performance

Intersection	Int. Type	Int. LoS	Int. DoS	Ave Delay (s)	Longest Queue (m)	Longest Queue Movement
Five Islands Road / York Street	Roundabout	A	0.778	10.5	73	Toronto Rd S Left/ Through
Racecourse Road / Griffen Road	Give way	A	0.046	4.5	3	Racecourse Rd S
Northville Drive / The Weir Road	Give way	A	0.132	1.8	2	The Weir Road

Source: AECOM, 2009
LoS – Level of Service
DoS – Degree of Saturation

The analysis shows all three intersections operate at an acceptable level of service in the morning peak. The Five Islands Road and York Street roundabout operates at LoS A with spare capacity and minimal delays. The south approach of Toronto Road is the worst with queue lengths up to 73m and delays of 10.5 seconds, given it is the major traffic approach. The through traffic on Toronto Road is sensitive to right turning traffic from the east approach of First Street in the morning peak resulting in possible extensive queuing.

The priority intersections of Racecourse and Griffen Road as well as Northville Drive and The Weir Road operate efficiently with minimal delays. Analysis shows both intersections have significant spare capacity on the worst movement with a degree of saturation (DoS) of only 4.6% and 13% of the lane capacity.

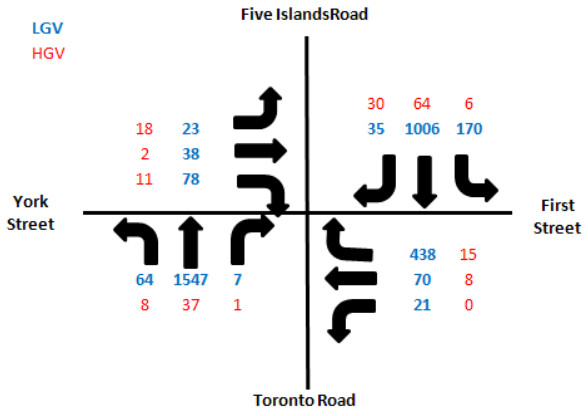
3.0 Future Conditions

This section reviews the impact of increased traffic flows on the road network for the future years prior to any proposed developments on-site. Future year assessment is based on a 10 year forecast from commissioning of the facility in 2012. It will be assumed the forecast year for the assessment of the future case will be the year 2022.

3.1 Background Traffic Growth

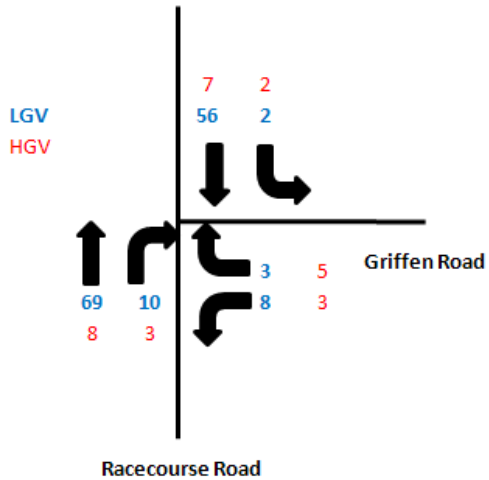
A background growth rate of 0.9% per annum is determined from published historical RTA Traffic Volume Data. The background growth rate of 0.9% p.a. has been applied to the existing network flows (as shown in **Figure 2.5**, **Figure 2.6** and **Figure 2.7**) to forecast the future traffic conditions in 2022 (without the proposed development). The estimated traffic volumes at key intersections under this scenario (2022 without development traffic) are shown in **Figure 3.1**, **Figure 3.2** and **Figure 3.3**.

Figure 3.1: 2022 AM Peak Five Islands Road / Toronto Road Intersection



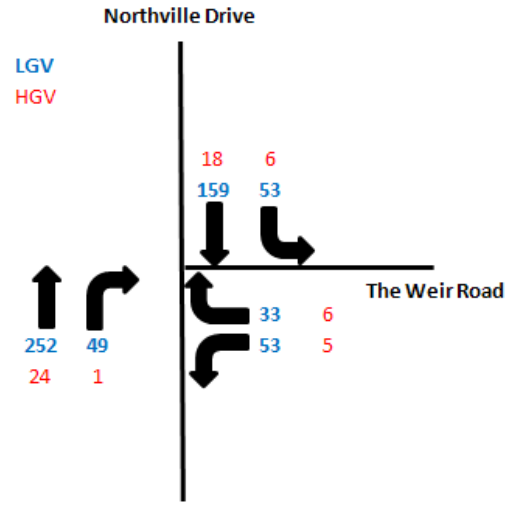
Source: AECOM, 2009
LGV – Light Goods Vehicles including Cars and Motorcycles
HGV – Heavy Goods Vehicles

Figure 3.2: 2022 AM Peak Racecourse Road / Griffen Road Intersection



Source: AECOM, 2009
LGV – Light Goods Vehicles including Cars and Motorcycles
HGV – Heavy Goods Vehicles

Figure 3.3: 2022 AM Peak Northville Drive / The Weir Road Intersection



Source: AECOM, 2009
LGV – Light Goods Vehicles including Cars and Motorcycles
HGV – Heavy Goods Vehicles

3.2 Committed Development

As part of the LES process recently undertaken for the area, a sporting and recreational facility is proposed to be developed to the east of the proposed Facility. This sporting and recreational facility will consists of two large parcels which will be developed as follows:

- Site 1: Three (3) soccer fields overlaid with one cricket field
- Site 2: Two (2) rugby league fields overlaid with one cricket field.

It is assumed the proposed recreational development will generate most traffic on weekday evenings and weekend afternoons and therefore cumulative traffic impacts between these developments and the recycling facility are considered negligible as the proposed facility will have its peak operation hours during weekday mornings. Therefore the sporting and recreational development has not been included as part of the committed development traffic for this assessment.

3.3 Future Intersection Performance

The intersections of Five Islands Road / York Street, Racecourse Road / Griffen Road and Northville Drive / The Weir Road have been assessed using *SIDRA Intersection 3.2* for the future year scenario (2022) with no geometric changes to the existing scenario and no development trips generated by the Facility.

The future performance of the AM peak hour results for all intersections is shown in **Table 3.1**.

Table 3.1: 2022 AM Peak Hour Intersection Performance (without proposed development)

Intersection	Int. Type	Int. LoS	Int. DoS	Average Delay (sec)	Longest Queue (m)	Longest Queue Movement
Five Islands Road / York Street	Roundabout	B	0.889	13.9	127	Toronto Rd S Left/ Through
Racecourse Road / Griffen Road	Give way	A	0.051	4.5	3	Racecourse Rd S
Northville Drive / The Weir Road	Give way	A	0.150	1.8	2	The Weir Road

Source: AECOM, 2009
LoS – Level of Service
DoS – Degree of Saturation

The analysis shows that all three intersections still operate at an acceptable level of service in the morning peak. The Five Islands Road and York Street roundabout has a decrease in level of service from LoS A in the base case to LoS B in the future, however still with spare capacity and minimal delays. The south approach of Toronto Road is the worst with extensive queue lengths increasing from 73m in the base case, to 127m and delays increasing from 10.5 seconds to 13.9 seconds.

The priority intersections of Racecourse Road and Griffen Road as well as Northville Drive and The Weir Road would operate efficiently with minimal delays. Analysis shows both intersections have significant spare capacity on the worst movement with a DoS of only 5.1% and 15.0% of the lane capacity.

4.0 Proposed Operations

This section describes operations of the proposed facility including; proposed operational hours, proposed haulage routes and proposed access to the site.

4.1 Proposed Production

The following tables show the proposed production and operation of the Facility at maximum capacity of up to 200, 000tpa. Table 4.1 shows the operations of feedstock coming into the facility and Table 4.2 shows the operations of materials leaving the facility. The delivery of feedstock into the Facility will typically take place between the hours of 7am and 4pm, with 5% of that occurring during the network AM peak hour (8am to 9am). The transportation of materials out of the Facility will take place between the hours of 6am and 3pm, with 10% of that occurring during the network AM peak hour (8am to 9am). It should be noted that the operation of the Facility does not coincide with the road network peak hour of 4pm to 5pm.

Table 4.1: Proposed Facility Production – Feedstock In

Operations	Amount (tonnes per annum)	Operational timings
Concrete Feedstock	120,000	6 days per week / 50 weeks per year
Recycled Asphalt Pavement (RAP)	30,000	6 days per week / 50 weeks per year
Mulch*	10,000	6 days per week / 50 weeks per year
Aggregate	2,000	6 days per week / 50 weeks per year
Miscellaneous	40,000	6 days per week / 50 weeks per year
Sealing Aggregate	4,000	6 days per week / 50 weeks per year
Total	**196,000 (excluding mulch)**	

**Unit of mulch = m3*

Source: CH2MHILL 2008

Table 4.2: Proposed Facility Production – Materials Out

Operations	Amount (tonnes per annum)	Operational timings
Concrete Feedstock	120,000	6 days per week / 50 weeks per year
Recycled Asphalt Pavement (RAP)	30,000	6 days per week / 50 weeks per year
Mulch*	10,000	6 days per week / 50 weeks per year
Aggregate	2,000	6 days per week / 50 weeks per year
Miscellaneous	40,000	6 days per week / 50 weeks per year
Sealing Aggregate	4,000	6 days per week / 50 weeks per year
Total	**196,000 (excluding mulch)**	

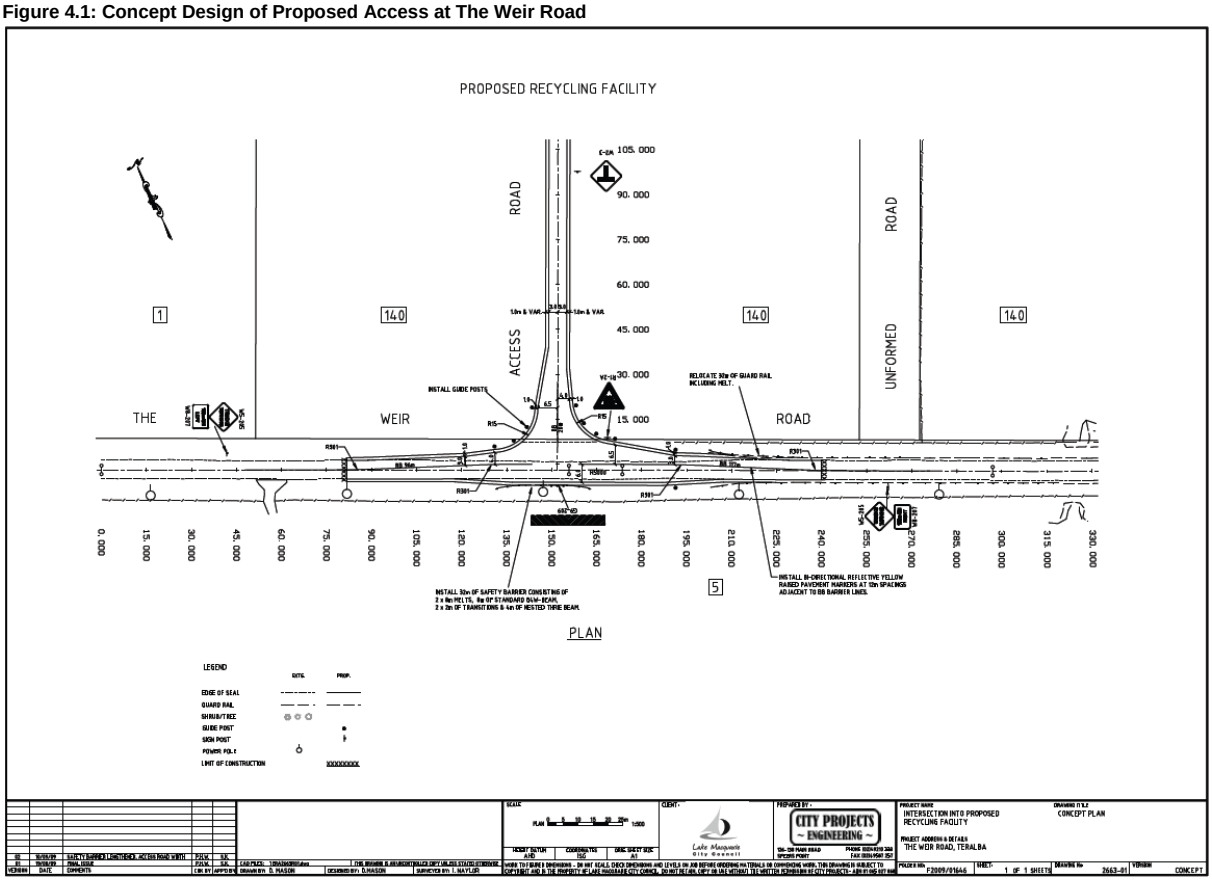
**Unit of mulch = m3*

Source: CH2MHILL 2008

4.2 Proposed Access

The proposed Facility will be accessed from The Weir Road. A concept design prepared by Council is shown in **Figure 4.1**. The proposed layout of the access is discussed further in Section 5.

Figure 4.1: Concept Design of Proposed Access at The Weir Road



Source: Lake Macquarie City Council, 2009

4.3 Proposed Parking Demand

It is understood that there will be a maximum of five employees at the Facility who will use their own vehicle for transport to and from work. Assuming that the employees work during the same hours, there will be a maximum need of five parking spaces. The current site arrangement allows for six parking spaces outside the office block, which will cater for the maximum employee parking demand.

It is not expected the truck loadings generated by the proposed Facility will require on-site parking as the trucks will generally enter the Facility to unload the feedstock or remove the material and then leave the Facility immediately. However, the proposed Facility will provide some on-site short-term parking for operation vehicles servicing the Facility.

4.4 Proposed Haulage Route

It is proposed that the transportation of materials will be from two directions. It is assumed that approximately 60 percent of the material will be transported via Teralba and Racecourse Road and the remaining 40 percent of the material will come from the west via Barnsley and The Weir Road.

It is intended that heavy vehicles travelling via Teralba will be using Racecourse Road, York Street and Toronto Road to access Five Islands Road. Anzac Parade has a load limit of five tonnes and it is not intended for heavy vehicles generated by the proposed development to use Anzac Parade as a thoroughfare between William Street and Five Islands Road.

4.5 Proposed Construction Activities

The latest concept design proposes that the site be filled requiring up to 200,000 tonne of fill. The total fill importation will be carried out during a timeframe of two to three years (i.e. between 67,000 tonne and 100,000 tonne in total per year). It is assumed that the fill would be imported to the site using 30 tonne trucks.

5.0 Traffic Impact Assessment

This section includes a discussion of the potential traffic impacts of the proposed Facility on the local road network near Teralba, NSW.

5.1 Trip Generation

The trips generated by the proposed Facility are based on the amount of feedstock and material to be transported by truck, the truck loading assumptions and the operational requirements (as discussed in Section 4.1). The truck loading assumptions are as follows (**Table 5.1**).

Table 5.1: Truck Loading Assumptions

Operation	Truck load amount (tonnes / load) - Materials in	Truck load amount (tonnes / load) - Materials out
Concrete Feedstock	6	6
	12	12
	30	30
Recycled Asphalt Pavement (RAP)	12	12
Mulch*	10	10
Aggregate	10	10
Miscellaneous	12	12
Sealing Aggregate	30	12

**Unit of mulch = m3*

Source: CH2MHILL 2008

Table 5.2 and **Table 5.3** show the number of trucks that will be generated by the proposed facility. The number of trucks per hour is based on the operational hours of the facility discussed in **Section 4.1**. The number of associated truck movements, which is based on two movements per truck (one movement into site and one movement out) are also shown in the tables. This would represent the worst case scenario where it is assumed that there is no coordination in truck deployment between the 'feedstock in' and 'materials out' movements – a loaded truck would leave the proposed facility empty after unloading the feedstock and another empty truck is required to remove the materials from the proposed facility.

Table 5.2: Truck Movements associated with the Proposed Facility – Feedstock In

Operation	Truck movements per year	Truck movements per day	Truck movements per hour*
Concrete Feedstock (6 tonnes/load)	6,400	22	2
Concrete Feedstock (12 tonnes/load)	10,800	36	2
Concrete Feedstock (30 tonnes/load)	2,240	8	1
Recycled Asphalt Pavement (RAP)	5,000	16	1
Mulch	2,000	6	1
Aggregate	400	2	1
Miscellaneous	6,666	22	2
Sealing Aggregate	266	1	1
Total	33,774	**112**	**11**

Source: CH2MHILL 2008

**-5% of daily movements (subject to round-offs)*

Table 5.3: Truck Movements associated with the Proposed Facility – Materials Out

Operation	Truck movements per year	Truck movements per day	Truck movements per hour*
Concrete Feedstock (6 tonnes/load)	5,600	18	2
Concrete Feedstock (12 tonnes/load)	7,400	24	3
Concrete Feedstock (30 tonnes/load)	3,920	14	2
Recycled Asphalt Pavement (RAP)	5,000	16	2
Mulch	2,000	6	1
Aggregate	400	2	1
Miscellaneous	6,666	22	3
Sealing Aggregate	666	2	1
Total	31,654	**106**	**15**

Source: CH2MHILL 2008
**-10% of daily movements (subject to round-offs)*

The table above shows that the facility will generate approximately 26 truck movements (11 movements in and 15 movements out of the Facility) in the peak hour.

It should be noted, there is a difference in the number of trucks allocated between the material operations, particularly 'Sealing Aggregate' in **Table 5.1.** This assumption is based on discussions and agreement with council. This is reflected in the calculations of total truck movements estimated per year as shown in **Table 5.2** and **Table 5.3** for sealing aggregate.

It is understood that there will be a maximum of five employees at the Facility who will use their own vehicle for transport to and from work creating an additional 10 vehicle movements per day. It is assumed that 5 vehicle movements will be made in the AM peak and 5 vehicle movements will be made in the PM peak.

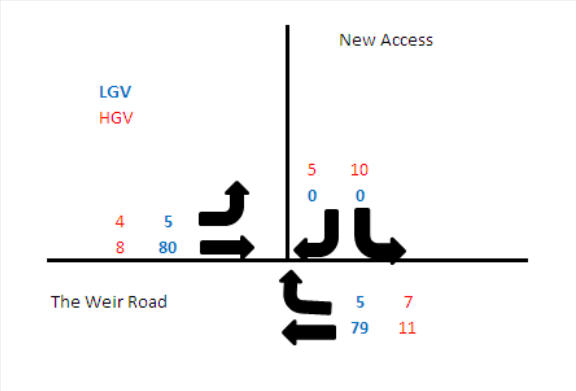
5.2 Trip Distribution

Based on current traffic distribution, it is assumed that approximately 60 percent of the heavy vehicle movements will come and leave via Teralba and Racecourse Road and 40 percent of the heavy vehicle movements will come and leave from the west via Barnsley and The Weir Road. As there is no information on the location from which employees will travel to work, a 50/50 split between the two routes has been assumed.

5.3 Future Intersection Traffic Volumes with Proposed Development

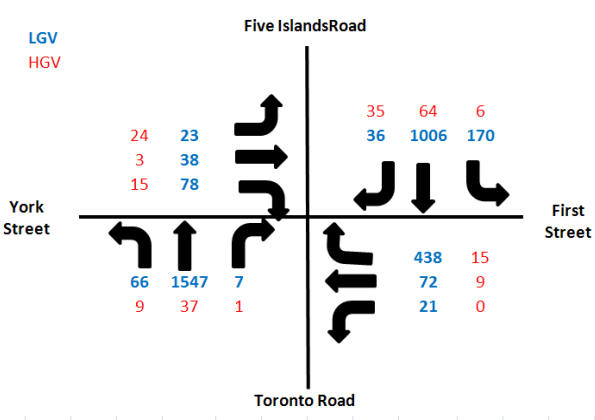
Based on the trip generation and distribution pattern as discussed in Section 5, **Figure 5.1**, **Figure 5.2**, **Figure 5.3** and **Figure 5.4** show the AM peak hour traffic movements at the three critical intersections in the vicinity of the proposed development as well as the proposed access point with Racecourse Road during the AM peak hour in 2022.

Figure 5.1: 2022 AM Peak, New Access / Racecourse Road with Development Traffic



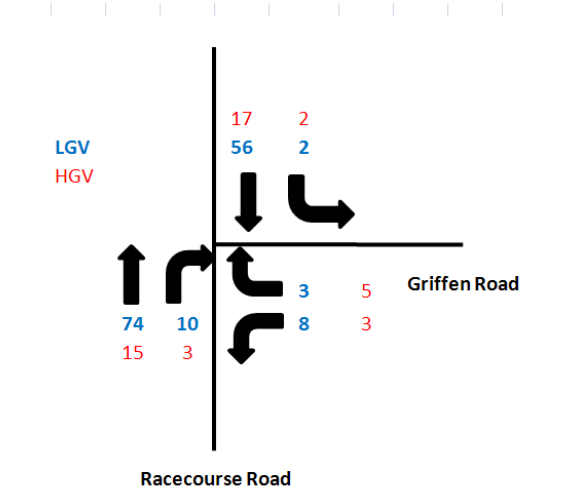
Source: AECOM, 2009
LGV – Light Goods Vehicles including Cars and Motorcycles
HGV – Heavy Goods Vehicles

Figure 5.2: 2022 AM Peak Five Islands Road / Toronto Road Intersection with Development Traffic



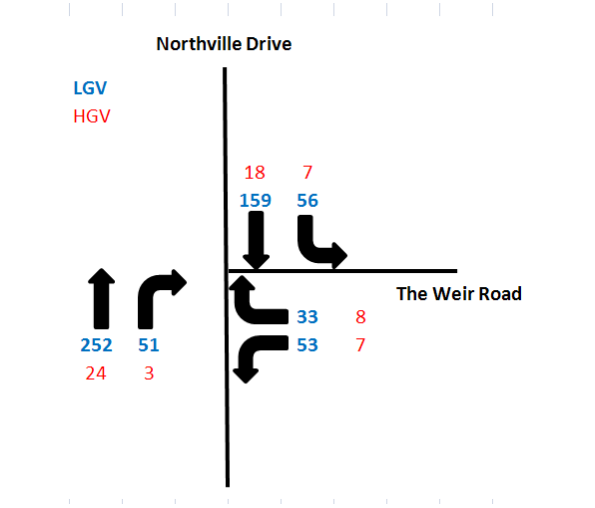
Source: AECOM, 2009
LGV – Light Goods Vehicles including Cars and Motorcycles
HGV – Heavy Goods Vehicles

Figure 5.3: 2022 AM Peak Racecourse Road / Griffen Road Intersection with Development Traffic



Source: AECOM, 2009
LGV – Light Goods Vehicles including Cars and Motorcycles
HGV – Heavy Goods Vehicles

Figure 5.4: 2022 AM Peak Northville Drive / The Weir Road Intersection with Development Traffic



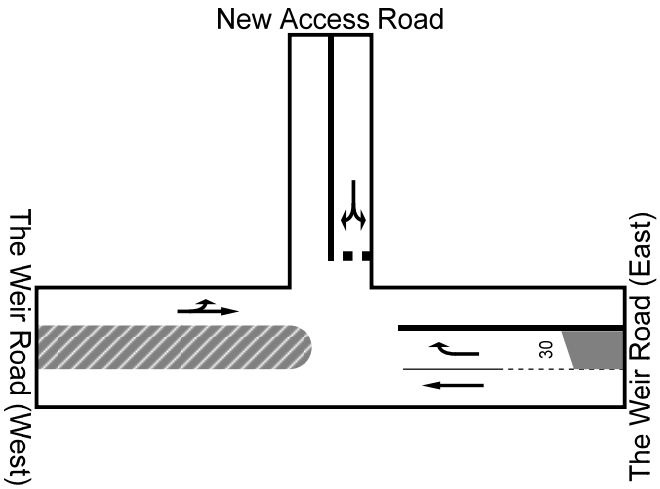
Source: AECOM, 2009
LGV – Light Goods Vehicles including Cars and Motorcycles
HGV – Heavy Goods Vehicles

5.4 Intersection Performance with Proposed Facility

5.4.1 New Access Layout and Intersection Performance

The new access to the site has been modelled as a two lane - two way road intersecting Racecourse Road at a priority T- intersection shown in **Figure 5.5**. The intersection will form a type BAR (Basic Right Turn) treatment. This is the minimum treatment for a right turn movement from a through road to a side road and local access points. This treatment will provide sufficient trafficable width for a heavy vehicle to pass on the left of a single unit stationary vehicle.

Figure 5.5: New Access Road and Racecourse Road (Proposed)



Source: AECOM, 2009

Table 5.4 shows the performance of the intersection of the site access road and Racecourse Road.

Table 5.4: New Access Road, Intersection Performance in 2022 AM Peak

Intersection	Int. Type	Int. LoS	Int. DoS	Average Delay (sec)	Longest Queue (m)	Longest Queue Movement
New Access Rd / Racecourse Road	Give way	A	0.054	2.3	2	Right turn from the New Access Road

Source: AECOM, 2009
LoS – Level of Service
DoS – Degree of Saturation

Using the minimum intersection treatment, the performance the access road intersection shows an overall acceptable level of service (LoS) A. The worst movement is shown to be the right turn from the new access road onto Racecourse Road having a degree of saturation (DoS) of approximately 5%. The queue for the worst movement is also shown to be less than 10m.

5.4.2 Impact on Surrounding Network

The performance of intersections on the surrounding road network during the AM peak of 2022 with the development of the facility is shown in **Table 5.5**.

Table 5.5: Development Traffic Impact s on surrounding network (2022 AM peak)

Intersection	Int. Type	Int. LoS	Int. DoS	Average Delay (sec)	Longest Queue (m)	Longest Queue Movement
Five Islands Road / York Street	Roundabout	B	0.904	14.7	135	Toronto Rd S Left/ Through
Racecourse Road / Griffen Road	Give way	A	0.060	4.4	4	Racecourse Rd S Through
Northville Drive / The Weir Road	Give way	A	0.150	2.0	3	The Weir Rd – Right Turn

Source: AECOM, 2009
LoS – Level of Service
DoS – Degree of Saturation

In comparison to **Table 3.1**, the impacts of development traffic on the surrounding network during the AM peak hour of 2022 is negligible.

The 'average delay' calculations in **Table 3.1** and **Table 5.5** for all intersections are based on an overall weighted average. The intersection of Racecourse and Griffen Road scenario is shown to have marginally improved delay due to development traffic. Due to increasing traffic from the development on Racecourse Road, there is no delay associated with this movement. The sign controlled approach of Griffen Road (critical approach) is subject to a delay and will show this parameter to increase with every future year. However, the effect of these extra vehicles on Racecourse Road in the overall average outweighs the increased delay at the give-way sign on Griffen Road.

The analysis shows that all three (3) intersections operate at an acceptable level of service and there is no change in level of service from the base case during the morning peak in 2022. The Five Islands Road and York Street roundabout maintains the same level of service B with spare capacity and minimal delays. The south approach of Toronto Road still fares poorly with extensive queue lengths increasing from 127m in the base case to 135m and delays increasing from 13.9 seconds to 14.7 seconds.

The priority intersections of Racecourse and Griffen Road as well as Northville Drive and The Weir Road operate efficiently with minimal delays. Analysis shows both intersections have significant spare capacity on the worst movement with a degree of saturation (DoS) of only 6.0% and 15.0% of the lane capacity.

5.5 Construction Traffic Impacts

Assuming a worst case scenario of importing 100,000 tonne of fill per year using 30 tonne trucks and 300 working days, the construction stage will generate 11 heavy vehicle trips (22 truck movements) per day. Given that the heavy vehicle generation during the construction stage is much less than the operation stage and the surrounding road network will operate with an acceptable level of service during the operation stage, the impacts during the construction stage are considered to be negligible.

6.0 Conclusions and Summary

Under existing traffic conditions, the major intersections in the vicinity of the proposed development operate at an acceptable level of service and have spare capacity during the AM peak hour.

It is expected that the Facility will generate a total of approximately 26 heavy vehicle movements and 5 car movements during the AM peak hour. The traffic impact analysis has shown that the surrounding road network will operate with an acceptable level of service and with spare capacity with the additional traffic.

The proposed access intersection has been designed as a priority T-intersection with a typical BAR (Basic Right Turn) treatment. This is the minimum treatment for a right turn movement from a through road to a side road and local access points. This treatment will provide sufficient trafficable width for heavy vehicle to pass on the left of a single unit stationary vehicle. The proposed access will operate with an acceptable level of service in the future scenario.

Appendix A

SIDRA Analysis

SIDRA INTERSECTION

Movement Summary

Five Islands Road_Toronto Road

2009 AM

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Toronto Road										
1	L	64	10.9	0.744	12.6	LOS A	73	0.86	0.99	49.4
2	T	1404	2.4	0.747	11.6	LOS A	73	0.87	0.99	50.3
3	R	7	14.3	0.778	19.2	LOS B	70	0.87	1.06	44.0
Approach		1475	2.8	0.747	11.7	LOS A	73	0.87	0.99	50.2
First Street										
4	L	19	0.0	0.118	10.8	LOS A	4	0.65	0.83	47.8
5	T	69	10.1	0.469	8.8	LOS A	25	0.68	0.79	48.2
6	R	401	3.2	0.471	15.2	LOS B	25	0.74	0.96	43.4
Approach		489	4.1	0.471	14.1	LOS A	25	0.73	0.94	44.2
Five Islands Road										
7	L	156	3.2	0.442	6.2	LOS A	30	0.39	0.51	49.3
8	T	949	6.0	0.442	6.0	LOS A	30	0.40	0.49	51.1
9	R	58	46.6	0.443	13.1	LOS A	30	0.42	0.67	44.9
Approach		1163	7.7	0.442	6.4	LOS A	30	0.40	0.50	50.5
York Street										
10	L	36	44.4	0.286	18.7	LOS B	15	0.86	0.94	40.6
11	T	36	5.6	0.286	16.3	LOS B	15	0.86	0.93	41.6
12	R	79	12.7	0.177	19.8	LOS B	10	0.89	0.97	41.9
Approach		151	18.5	0.287	18.7	LOS B	15	0.87	0.95	41.6
All Vehicles		3278	5.4	0.778	10.5	LOS A	73	0.68	0.81	48.8

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA INTERSECTION

Movement Summary

Racecourse Road / Griffen Road

2009 AM

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Racecourse Road S										
2	T	68	10.3	0.046	2.9	LOS A	3	0.19	0.18	67.5
3	R	12	25.0	0.046	9.7	LOS A	3	0.19	0.64	47.9
Approach		80	12.5	0.046	3.9	LOS A	3	0.19	0.25	63.6
Griffen Road										
4	L	10	30.0	0.022	11.5	LOS A	1	0.20	0.63	50.1
6	R	7	57.1	0.022	13.1	LOS A	1	0.20	0.70	50.1
Approach		17	41.2	0.022	12.2	LOS A	1	0.20	0.66	50.1
Racecourse Road N										
7	L	4	50.0	0.034	10.0	LOS A	0	0.00	0.67	49.0
8	T	56	10.7	0.034	2.6	LOS A	0	0.00	0.22	71.0
Approach		60	13.3	0.034	3.1	LOS A		0.00	0.25	68.9
All Vehicles		157	15.9	0.046	4.5	Not Applicable	3	0.12	0.29	63.4

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

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SIDRA INTERSECTION

Movement Summary

The Weir Road / Northville Drive

2009 AM

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Northville Drive S										
2	T	244	8.6	0.132	0.0	LOS A	0	0.00	0.00	40.0
3	R	44	2.3	0.030	5.5	LOS A	1	0.33	0.54	35.7
Approach		288	7.6	0.132	0.8	LOS A	1	0.05	0.08	39.3
The Weir Road										
4	L	51	7.8	0.061	5.3	LOS A	2	0.27	0.52	35.9
6	R	34	14.7	0.053	8.4	LOS A	2	0.48	0.70	34.4
Approach		85	10.6	0.061	6.5	LOS A	2	0.36	0.59	35.3
Northville Drive N										
7	L	52	9.6	0.116	4.6	LOS A	0	0.00	0.52	36.7
8	T	157	10.2	0.116	0.0	LOS A	0	0.00	0.00	40.0
Approach		209	10.0	0.116	1.2	LOS A		0.00	0.13	39.1
All Vehicles		582	8.9	0.132	1.8	Not Applicable	2	0.08	0.17	38.6

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: 2009 AM
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SIDRA INTERSECTION

Movement Summary

Five Islands Road_Toronto Road

2022 AM

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Toronto Road (South)										
1	L	72	11.1	0.889	18.6	LOS B	127	1.00	1.27	43.5
2	T	1584	2.3	0.887	18.1	LOS B	127	1.00	1.27	43.9
3	R	8	12.5	0.889	26.1	LOS B	120	1.00	1.29	39.0
Approach		1664	2.8	0.887	18.1	LOS B	127	1.00	1.27	43.8
First Street (East)										
4	L	21	0.0	0.196	11.5	LOS A	8	0.70	0.86	47.2
5	T	78	10.3	0.197	9.7	LOS A	8	0.70	0.82	47.7
6	R	453	3.3	0.541	16.3	LOS B	32	0.81	1.01	42.5
Approach		552	4.2	0.541	15.2	LOS B	32	0.79	0.98	43.3
Five Islands Road (North)										
7	L	176	3.4	0.506	6.3	LOS A	37	0.45	0.53	49.0
8	T	1070	6.0	0.506	6.1	LOS A	37	0.47	0.50	50.6
9	R	65	46.2	0.504	13.3	LOS A	37	0.48	0.68	44.7
Approach		1311	7.6	0.506	6.5	LOS A	37	0.46	0.52	50.1
York Street (West)										
10	L	41	43.9	0.451	29.5	LOS C	25	0.93	1.03	33.8
11	T	40	5.0	0.449	27.1	LOS B	25	0.93	1.03	34.6
12	R	89	12.4	0.264	22.8	LOS B	16	0.96	0.99	39.9
Approach		170	18.2	0.452	25.4	LOS B	25	0.94	1.01	37.1
All Vehicles		3697	5.4	0.889	13.9	LOS A	127	0.78	0.95	45.4

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA INTERSECTION

Movement Summary

Racecourse Road / Griffen Road

2022 AM

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Racecourse Road S										
2	T	77	10.4	0.051	2.9	LOS A	3	0.20	0.18	67.3
3	R	13	23.1	0.051	9.7	LOS A	3	0.20	0.64	47.8
Approach		90	12.2	0.051	3.9	LOS A	3	0.20	0.24	63.6
Griffen Road										
4	L	11	27.3	0.026	11.6	LOS A	1	0.22	0.63	49.9
6	R	8	62.5	0.026	13.6	LOS A	1	0.22	0.71	49.9
Approach		19	42.1	0.026	12.4	LOS A	1	0.22	0.66	49.9
Racecourse Road N										
7	L	4	50.0	0.038	10.0	LOS A	0	0.00	0.67	49.0
8	T	63	11.1	0.038	2.6	LOS A	0	0.00	0.22	71.0
Approach		67	13.4	0.038	3.1	LOS A		0.00	0.25	69.1
All Vehicles		176	15.9	0.051	4.5	Not Applicable	3	0.12	0.29	63.5

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: 2022 AM
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SIDRA INTERSECTION

Movement Summary

The Weir Road / Northville Drive

2022 AM

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Northville Drive S										
2	T	276	8.7	0.150	0.0	LOS A	0	0.00	0.00	40.0
3	R	50	2.0	0.036	5.6	LOS A	1	0.36	0.55	35.6
Approach		326	7.7	0.150	0.9	LOS A	1	0.05	0.08	39.3
The Weir Road										
4	L	58	8.6	0.070	5.4	LOS A	2	0.30	0.53	35.9
6	R	39	15.4	0.067	9.0	LOS A	2	0.51	0.73	34.0
Approach		97	11.3	0.070	6.9	LOS A	2	0.38	0.61	35.1
Northville Drive N										
7	L	59	10.2	0.131	4.6	LOS A	0	0.00	0.52	36.7
8	T	177	10.2	0.131	0.0	LOS A	0	0.00	0.00	40.0
Approach		236	10.2	0.131	1.2	LOS A		0.00	0.13	39.1
All Vehicles		659	9.1	0.150	1.8	Not Applicable	2	0.08	0.18	38.5

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: 2022 AM
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SIDRA INTERSECTION

Movement Summary

New Access / Racecourse Road

2022 AM Peak - With Generation Traffic

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Racecourse Road (East)										
5	T	90	12.2	0.050	0.0	LOS A	0	0.00	0.00	60.0
6	R	12	58.3	0.017	11.2	LOS A	1	0.26	0.61	47.7
Approach		102	17.6	0.050	1.3	LOS A	1	0.03	0.07	58.2
New Access Road										
7	L	15	66.7	0.040	12.2	LOS A	2	0.29	0.63	47.3
9	R	10	50.0	0.040	11.7	LOS A	2	0.29	0.67	47.2
Approach		25	60.0	0.040	12.0	LOS A	2	0.29	0.65	47.2
Racecourse Road (West)										
10	L	9	44.4	0.054	9.8	LOS A	0	0.00	0.67	49.0
11	T	88	9.1	0.054	0.0	LOS A	0	0.00	0.00	60.0
Approach		97	12.4	0.054	0.9	LOS A		0.00	0.06	58.8
All Vehicles		224	20.1	0.054	2.3	Not Applicable	2	0.05	0.13	57.0

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: 2022 w/TG
K:\60101141_LMRC\4. Tech work area\1.1 Transport Planning\new access_Racecourse Road.aap
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SIDRA INTERSECTION

Movement Summary

Five Islands Road_Toronto Road

2022 AM

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Toronto Road (South)										
1	L	75	12.0	0.904	19.9	LOS B	135	1.00	1.31	42.5
2	T	1584	2.3	0.898	19.4	LOS B	135	1.00	1.32	42.7
3	R	8	12.5	0.889	27.5	LOS B	128	1.00	1.33	38.1
Approach		1667	2.8	0.899	19.5	LOS B	135	1.00	1.32	42.7
First Street (East)										
4	L	21	0.0	0.208	11.6	LOS A	8	0.71	0.86	47.0
5	T	81	11.1	0.208	9.8	LOS A	8	0.71	0.83	47.6
6	R	453	3.3	0.550	16.5	LOS B	33	0.82	1.02	42.4
Approach		555	4.3	0.550	15.3	LOS B	33	0.80	0.98	43.2
Five Islands Road (North)										
7	L	176	3.4	0.516	6.3	LOS A	38	0.47	0.54	48.8
8	T	1070	6.0	0.516	6.2	LOS A	38	0.48	0.51	50.5
9	R	71	49.3	0.514	13.5	LOS A	38	0.50	0.70	44.6
Approach		1317	8.0	0.516	6.6	LOS A	38	0.48	0.52	49.9
York Street (West)										
10	L	47	51.1	0.540	35.5	LOS C	31	0.94	1.07	31.1
11	T	41	7.3	0.539	32.9	LOS C	31	0.94	1.07	31.7
12	R	93	16.1	0.290	23.3	LOS B	18	0.95	0.99	39.7
Approach		181	23.2	0.537	28.6	LOS C	31	0.95	1.03	35.4
All Vehicles		3720	5.9	0.904	14.7	LOS B	135	0.78	0.97	44.6

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA INTERSECTION

Movement Summary

Racecourse Road / Griffen Road

2022 AM

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Racecourse Road S										
2	T	89	16.9	0.060	3.1	LOS A	4	0.23	0.17	66.8
3	R	13	23.1	0.060	9.8	LOS A	4	0.23	0.64	47.7
Approach		102	17.6	0.060	3.9	LOS A	4	0.23	0.23	63.6
Griffen Road										
4	L	11	27.3	0.027	11.9	LOS A	1	0.26	0.63	49.6
6	R	8	62.5	0.027	13.9	LOS A	1	0.26	0.72	49.6
Approach		19	42.1	0.027	12.7	LOS A	1	0.26	0.67	49.6
Racecourse Road N										
7	L	4	50.0	0.046	10.0	LOS A	0	0.00	0.67	49.0
8	T	73	23.3	0.046	2.7	LOS A	0	0.00	0.21	71.0
Approach		77	24.7	0.046	3.1	LOS A		0.00	0.23	69.4
All Vehicles		198	22.7	0.060	4.4	Not Applicable	4	0.14	0.27	63.7

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Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

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SIDRA INTERSECTION

Movement Summary

The Weir Road / Northville Drive

2022 AM

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Northville Drive S										
2	T	276	8.7	0.150	0.0	LOS A	0	0.00	0.00	40.0
3	R	54	5.6	0.039	5.7	LOS A	2	0.36	0.55	35.6
Approach		330	8.2	0.150	0.9	LOS A	2	0.06	0.09	39.2
The Weir Road										
4	L	60	11.7	0.076	5.5	LOS A	2	0.30	0.53	35.9
6	R	41	19.5	0.075	9.5	LOS A	3	0.53	0.75	33.8
Approach		101	14.9	0.076	7.1	LOS A	3	0.39	0.62	35.0
Northville Drive N										
7	L	63	11.1	0.133	4.7	LOS A	0	0.00	0.52	36.7
8	T	177	10.2	0.133	0.0	LOS A	0	0.00	0.00	40.0
Approach		240	10.4	0.133	1.2	LOS A		0.00	0.14	39.1
All Vehicles		671	10.0	0.150	2.0	Not Applicable	3	0.09	0.19	38.5

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Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: 2022 AM + Dev
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