TRANSNET

national ports authority

Maydon Road Deproclamation
Transport Impact Assessment
Revision 4

J39046

22 October 2020

GIBB
ENGINEERING & ARCHITECTURE

People • Expertise • Excellence

Cape Town

8th Floor, Link Building
19 D.F. Malan Street
Cape Town 8001
PO Box 3965
Cape Town 8000

Tel: +27 21 469 9100
Fax: +27 21 424 5571
Web: www.gibb.co.za

To whom it may concern

The undersigned has been appointed as the registered professional for this Transport Impact Assessment (TIA) and has applied due diligence to the content of this report and endeavoured to ensure that the TIA is free of technical errors and takes full responsibility for its contents.

The undersigned also undertake to attend any forum where the TIA is in dispute to report on matters that relate to the TIA. The undersigned understand and agree that the municipality shall not be liable to compensate her in this regard.

KARIN LIEBENBERG PrEng

GIBB (Pty) Ltd
8th Floor, The Link
19 DF Malan Street
CAPE TOWN

Contact Number: 021 469 9188

Academic Qualifications: MEng (Transport), BEng (Civil)

ETHEKWINI TRANSPORT AUTHORITY

30 Archie Gumede Place | Durban | 4001
P O Box 680 | Durban | 4000
Tel: 031 311 7344 | Fax 031 305 5871
www.durban.gov.za

TRAFFIC IMPACT ASSESSMENT CHECKLIST

Before a full review is conducted, the report will be checked for completeness. If the report is missing any of the items listed below, it will be returned for revision without reviewing the document. If any content is not applicable this must be indicated (with reasons) as such under the section/s of the report

ETA Ref. No.: TT42122 Date of Application: N/A

Development Address: Maydon Wharf Precinct, Port of Durban

Development Description: Maydon Road Deproclamation

Traffic Professional: Karin Liebenberg

Content	Yes	No	N/A	Comment
1. Traffic impact assessment cover	✓			
2. Letter signed by ECSA registered professional	✓			
3. Development Particulars				
3.1. Development description and reference name	✓			
3.2. Location plan	✓			
3.3. Land use rights existing and applied, including type and extent of rights, list of land uses under proposed zoning including town planning controls			✓	
4. Study area				
4.1 Study area plan or map indicated	✓			
5. Background information				
5.1. Listed information – transport facilities and planning	✓			
5.2. Relevant information provided by municipality e.g. Framework plans, road classification, traffic models, etc.	✓			
5.3. Schematic diagram/s	✓			
6. Site investigation				
6.1. Documented and photographic record (e.g. road conditions, geometrics, operations, transport facilities, etc)		✓		some - remainder available on request
7.Traffic Demand Estimation				
7.1. Carried out for worst case trip demand land use under the proposed change in land use or extent as stipulated in the town planning application	✓			
7.2. Assessment years	✓			
7.3 Assessment hours	✓			
7.4. Traffic counts not more than 2 years old – date and time	✓			
7.5. Traffic growth rates	✓			
7.6. Trip generation rates			✓	
7.7. Modal split	✓			
8. Trip Distribution and Traffic Assignment				
8.1. Manual trip distribution and assignment		✓		
8.2. Simulation software used for trip distribution and assignment – software files must be provided	✓			
8.3. Supporting information documented for traffic distribution and assignment	✓			

8.4. Trip Distribution and Traffic Assignment diagrams	✓		✓	
9. Total traffic demand – all aspects including diagrams			✓	re-assignment of traffic only
10. Demand side mitigation	✓			
11. Proposed improvements				
11.1. New roads or widening or intersection improvements – TRL drawing and fatal flaw implementation screening checklist	✓			
11.2. Traffic signals must meet ETA's Urban Traffic Control warrant and requirements. In addition, a roundabout assessment comparison must be carried out			✓	
11.3. Traffic management plans				
12. Traffic Impact Assessment Scenarios				
12.1. Assessment based on worst case land use scenario			✓	
12.2. Design year horizon assessment				
12.2.1. "Without" proposed mitigating measures (with and without development)				
12.2.2. "With" proposed mitigating measures (with and without development	✓			
12.3. Planning year horizon assessment				
12.3.1. "With" proposed mitigating measures	✓			
13. Site Impact Assessment (if applicable)			✓	
14. Transport requirements and cost				
14.1. Any changes to transport master planning			✓	
14.2. Transport / Road services cost contribution			✓	
14.3. Improvement costs estimates or municipal tariff as applicable			✓	
14.4. Recommendations	✓			
14.5. Traffic Road Layout Plans	✓			
14.6. Eng. Drawings, Cost estimate, Financial guarantees, and Undertakings for new or existing road improvements			✓	
15. Recommendations				
15.1. The change in land use for which approval is required.			✓	
15.2. Proposed type and location of all erf accesses.			✓	
15.3. The improvements, changes and mitigation measures that are required, subject thereto that these improvements or measures may be amended in subsequent investigations.	✓			
15.4. Elements of the transport / road network master plan that should be implemented in support of the development.			✓	
15.5 Traffic management measures aimed at protecting residential or other sensitive areas.			✓	
16. Appendix				
16.1. Relevant Traffic Impact Assessment Correspondence. e.g. Traffic Counts, analysis details, maps, plans, etc	✓			

Date: 09/09/2020

Signature

Name : Karin Liebenberg

Professional registration details

ECSA Reg No 20080324

Disclaimer : Refer to ETA Manual For Traffic Impact Assessments and Site Traffic Assessments

Maydon Road Transport Impact Assessment
Revision 4

CONTENTS

Contact Information

Please contact the undermentioned should you require further information.

GIBB (Pty) Ltd	
Address: Durban Office	1st Floor, Norfolk House 54 Norfolk Terrace, Westville, Durban 3630 PO Box 1365, Westville, Durban 3630
Website	www.gibb.co.za
Contact Person	Karin Liebenberg
Contact number	+27 21 469 9188
Cell number	+27 82 649 7675
Fax Number	+27 21 424 5571
Email	kliebenberg@gibb.co.za

Revision Status

Rev No.	Issue Date	# Pages	Revision Description	Prepared By	Reviewed By	Approved By
0	31/01/2020	65	Draft	C. Clark	K. Liebenberg	S. Poorter
1	18/05/2020	79	Final Draft	C. Clark	K. Liebenberg	S. Poorter
2	21/05/2020	81	Final Original	C. Clark	K. Liebenberg	S. Poorter
3	07/07/2020	95	Final Revision 1	C. Clark	K. Liebenberg	K. Liebenberg
4	09/09/2020	99	Final Revision 2	C. Clark	K. Liebenberg	K. Liebenberg
5	21/10/2020	99	Final Revision 3	C. Clark	K. Liebenberg	K. Liebenberg
6	22/10/2020	99	Final Revision 4	C. Clark	K. Liebenberg	K. Liebenberg

Distribution List

Copies to:

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Copy 3 of 3	Tisetso Madube (TNPA)

Appendices

List of Figures

List of Tables

Executive Summary

Background

GIBB (Pty) Ltd has been appointed by the Transnet National Ports Authority (TNPA) to prepare a Traffic Impact Assessment (TIA) for the proposed deproclamation of the roads located within the Maydon Wharf precinct in Durban, specifically Maydon Road (and by extension Wisely and Crabtree Roads).

It is the intention of TNPA to implement access control gates at the entry points to this precinct to better comply with the International Ship and Port Facility Security (ISPS) Code requirements for port operations.

Current and Proposed Port Access

Access to the Maydon Wharf precinct within the port of Durban is currently gained via the following roads:

1. Maydon Road / Che Guevara Road
2. Rick Turner Road / Wisely Road / Shadwell Road
3. Crabtree Road / Wisely Road

The three access roads to the Maydon Wharf precinct are not controlled and are open to the public, i.e. general traffic. Access to Maydon Wharf Street, and the edge of the dock specifically, is however controlled by multiple security points.

Five scenarios were presented to TNPA to implement controlled access gates at various locations and with various access permutations in the Maydon Wharf area. The proposed gate locations are listed below:

- Richard Walne Road vehicle and pedestrian gate (north)
- Maydon Road (south of Richard Walne Road) vehicle and pedestrian gate (north)
- Dalbridge railway bridge pedestrian access gate
- Congella railway bridge pedestrian access gate
- Rick Turner Road vehicle and pedestrian gate (west)
- Crabtree Road vehicle and pedestrian gate (south)

Capacity Analysis

The Aimsun hybrid mesoscopic / microscopic transport model was used to estimate the re-distribution of traffic for the current and future weekday AM and PM peak hour scenarios following the deproclamation of Maydon Road and introduction of access restrictions to the Maydon Wharf area. The five scenarios were tested using the transport model to determine the preferred option. Option 1b was found to be the preferred option with the following configuration:

- Richard Walne Road gate (north) – 1 inbound lane + 1 outbound lane
- Maydon Road (south of Richard Walne Road) gate (north) – 3 inbound lanes + 2 outbound lanes

- Rick Turner Road gate (west) – 2 inbound lanes + 2 outbound lanes
- Crabtree Road gate (south) – 2 inbound lanes + 1 outbound lane

The following was assumed for the purposes of the transport model:

- The security inspection for passenger vehicles at the gates will be 15 seconds
- The security inspection for heavy vehicles at the gates will be 40 seconds
- The signal time plans will be optimised regularly to accommodate the future traffic demand
- Peak spreading will occur in the 2025 (to a limited extent) and 2035 future scenarios

The results showed that the majority of the intersections in the study area currently operate well during the 2019 background traffic scenario with the exception of the following intersections:

- Sydney Road / Hannah Road (TC009)
- Maydon Road / Rick Turner Road (TC026)
- Maydon Road / Leuchars Road (TC028)
- Maydon Road / Inkosi Albert Luthuli Road (TC021/22)

During the 2019 future background traffic scenario, the majority of the intersections will operate well with the exception of the following intersections:

- Bayhead Road / Crabtree Road (TC001)
- Umbilo Road / Farimond Road (TC004)
- Sydney Road / Hannah Road (TC009)

During the 2025 future traffic scenario, the majority of the intersections will continue to operate well with the exception of the Maydon Road / Rick Turner Road intersection (TC026).

Public Transport and Non-Motorised Transport

Limited public transport services are located within the study area and no public transport services were observed operating along Maydon Road during the site investigation. Staff transport was, however, observed. The bus volumes captured as part of the background traffic surveys were also low with no distinction made as to whether these were public transport or private staff transport vehicles. Public transport services and rail passengers will continue to have access to the Maydon Wharf Precinct following the proposed implementation of the controlled access gates.

Given that buses operate on scheduled routes, no provision for stopping or turnaround facilities are required for buses on the non-secure side of the proposed gate locations. Provision has, however, been made for the turnaround of minibus-taxis not wishing to enter the secure area on the non-secure side of the proposed gate locations. It is anticipated that the majority of the minibus-taxis will continue to serve passengers within the Maydon Wharf precinct and stopping locations for minibus-taxis on the non-secure side of the gates were therefore only provided on one side of the road at the Maydon Road and Crabtree Road gates. No turnaround and stopping location is proposed outside the Rick Turner

gate location, although minibus-taxis are able to turn around on the non-secure side of the gate should this be required.

Limited non-motorised transport (NMT) facilities are located within the study area, specifically in the Maydon Wharf precinct and most of the NMT facilities was observed to be in poor condition. Pedestrian activity was observed longitudinally along Maydon Road and extremely limited east-west pedestrian movement was observed during the site investigation. It is recommended that the two pedestrian accesses to / from the stairs to the railway stations be retained once the precinct is secured and that the sidewalks along Maydon Road be resurfaced and repaired, where necessary, to safely and comfortably accommodate the existing and future pedestrian activity.

Recommendations

The following is recommended within the port limits:

- A security procedure be developed to achieve the required service flow speeds for the private and heavy vehicles and to provide for mitigation measures in case of excessive queue development over extended periods of time, as discussed in this report.

- Access for public transport / staff transport services to / from the Maydon Wharf precinct be maintained in perpetuity

- A security procedure be developed, if not already available, to accommodate the public transport / staff transport operations

- Once approval for the deproclamation of the roads within the Maydon Wharf precinct, especially Maydon Road (and by extension Wisely and Crabtree Roads) is obtained, the security access gates to / from the Maydon Wharf precinct area be provided generally in accordance with the locations and lane requirements, as per Appendix E, subject to a preliminary and detailed design process.

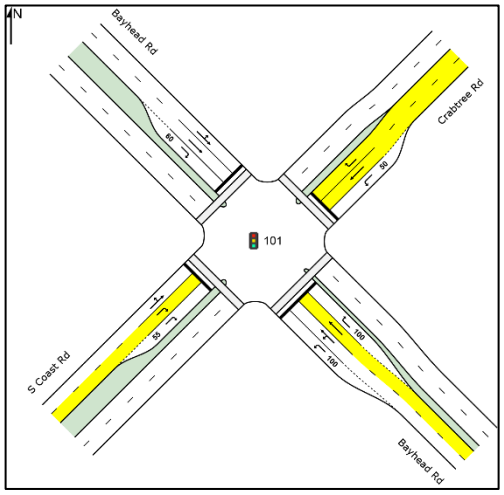
- Provision be made for the turnaround and stopping of minibus-taxis on the non-secure side of the Maydon Road and Crabtree Road gate locations

- Provision be made for public transport stops (both bus and minibus-taxi) along Maydon Road

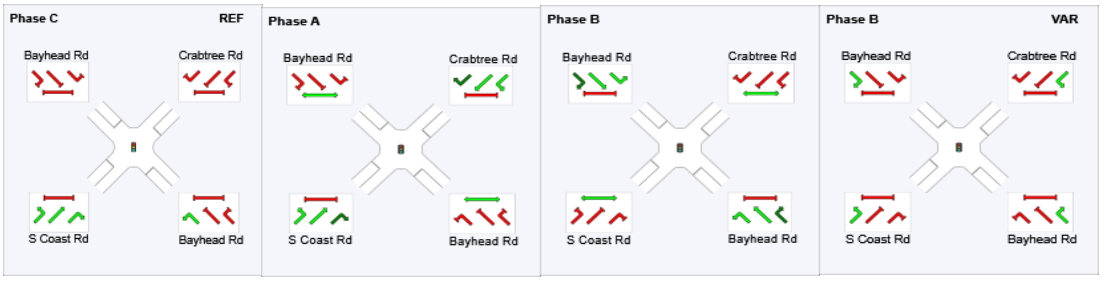
- The two pedestrian accesses to / from the stairs to the railway stations be maintained in perpetuity once the precinct is secured

- The sidewalks along Maydon Road (and by extension Wisely and Crabtree Roads) be resurfaced and repaired, where necessary, to safely and comfortably accommodate the existing and future pedestrian activity

- The Bayhead Road / Crabtree Road (TC001) intersection be amended as part of the implementation of the security access gates by reassigning lane disciplines and improving the signal phasing to improve the operation of the intersection (see figures below)



Proposed upgrade - Bayhead Road / Crabtree Road (TC001)



Proposed signal phasing - Bayhead Road / Crabtree Road (TC001)

- The operations of intersections within the study area and Maydon Wharf precinct port limits be assessed following implementation of the security access gates in order to re-assess lane disciplines and signal timing plans (no road upgrades proposed)

- Signal timing plans of intersections within the Maydon Wharf port limits be updated on a regular basis to accommodate changes in traffic demand into the future.

The following is recommended within the study area, but outside the port limits:

- The Umbilo Road / Farimond Road intersection (TC004) be upgraded following implementation of the security access gates and assessment of the re-distribution of traffic. Two options for the required upgrades are included in Appendix H.

- The operations of intersections within the study area be assessed following implementation of the security access gates in order to re-assess lane disciplines and signal timing plans within the study area (no road upgrades proposed)

- Signal timing plans in the study area be updated on a regular basis to accommodate changes in traffic demand into the future.

1 Introduction

1.1 Background

GIBB (Pty) Ltd has been appointed by the Transnet National Ports Authority (TNPA) to prepare a Traffic Impact Assessment (TIA) for the proposed deproclamation of the roads located within the Maydon Wharf precinct in Durban, specifically Maydon Road, as shown in **Figure 1.1**.

Maydon Road, and by extension Wisely and Crabtree Roads, serve as connections between the Maydon Wharf Precinct and the Durban Central Business District (CBD) road network. The property over which the road traverses belongs to Transnet National Ports Authority (TNPA), but the eThekwini Municipality currently owns the road infrastructure and is responsible for the maintenance thereof.

It is the intention of TNPA to implement access control gates on the entry roads to this precinct to better comply with the International Ship and Port Facility Security (ISPS) Code requirements for port operations.

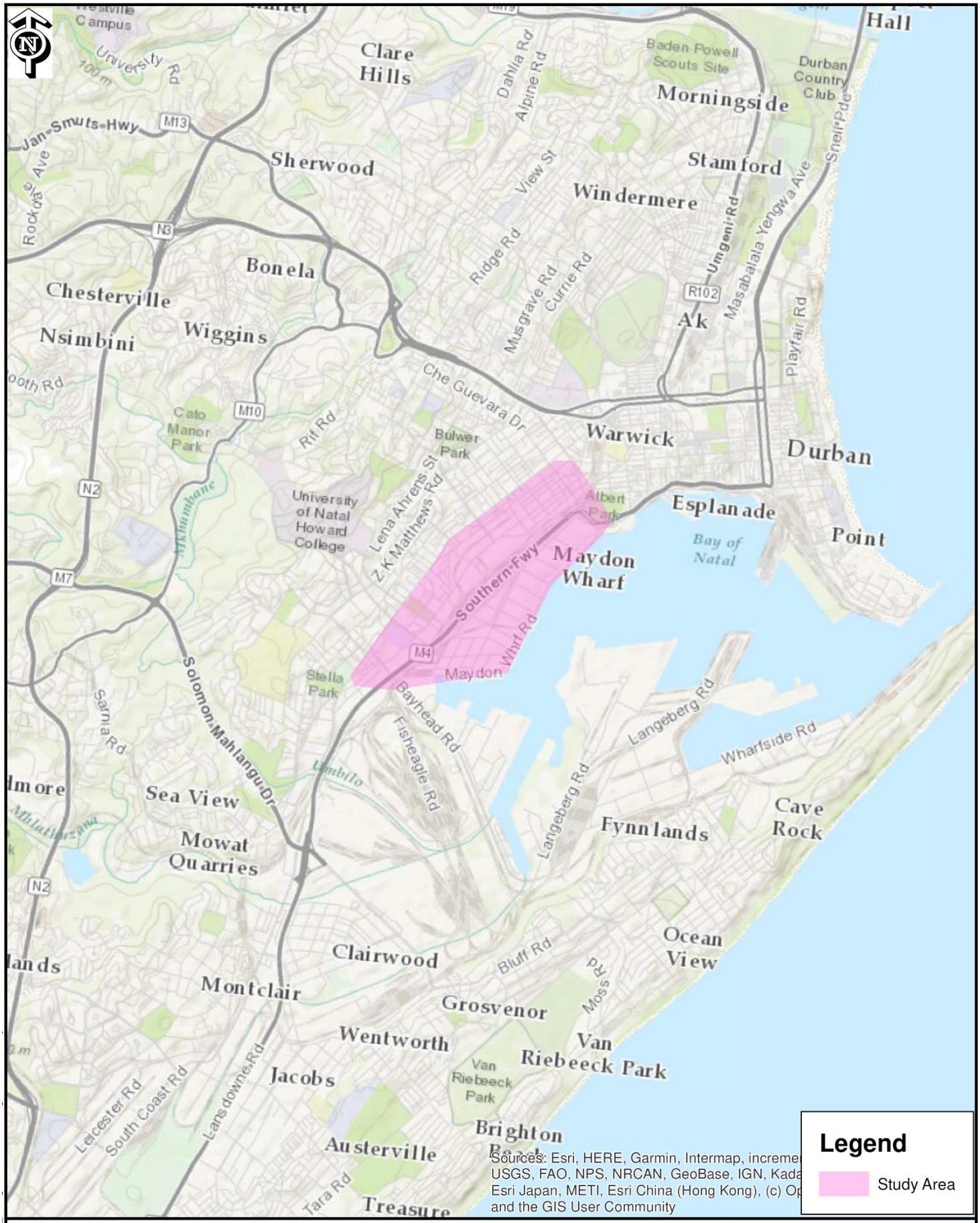
The study area, as agreed with eThekwini Transport Authority (ETA), is bounded by Umbilo Road and Magwaza Maphala Street to the north-west, Inkosi Albert Luthuli Road to the north-east, Maydon Road to the south-east and Farimond and Bayhead Roads to the south-west, as shown in **Figure 1.2**.

1.2 Purpose of Report

The eThekwini Transport Authority's (ETA) *Manual for Traffic Impact Assessments and Site Traffic Assessments (2018)* states that a TIA should be undertaken for studies where there is a change in land use that will generate in excess of 11 new peak hour trips. However, ETA can request a TIA to be undertaken based on various factors that could impact the environment or road network. The rerouting of traffic as a result of the deproclamation of the roads within the Maydon Wharf precinct, and specifically the introduction of access control measures on Maydon Road, Rick Turner and Crabtree Roads, is expected to exceed this criterion and will likely have an impact on the adjacent road network even though no additional development is proposed within the precinct at this time. A TIA was therefore, requested by ETA.

The purpose of the TIA is to assess the impact of rerouting traffic through the adjacent road network away from Maydon Road due to the proposed access control gates and limiting access to the Maydon Wharf precinct to port-related traffic only.

The TIA will also assess the impact of the proposed deproclamation of the roads within the Maydon Wharf precinct, especially Maydon Road, on non-motorised transport (NMT), i.e. pedestrian and cyclist activity, as well as to determine the mitigation measures required to reduce the impact of traffic in the Maydon Wharf precinct, surrounding port areas, as well as the surrounding road network.



Sources: Esri, HERE, Garmin, Intermap, increme
USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kada
Esri Japan, METI, Esri China (Hong Kong), (c) Op
and the GIS User Community

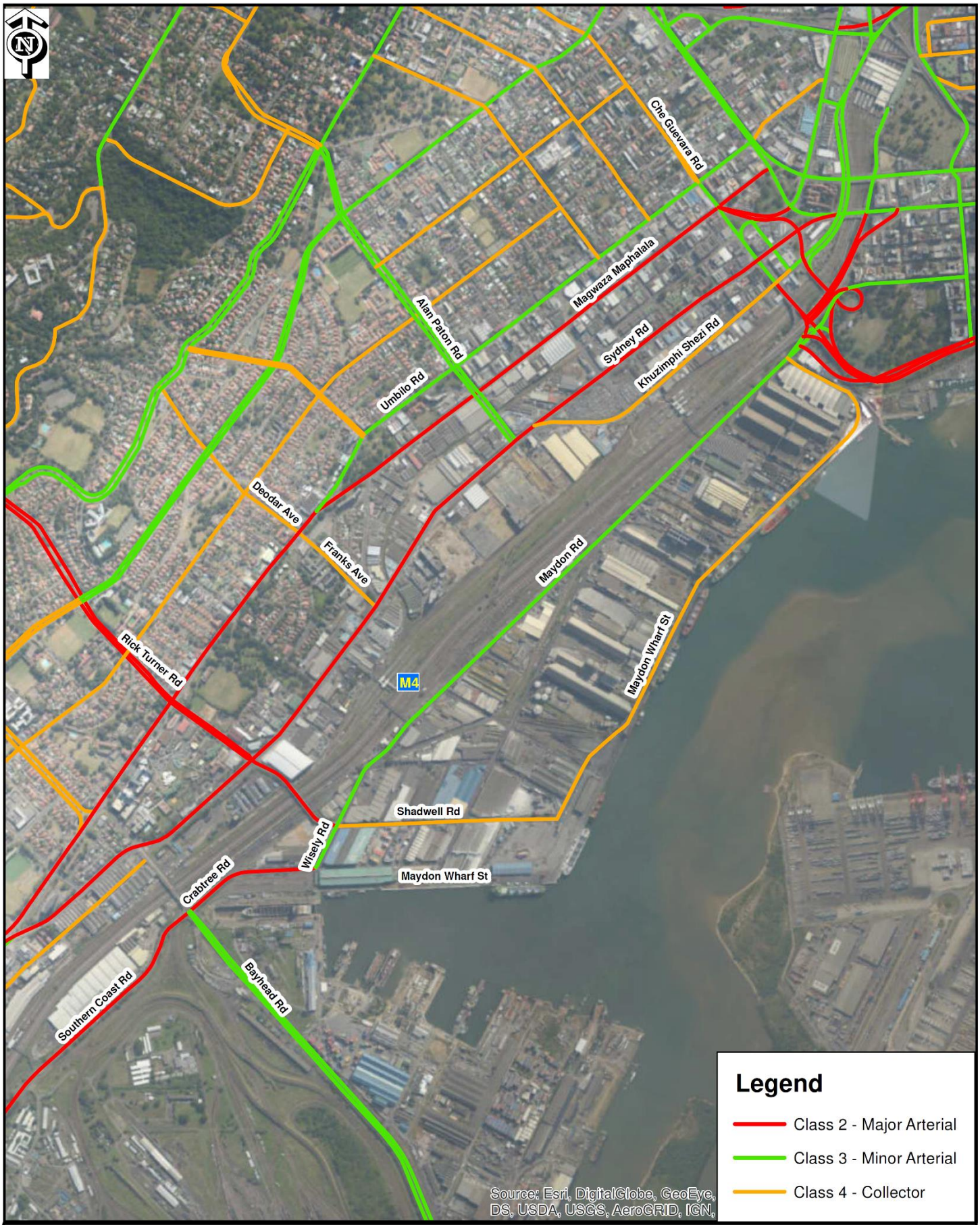
PROJECT: **Maydon Road TIA**	GIBB ENGINEERING & ARCHITECTURE	Drawn By: T. Mohlala	Checked By: C. Clark
		Reviewed By: C. Clark	Approved By: K. Liebenberg
DETAIL: **Locality**	Scale: 1:15 000	Date: October 2019	Project No.: J39046 / Drg No.: Figure 1.1 / Rev:

PROJECT: **Maydon Road TIA**	GIBB ENGINEERING & ARCHITECTURE	Drawn By: T. Mohlala	Checked By: C. Clark
DETAIL: **Aerial View**		Reviewed By: C. Clark	Approved By: K. Liebenberg
	Scale: 1:18 000	Date: October 2019	Project No.: J39046 / Drg No.: Figure 1.2 / Rev:

2 Existing Road Network

The existing road network within the vicinity of the study area, as classified by ETA, is described below and shown in **Figure 2.1**.

- Umbilo Road is a four- to six-lane, one-way road (northbound) and is classified as a Class 2 Major Arterial south and a Class 3 Minor Arterial north of Magwaza Maphala Street
- Magwaza Maphala Street is a four-lane one-way road (northbound) and is classified as a Class 2 Major Arterial
- Sydney Road is a four- to six-lane, one-way road (southbound) and is classified as a Class 2 Major Arterial
- Rick Turner Road is a two-lane, two-way road and is classified as a Class 2 Major Arterial
- Crabtree Road is a two-lane, two-way undivided road, with some sections having three lanes, and is classified as a Class 2 Major Arterial
- Maydon Road is a two-lane, two-way undivided road and is classified as a Class 3 Minor Arterial
- Wisely Road is a two-lane, two-way undivided road and is classified as a Class 3 Minor Arterial



PROJECT: **Maydon Road TIA**	GIBB ENGINEERING & ARCHITECTURE	Drawn By: T. Mohlala	Checked By: C. Petersen
DETAIL: **Existing Road Network**		Reviewed By: C. Petersen	Approved By: K. Liebenberg
	Scale: 1:18 000	Date: October 2019	Project No.: J39046 / Drg No.: Figure 2.1 / Rev:

3 Port Access

3.1 Current Port Access

Access to the Maydon Wharf precinct within the port of Durban is currently gained via the following roads:

- Maydon Road / Che Guevara Road
- Rick Turner Road / Wisely Road / Shadwell Road
- Crabtree Road / Wisely Road

The three access roads to the Maydon Wharf precinct are not controlled and are open to general traffic. There are also multiple side roads off Maydon Road which gives access to the Maydon Wharf precinct and the dock along Maydon Wharf Street.

Access to Maydon Wharf Street, and the edge of the dock specifically, is controlled by multiple security points, as shown in **Figure 3.1**. Staff and visitors are required to manually complete a form before entering the port security area.

As discussed in **Chapter 0**, it is the intention of TNPA to deproclaim Maydon Road and implement access control gates to reduce the number of security check points and better comply with the International Ship and Port Facility Security (ISPS) Code requirements.

3.2 Proposed Port Access

Five scenarios were presented to TNPA to implement controlled access gates at various locations and with various access permutations in the Maydon Wharf area. The proposed gate locations are listed below:

- Richard Walne Road vehicle and pedestrian gate (north)
- Maydon Road (south of Richard Walne Road) vehicle and pedestrian gate (north)
- Dalbridge railway bridge pedestrian access gate
- Congella railway bridge pedestrian access gate
- Rick Turner Road vehicle and pedestrian gate (west)
- Crabtree Road vehicle and pedestrian gate (south)

PROJECT: **Maydon Road TIA**	Approved By: K. Liebenberg			Scale: 1:17 000	Date: October 2019
DETAIL: **Port Access Gates**	Drawn By: T. Mohlala	Checked By: C. Clark	Reviewed By: C. Clark	Project No. / Drg No. / Rev: J39046 / Figure 3.1 /	

GIBB ENGINEERING & ARCHITECTURE

4 Background Traffic

4.1 Video Survey

4.1.1 Methodology

A video survey was undertaken at the three access points to the Maydon Wharf precinct on Thursday, 18 July 2019 for a 12-hour period (06:00 to 18:00). The video survey was undertaken at the following locations, shown in **Figure 4.7**.

1. Maydon Road, south of the intersection with Richard Walne Road
2. Rick Turner Road, west of the intersection with Wisely Road
3. Crabtree Road, west of the intersection with Wisely Road

The video survey recorded the registration numbers (by vehicle registration plate identification technique) at the three survey locations of all vehicles entering and exiting Maydon Road by link direction. The camera views at the respective count locations are shown in **Figure 4.1** to **Figure 4.3**.

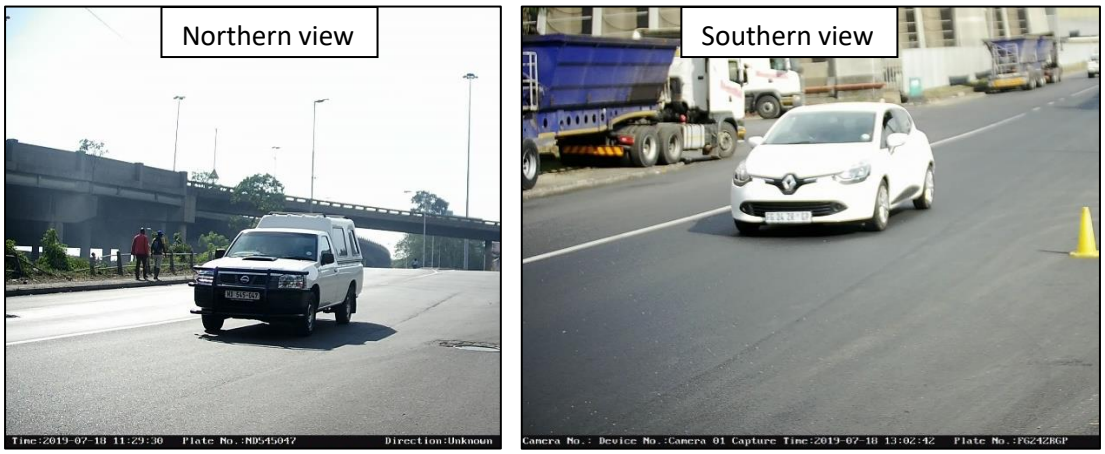


Figure 4.1: Location 1 (Maydon Road)

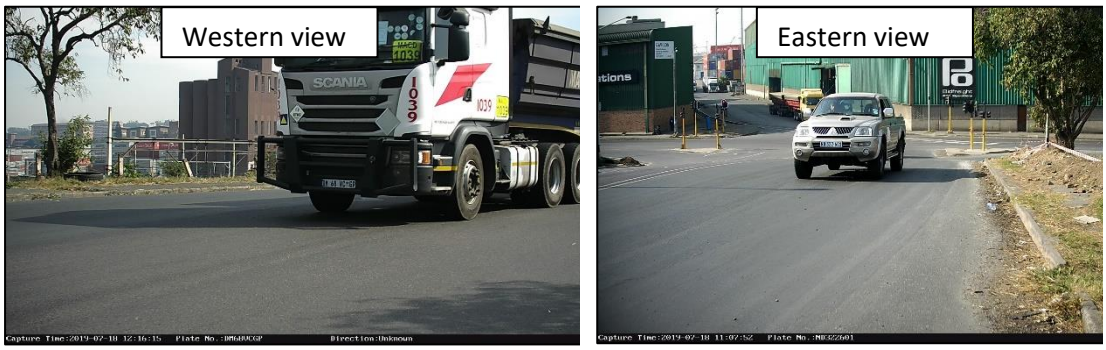


Figure 4.2: Location 2 (Rick Turner Road)

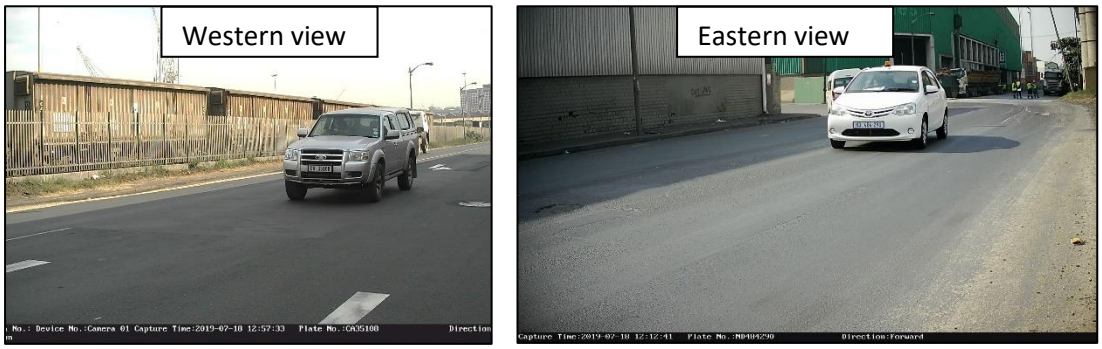


Figure 4.3: Location 3 (Crabtree Road)

The records were categorised as follows:

- Matched dataset – where an origin and destination (from nine origin-destination (OD) pairs) was recorded for a vehicle registration number
- No Match – where only an origin or destination was recorded for a vehicle registration number (it should be noted that there is another access to the Maydon Wharf Precinct from Richard Walne Road; directly onto Maydon Wharf Street, which was not surveyed - this could result in unmatched records where a vehicle uses this access for entry / exit while using one of the surveyed points for the other trip – the number of vehicles (based on traffic counts) making use of this access point, however, is low)
- Partial No Match – where only a partial vehicle registration number was recorded at an origin or destination as a result of poor visibility/legibility
- Unclear – where a vehicle registration number was completely unclear due to poor visibility/legibility (it should be noted that the video survey was undertaken during the winter season which results in poor visibility at the beginning and end of the AM and PM peak periods, as a result of low light conditions during these periods and the glare from the vehicle headlights making vehicle registration recognition difficult)
- No Plate – where vehicles observed at the origin or destination did not have a vehicle registration number

As a worst case scenario a travel time of 10 minutes was determined for the nine origin-destination (O-D) pairs and used to classify through traffic and port traffic, i.e. any vehicle taking longer than 10 minutes will be classified as port traffic (traffic that will continue to enter the future access controlled Maydon Wharf area for a similar purpose).

4.1.2 Results

A total of 16 836 vehicle observations were recorded during the 12-hour video survey. Where possible, the vehicle registration numbers were matched between the nine O-D pairs.

It should be noted that some trips originally recorded under 'Partial No Match' were manually rectified and moved to the matched dataset. The distribution of the corrected video survey data is provided in **Table 4.1**.

Table 4.1: Summary of video survey data

DESCRIPTION	Number of Records	% of Total Records
Matched records (between O-D pairs)	9 804	58%
Unmatched records - Unmatched records from vehicles with multiple records[1,3] - Unmatched records from vehicles with a single record[2,3]	4 181 1 660 2 521	25%
SUB-TOTAL (all non-error records)	13 985	83%
Partial number plates	115	1%
Unclear number plates	2 577	15%
No number plates	158	1%
SUB-TOTAL (all error records)	2 850	17%[4]

Notes

1. Records related to registration numbers that were recorded more than once during the survey period but that does not have a matching record to complete the trip (e.g. exit-enter-exit / out-out / in-in data)
2. Records related to registration numbers that were recorded as a single entry / exit record
3. The matching record could (1) have taken place before / after the survey period, (2) have made use of the Richard Walne / Maydon Wharf Street intersection to access the precinct, or (3) have a matching entry / exit record captured under the 'Partial No Match' or 'Unclear' records, that with insufficient number plate information cannot be matched.
4. The percentage of error records is technically only 16% given that number plate information cannot be assigned to vehicles without number plates, i.e. 158 incidences recorded.

The error rate is considered acceptable given that the survey locations were not designed for automatic number plate recognition, i.e. they do not have ideal viewing angles, lighting, etc., as well as the industrial nature of the area that could result in a high proportion of vehicles with dirt on their number plates. At times of localised congestion, vehicles can also obscure the number plate of the following vehicle. The 9 804 matched records, i.e. 4 902 O-D pairs, were recorded for 4 058 unique vehicle registration numbers.

The matched trips for the respective nine O-D pairs are shown in **Table 4.2.**

The number of matched trips (by O-D pair) with a journey time of less than 10 minutes is also provided with an indication of what percentage of the total number of O-D pair trips this represents.

Table 4.2: O-D movements of matched trips

DESCRIPTION	O-D MOVEMENTS						SAME O-D MOVEMENTS			TOTAL
	1-2	1-3	2-1	2-3	3-1	3-2	1-1	2-2	3-3	
All matched trips	161	720	351	753	935	782	601	266	333	4 902
Matched trips < 10 min	78	598	171	651	779	695	111	33	35	3 151
Percentage of trips < 10 min of total	48%	83%	49%	86%	83%	89%	18%	12%	11%	64%

The results show that the majority of trips enter and exit via Access 3 and that the 1-3, 3-1 and 2-3, 3-2 O-D pairs are largely represented by trips with a journey time of less than 10 minutes.

At least half of the traffic making use of the Rick Turner Road access (Access Location 2) can be considered to be port traffic. The total volume of this traffic is however significantly less than for the other O-D trips. All trips entering and exiting at the same access location was assumed to be trips that would continue to access the Maydon Wharf precinct, irrespective of whether the journey time was less than 10 minutes or not.

The above trips, however, does not allow for additional matches should there have been no error records, i.e. "Partial", "Unclear" and "No Number Plates" records. To account for the error records, an equivalent percentage to the number of matched vs total non-error records was used to estimate additional trips to be added to the number of trips with a journey time of less than 10 minutes, i.e. 43%. A total number of 2 972 matched trips with a journey time of less than 10 minutes, ie excluding same O-D movement trips, was recorded and assumed to be traffic that will redistribute to the adjacent road network (over the surveyed 12-hour period) once port security is implemented on Maydon Road. Allowing for the error records this total increases to 4 466 unmatched records plus matched trips over the 12 hour period.

$$Trips\ to\ be\ redistributed = Matched\ trips + Estimated\ trips\ due\ to\ error$$
$$Trips\ to\ be\ redistributed = 2\,972 + 1\,278$$
$$Trips\ to\ be\ redistributed = \mathbf{4\,250}$$

It should be noted that this represents a worst case scenario, i.e. it can be assumed that the allowance for the error records may be an over-estimation. Some trips with a journey time of less than 10 minutes may also continue to make use of Maydon Road in the future depending on their trip purpose.

The break-down of the trips during the respective peak periods (as discussed in the next section) is shown in **Table 4.3** and illustrated in **Figure 4.4** to **Figure 4.6**.

Table 4.3: Estimated peak hour trips to be distributed onto adjacent road network

Description	AM Peak	Midday Peak	PM Peak
Surveyed primary O-D matched trips < 10 min	619	245	287
Estimated additional unidentified trips	37	15	69
TOTAL trips to be re-distributed onto adjacent road network	656	260	356

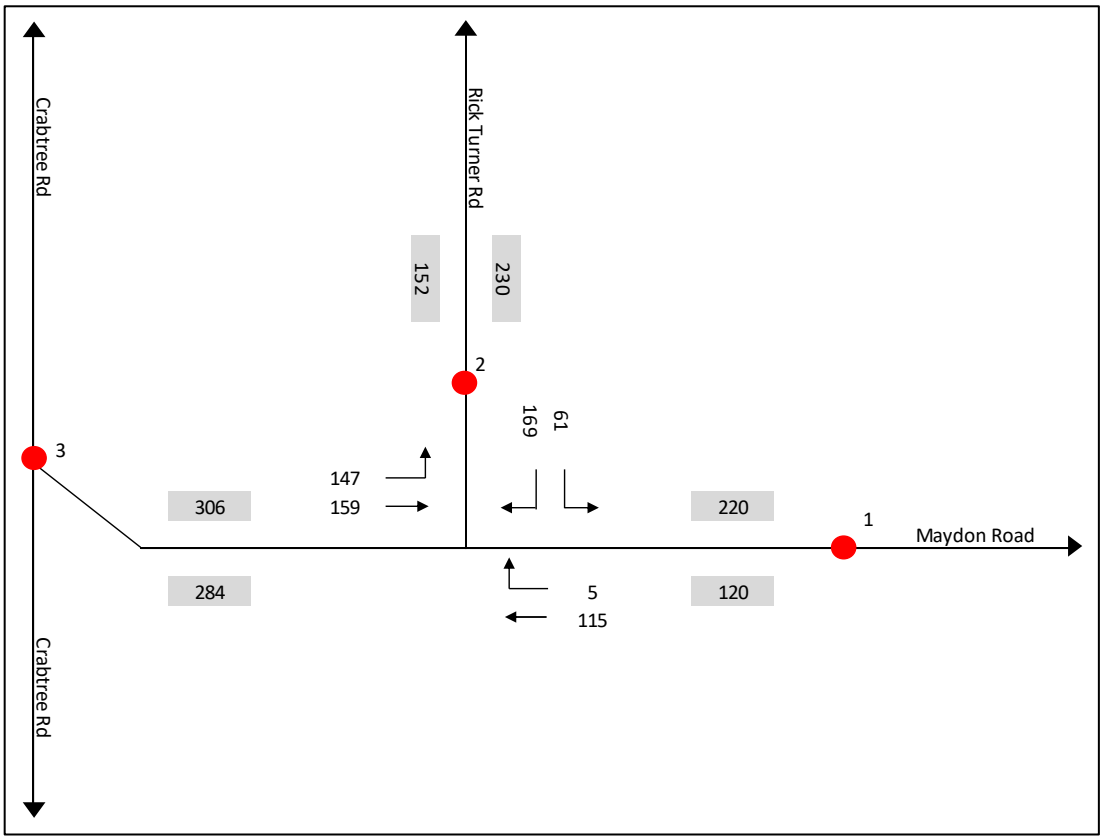


Figure 4.4: Matched data (<10 minutes) - AM Peak

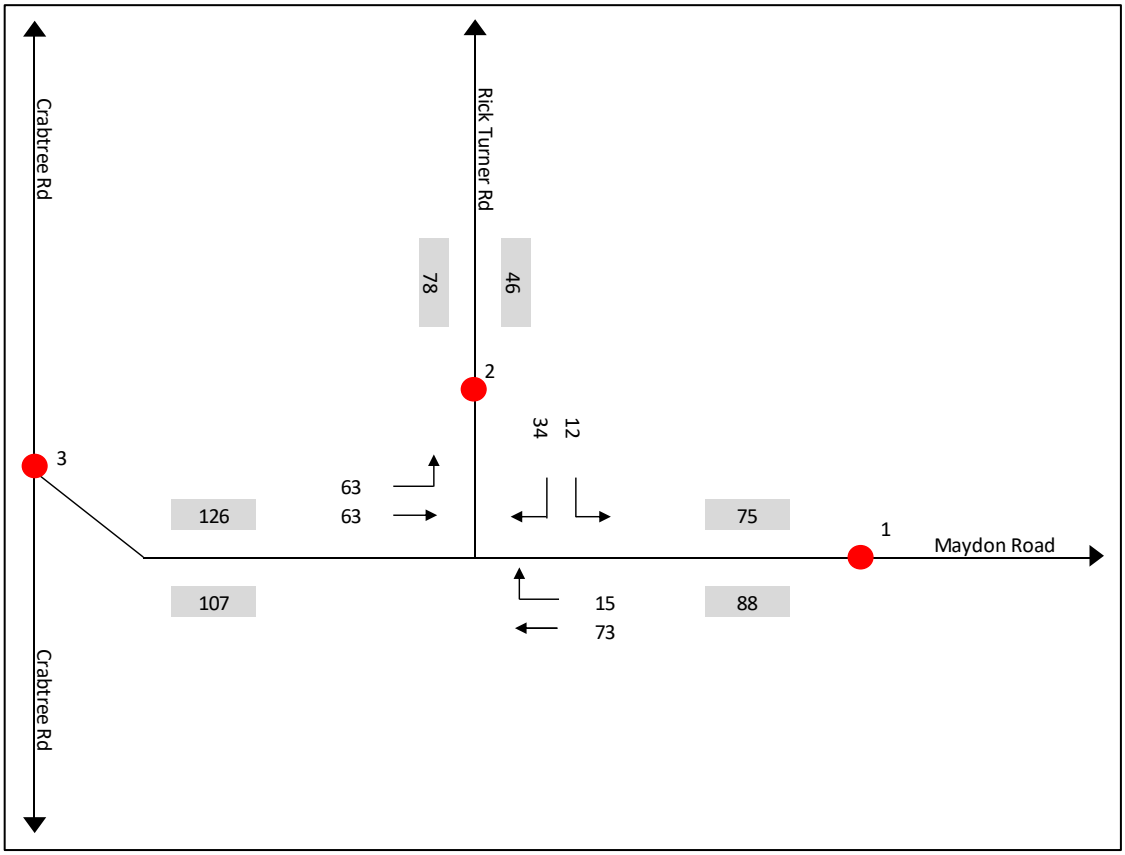


Figure 4.5: Matched data (<10 minutes) - Midday Peak

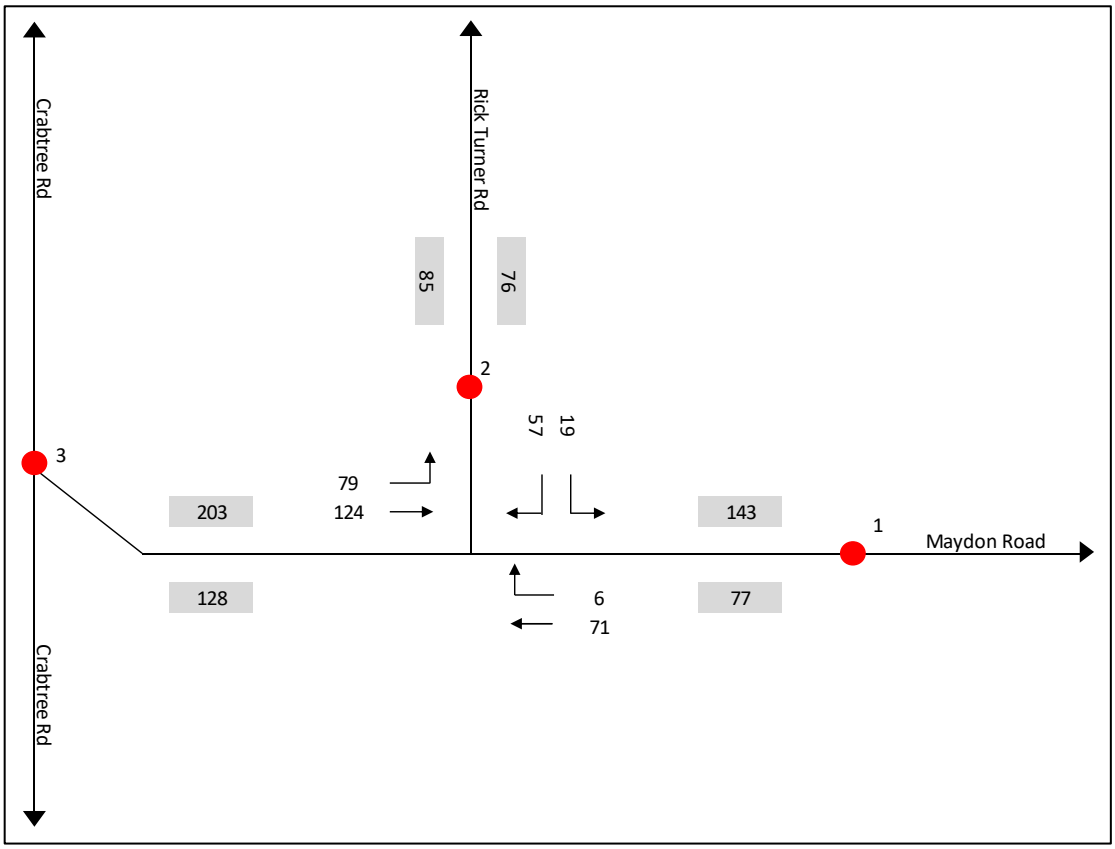


Figure 4.6: Matched data (<10 minutes) - PM Peak

4.2 Traffic Counts

As discussed in **Chapter 0**, GIBB, in consultation with ETA, defined the study area bounded by Umbilo Road and Magwaza Maphala Street to the north-west, Inkosi Albert Luthuli Road to the north-east, Maydon Road to the south-east and Farimond and Bayhead Roads to the south-west.

Manual weekday classified traffic counts were undertaken for a 12-hour period (06:00 to 18:00) at 31 intersections from Thursday, 12 September 2019 to Wednesday, 2 October 2019. The count locations are shown in **Table 4.4** and **Figure 4.7**. No traffic counts were undertaken during the school holiday period.

Table 4.4: Dates of traffic counts

Count No.	Count Location	Date
1	Bayhead Road / South Coast Road / Crabtree Road	Wednesday, 2 October 2019
2	Bayhead Road / Sydney Road	Wednesday, 2 October 2019
3	Sydney Road / Farimond Road	Wednesday, 2 October 2019
4	Umbilo Road / Farimond Road	Wednesday, 2 October 2019
5	Umbilo Road / Shrewsbury Avenue	Wednesday, 2 October 2019
6	Umbilo Road / Glastonbury Place	Wednesday, 2 October 2019
7	Sydney Road / Rick Turner Road	Tuesday, 17 September 2019
8	Umbilo Road / Rick Turner Road	Tuesday, 17 September 2019
9	Sydney Road / Hannah Road	Tuesday, 17 September 2019
10	Umbilo Road / Hannah Road	Tuesday, 17 September 2019
11	Umbilo Road / Magwaza Maphala Street	Thursday, 12 September 2019
12	Alan Paton Road / Sydney Road	Thursday, 12 September 2019
13	Alan Paton Road / Magwaza Maphala Street	Thursday, 12 September 2019
14	Sydney Road / Khuzimphi Shezi Road	Thursday, 12 September 2019
15	Sydney Road / Che Guevara Road	Tuesday, 17 September 2019
16	Che Guevara Road / Magwaza Maphala Street	Tuesday, 17 September 2019
17	Inkosi Albert Luthuli Road / Julius Nyerere Avenue	Tuesday, 17 September 2019
18	Julius Nyerere Avenue / Anton Lembede Street	Tuesday, 17 September 2019
19	Inkosi Albert Luthuli Road / Sydney Road	Tuesday, 17 September 2019
20	Inkosi Albert Luthuli Road / Khuzimphi Shezi Road	Tuesday, 17 September 2019
21 & 22	Inkosi Albert Luthuli Road / Maydon Road / Diakonia Avenue	Wednesday, 18 September 2019
23 & 24	Maydon Road / Margaret Mnacadi Avenue	Wednesday, 18 September 2019
25	Crabtree Road / Wisely Road	Tuesday, 17 September 2019
26	Wisely Road / Rick Turner Road	Tuesday, 17 September 2019
27	Maydon Road / Metheven Road	Tuesday, 17 September 2019
28	Maydon Road / Leuchars Road	Thursday, 12 September 2019
29	Maydon Road / Access Road	Thursday, 12 September 2019
30	Maydon Road / Richard Walne Road	Wednesday, 18 September 2019
31	Maydon Wharf Street / Richard Walne Road	Wednesday, 18 September 2019

PROJECT: **Maydon Road TIA**	Approved By: K. Liebenberg			Scale: 1:18 000	Date: October 2019
DETAIL: **Count Locations**	Drawn By: T. Mohlala	Checked By: C. Clark	Reviewed By: C. Clark	Project No.: J39046 / Drg No.: Figure 4.7 /	Rev:

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The AM and PM peak hours were determined by calculatinig the maximum number of total vehicles per peak period. These peak hours were not common for all the intersections and the peak hours at some of the intersections were adjusted.

In order to determine the peak hour for the midday peak period, the maximum number of heavy vehicles (freight) were calculated instead. It should be noted that traffic volumes for total traffic varied from that of heavy vehicles during the midday peak period, as shown in **Figure 4.8** and **Figure 4.9**.

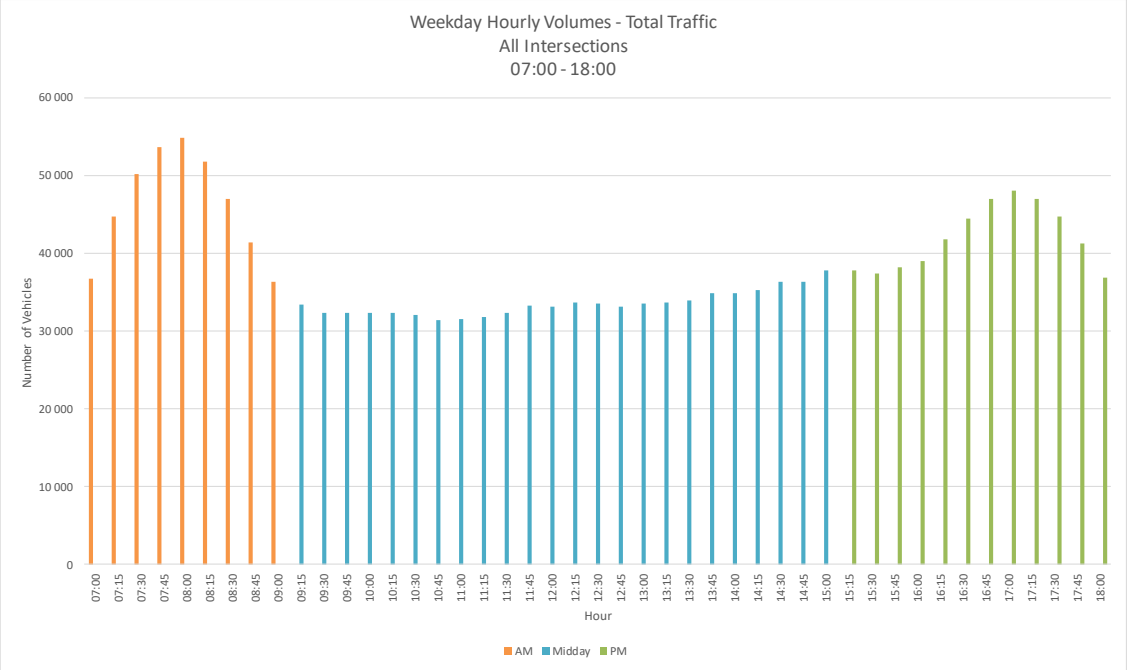


Figure 4.8: Hourly Volumes - Total Traffic

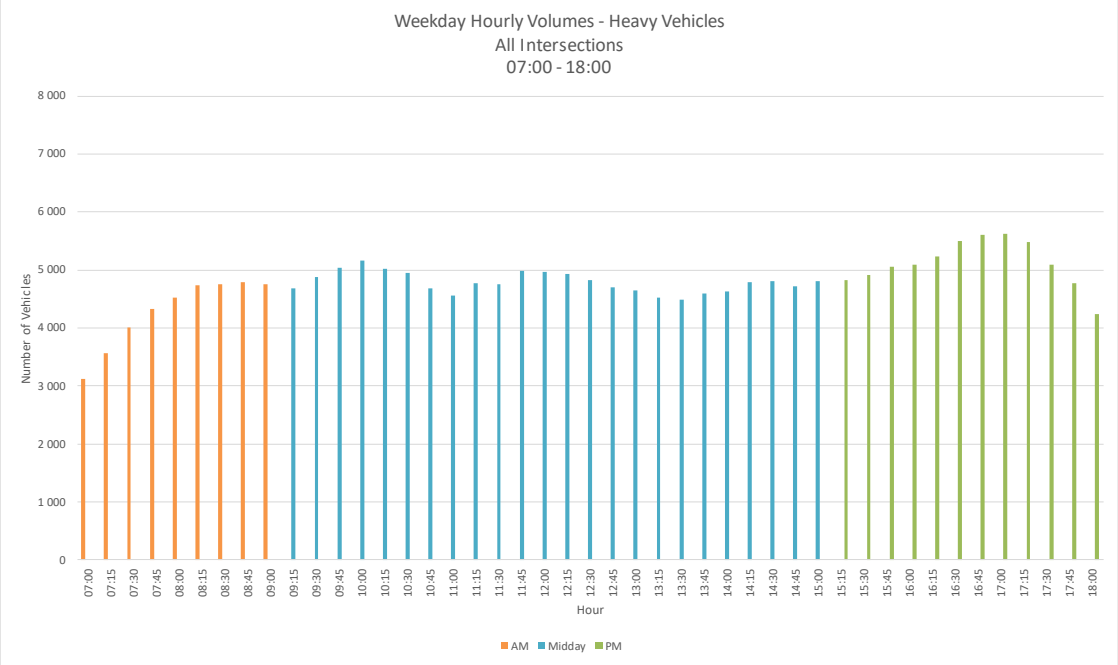


Figure 4.9: Hourly Volumes – Heavy Vehicles only

Figure 4.8 shows that the volumes are generally constant for total traffic during the midday peak with no notable fluctuations. **Figure 4.9** shows a more notable fluctuation in volumes for heavy vehicles during the midday peak. It should also be noted that two out of the three notable peaks for the heavy vehicles can be associated with the AM and PM peak periods (shoulder peaks) and the second peak for heavy vehicles during the midday peak period was, therefore, selected. The traffic surveys, indicate an average of 36% heavy vehicles along Maydon Road.

A low volume of minibus taxis and buses were recorded within the Maydon Wharf precinct area during the overall AM and PM hours. Minibus taxis and buses peaked from 06:00 to 07:00 during the AM peak period and from 17:00 to 18:00 during the PM peak period. A maximum of 25 minibus taxis and 10 buses were recorded along Maydon Road from 06:00 to 07:00 and 10 minibus taxis and 8 buses from 17:00 to 18:00.

According to the traffic counts, the weekday AM, midday and PM peak hours for the area are as follows:

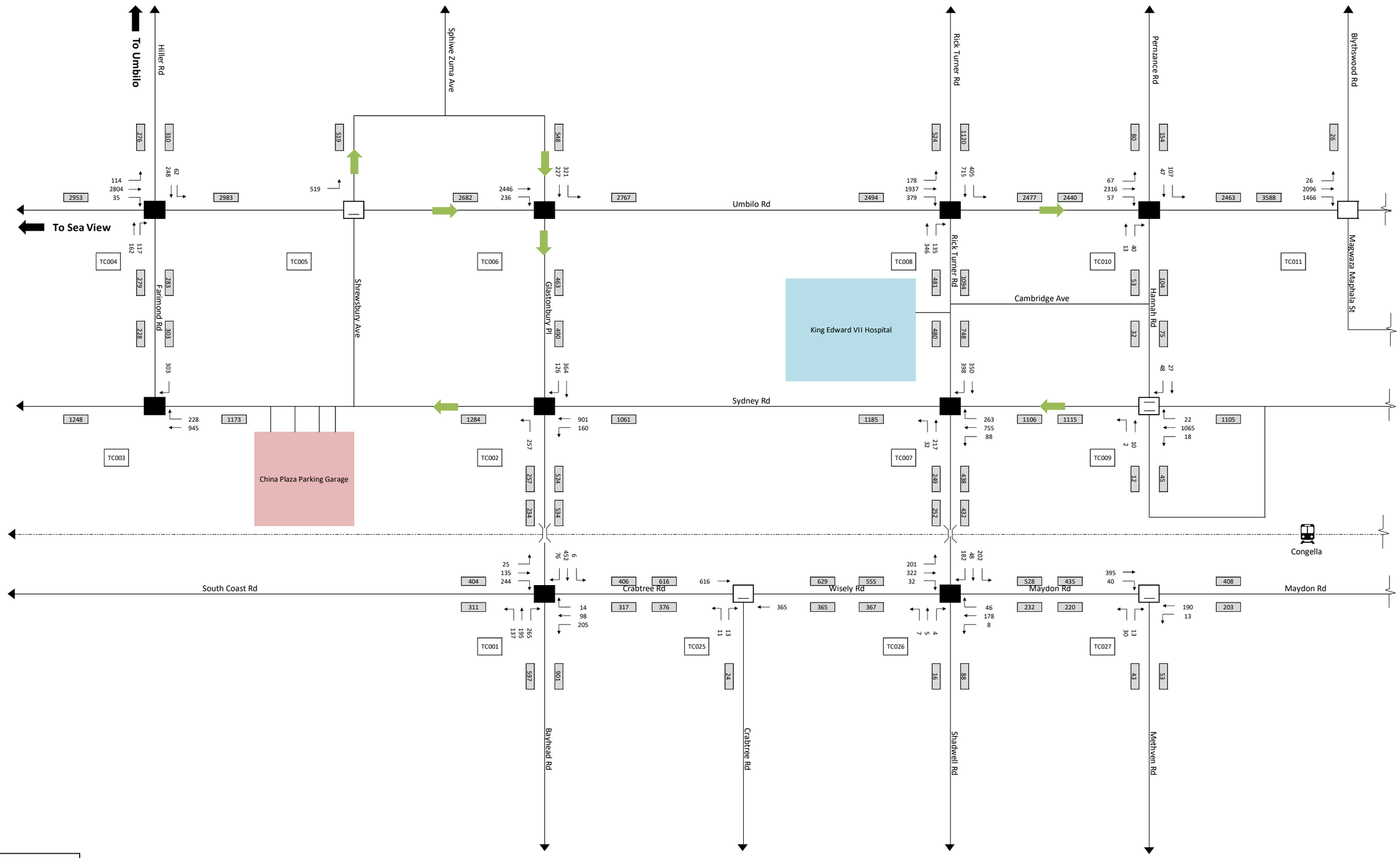
- Weekday AM Peak Hour: 07:00 to 08:00
- Weekday Midday Peak Hour: 10:45 to 11:45
- Weekday PM Peak Hour: 16:00 to 17:00

The typical capacity of a two-lane road is in the order of 2 800 veh/h in both directions. The surveyed traffic volumes along Maydon Road are significantly less than this, ie generally in the order of 500 veh/h in both directions combined, with the highest bi-directional link volume over a short section measured as 994 veh/h. It should be noted though that in an urban road corridor the throughput of vehicles is much more affected by intersection stop line capacity than the link capacity between intersections.

The 2019 background traffic scenario for total vehicles for the weekday AM, midday and PM peak hours are shown in **Figure 4.10** to **Figure 4.18**.

The 2019 background traffic scenario by mode for minibus taxis, buses and heavy vehicles for the weekday AM, midday and PM peak hours are included as **Appendix A**.

The traffic count data is shown in **Appendix B**.

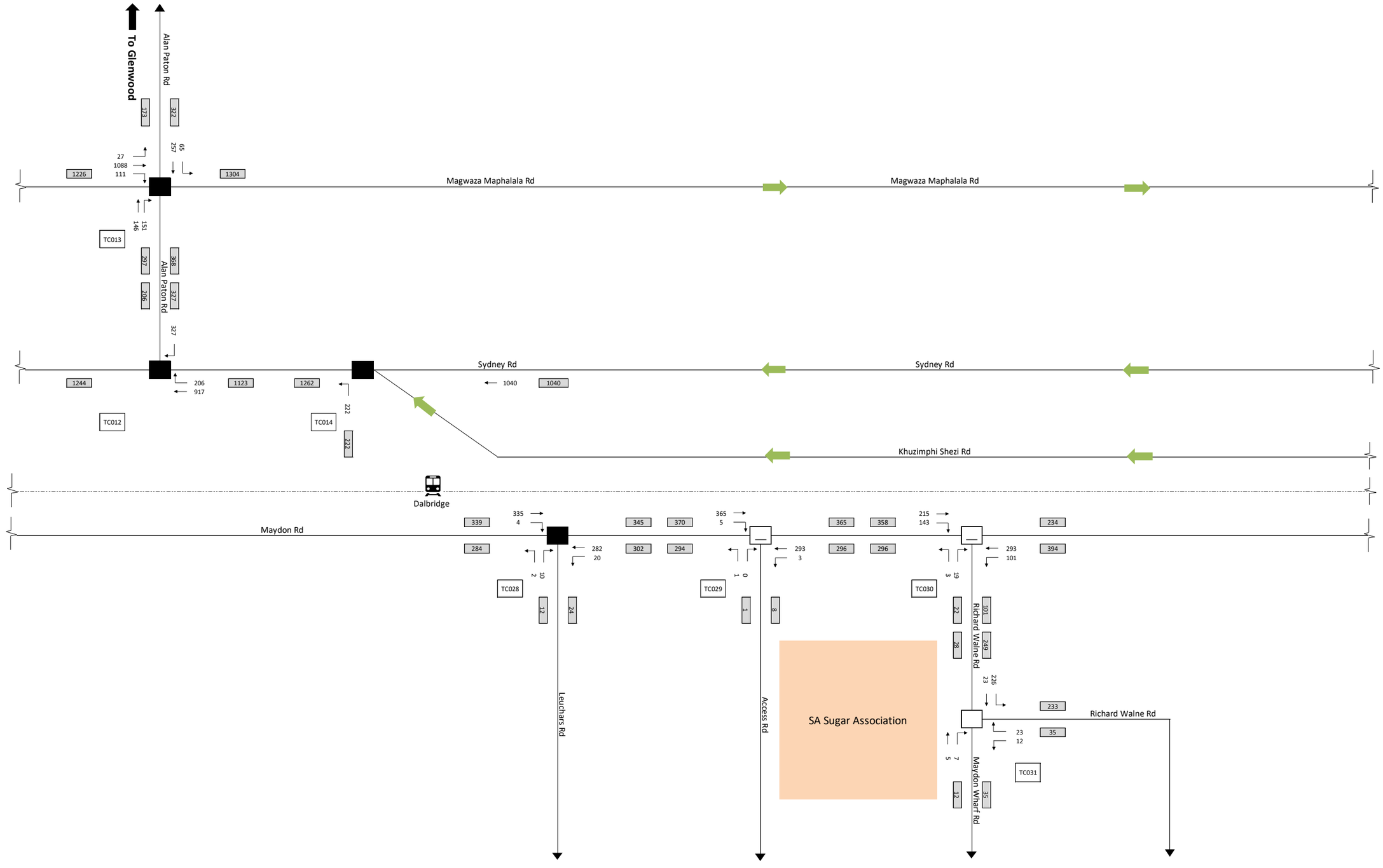


Peak Hour (07:00 - 08:00)

Legend

- Existing Road
- One-Way Road Direction
- Existing Bridge
- Railway Line
- Signalised Intersection
- Stop-Controlled Intersection
- Yield-Controlled Intersection

Project: **Maydon Road TIA**				GIBB ENGINEERING & ARCHITECTURE		
Detail: **2019 Background Traffic - Total Vehicles - AM Peak (sheet 1)**						
Prepared by: **T. Mohlala**	Checked by: **C. Clark**	Reviewed by: **K. Liebenberg**	Date: **October 2019**	Project No.: **J39046**	Drawing No.: **Figure 4.10**	Rev:

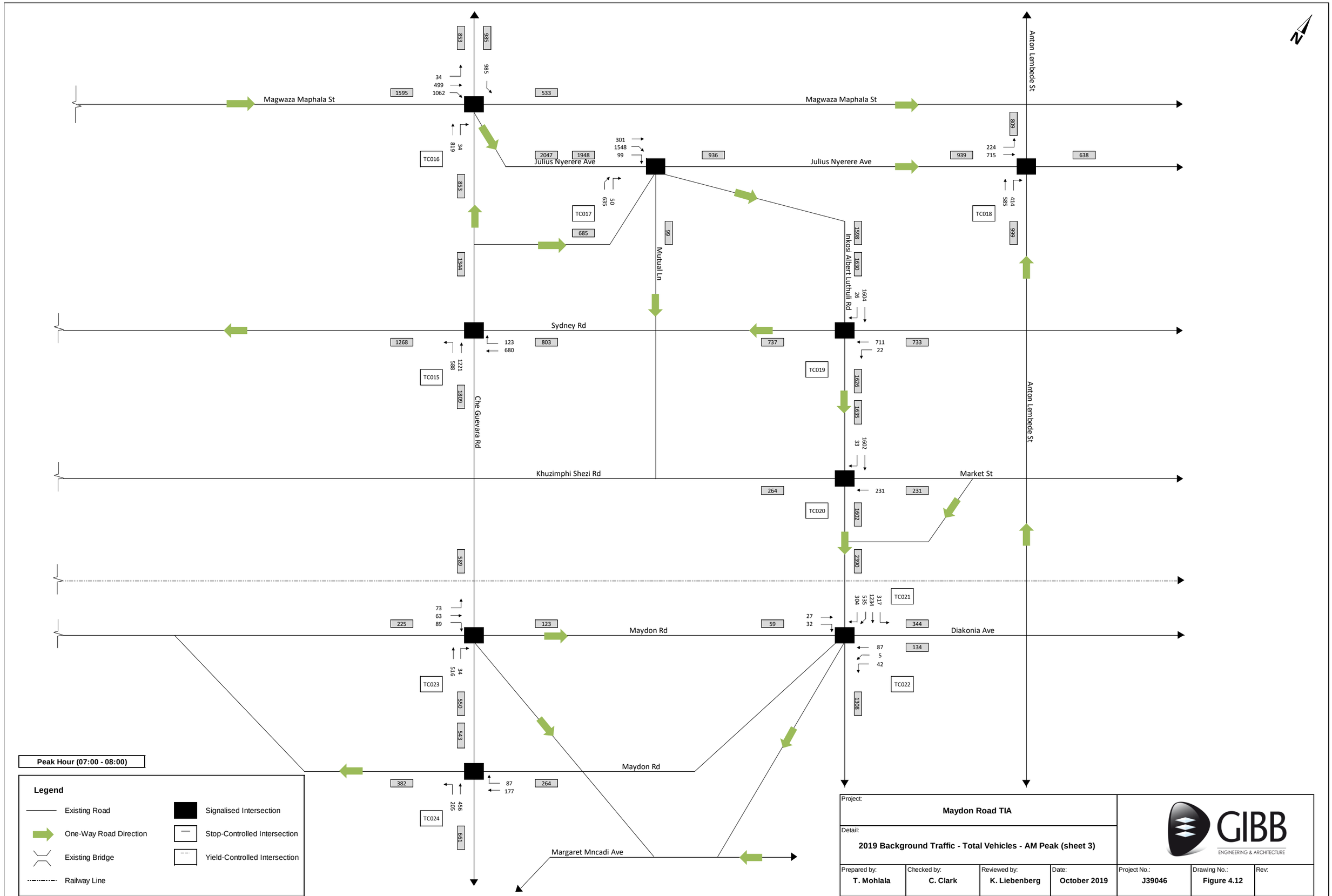


Peak Hour (07:00 - 08:00)

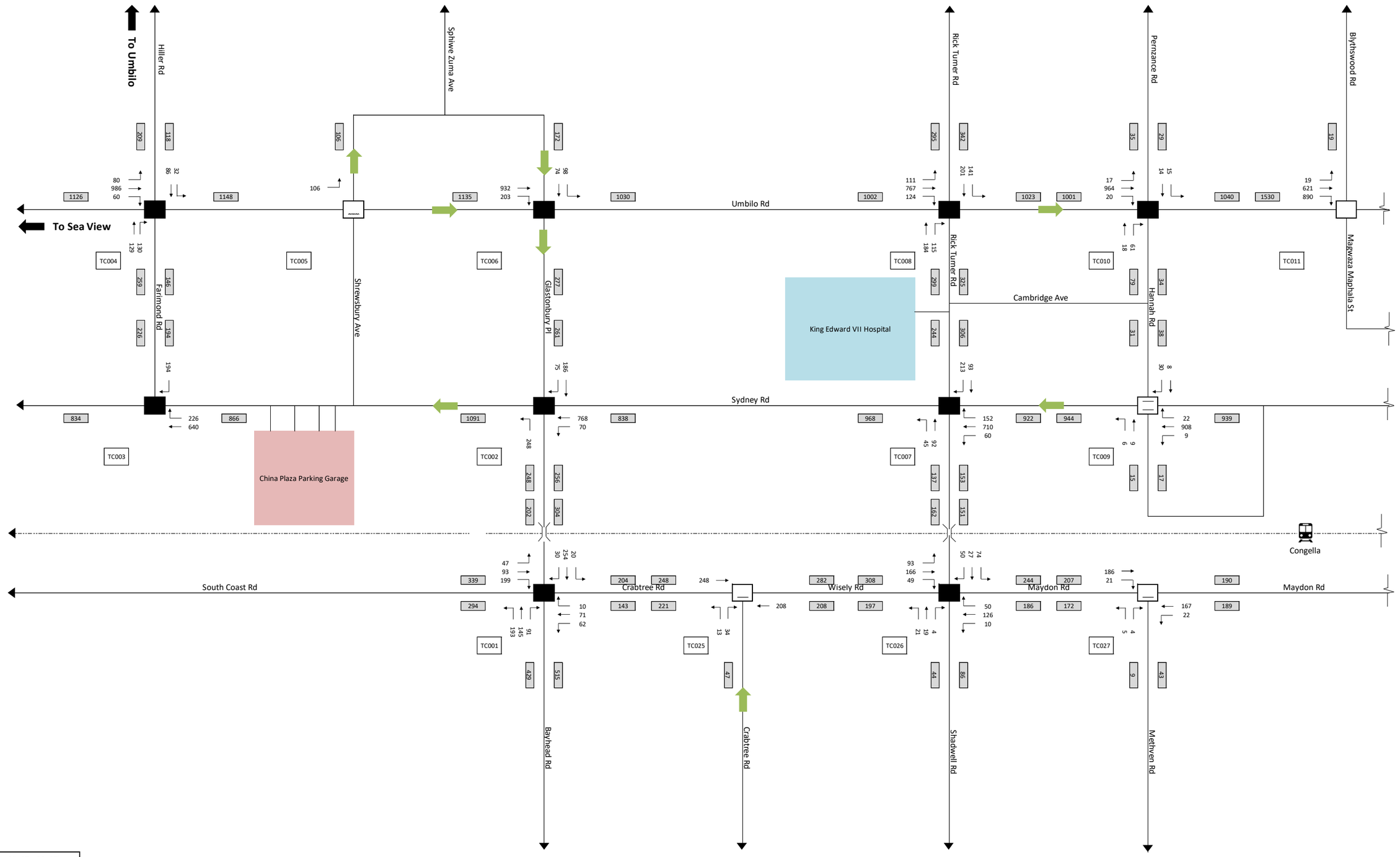
Legend

- Existing Road
- One-Way Road Direction
- Existing Bridge
- Railway Line
- Signalised Intersection
- Stop-Controlled Intersection
- Yield-Controlled Intersection

Project: **Maydon Road TIA**				GIBB ENGINEERING & ARCHITECTURE		
Detail: **2019 Background Traffic - Total Vehicles - AM Peak (sheet 2)**						
Prepared by: **T. Mohlala**	Checked by: **C. Clark**	Reviewed by: **K. Liebenberg**	Date: **October 2019**	Project No.: **J39046**	Drawing No.: **Figure 4.11**	Rev:



Project: **Maydon Road TIA**				GIBB ENGINEERING & ARCHITECTURE		
Detail: **2019 Background Traffic - Total Vehicles - AM Peak (sheet 3)**						
Prepared by: **T. Mohlala**	Checked by: **C. Clark**	Reviewed by: **K. Liebenberg**	Date: **October 2019**	Project No.: **J39046**	Drawing No.: **Figure 4.12**	Rev:

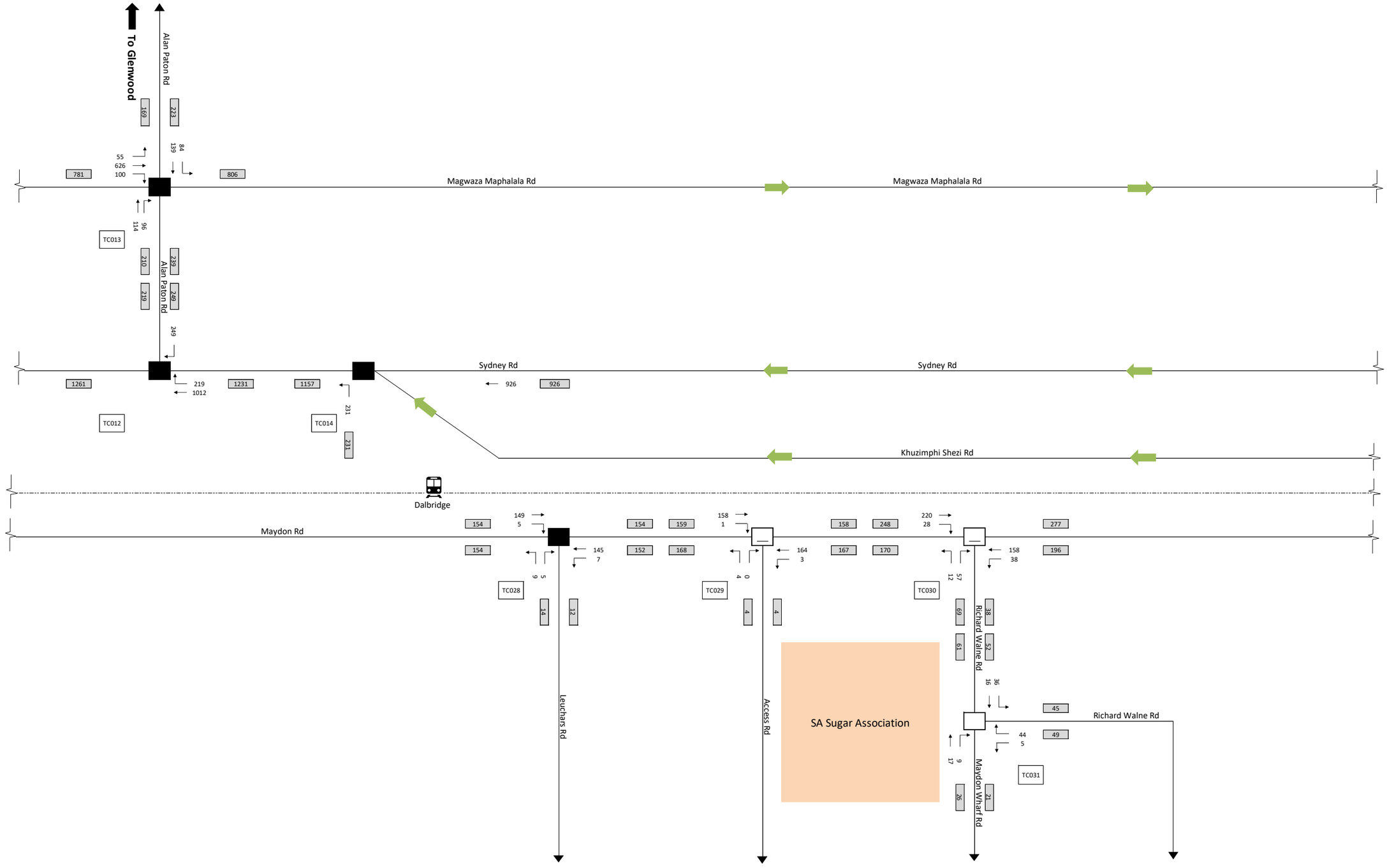


Peak Hour (10:45 - 11:45)

Legend

- Existing Road
- One-Way Road Direction
- Existing Bridge
- Railway Line
- Signalised Intersection
- Stop-Controlled Intersection
- Yield-Controlled Intersection

Project: **Maydon Road TIA**				GIBB ENGINEERING & ARCHITECTURE		
Detail: **2019 Background Traffic - Total Vehicles - Midday Peak (sheet 1)**						
Prepared by: **T. Mohlala**	Checked by: **C. Clark**	Reviewed by: **K. Liebenberg**	Date: **October 2019**	Project No.: **J39046**	Drawing No.: **Figure 4.13**	Rev:



Peak Hour (10:45 - 11:45)

Legend

- Existing Road
- One-Way Road Direction
- Existing Bridge
- Railway Line
- Signalised Intersection
- Stop-Controlled Intersection
- Yield-Controlled Intersection

Project: **Maydon Road TIA**				GIBB ENGINEERING & ARCHITECTURE		
Detail: **2019 Background Traffic - Total Vehicles - Midday Peak (sheet 2)**						
Prepared by: **T. Mohlala**	Checked by: **C. Clark**	Reviewed by: **K. Liebenberg**	Date: **October 2019**	Project No.: **J39046**	Drawing No.: **Figure 4.14**	Rev:

Magwaza Maphala St

Julius Nyerere Ave

Sydney Rd

Khuzimphi Shezi Rd

Maydon Rd

Maydon Rd

Margaret Mncadi Ave

Che Guevara Rd

Mutual Ln

Inkosi Albert Luthuli Rd

Anton Lembede St

Anton Lembede St

Market St

Diakonia Ave

TC016

TC017

TC015

TC018

TC019

TC020

TC021

TC022

TC023

TC024

1337 716 630 630 75 530 732 557

641 27 1362 1359 379 915 65 585 621 76 545 497

668 20 206 494 421 418

226 65 894 935 982 926 56

839

944 237 611 848 718 662 20 682

657 333 990 946 941 901 40

276 236 236

901

548 1241

227 80 63 84 103 66 34 32 139 105 756 256 124

19 468 84 1 38 123

487 826

499

185 86 72 158

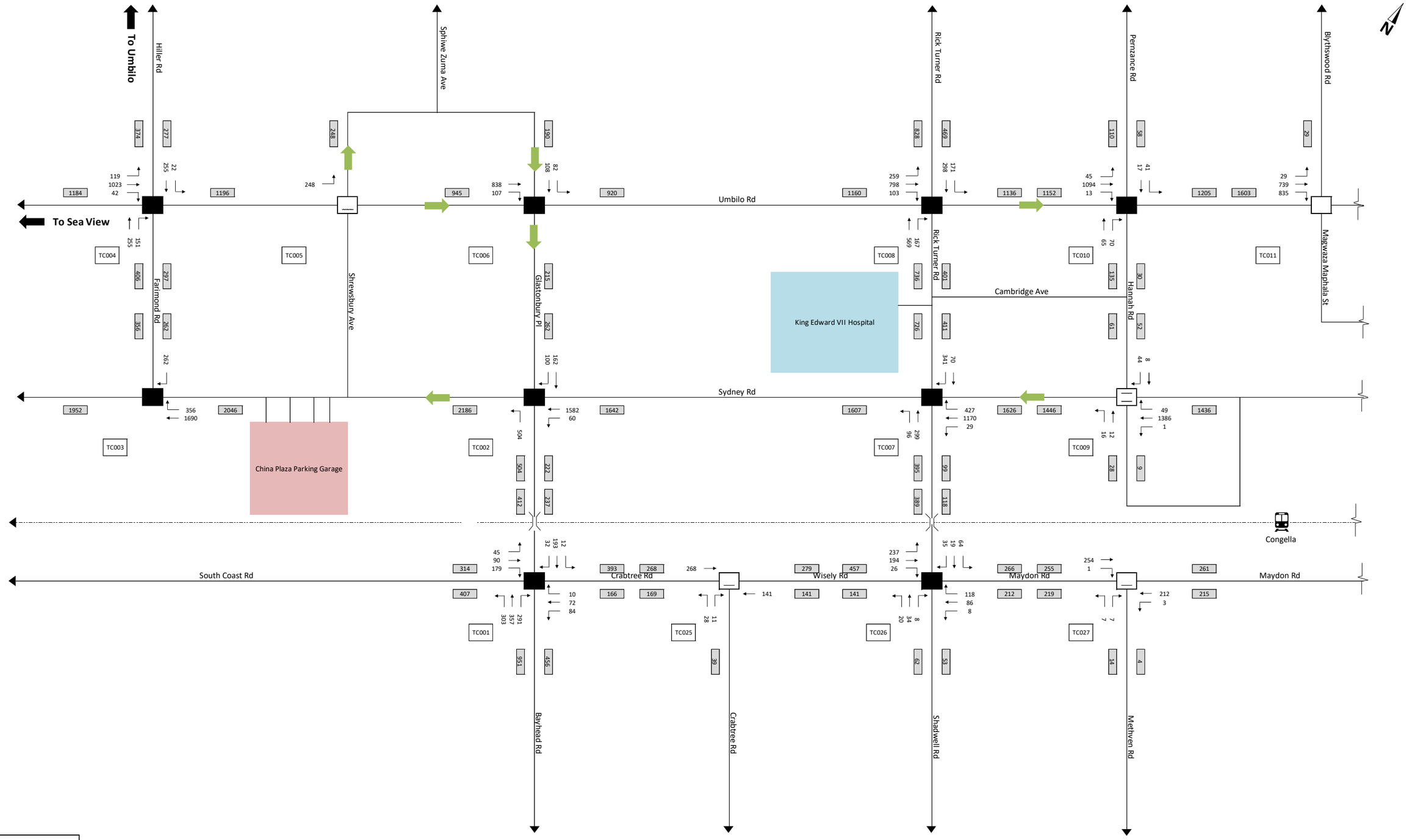
413 113 526

Peak Hour (10:45 - 11:45)

Legend

- Existing Road
- One-Way Road Direction
- Existing Bridge
- Railway Line
- Signalised Intersection
- Stop-Controlled Intersection
- Yield-Controlled Intersection

Project: **Maydon Road TIA**				GIBB ENGINEERING & ARCHITECTURE		
Detail: **2019 Background Traffic - Total Vehicles - Midday Peak (sheet 3)**						
Prepared by: **T. Mohlala**	Checked by: **C. Clark**	Reviewed by: **K. Liebenberg**	Date: **October 2019**	Project No.: **J39046**	Drawing No.: **Figure 4.15**	Rev:

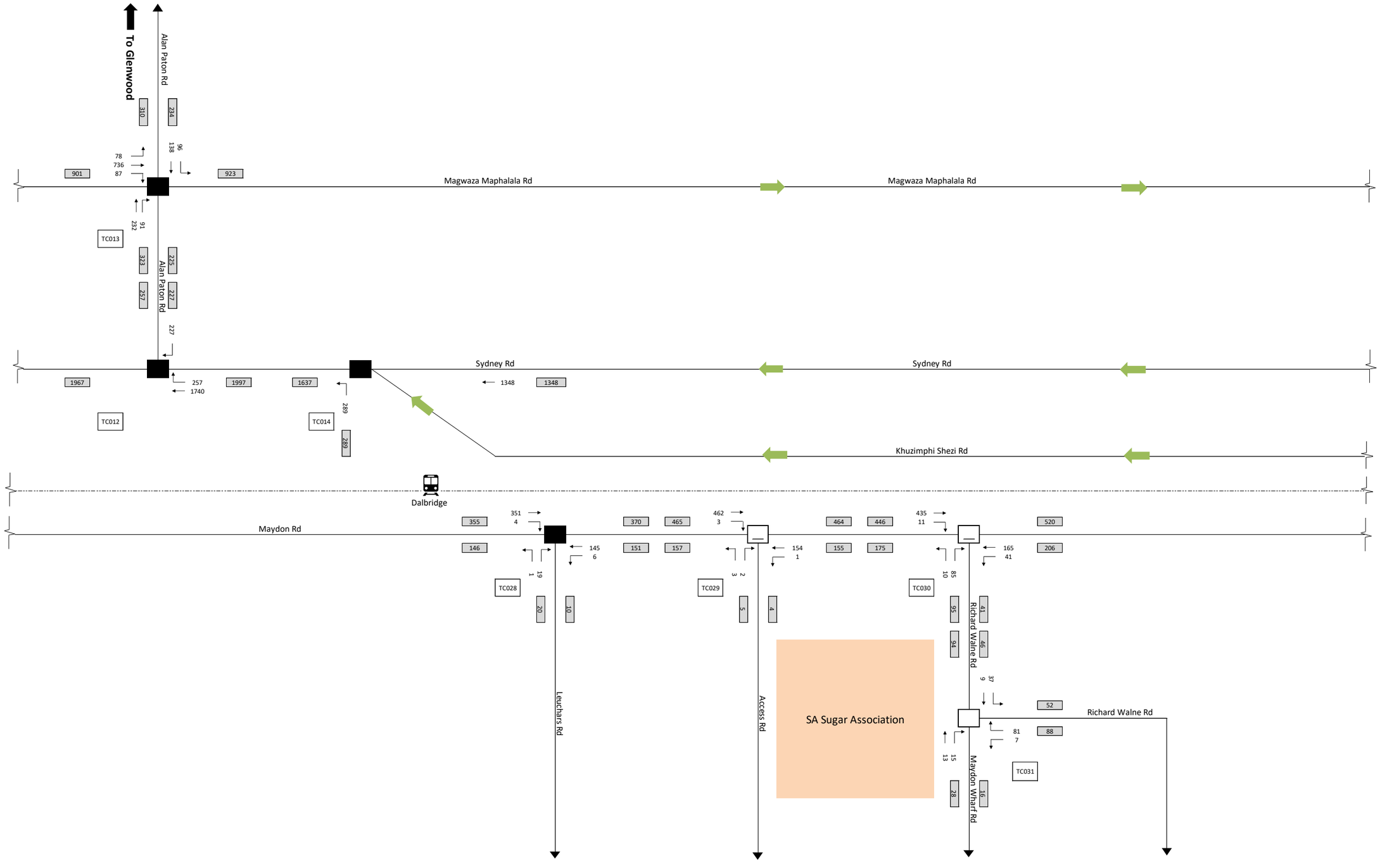


Peak Hour (16:00 - 17:00)

Legend

- Existing Road
- One-Way Road Direction
- Existing Bridge
- Railway Line
- Signalised Intersection
- Stop-Controlled Intersection
- Yield-Controlled Intersection

Project: **Maydon Road TIA**				GIBB ENGINEERING & ARCHITECTURE		
Detail: **2019 Background Traffic - Total Vehicles - PM Peak (sheet 1)**						
Prepared by: **T. Mohlala**	Checked by: **C. Clark**	Reviewed by: **K. Liebenberg**	Date: **October 2019**	Project No.: **J39046**	Drawing No.: **Figure 4.16**	Rev:

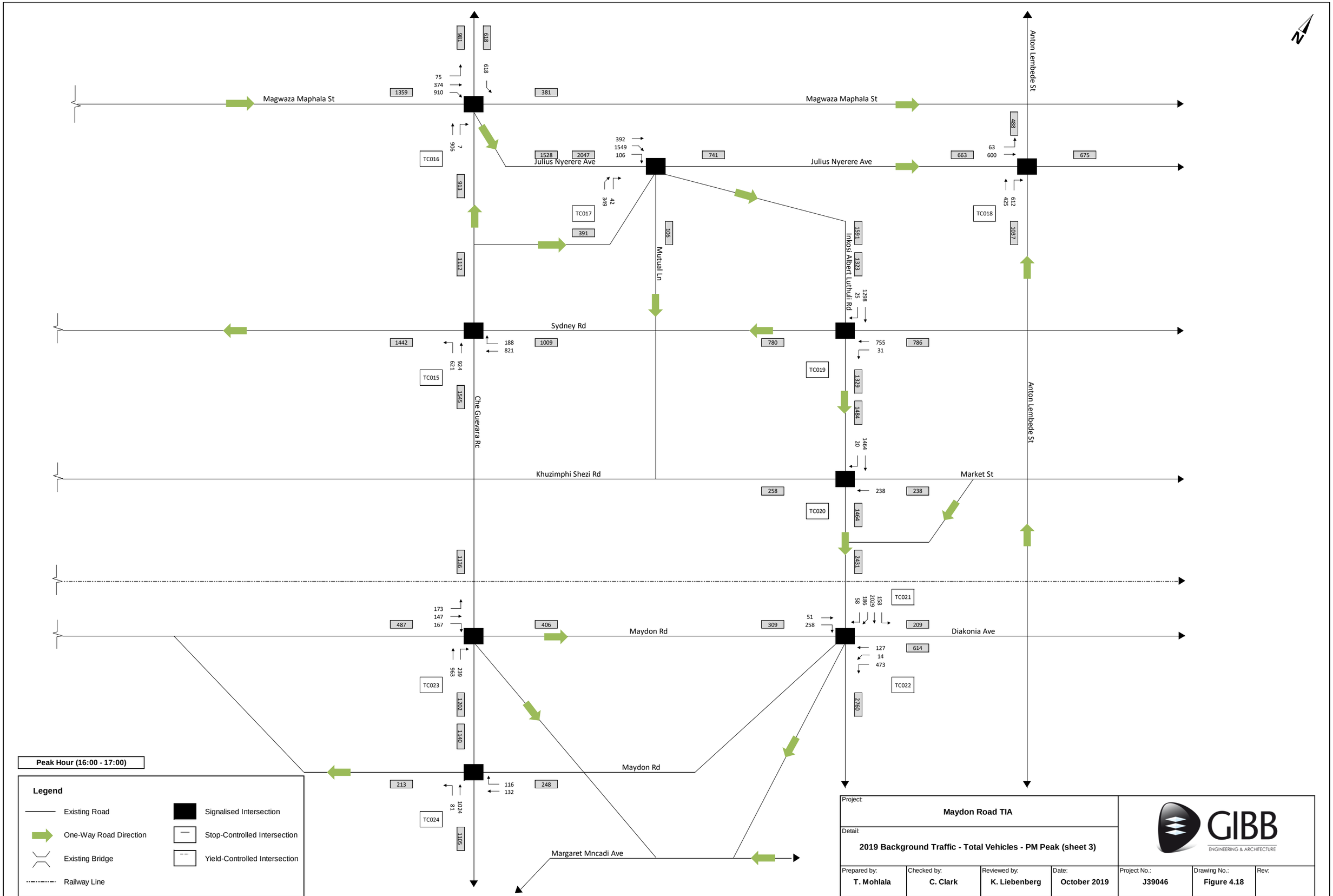


Peak Hour (16:00 - 17:00)

Legend

- Existing Road
- One-Way Road Direction
- Existing Bridge
- Railway Line
- Signalised Intersection
- Stop-Controlled Intersection
- Yield-Controlled Intersection

Project: **Maydon Road TIA**						
Detail: **2019 Background Traffic - Total Vehicles - PM Peak (sheet 2)**						
Prepared by: **T. Mohlala**	Checked by: **C. Clark**	Reviewed by: **K. Liebenberg**	Date: **October 2019**	Project No.: **J39046**	Drawing No.: **Figure 4.17**	Rev:



Project: **Maydon Road TIA**						
Detail: **2019 Background Traffic - Total Vehicles - PM Peak (sheet 3)**						
Prepared by: **T. Mohlala**	Checked by: **C. Clark**	Reviewed by: **K. Liebenberg**	Date: **October 2019**	Project No.: **J39046**	Drawing No.: **Figure 4.18**	Rev:

5 Transport Model

5.1 Background

The Aimsun hybrid mesoscopic / microscopic transport model was used to estimate the re-distribution of traffic for the current and future weekday AM and PM peak hour scenarios following the deproclamation of Maydon Road and introduction of access restrictions to the Maydon Wharf precinct area. Given the number of optioneering scenarios requiring testing and that the midday day vehicle volumes are less than the AM and PM peak periods, the midday scenario was not included as part of the modelling scope of work.

The calibrated and validated Aimsun hybrid mesoscopic / microscopic transport model was applied to quantify the traffic conditions for the base year (2019) and to explain the traffic patterns. It was also applied to determine the impact of:

- Prohibiting through traffic on Maydon Road (and by extension Wisely and Crabtree Roads) and identifying road improvements to accommodate the re-distributed traffic on the surrounding road network
- Impact of delay time at the proposed access control locations on traffic flow
- Evaluation of different access control location and access configuration options under mainly base year conditions
- Evaluation of the network under the expected future assessment year demands and identifying road improvements to accommodate the traffic.

A detailed Modelling report was prepared and is included as **Appendix C** to this report.

5.2 Selection of Future Assessment Years

Typically, the COTO TMH16 Volume 1 *South Africa Traffic Impact and Site Traffic Assessment Manual Version 1* (2012) requires a design horizon year of five years for TIA's. However, based on road network proposals and public transport supply changes obtained from ETA for the study area, it was agreed that a five year horizon would not be suitable for this study. ETA indicated that there will be a substantial increase in demand from 2019 to 2035 and the existing road network in the study area will most likely not be able to accommodate the expected increase in future traffic. Due to the magnitude of the impact, it was agreed that two future assessment years, namely; 2025 and 2035, would be more appropriate for the study.

5.3 Base year (2019) Traffic Operations

The total demand is 38 096 and 39 469 vehicles for the morning and afternoon peak periods respectively, with the majority of vehicles as through traffic (62% in the morning peak period and 65% in the afternoon period). Internal-internal traffic is 2.5% in the morning peak period and 1% in the afternoon peak period. The contribution of heavy vehicles is 10% in the morning peak period and 7% in the afternoon peak period.

Traffic conditions in the morning peak period varies and decrease towards the end of the peak period. No severe congestion is present during the morning peak period. Intersections experiencing higher densities are:

- Rick Turner and Bayhead Roads
- Umbilo Road and Franks Avenue
- Magwaza Maphala Road and Che Guevara Road
- Market Street and Leo Boyd Highway

Congestion during the afternoon peak period is concentrated in the north of the study area on streets providing access to and from the M4. This includes Market Street, Leo Boyd Highway, Che Guevara Road and Margaret Mncadi Avenue. High levels of density is experienced on Market Street throughout the afternoon peak period while high levels of density is experienced on the other roads in the north of the study area from 15:30 until 17:45.

There is substantial spare capacity on the road sections of all the main through routes (Umbilo Road / Magwaza Maphala Street, Sydney Road and the M4. Intersections are points where this capacity is impeded as listed above.

5.4 Re-distributed Traffic Operations

Re-directing the through traffic on Maydon Road result in a reduction of traffic volumes on Maydon Road and a re-location to Umbilo Road and Sydney Road as well as Che Guevara Road and Leo Boyd Highway, as shown in **Error! Reference source not found.**. Red indicates an i ncrease in traffic and green a reduction in traffic and the bandwidth indicate the volumes. Traffic that did not relocate is indicated in grey.

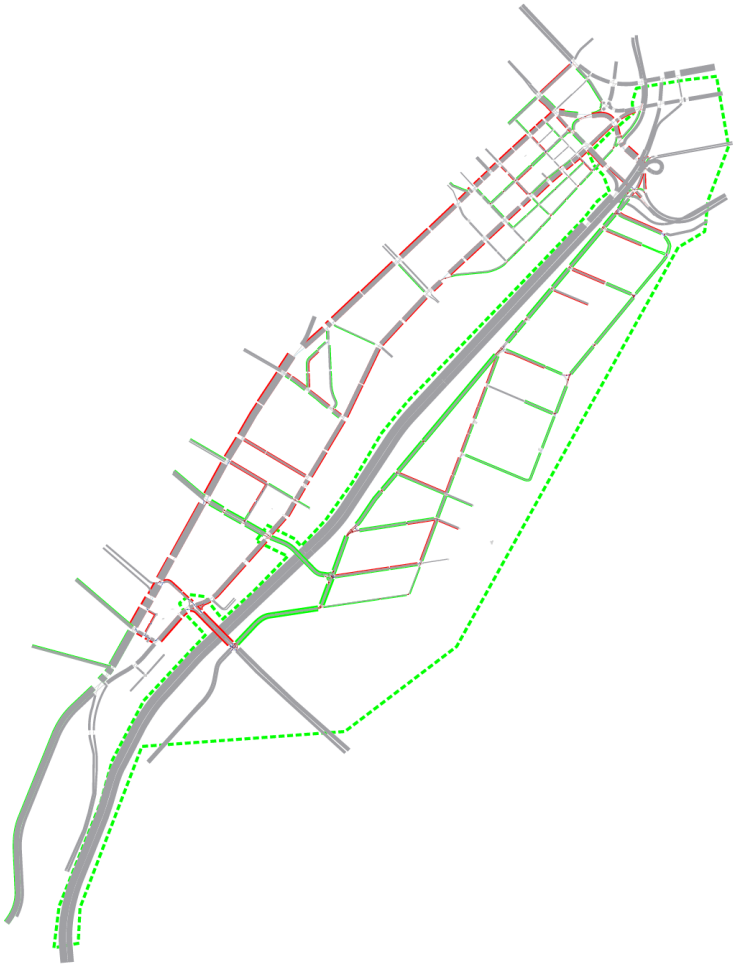


Figure 5.1: Expected changes in base year traffic volumes when Maydon Road traffic is re-directed during the Base Year Morning Peak Period

The additional vehicles increase the density on Che Guevara Road to such an extent that traffic from the M4 to Che Guevara Road cannot be accommodated and therefore an increase of density on the M4 (northbound direction) can be expected. Sydney Road is not affected negatively due to sufficient spare capacity, except for the intersection with Rick Turner Road. The following streets experience an increase in density in the morning peak period:

- Magwaza Maphala Road (northbound direction)
- Che Guevara Road (westbound direction)
- Market Street (southbound direction)
- Rick Turner Road (eastbound direction)
- Bayhead Road (eastbound direction)
- M4 northbound (northbound direction)

Re-directing the through traffic on Maydon Road will increase the average density from 45 sec/km to 247 sec/km which is an increase of almost 5.5 times. Low-cost improvements were implemented which reduce the average delay to 80 sec/km (an increase of 1.7 times compare to the base year). This implies that the average speed will reduce from the current 37 km/h to 33 km/h with the Maydon Road through traffic diverted and the low-cost improvements implemented. The low-cost improvements are:

- Intersection of Umbilo Road and King Dinuzulu Road: Change lane configuration to one lane left and through shared and three lanes right turn on Umbilo Rd northbound direction (road marking changes only)
- Intersection of Umbilo Road and Che Guevara Road: Change lane configuration on Che Guevara Road direction westbound to one through lane and two right turn lanes (road marking changes only)
- Intersection of Magwaza Maphala Road and Canada Road: Change signal timing plan
- Intersection of Spradbrow Road and Sydney Road: Change signal timing plan
- Intersection of Umbilo Road and Franks Avenue: Change signal timing plan
- Intersection of Sydney Road and Franks Avenue: Change signal timing plan
- Intersection of Bayhead Road and Crabtree/South Coast Road: Change signal timing plan
- Intersection of Umbilo Road and Farimond Road: Change signal timing plan

Future demand was prepared for 2025 and 2035 which is based on the increase in demand in the EMME model for these target years converted to the hybrid model's zoning system and added to the base year demand and distributed between the 15-minute intervals based on the base year proportions. The expected growth in traffic is provided in **Figure 5.6**.

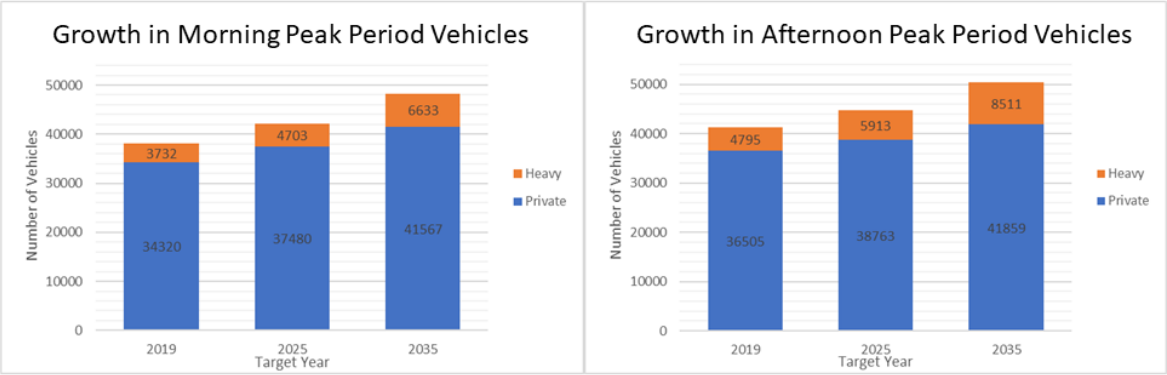


Figure 5.2: Expected Growth in Peak Period Demand

The growth tendency for the morning peak period is a sharp increase of 13% in the first five years followed by a downward trend in the percentage growth for each consecutive five-year period. For heavy vehicles it is predicted that the percentage growth will increase for each consecutive five-year period. The afternoon peak follows a similar pattern. A higher percentage growth in private vehicles are expected in the morning peak period compared to the percentage growth in the afternoon peak period for the study area. The percentage growth expected in heavy vehicles are significantly higher compared to the percentage growth in private vehicles. This implies that the proportion heavy vehicles in the study area will increase over time as indicated in **Table 5.1**.

Table 5.1: Expected Percentage Growth in Demand by Mode for Future Year Scenarios

Target Year	AM Peak		PM Peak	
	Private	Heavy	Private	Heavy
2025	9%	26%	6%	23%
2035	11%	41%	8%	44%

In summary, the breakdown of vehicle types for the base year is private vehicles 65%, followed by heavy vehicles 29%, minibus-taxis 5% and buses 1%. The contribution of heavy vehicles is expected to increase to 33% in 2025 and 44% in 2035.

In the reality an increase in demand will trigger two actions when the travel time increase too much. The one action is that road users will adjust their paths to try and keep travel time as close as possible to their current travel time. This is accommodated in traffic models via the route choice model. The second action is to adjust the departure time accordingly to the increase in travel time. This can be taken into account by applying the technique of peak spreading.

This hybrid model covers a small area (approximately 5 km long and 1,4 km wide) with a high number of one-way streets. This situation implies that the option for changing paths within this area to reduce travel time increase is limited. Due to the small size of the study area changing in paths would most likely happens outside the study area. The only other option is therefore peak spreading. The worst situation is where the model does not take peak spreading into consideration while the most optimistic situation is where it is applied too liberally. The worst situation is unlikely to happens, because road users will change their behaviour and the most optimistic situation is also unlikely to happen because there are factors that limits the magnitude of adaption to be applied by road users.

The effect of applying the technique of peak spreading is best illustrating by comparing the base year demand per 15-minute interval with the 2025 demand without and with peak spreading as illustrated in **Figure 5.3**. Comparison of the 15-minute demand shows a smoother curve for the progression in traffic over time compared to the base year and the option without peak spreading which is similar as discussed earlier. For some 15-minutes the demand is higher in the peak spreading option, but lower in the non-peak spreading option. The nett effect is clearly visible when the peak hour demands are compared. The peak spreading option result in a higher peak hour compared to the option without peak spreading. Comparing the morning peak hour (based on a smoother base year profile) with the afternoon peak hour (based on a more erratic profile) the latter result in a higher increase in peak hour volumes (3.8%) compared to the smoother base year profile (2.8%). Applying the peak spreading technique creates a smoother progression of traffic over time which is more in line with representative volumes and it results in higher peak hour volumes compared to the option without peak spreading, thus creating a “worst case scenario” option.

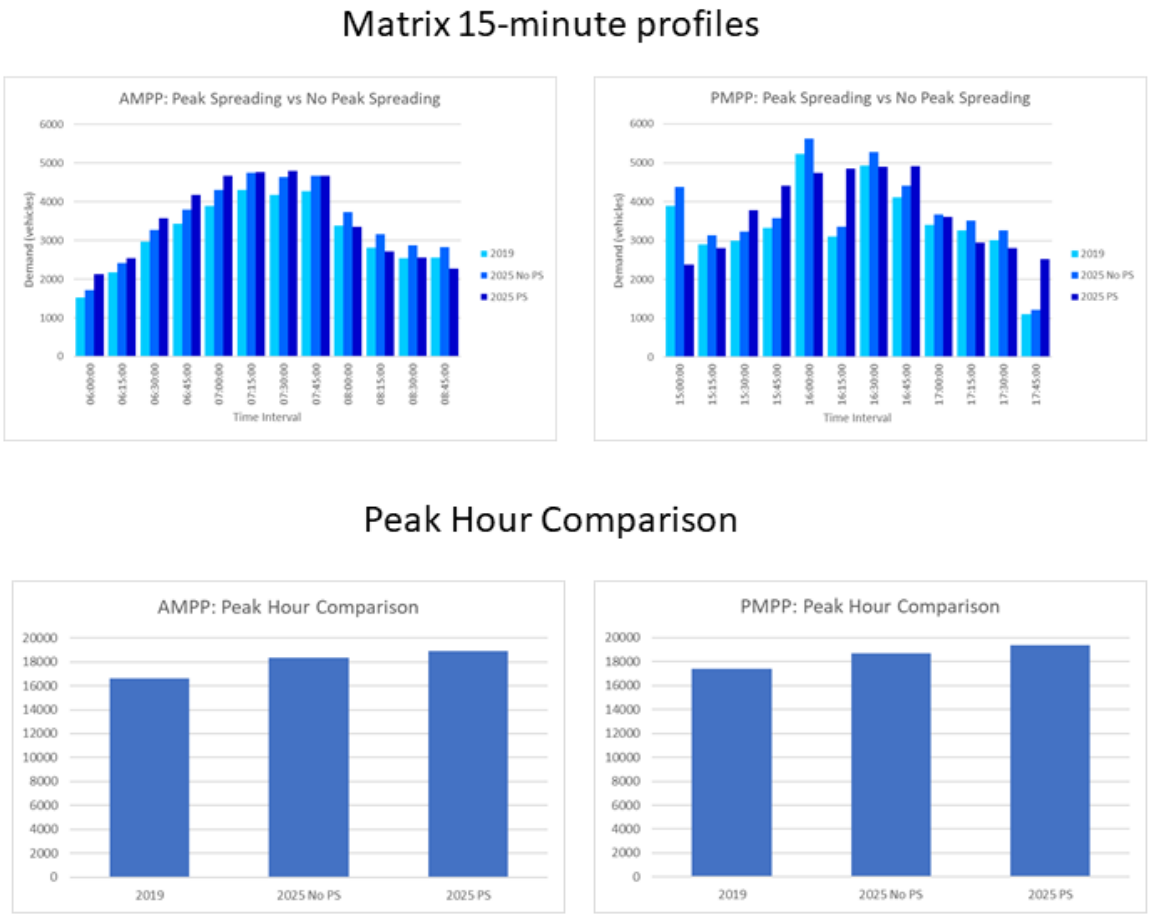


Figure 5.3: The impact of peak spreading technique

The expected increase in volumes for both 2025 and 2035 is such that the Bayhead-Sydney-Farimond-Umbilo path is unable to accommodate the expected increase in traffic along this path. The main bottleneck is Farimond Road with the right turn from Farimond Road to Umbilo Road. This bottleneck hampers the flow of traffic in 2025 and 2035. The proposed solution to accommodate the traffic and provide acceptable flow of traffic is to introduce three lanes in the westbound direction with a lane configuration of two lanes for right turn plus one lane sharing through and right turn traffic as shown in **Figure 5.4**.

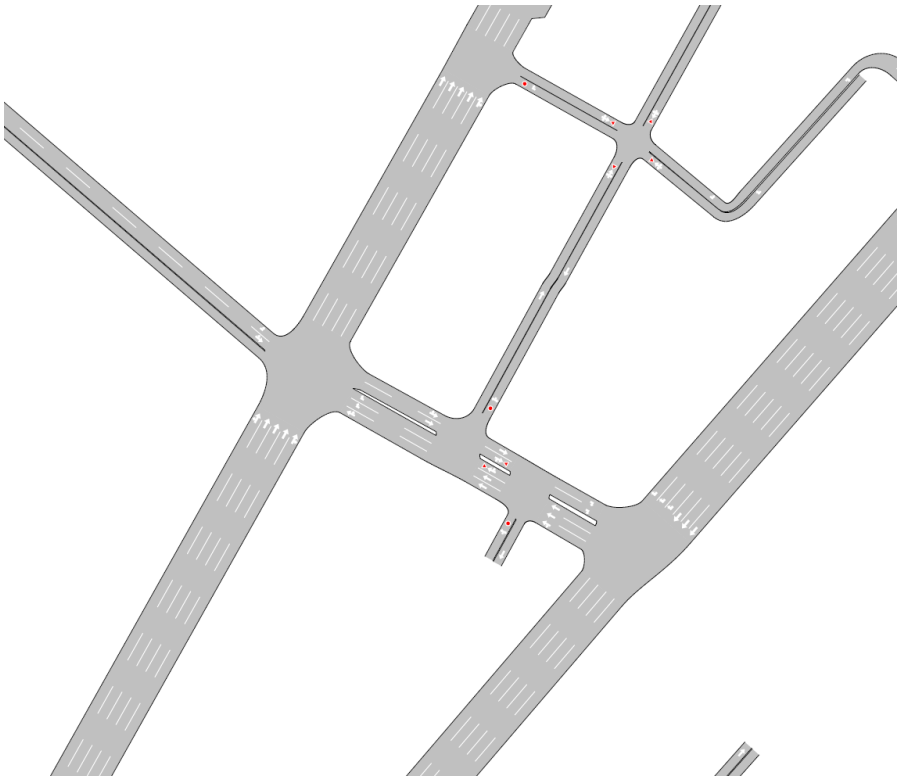


Figure 5.4: Proposed improvements on Farimond Road

With the above change, as well as the previously proposed low-cost improvements, the expected 2025 and 2035 future traffic can be accommodated but at a higher delay time compare to the base year.

The 2025 demand was increased by 30%, which is higher than the predicted 2035 demand and assigned to the 2025 network. The simulation results showed that at this increase in demand, the throughput of the network in terms of vehicles per hour is 12% more in the morning peak period and 17% more in the afternoon peak period. This results in a reduction in average speed from 37 km/h to 29 km/h in the morning peak period and 35 km/h to 27 km/h in the afternoon peak period.

The 2019, 2025 and 2035 future traffic volumes, as obtained from the transport modelling exercise, are included as **Appendix D**.

5.5 Proposed Access Configurations

The respective Maydon Wharf access configuration options considered are described below.

5.5.1 Option 1a

The proposed gate locations are listed below and shown in **Figure 5.5**:

- Richard Walne Road gate (north) – 1 inbound lane + 1 outbound lane
- Maydon Road (south of Richard Walne Road) gate (north) – 2 inbound lanes + 2 outbound lanes
- Rick Turner Road gate (west) – 2 inbound lanes + 2 outbound lanes

- Crabtree Road gate (south) – 2 inbound lanes + 1 outbound lane

Figure 5.5: Proposed gate locations - Options 1a and 1b

5.5.2 Option 1b

Option 1b is similar to Option 1a, as shown in **Figure 5.5**, with the exception of the number of inbound lanes at the northern Maydon Road gate. Option 1b allows for 3 inbound lanes and 2 outbound lanes.

5.5.3 Option 1c

Option 1c is similar to Option 1a, as shown in **Figure 5.6**, however, the access gate proposed on Maydon Road is located further south, ie just north of Leuchars Road with 2 inbound lanes and 2 outbound lanes.

Traffic to and from the Sugar Association will not pass through access control. The access at the Sugar Association linking to Maydon Wharf Street will need to be closed or also controlled.

Figure 5.6: Proposed gate locations - Options 1c

5.5.4 Option 2

Option 2 is similar to Option 1a, as shown in **Figure 5.5**, however, the access gate on Rick Turner Road is proposed as an entrance only gate with 3 inbound lanes. All other gates will operate as bi-directional gates.

5.5.5 Option 3

Option 3 is similar to Option 1a, as shown in **Figure 5.5,** with the following exceptions:

- Rick Turner Road is proposed as an exit only gate with 3 outbound lanes
- Crabtree Road is proposed as an entrance only gate with 3 inbound lanes

5.6 Proposed Access Configuration Evaluations

The criteria used to evaluate the delay time is that it should not result in maximum queues that impact negatively on the upstream intersection. The initial security inspection time was based on a system where the driver's license and vehicle license are scanned before entry which results in an average delay time of about 30 seconds. This delay time is influenced by the security guard, the driver and the conversation time between the driver and security guard. The security inspection time for heavy vehicles, buses and minibus-taxis is expected to be longer. The initial gate delay times assumed is shown in **Table 5.2**. The delay times as indicated in **Table 5.2** resulted in queue lengths through the intersection of Maydon Road and Margaret Mncadi Avenue which escalates and affects Leo Boyd Highway and Che Guevara Road

negatively. The delay time for private vehicles were therefore shortened to 15s (it is short but considered achievable) and the deviation was kept at 2s.

Table 5.2: Gate Delay Times

Vehicle Type	Initial Delay (sec)	Final Delay (sec)	Standard Deviation (sec)
Light Vehicle	30	15	2
Minibus-taxi	30		10
Bus	40		10
Heavy Vehicle	40	40/15[1]	10

Note:

1. For the 2035 scenario a delay of 15 seconds/vehicle is required (this can be achieved through only screening selected vehicles or other technology improvements) to accommodate the significant increase in heavy vehicles on the road network – for all other target years a delay of 40 seconds/vehicle is sufficient

Model runs showed that the most critical gate positions are at the following locations:

- On Maydon Road just south of Canal Road (Gate A1), and
- On Maydon Road just north of the intersection with Leuchars Road (Gate A2)

Gates at these locations where used to determine the impact of the through traffic on Maydon Road and to determine a delay time that will ensure acceptable queue lengths.

The gates were evaluated for each of the five options for the base year. For the target years 2025 and 2035 only options 1a and 1b were evaluated. The expected maximum queues are not expected to impact negatively on the operations of the upstream intersections for all options and demands tested (target years and peak periods), except for a few instances which are highlighted in the summary below:

- Existing Gate on Maydon Wharf Street – The expected maximum queue lengths for all the options are short and will not impact negatively on the surrounding network for the base year traffic.
- Gate A1 on Maydon Road – The expected maximum queue lengths for all the options except Option 2 in the morning peak period is acceptable. Option 2 result in the maximum inbound queue at Gate 1a to become too long and is therefore not desirable. The cause of this long queue is Rick Turner Road being converted to a one-way street outbound resulting in traffic that would have entered the Maydon Wharf precinct area from the east to divert to the north, thus resulting in longer queues at Gate 1a. Evaluation of this gate indicated that reserved lanes for heavy vehicles on the approaches to gates cannot be implemented otherwise the queues become too long. The reason being that the reserved lane result in only 50% of the road capacity being allocated to private vehicles which constitute approximately 90% of the demand.
- Gate A2 on Maydon Road - The proposed three inbound lanes at this gate reduce the maximum queue length substantially. The queues do not impact negatively on the adjacent intersection and is therefore considered a safer option compared to the location of Gate 1a. This applies to Option 2 as well.
- Gate A3 on Maydon Road – This gate location is applicable only to Option 1c and due to the greater distance between this gate and the surrounding road network it is expected

that the maximum queues at this location will not affect the surrounding traffic negatively. Evaluation of this gate clearly indicated that reserved lanes for heavy vehicles on the approaches to gates need to be dropped otherwise the queues become too long. The reason being that the reserve lane result in only 50% of the road capacity being allocated to private vehicles which is approximately 90% of the demand.

- Gate A4 on Rick Turner Road – None of the proposed options provide any threat to impact negatively on the surrounding road network during either the morning or afternoon peak periods.
- Gate A5 on Crabtree Road – None of the proposed options provide any threat to impact negatively on the surrounding network during either the morning or afternoon peak periods.

In summary, with the exception of Option 3 (AM peak) the options operate very similar in terms of total delay, as shown in **Figure 5.7** and **Figure 5.8**.

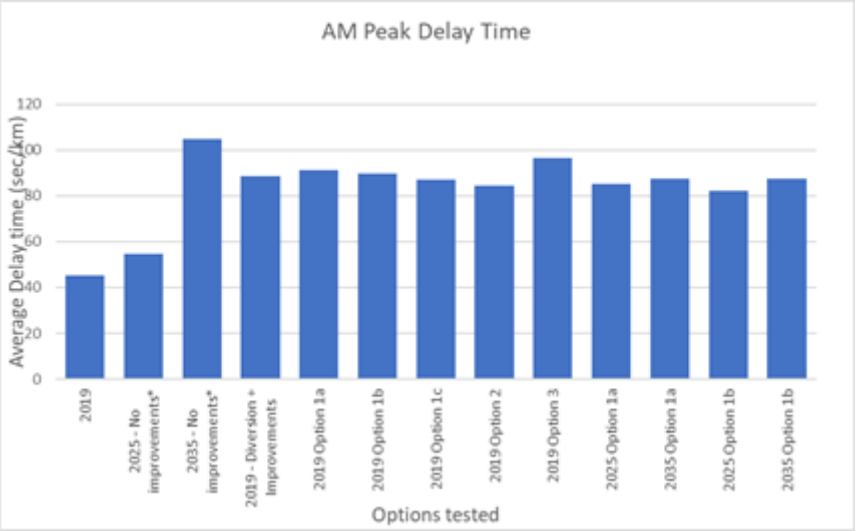


Figure 5.7: AM Peak Delay for various access configurations and assessment years

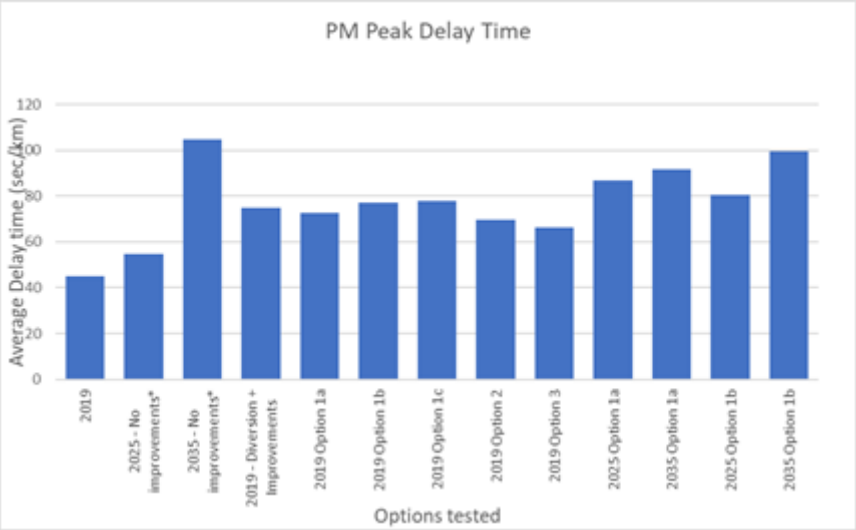


Figure 5.8: PM Peak Delay for various access configurations and assessment years

Given that Options 1c, 2 and 3 have some operational limitations in terms of access to the precinct, as well as individual properties such as the Sugar Association, the selection was between Options 1a and 1b, ie the number of entry lanes at the northern Maydon Road access gate. Option 1b has a lesser impact in terms of queue length at the northern Maydon Road access gate, ie the queue does not affect the operations at the Maydon Road / Richard Walne Road intersection. The maximum queue length results are shown in **Figure 5.9** to **Figure 5.13** for the various scenarios and gate location permutations (base year scenario only). The maximum queue length indication is based on available distance to downstream intersections.

Based on the above Option 1b was selected for analysis in the 2025 and 2035 scenario years. Modelled typical expected queue lengths at the most critical gate, ie Maydon Road (north), is shown visually in **Figure 5.14** to **Figure 5.19**. The layout plans indicating how these gates can be accommodated within the road reserve is included in **Appendix E**. It should be noted that an application has been submitted to ETA for a satellite fire station which will have an impact on the proposed Maydon Road access gate layout should it go ahead in its current form. Should the fire station application be supported by the ETA, it is considered that the fire station can be accommodated with some changes to both the access gate and fire station layouts.

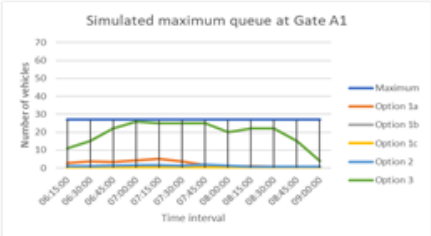
Base Year (2019)
AM Peak Period

Base Year (2019)
PM Peak Period

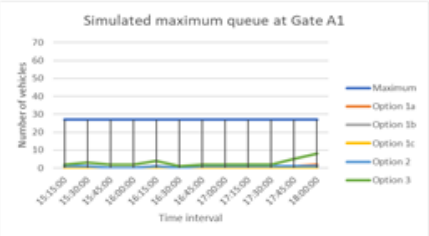
Gate: Existing

Gate: Existing

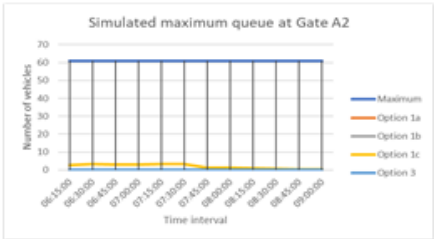
Gate: Maydon Rd (A1)



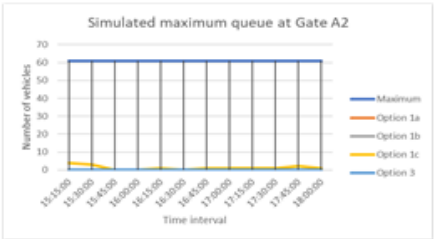
Gate: Maydon Rd (A1)



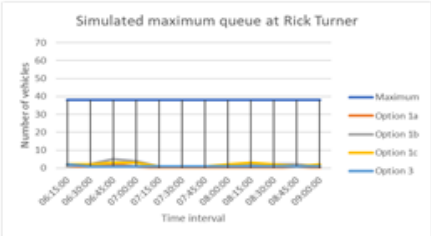
Gate: Maydon Rd (A2)



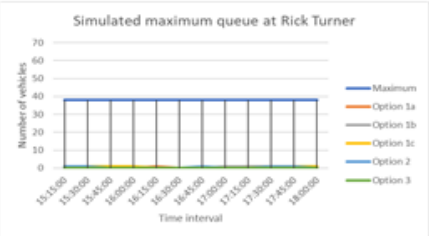
Gate: Maydon Rd (A2)



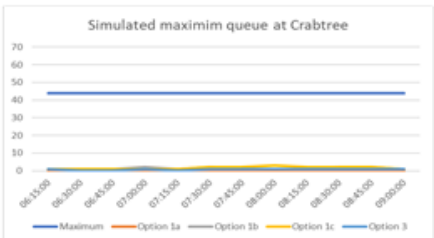
Gate: Rick Turner



Gate: Rick Turner



Gate: Crabtree



Gate: Crabtree

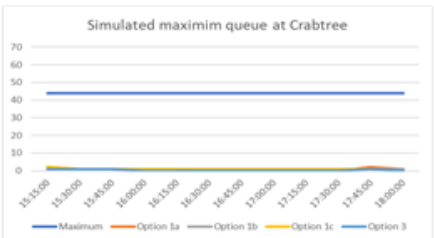


Figure 5.9: Expected maximum inbound queue lengths with the Base Year Demand

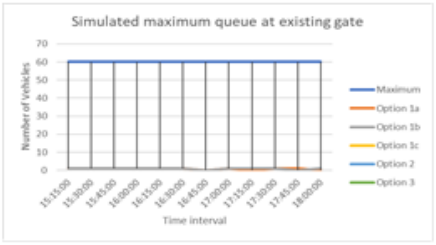
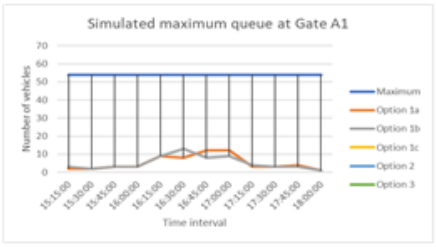
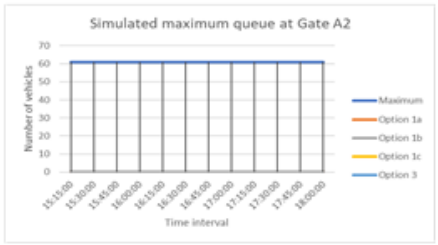
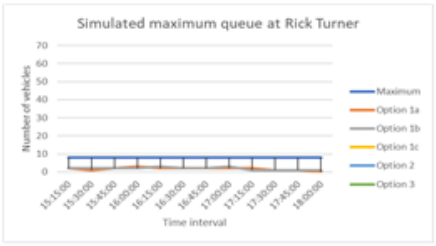
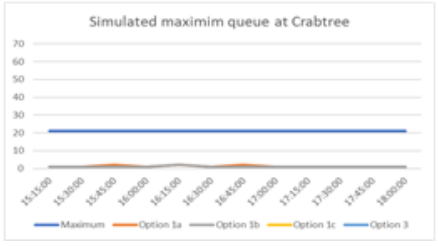
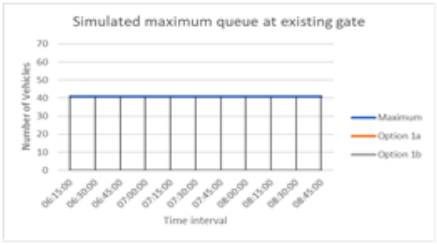
Base Year (2019) AM Peak Period	Base Year (2019) PM Peak Period
No runs required	Gate: Existing 
	Gate: Maydon Rd (A1) 
	Gate: Maydon Rd (A2) 
	Gate: Rick Turner 
	Gate: Crabtree 

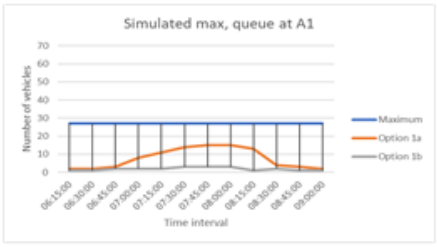
Figure 5.10: Expected Maximum outbound queue lengths with the Base Year Demand

2025 AM Peak Period

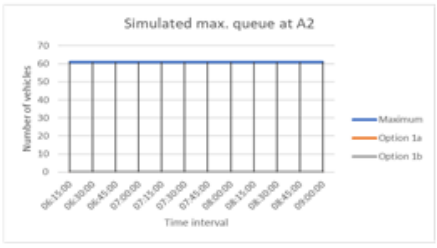
Gate: Existing



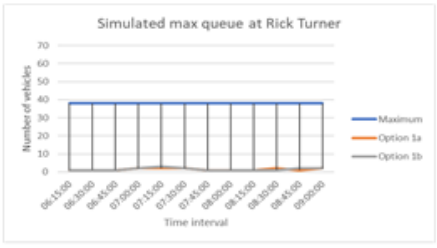
Gate: Maydon Rd (A1)



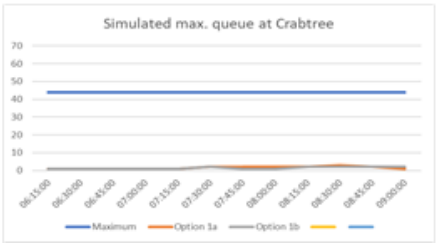
Gate: Maydon Rd (A2)



Gate: Rick Turner

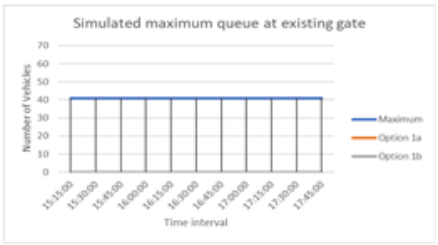


Gate: Crabtree

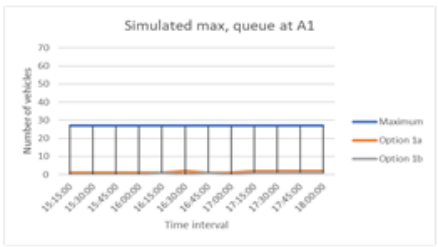


2025 PM Peak Period

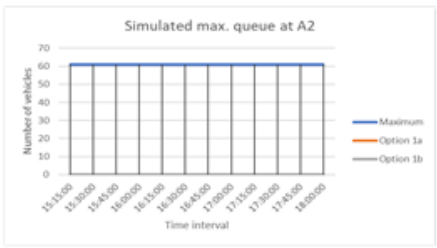
Gate: Existing



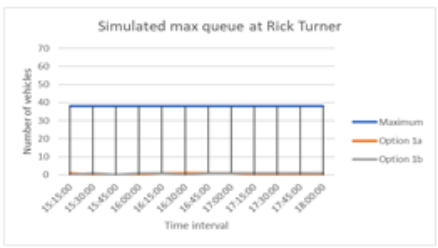
Gate: Maydon Rd (A1)



Gate: Maydon Rd (A2)



Gate: Rick Turner



Gate: Crabtree

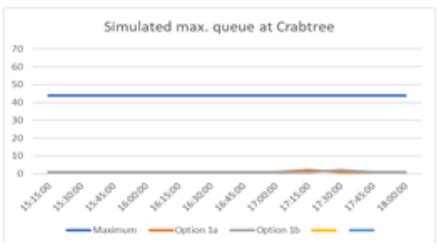
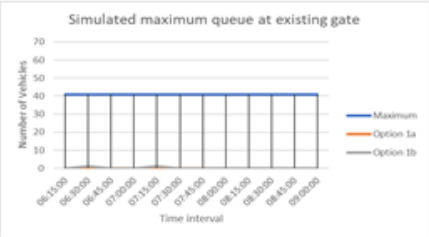


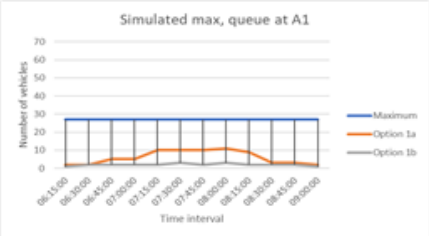
Figure 5.11: Expected Maximum inbound queue lengths with the 2025 Demand

2035 AM Peak Period

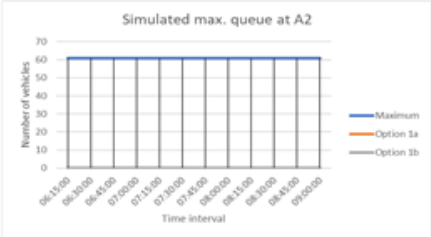
Gate: Existing



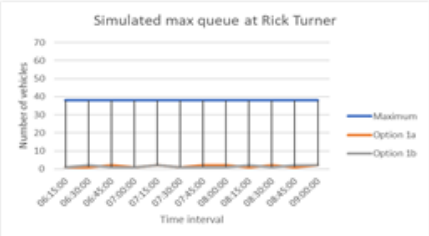
Gate: Maydon Rd (A1)



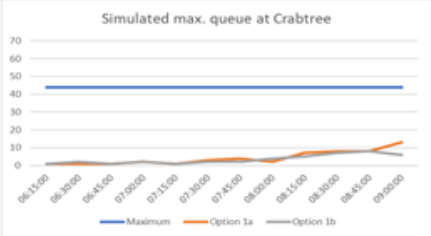
Gate: Maydon Rd (A2)



Gate: Rick Turner

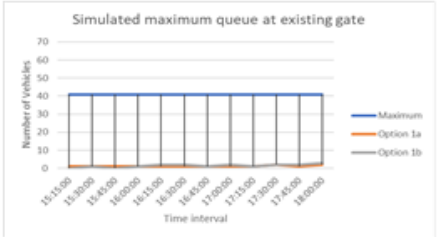


Gate: Crabtree

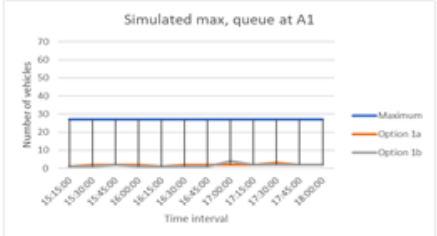


2035 PM Peak Period

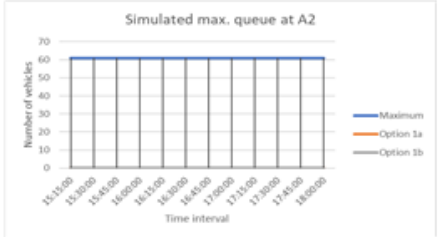
Gate: Existing



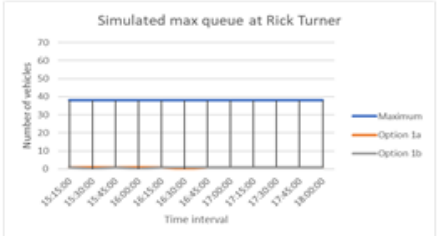
Gate: Maydon Rd (A1)



Gate: Maydon Rd (A2)



Gate: Rick Turner



Gate: Crabtree

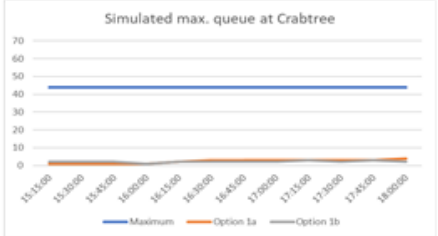
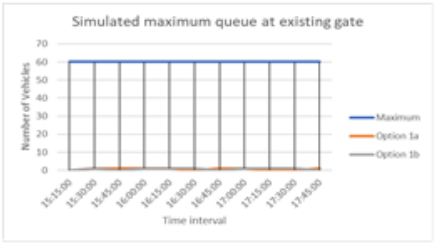
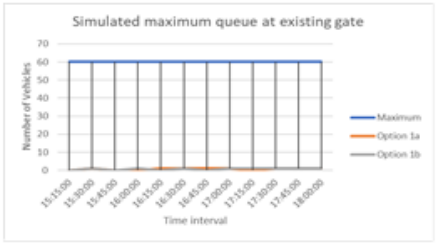
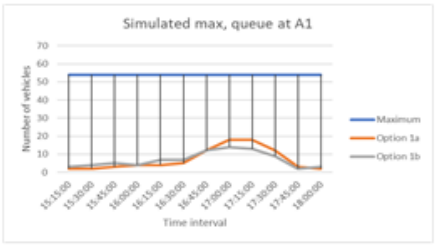
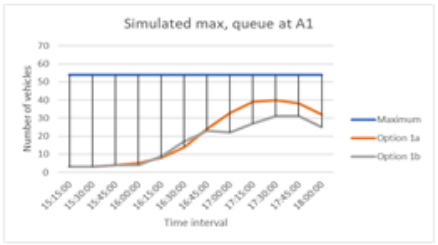


Figure 5. 12: Expected Maximum inbound queue lengths with the 2035 Demand

2025 PM Peak Period	2035 PM Peak Period
Gate: Existing	Gate: Existing
	
Gate: Maydon Rd (A1)	Gate: Maydon Rd (A1)
	
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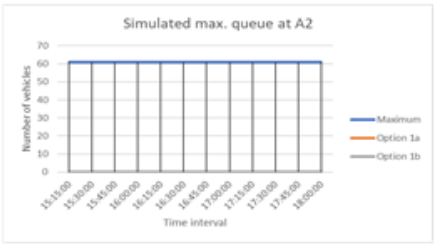
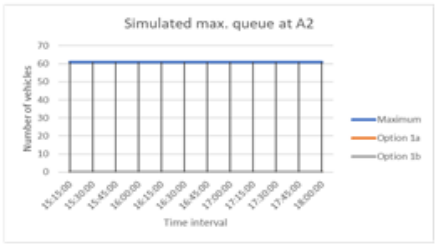
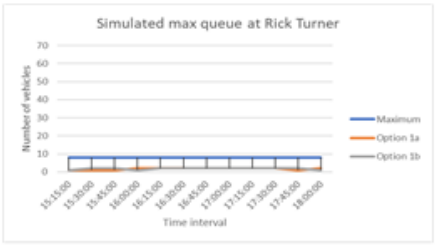
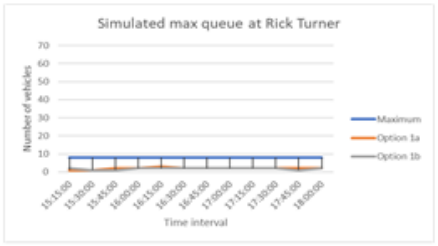
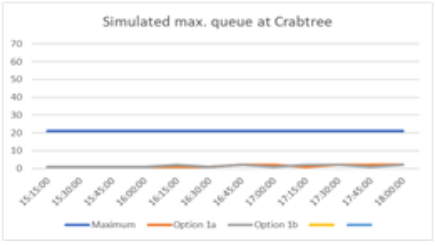
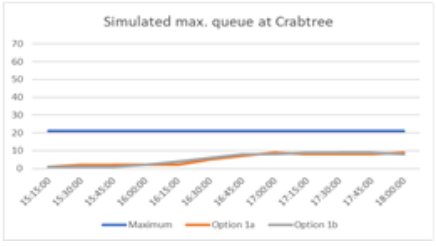
	
Gate: Rick Turner	Gate: Rick Turner
	
Gate: Crabtree	Gate: Crabtree
	

Figure 5.13: Expected Maximum outbound queue lengths with the2025 and 2035 Demand

Figure 5.14: 2019 AM Peak Period - Visual representation of modelled typical queue lengths

Figure 5.15: 2025 AM Peak Period - Visual representation of modelled typical queue lengths

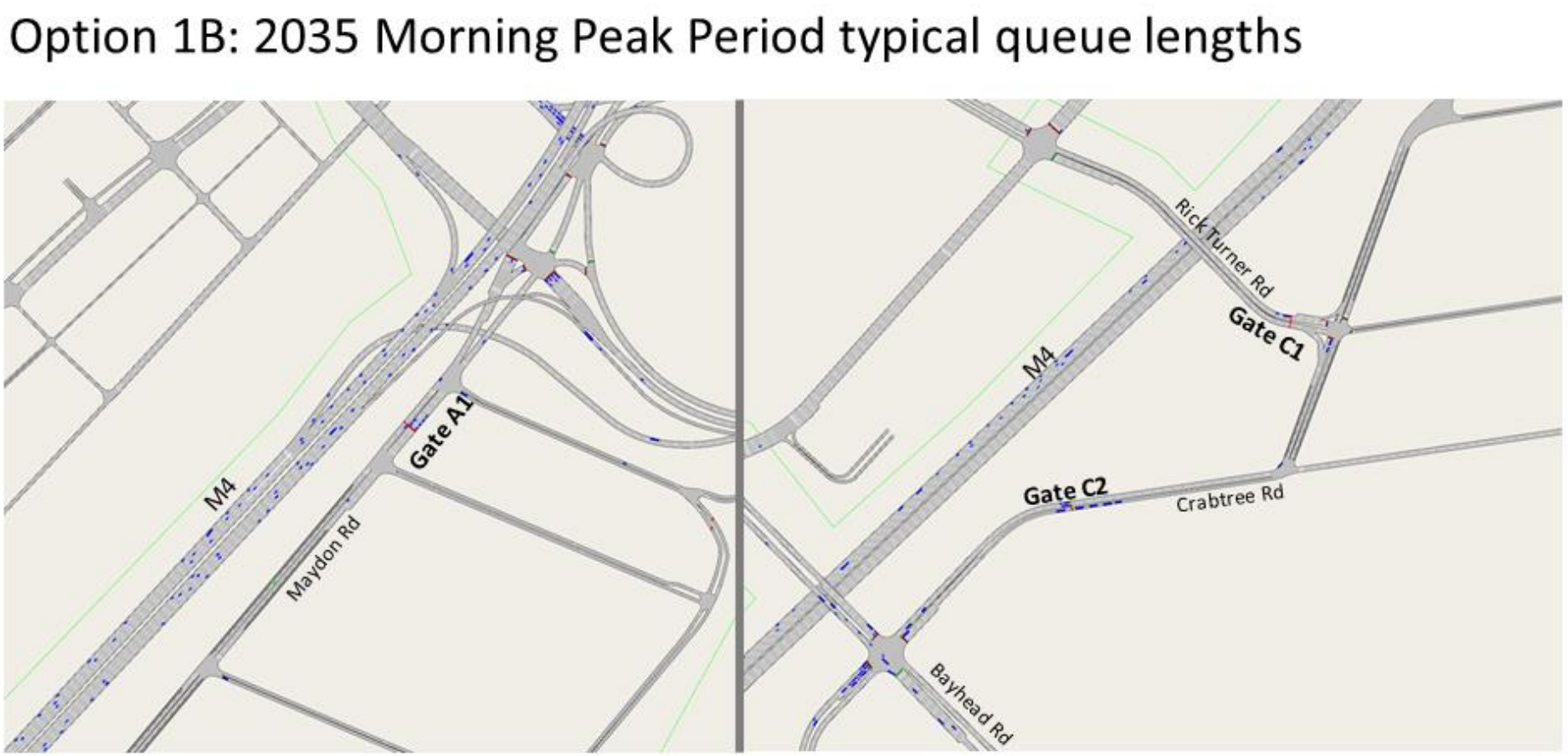


Figure 5.16: 2035 AM Peak Period - Visual representation of modelled typical queue lengths

Figure 5.17: 2019 PM Peak Period - Visual representation of modelled typical queue lengths

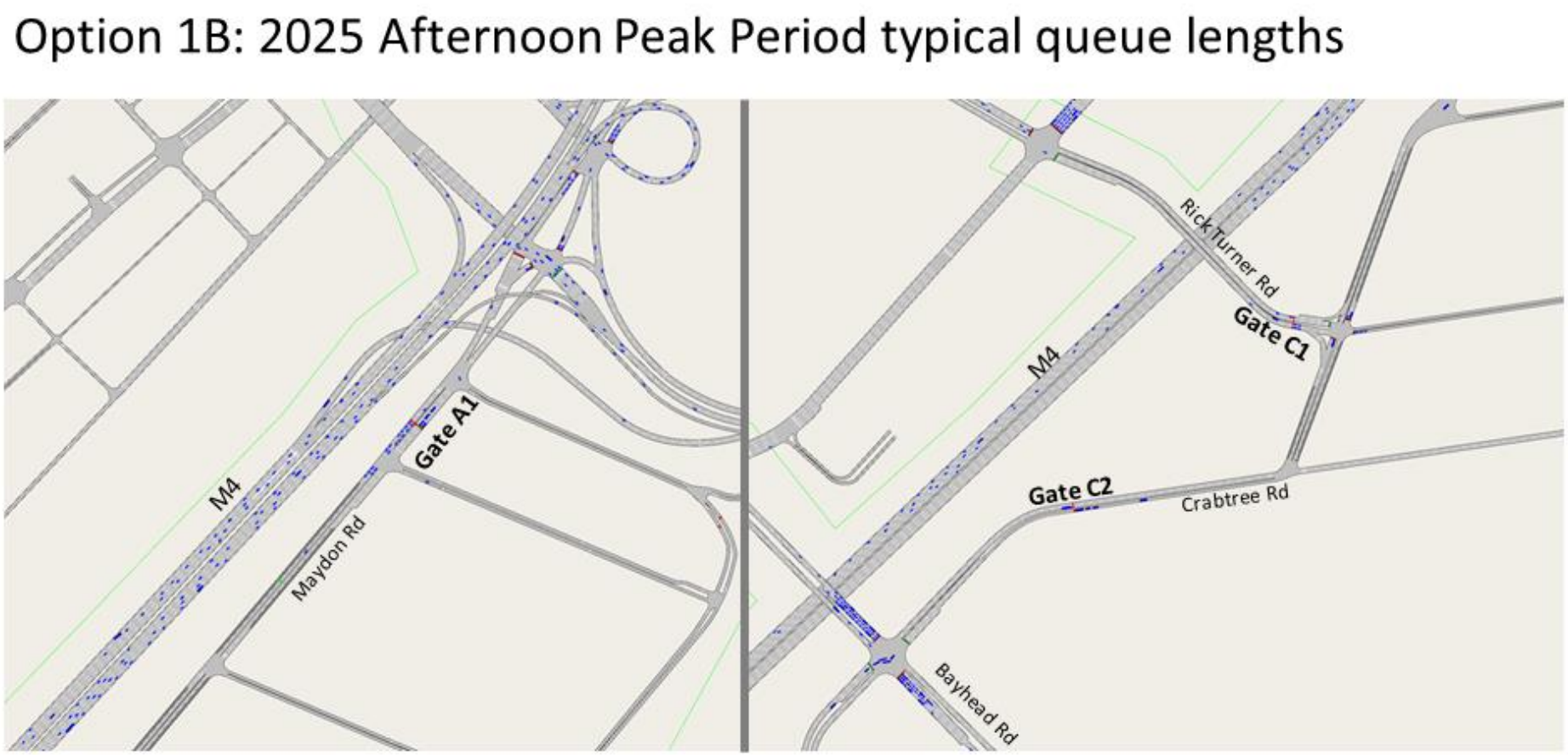


Figure 5.18: 2025 PM Peak Period - Visual representation of modelled typical queue lengths

Figure 5.19: 2035 PM Peak Period - Visual representation of modelled typical queue lengths

6 Capacity Analysis

The operations at the agreed intersections were analysed using the SIDRA 8.0 INTERSECTION analysis package, to confirm the upgrades identified as part of the modelling results. The operation of the intersections were analysed for the AM and PM peak hours and the following scenarios:

- 2019 Background Traffic (surveyed volumes)
- 2019 Future Background Traffic (redistributed 2019 background traffic following the implementation of Option 1b Maydon Wharf access control)
- 2025 Future Traffic (redistributed 2025 background traffic following the implementation of Option 1b Maydon Wharf access control)
- 2035 Future Traffic (redistributed 2035 background traffic following the implementation of Option 1b Maydon Wharf access control)

The analysis of the future scenarios were based on the estimated re-distributed volumes as obtained from the Aimsun model for the preferred option, ie Option 1b. Given the urban context the capacity of the road links are controlled by the stop line capacity of the intersections, ie even though there is more than enough road link capacity for the predicted traffic flows on the respective link sections within the study area, the capacity is restricted by the throughput of the closely spaced intersections.

The intersections analysed are the same as those that were counted in the study area (see **Chapter 4**).

Level of Service (LOS) is a measure used to assess the operation of existing transportation infrastructure, as well as the effectiveness of infrastructure improvements. LOS is categorised in letters A to F, with A being the best and F being the worst, based on the average control delay experienced by vehicles at the intersection approaches. Broadly it can be defined as follows:

A = Free flow
B = Reasonably free flow
C = Stable flow
D = Approaching unstable flow
E = Unstable flow
F = Forced or breakdown flow

The LOS and 95th percentile vehicle queues for the scenarios listed above for the weekday AM and PM peak hours are summarised in **Appendix F**. The existing geometry of the relevant intersections are attached as **Appendix G**.

Detailed SIDRA analysis outputs are available on request.

6.1.1 2019 Background Traffic

The majority of the intersections in the study area currently operate well ranging between LOS A to LOS E during the AM and PM peak hours with minimal 95th percentile vehicle queues.

The minor roads of the Sydney Road / Hannah Road intersection (TC009) currently operate poorly at LOS A to LOS F during the AM and PM peak hours with minimal 95th percentile vehicle queues as a result of limited opportunities to enter Sydney Road.

The through and left turns of the Inkosi Albert Luthuli Road approach and the right turn of the Maydon Road approach to the Maydon Road / Inkosi Albert Luthuli Road intersection (TC021/22) currently operates poorly at LOS F during the PM peak hour with moderate 95th percentile vehicle queues as a result of limited capacity on Inkosi Albert Luthuli Road and the on-ramp.

The Shadwell Road approach of the Wisely / Rick Turner Road intersection (TC026) currently operates poorly at LOS E during the PM peak hour with minimal 95th percentile vehicle queues as a result of limited opportunities to exit Shadwell Road.

The left turn of the Leuchars Road approach of the Maydon Road / Leuchars Road intersection (TC028) currently operates poorly at LOS E during the PM peak hour with minimal 95th percentile vehicle queues as a result of limited opportunities to exit Leuchars Road.

No upgrades are, however, proposed for this scenario.

6.1.2 2019 Future Background Traffic

The majority of the intersections in the study area will continue to operate well ranging between LOS A to LOS E during the AM and PM peak hours with minimal 95th percentile vehicle queues following the optimisation of all signal time plans. It is assumed that the signal time plans will be optimised regularly to accommodate the future traffic demand.

The left turn of the South Coast Road approach of the Bayhead Road / Crabtree Road intersection (TC001) will operate at LOS E during the AM peak hour with a minimal 95th percentile vehicle queue and requires upgrading. It is recommended that lane disciplines be reassigned and the signal phasing be amended, as shown in **Figure 6.1** and **Figure 6.2**.

Following the upgrade, the intersection operates adequately at LOS A to LOS D with minimal 95th percentile vehicle queues.

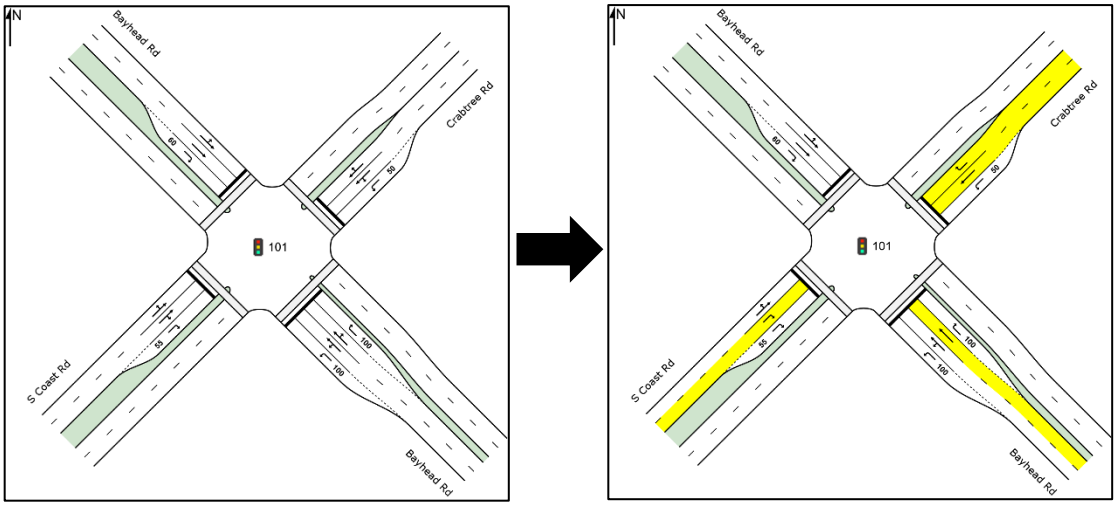


Figure 6.1: Existing geometry and proposed upgrade - Bayhead Road / Crabtree Road (TC001)

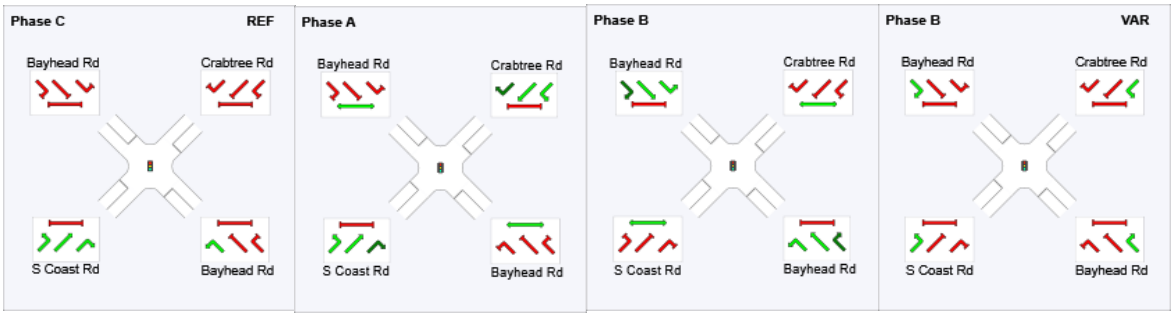


Figure 6.2: Proposed signal phasing - Bayhead Road / Crabtree Road (TC001)

The Umbilo Road / Farimond Road intersection (TC004) will operate poorly ranging between LOS A to LOS F during the AM peak hour with minimal 95th percentile vehicle queues and requires upgrading. It is recommended that lane disciplines be reassigned and the signal phasing be amended as shown in **Figure 6.3** and **Figure 6.4**.

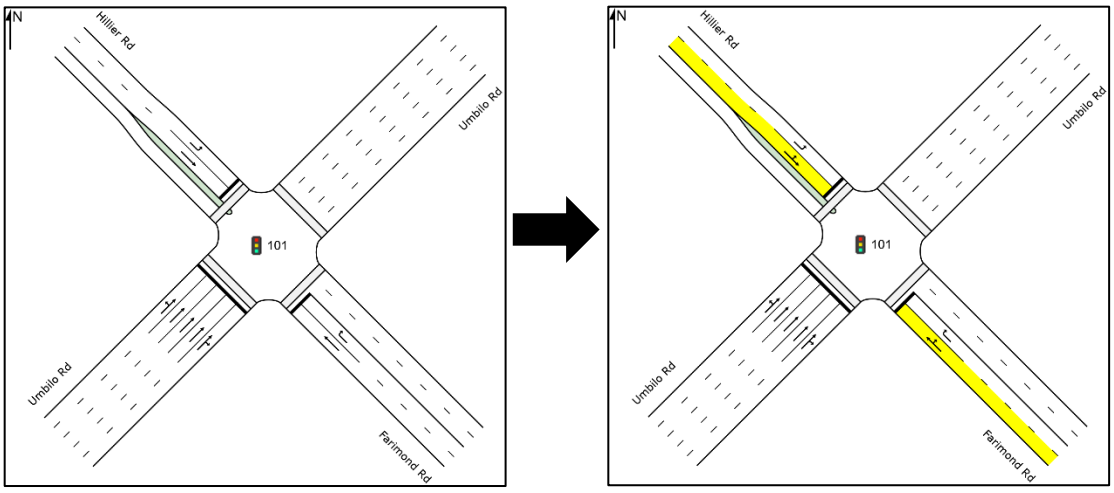


Figure 6.3: Existing geometry and proposed upgrade - Umbilo Road / Farimond Road (TC004)

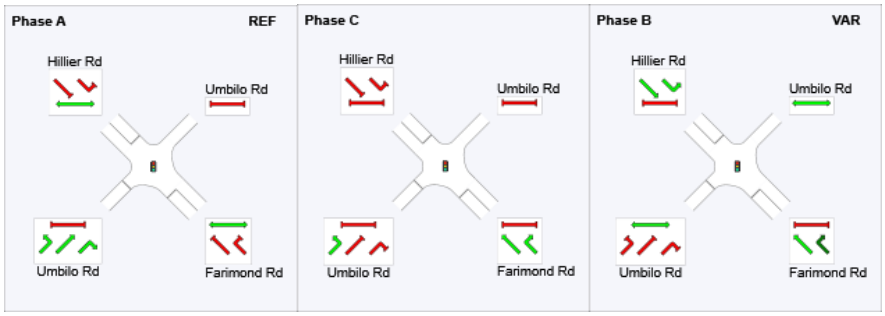


Figure 6.4: Proposed signal phasing Umbilo Road / Farimond Road (TC004)

Following the upgrade, the intersection operates adequately from LOS C and LOS D with moderate 95th percentile vehicle queues. It should be noted that this proposed upgrade differs from that proposed as part of the Aimsun modelling exercise and shown in **Figure 5.4.** Layout plans indicating how these proposed upgrades can be accommodated in the existing road reserves are included in **Appendix H.**

The Sydney Road / Hannah Road intersection (TC009) will operate poorly ranging between LOS A to LOS F during the AM and PM peak hours with moderate 95th percentile vehicle queues and requires upgrading. It is recommended that lane disciplines be reassigned as shown in **Figure 6.5**.

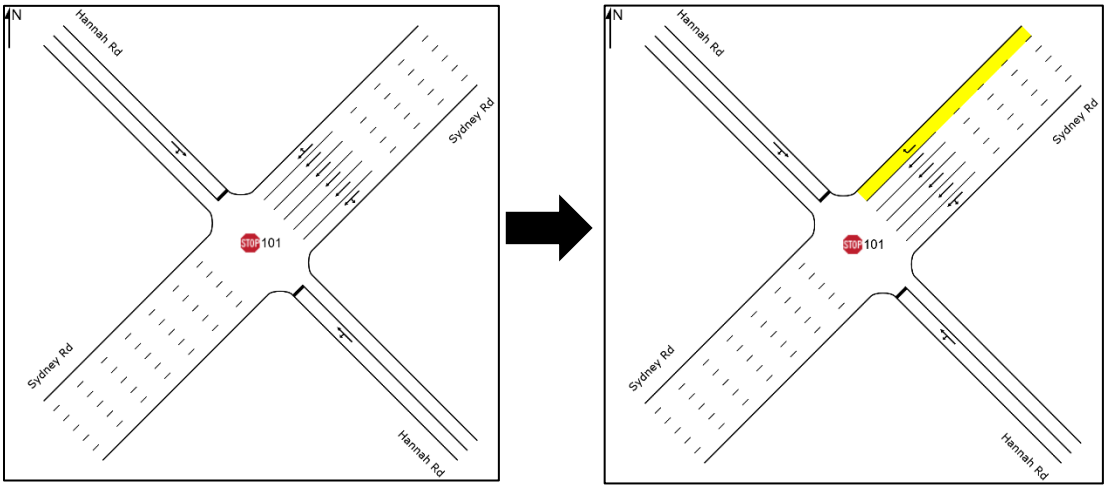


Figure 6.5: Existing geometry and proposed upgrade - Sydney Road / Hannah Road (TC009)

Following the upgrade, the intersection will continue to operate poorly from LOS A and LOS F but with lower (moderate) 95th percentile vehicle queues.

Following the implementation of Option 1b, the Maydon Road / Inkosi Albert Luthuli Road (TC021/22), Wisely / Rick Turner Road (TC026) and Maydon Road / Leuchars Road (TC028) intersections operate well as a result of the redistribution of traffic.

6.1.3 2025 Future Traffic

Following the optimisation of all the signal time plans in the study area, all the intersections in the study area will continue to operate as in the 2019 future traffic scenario with the exception of the Wisely Road / Rick Turner intersection (TC026) that will operate poorly ranging between LOS A to LOS E during the PM peak hour and requires upgrading by improving the signal phasing. The existing and proposed signal timing plan for the PM peak hour is shown in **Figure 6.6**. It is assumed that the signal timing plans will be optimised regularly to accommodate the future traffic demand.

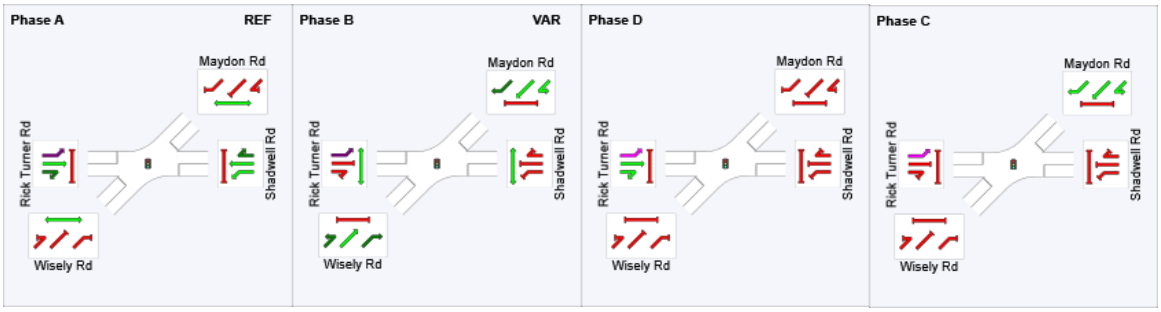


Figure 6.6: Existing signal phasing - Maydon Road / Rick Turner Road (TC026)

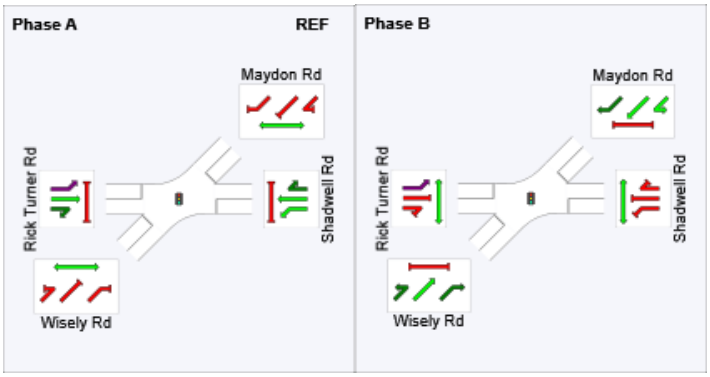


Figure 6.7: Existing signal phasing - Maydon Road / Rick Turner Road (TC026)

Following the upgrade, the intersection will operate adequately from LOS A and LOS D with minimal 95th percentile vehicle queues. No geometric or lane discipline reassignment will be required.

6.1.4 2035 Future Traffic

Following the optimisation of all the signal time plans in the study area, all the intersections in the study area will continue to operate as in the 2025 future traffic scenario. No additional road upgrades will be required as a result of future traffic volumes. It is assumed that the signal timing plans will be optimised regularly to accommodate the future traffic demand.

7 Public Transport and Non-Motorised Transport

7.1 Existing Public Transport

The Department of Transport's *Pedestrian and Bicycle Facility Guidelines (2003)* document states that 500m is an acceptable walking distance to public transport and that it is government policy for walking distances to be restricted to about 1 000m in urban areas. The existing public transport services and facilities operating in the study area, as stated in ETA's *Current Public Transport Record (CPTR, 2012)*, are shown in **Figure 7.1** overleaf.

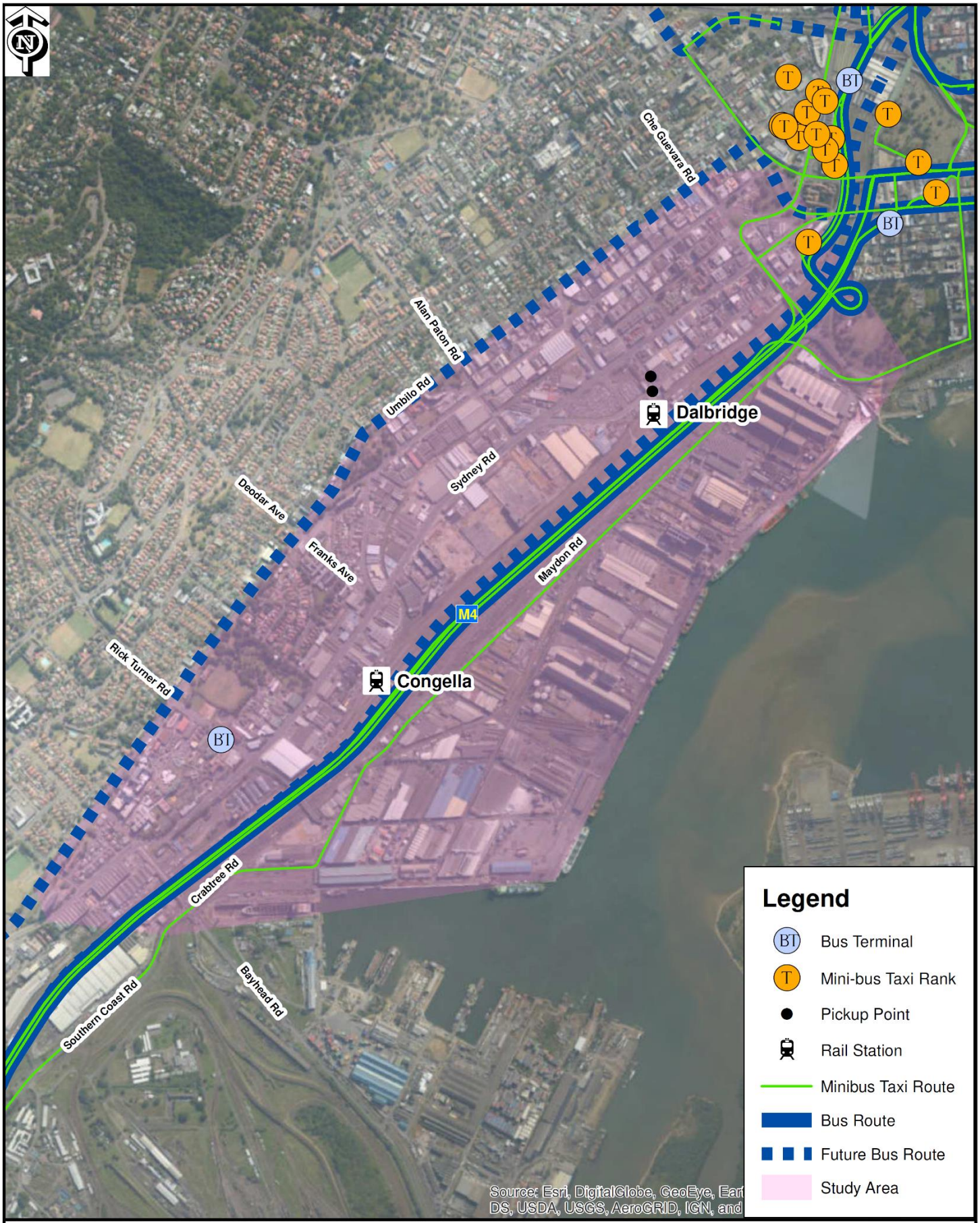
There are currently two modes of public transport that operate in the study area, namely minibus taxis and rail services. Site investigations in the Maydon Wharf precinct were undertaken on the following days for different periods:

- Friday, 23 August 2019 (06:30 to 11:00)
- Monday, 26 August 2019 (10:30 to 15:00)
- Thursday, 12 September 2019 (14:30 to 18:00)

Minibus taxi services operate along South Coast, Crabtree, Wisely, Maydon and Che Guevara Roads as well as Inkosi Albert Luthuli Freeway (M4). It should be noted that during the site investigation, minibus taxis serving a public transport function were not observed to be operating along Maydon Road specifically. A minibus was observed, however, that appeared to be a shuttle for staff transport. The minibus-taxi volumes captured as part of the background traffic surveys were also low with no distinction made as to whether these were public transport or private staff transport vehicles.

The People Mover bus service operates in the central business district (CBD) and, therefore, does not operate within the study area. ETA has, however, confirmed that a single bus route operates along Rick Turner, Maydon, Wisely and Crabtree Roads, however, the CPTR (2012) data does not include the route, ie the route did not operate on the day of the survey. During the site investigation a bus was observed travelling on Maydon Road, but appeared to be private staff transportation. No bus embayments or other transport facilities were observed along Maydon Road. The bus volumes captured as part of the background traffic surveys were also low with no distinction made as to whether these were public transport or private staff transport vehicles.

Durban has an expansive rail system comprising eight rail routes that operates throughout the city. Six of the eight rail routes currently operate in the study area and links the study area to Congela, KwaMashu, Cato Ridge, Crossmoor, Kelso and Wests. Public transport users are able to access two railway stations, namely; Dalbridge and Congella via two pedestrian bridges from Maydon Road. Trains operate at these stations from 03:30 to 23:30 on weekdays.

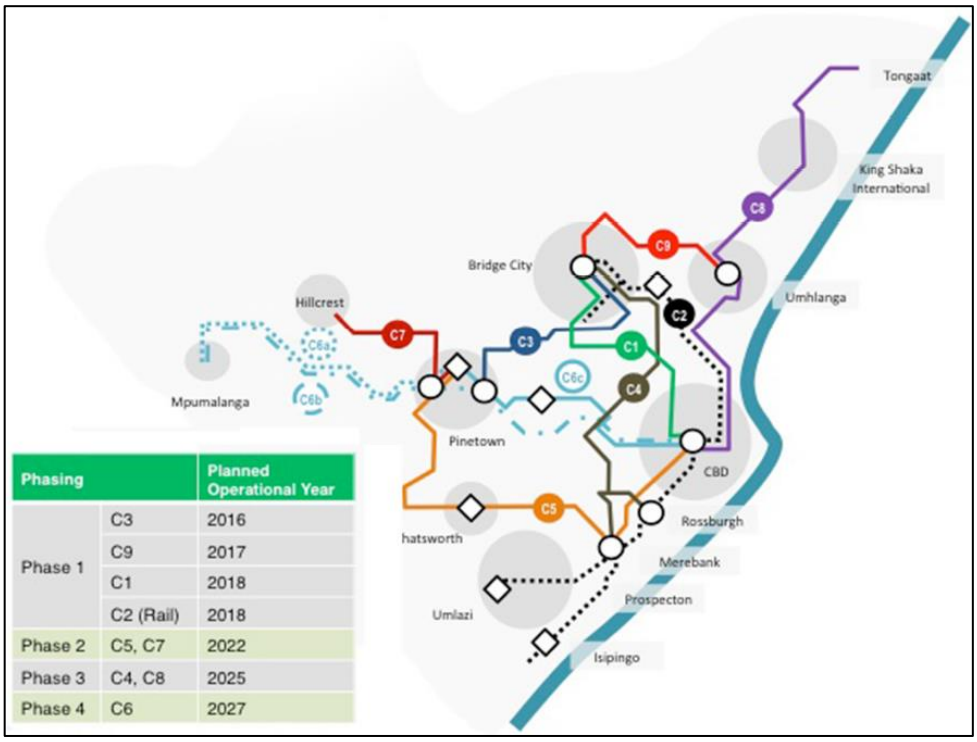


PROJECT: **Maydon Road TIA**	GIBB ENGINEERING & ARCHITECTURE	Drawn By: T. Mohlala	Checked By: C. Clark
DETAIL: **Existing And Future Public Transport Facillities**		Reviewed By: C. Clark	Approved By: K. Liebenberg
	Scale: 1:18 000	Date: October 2019	Project No.: J39046 / Drg No.: Figure 7.1 / Rev:

7.2 Future Public Transport

The Go Durban! bus service is planned for the city, as shown in **Figure 7.1** and **Figure 7.2** however, the commencement date of the bus service is still unknown. Phase 1 of the bus service was planned for commencement in 2018, however, the commencement date has been postponed indefinitely. Phase 1 of the Go Durban! bus service comprises three Bus Rapid Transit (BRT) routes and one rail corridor, namely:

- C1: Bridge City to Durban CBD
- C3: Bridge City to Pinetown
- C9: Bridge City to Umhlanga Corridor
- C2: Bridge City and KwaMashu via Berea Road to Umlazi and Isipingo (rail corridor)



Phasing		Planned Operational Year
Phase 1	C3	2016
	C9	2017
	C1	2018
	C2 (Rail)	2018
Phase 2	C5, C7	2022
Phase 3	C4, C8	2025
Phase 4	C6	2027

Figure 7.2: Go Durban! route map

The rail route C2 of Phase 1 is the only route that will operate in the study area.

Figure 7.2 shows that the future C4 and C5 bus routes will operate within the study area along Umbilo Road and Inkosi Albert Luthuli Freeway (M4). It should be noted that since the commencement date of Phase 1 has been postponed indefinitely, it is unlikely that the remaining phases will continue as per the planned operational dates.

Given that no public transport vehicles were observed within the Maydon Wharf precinct during site visits and low minibus-taxi and bus volumes were recorded as part of the background traffic surveys it is assumed that the majority of minibus-taxis and buses operating within the Maydon Wharf precinct provides transport for staff and will continue to operate within the precinct after the introduction of security gates. A security procedure will be

developed, if not already available, to continue to allow public transport / staff transport operations within the Maydon Wharf precinct, ie public transport / staff transport will continue to load / off-load passengers within the secure area of the precinct.

Given that buses operate on scheduled routes, no provision for stopping or turnaround facilities are required for buses on the non-secure side of the proposed gate locations. Provision has, however, been made on the non-secure side of the proposed gate locations for the turnaround of minibus-taxis not wishing to enter the secure area. It is anticipated that the majority of the minibus-taxis will continue to serve passengers within the Maydon Wharf precinct and stopping locations for minibus-taxis on the non-secure side of the gates were therefore only provided on one side of the road at the Maydon Road and Crabtree Road gates (as shown on the gate layout drawings included in **Appendix E**). No turnaround and stopping location is proposed outside the Rick Turner gate location, although minibus-taxis are able to turn around on the non-secure side of the gate should this be required.

It should be noted that the embayment for use by minibus-taxis on the non-secure side of the proposed Crabtree gate location was positioned on the approach side given the space constraints and lack of a sidewalk on the eastern side of the road. The location of the proposed embayment on the western side is limited by the available space to the adjacent rail siding and the start of the embankment to the Bayhead/Crabtree Road intersection. The width of the embayment is therefore restricted to 2.6m with access to and from an occasionally used access point taken along the approach taper to the embayment. The proposed concept layout design is however considered acceptable for the anticipated occasional minibus-taxi use and was accepted as such by the ETA. It is however recommended that the design team investigate the potential of increasing the embayment width to 3.0m (or even 3.5m) at detail design stage when more information is available.

Public transport stops have also been proposed along Maydon Road to provide safe stopping locations for those services not transporting passengers directly to/from their places of work. The layout plans indicating these proposed public transport stops are included in **Appendix I.**

It should be noted that an ideal exclusive public transport use parking length of 25m, ie allowing for use by one bus and two minibus-taxis, was not possible at all the locations given the specific site constraints. One of these constraints is the numerous rail sidings, which are all operational albeit used infrequently. It should be noted that when the rail sidings are in use a team of Transnet Freight Rail employees will be stationed along the rail sidings to direct traffic and communicate with the locomotives. Their main aim is to ensure safety and avoid any incidents, eg by stopping traffic to allow rail operations to take place and opening the road again as soon as the locomotives/carriages have cleared the road. The proposed locations and lengths are considered adequate for the anticipated use and was accepted as such by the ETA.

7.3 Non-Motorised Transport - Pedestrian Facilities

During the site investigation, the majority of pedestrians were observed using the pedestrian bridge at Congella Railway Station. Pedestrian activity at the Dalbridge Railway Station was notably lower than at Congella Railway Station. Minimal pedestrian activity was otherwise observed during the site investigation (06:30 to 07:30) and according to a local vendor, the pedestrian peak period is typically between 05:00 and 05:30. However, the pedestrian activity is low along Maydon Road as the majority of pedestrians travel westwards towards the Durban CBD. Maydon Road is also not considered to be safe for pedestrians as heavy vehicles were observed travelling at high speeds.

A 3m wide surfaced sidewalk is provided on the western side of Maydon Road and a surfaced sidewalk of varying width (0m to 2.5m) is provided on the eastern side. The majority of the sidewalks are in poor condition and is likely a result of heavy vehicles parking on the sidewalks.

Sidewalks of varying widths are also provided along the majority of the side streets off Maydon Road, but is mostly in a poor condition. During the site investigation, pedestrians were observed walking longitudinally along Maydon Road. No east-west pedestrian movement was observed during the site investigation.

Existing east-west crossing opportunities of Maydon Road are, however, provided at the signalised pedestrian crossing near the stairs of the pedestrian bridge to / from the Congella Railway Station as well as at the signalised Maydon / Leuchars Road intersection, just north of the stairs of the pedestrian bridge to/from the Dalbridge Railway Station. These two pedestrian crossings are also to serve the proposed public transport stop locations along Maydon Road. It is proposed that the two pedestrian accesses to / from the stairs to the railway stations be retained once the precinct is secured.

Generally, low pedestrian activity was observed in the Maydon Wharf precinct. Due to the potential conflict between pedestrians and heavy vehicles, it is however, recommended that the eastern and western sidewalks along Maydon and Wisely Roads, and the northern and southern sidewalks along Crabtree Road, be resurfaced and repaired, where necessary, to safely and comfortably accommodate the existing and future pedestrian activity.

8 Conclusions and Recommendations

8.1 Conclusions

The following can, therefore, be concluded:

- Maydon Road serves as a connection to the Central Business District (CBD) road network via South Coast Road and the R102, passing through the Maydon Wharf Precinct.

- Access to the port is currently gained via three access points, namely;
  - Maydon Road / Che Guevara Road
  - Rick Turner Road / Wisely Road / Shadwell Road
  - Crabtree Road / Wisely Road

- There are currently 12 security points to the dock along Maydon Wharf Street

- The deproclamation of the following roads within the Maydon Wharf precinct is proposed:
  - Maydon Wharf Street
  - Leuchars Road
  - Lever Road
  - Sunlight Road
  - McBride Road
  - Parker Road
  - Johnstone Road
  - Davey Road
  - Crofts Road
  - Fletcher Road
  - Herschell Road
  - Methven Road
  - Shadwell Road
  - Rainnie Road
  - Vetch Road
  - Jenkyn Road
  - Crabtree Road
  - Wisely Road
  - Maydon Road

- The deproclamation of the roads within the Maydon Wharf precinct, especially Maydon Road, will result in a total of 2 972 trips (as recorded) being added to the surrounding road network over a 12-hour period

- To account for the error records, an additional 1 494 trips will be added to the adjacent road network over a 12-hour period, i.e. resulting in a total of 4 466 unmatched records plus matched trips over the 12 hour period.

- The majority of the intersections in the study area currently operate well during the 2019 background traffic scenario with the exception of the following intersections:
  - Sydney Road / Hannah Road (TC009)
  - Maydon Road / Rick Turner Road (TC026)
  - Maydon Road / Leuchars Road (TC028)
  - Maydon Road / Inkosi Albert Luthuli Road (TC021/22)

- The majority of the intersections will continue to operate well during the 2019 future background traffic scenario with the exception of the following intersections that will require upgrading:
  - Bayhead Road / Crabtree Road (TC001)
  - Umbilo Road / Farimond Road (TC004)
  - Sydney Road / Hannah Road (TC009)

- The majority of the intersections will continue to operate well during the 2025 future traffic scenario with the exception of the Maydon Road / Rick Turner Road intersection (TC026) and will require upgrading

- All the intersections will continue to operate well during the 2035 future traffic scenario and no road upgrades will be required as a result of the future traffic volumes

- Limited public transport services are located within the study area and no public transport services were observed operating along Maydon Road during the site investigation. Staff transport was, however, observed. Future public transport services are planned along Maydon Road and is considered acceptable to accommodate the future public transport demand

- No provision for stopping or turnaround facilities are required for buses on the non-secure side of the proposed gate locations.

- No provision for formal minibus taxi embayments are required on the non-secure side of the gate locations, although turnaround facilities and a single stop location will be provided at the Maydon Road and Crabtree Road gates.

- Limited NMT facilities are located within the study area, specifically in the Maydon Wharf precinct and most of the NMT facilities was observed to be in poor condition

- Pedestrian activity was observed longitudinally along Maydon Road and no east-west pedestrian movement was observed during the site investigation

8.2 Recommendations inside port limits

It is recommended that:

- A security procedure be developed to achieve the required service flow speeds for the private and heavy vehicles and to provide for mitigation measures in case of excessive queue development over extended periods of time, as discussed in this report.

- Access for public transport / staff transport operations within the Maydon Wharf precinct to be maintained in perpetuity

- A security procedure be developed, if not already available, to accommodate the public transport / staff transport access to the /from the precinct

- Once approval for the deproclamation of the roads within the Maydon Wharf precinct, especially Maydon Road (and by extension Wisely and Crabtree Roads) is obtained, the security access gates to / from the Maydon Wharf precinct area be provided generally in accordance with the locations and lane requirements, as per Appendix E, subject to a preliminary and detailed design process.

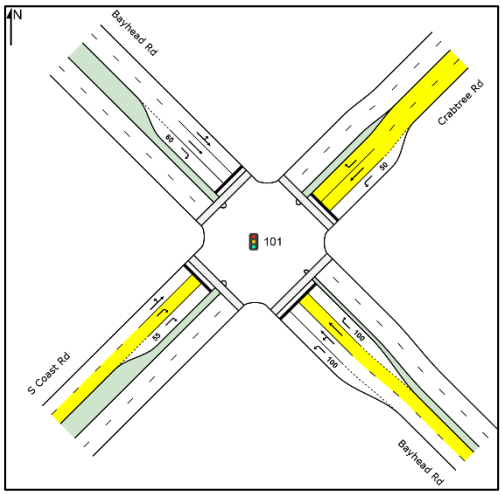
- Provision be made for the turnaround of minibus-taxis on the non-secure side of the proposed gate locations, and stopping at the Maydon Road and Crabtree Road gates

- Public transport stops be provided along Maydon Road, as per Appendix I.

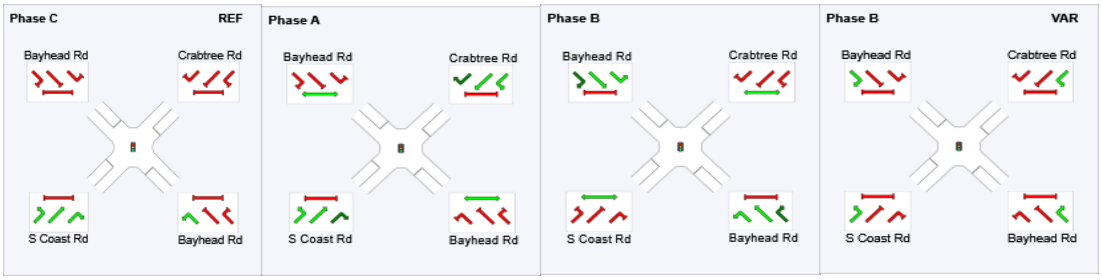
- The two pedestrian accesses to / from the stairs to the railway stations be retained in perpetuity

- The sidewalks along Maydon Road (and by extension Wisely and Crabtree Roads) be resurfaced and repaired, where necessary, to safely and comfortably accommodate the existing and future pedestrian activity

- The Bayhead Road / Crabtree Road (TC001) intersection be amended as part of the implementation of the security access gates by reassigning lane disciplines and improving the signal phasing to improve the operation of the intersection (see figures below)



Proposed upgrade - Bayhead Road / Crabtree Road (TC001)



Proposed signal phasing - Bayhead Road / Crabtree Road (TC001)

- The operations of intersections within the study area and Maydon Wharf precinct port limits be assessed following implementation of the security access gates in order to re-assess lane disciplines and signal timing plans (no road upgrades proposed)

- Signal timing plans of intersections within the Maydon Wharf port limits be updated on a regular basis to accommodate changes in traffic demand into the future.

8.3 Recommendations outside port limits

It is recommended that:

- The Umbilo Road / Farimond Road intersection (TC004) be upgraded following implementation of the security access gates and assessment of the re-distribution of traffic. Two options for the required upgrades are included in Appendix H.

- The operations of intersections within the study area be assessed following implementation of the security access gates in order to re-assess lane disciplines and signal timing plans within the study area (no road upgrades proposed)

- Signal timing plans in the study area be updated on a regular basis to accommodate changes in traffic demand into the future.

8.4 Way Forward

In order to formalise the above mentioned recommendations it is proposed that a memorandum of agreement be concluded between TRANSNET and the eThekwini Municipality with respect to the following:

- The road closure relating to access gate locations in order to prevent negative impacts of traffic on the public road network in the event that the required service rates (as indicated in this report) are not achieved at the access gates
- Public transport operations and requirements
- Other traffic operational requirements, as necessary

The memorandum of agreement is to be concluded prior to approval of the town planning application for the road closure.

Appendix A: Peak Hour Classified Volumes

Appendix B: Traffic Count Data

Appendix C: Maydon Road: Modelling the impact of proposed control gates: Modelling Report

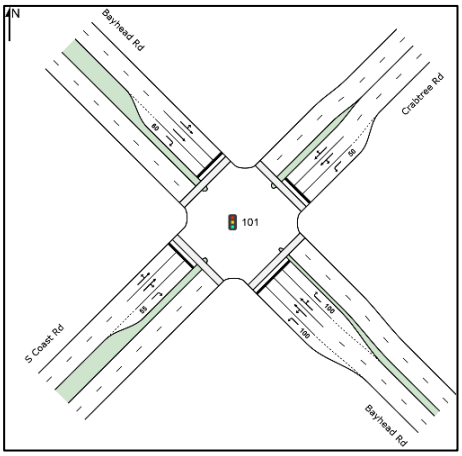
Appendix D: Traffic Volumes – Option 1b (2019, 2025 and 2035)

Appendix E: Proposed Gate Location Layout Plans

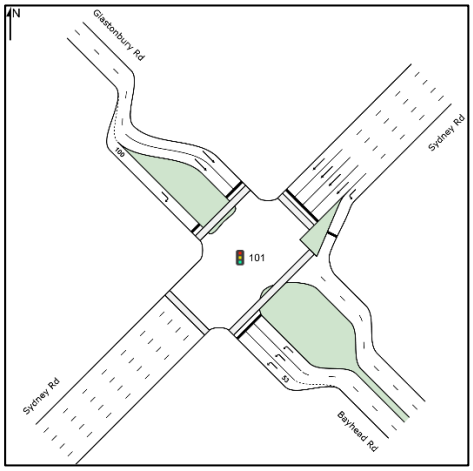
Appendix F: Capacity Analysis Results – Option 1b (2019, 2025 and 2035)

Appendix G: Relevant Intersection Geometry

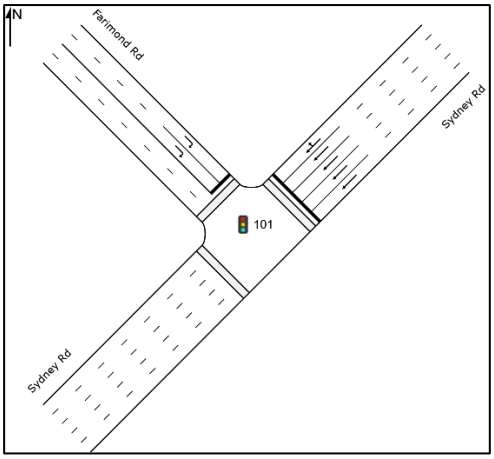
Bayhead Road / South Coast Road / Crabtree Road (TC001)



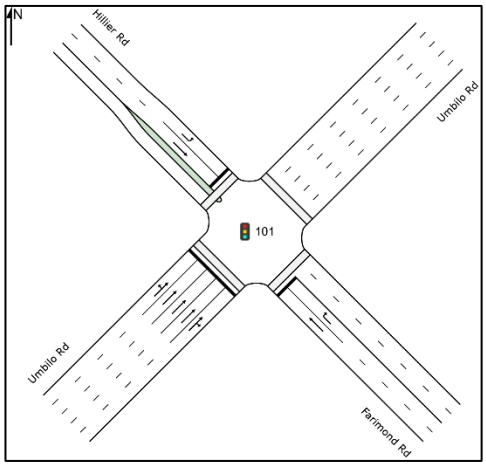
Bayhead Road / Sydney Road (TC002)



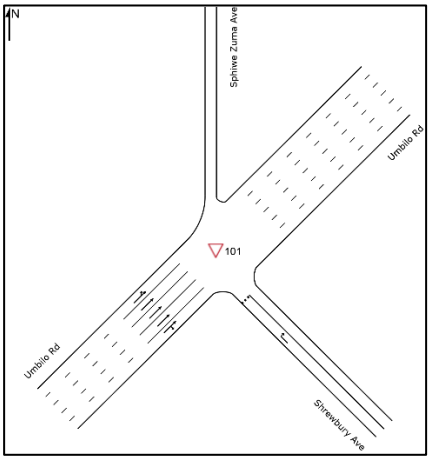
Sydney Road / Farimond Road (TC003)



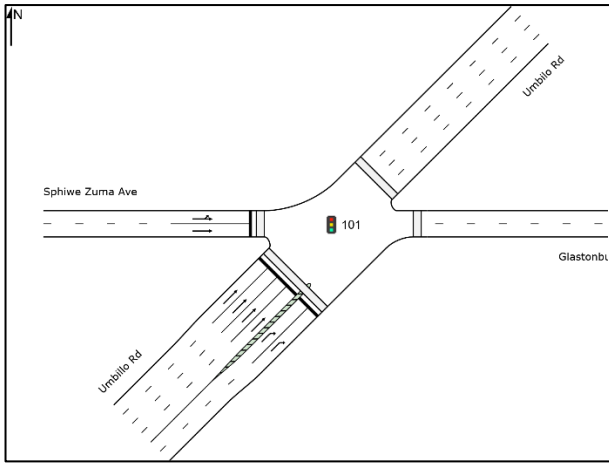
Umbilo Road / Farimond Road (TC004)



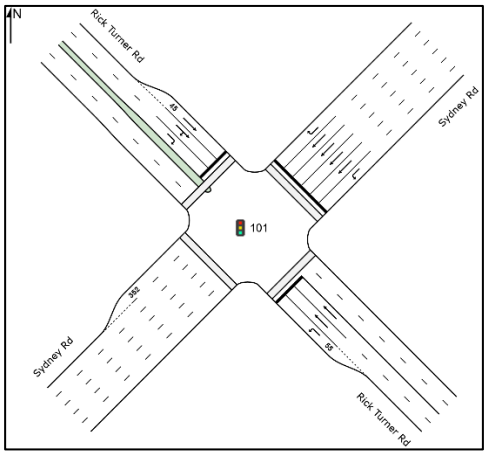
Umbilo Road / Shrewsbury Avenue (TC005)



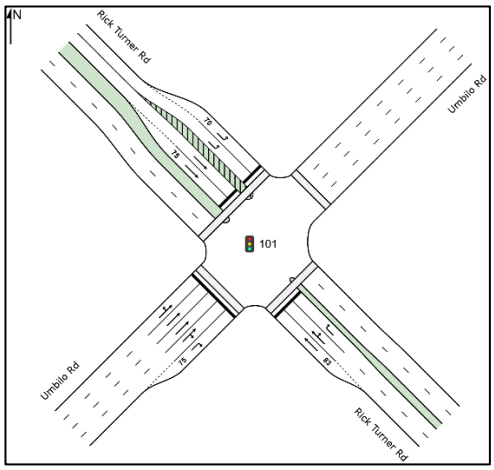
Umbilo Road / Glastonbury Place (TC006)



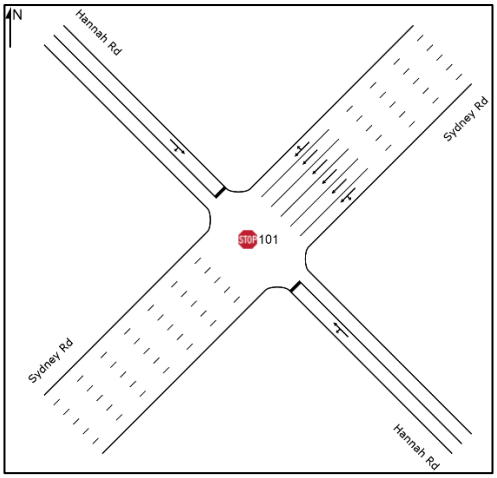
Sydney Road / Rick Turner Road (TC007)

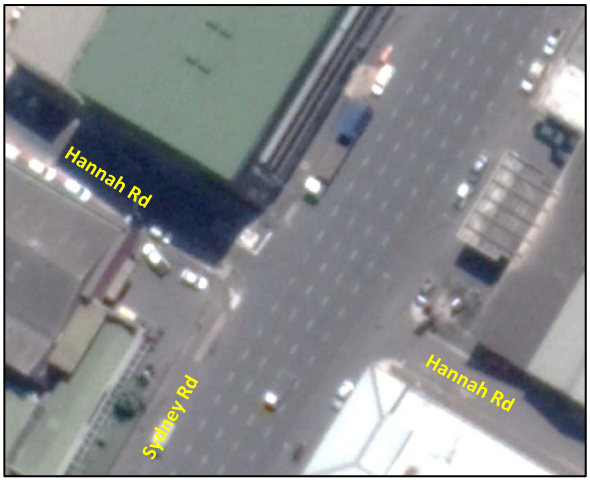


Umbilo Road / Rick Turner Road (TC008)

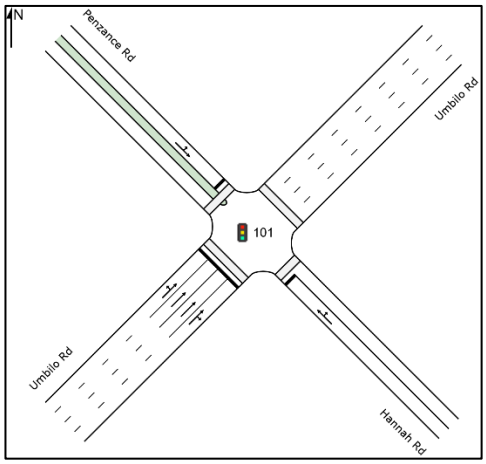


Sydney Road / Hannah Road (TC009)

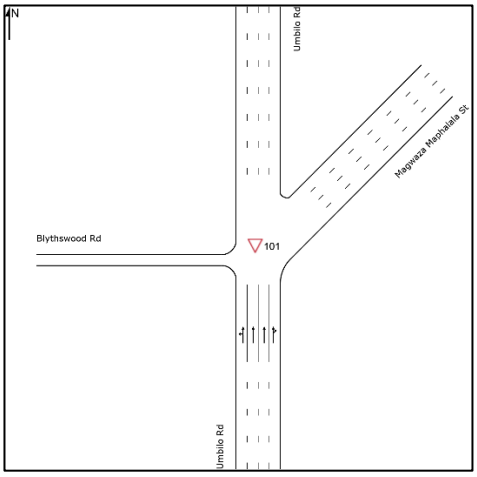




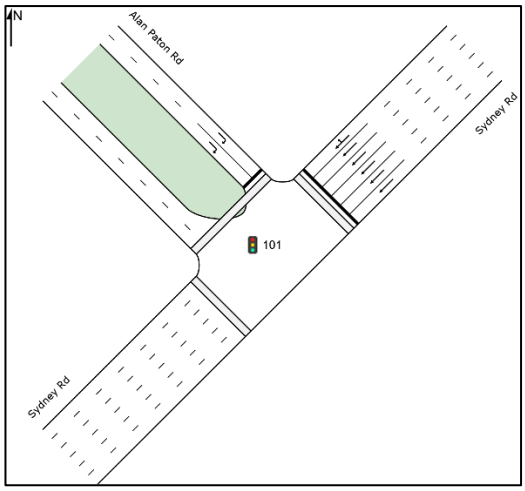
Umbilo Road / Hannah Road (TC010)



Umbilo Road / Magwaza Maphala Street (TC011)



Alan Paton Road / Sydney Road (TC012)



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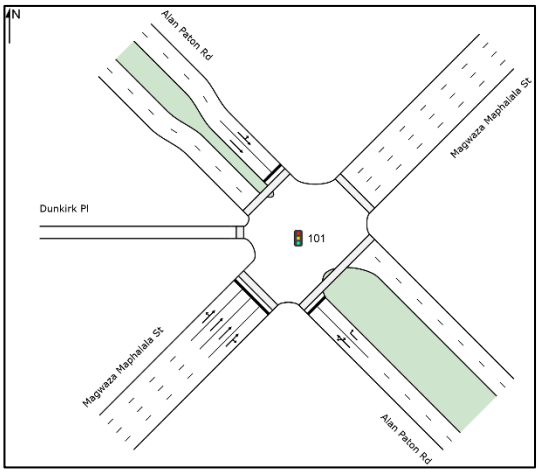
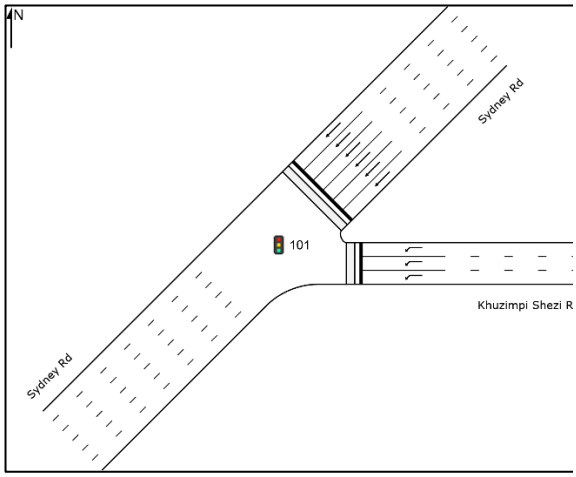
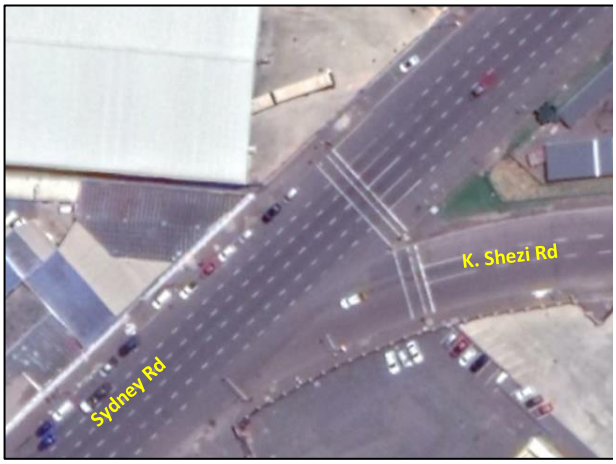


Sydney Road / Khuzimphi Shezi Road (TC014)





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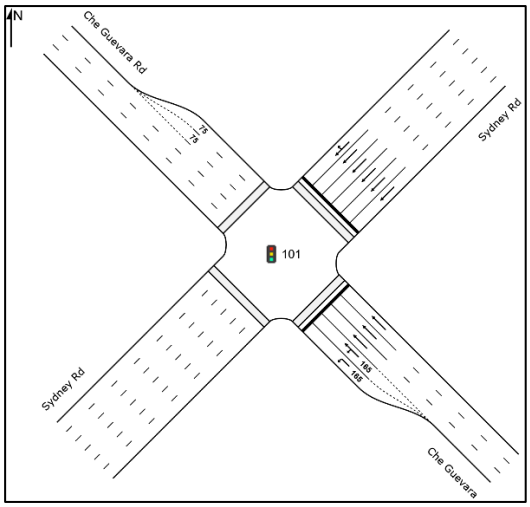

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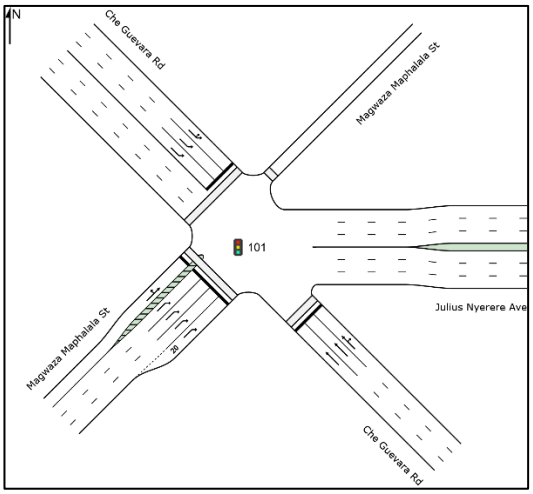

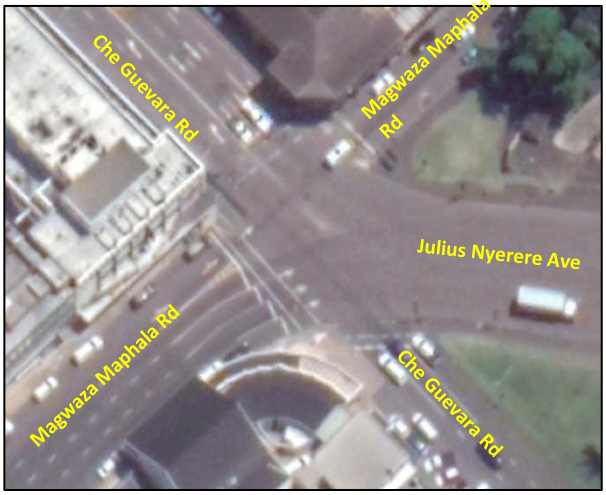

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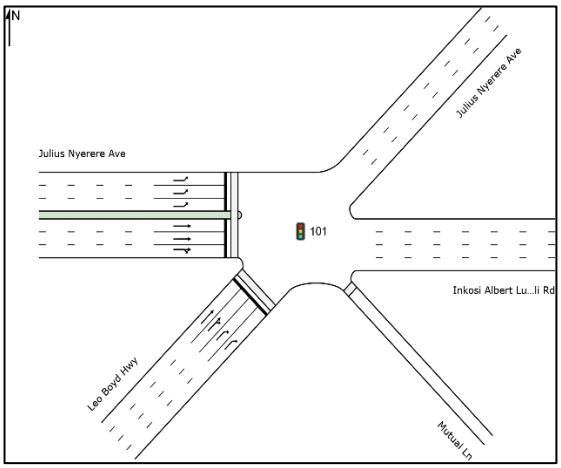
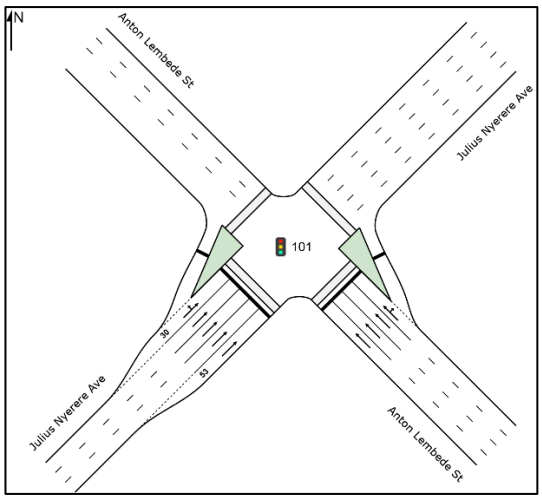


Julius Nyerere Avenue / Anton Lembede Street (TC018)



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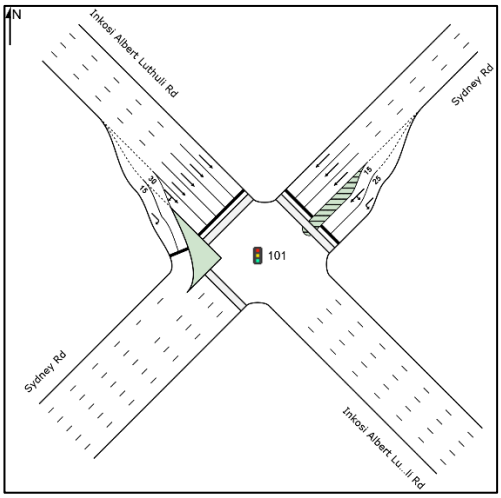

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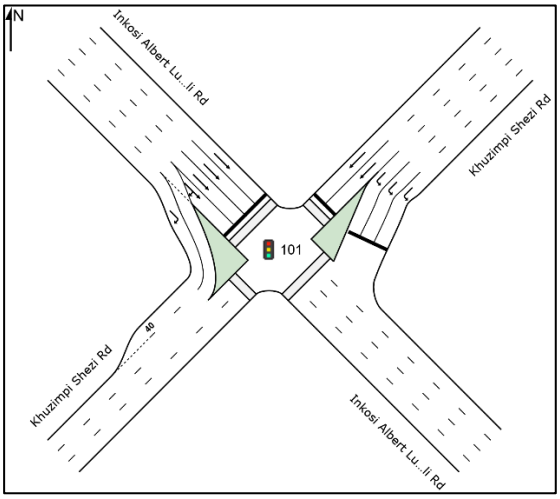

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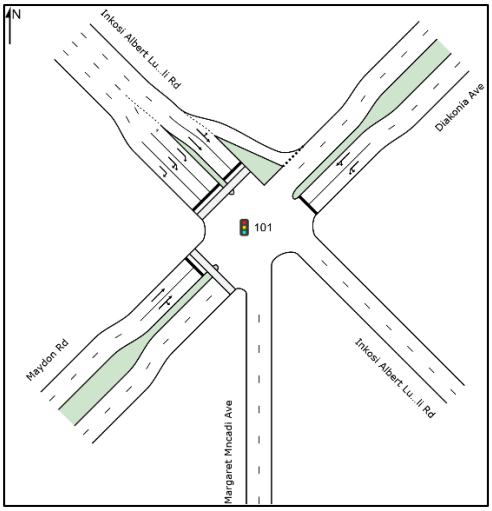

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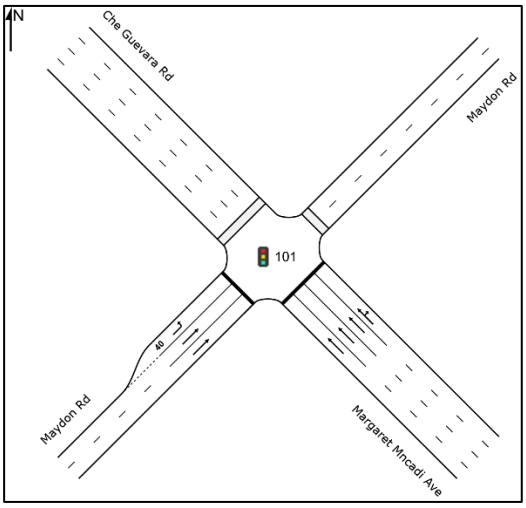

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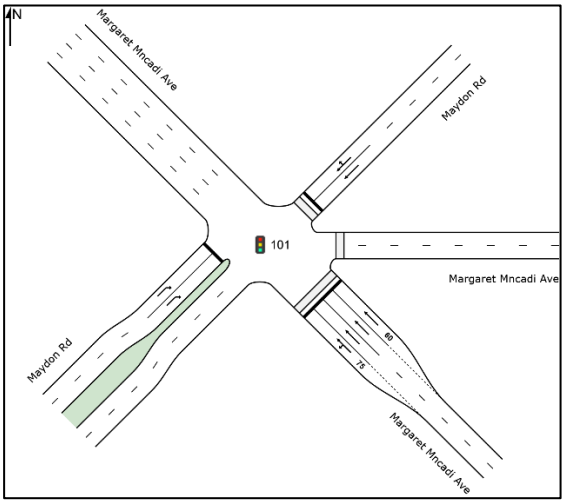

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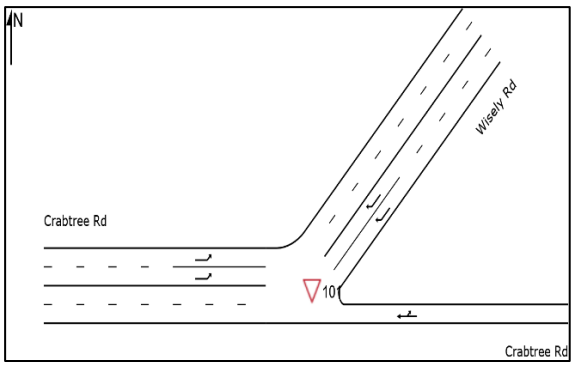

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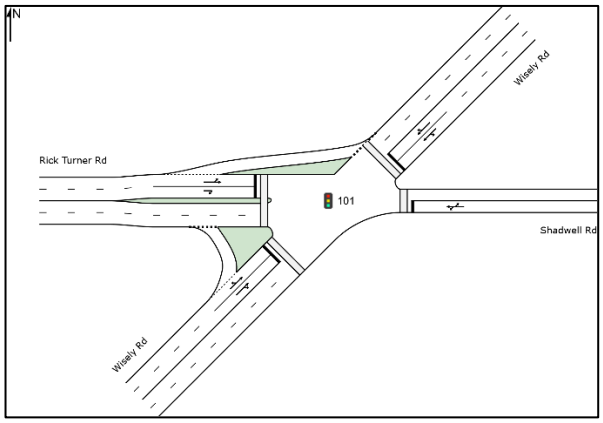

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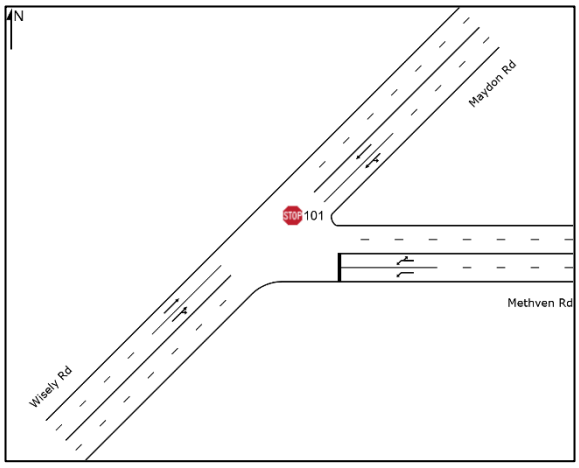

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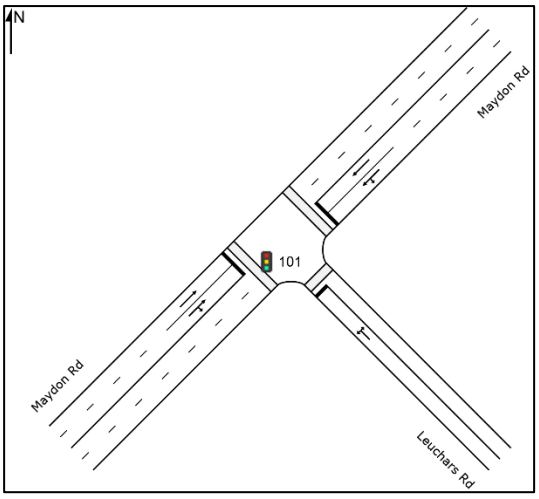

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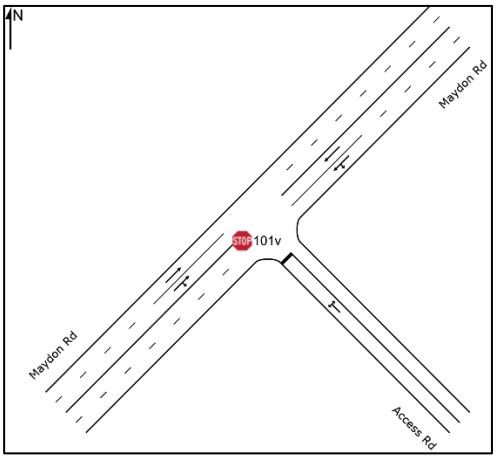
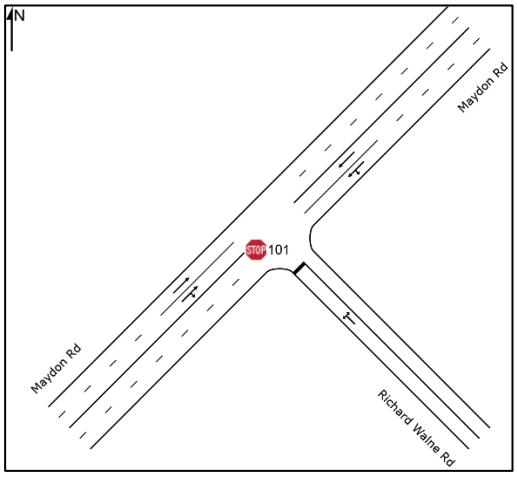


Maydon Road / Richard Walne Road (TC030)



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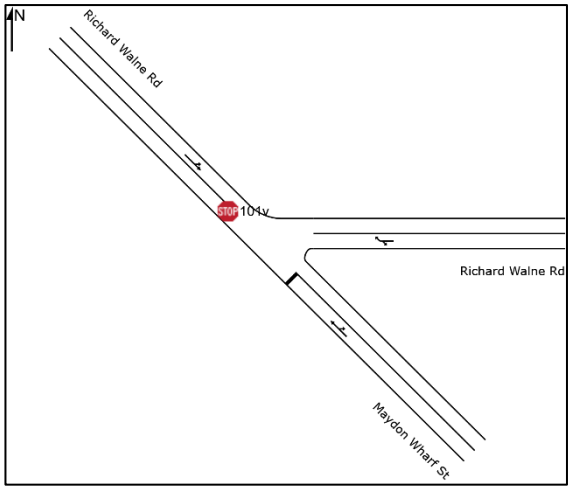

Appendix H: Proposed Farimond Road Upgrade Layout Plans

Appendix I: Proposed Public Transport Stop Layout Plans

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FORM IP180_B

CLIENT	:	Transnet National Ports Authority			
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TITLE OF DOCUMENT	:	Maydon Road Transport Impact Assessment – FINAL Revision 2			
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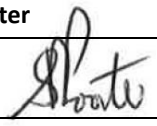
	Approved By Project Executive	Reviewed By	Prepared By
DRAFT	NAME **Steve Poorter**	NAME **Karin Liebenberg**	NAME **Carmel Clark**
DATE **31 January 2020**	SIGNATURE	SIGNATURE 	SIGNATURE 

	Approved By Project Executive	Reviewed By	Prepared By
Final DRAFT	NAME **Steve Poorter**	NAME **Karin Liebenberg**	NAME **Carmel Clark**
DATE **18 May 2020**	SIGNATURE	SIGNATURE 	SIGNATURE 

	Approved By Project Executive	Reviewed By	Prepared By
Final ORIGINAL	NAME **Steve Poorter**	NAME **Karin Liebenberg**	NAME **Carmel Clark**
DATE **21 May 2020**	SIGNATURE 	SIGNATURE 	SIGNATURE 

	Approved By Project Executive	Reviewed By	Prepared By
Final REVISION 1	NAME **Karin Liebenberg**	NAME **Karin Liebenberg**	NAME **Carmel Clark**
DATE **7 July 2020**	SIGNATURE 	SIGNATURE 	SIGNATURE 

	Approved By Project Executive	Reviewed By	Prepared By
Final REVISION 2	NAME **Karin Liebenberg**	NAME **Karin Liebenberg**	NAME **Carmel Clark**
DATE **9 September 2020**	SIGNATURE 	SIGNATURE 	SIGNATURE 

	Approved By Project Executive	Reviewed By	Prepared By
Final REVISION 3	NAME **Karin Liebenberg**	NAME **Karin Liebenberg**	NAME **Carmel Clark**
DATE **21 October 2020**	SIGNATURE 	SIGNATURE 	SIGNATURE 

	Approved By Project Executive	Reviewed By	Prepared By
Final REVISION 4	NAME **Karin Liebenberg**	NAME **Karin Liebenberg**	NAME **Carmel Clark**
DATE **22 October 2020**	SIGNATURE 	SIGNATURE 	SIGNATURE 

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