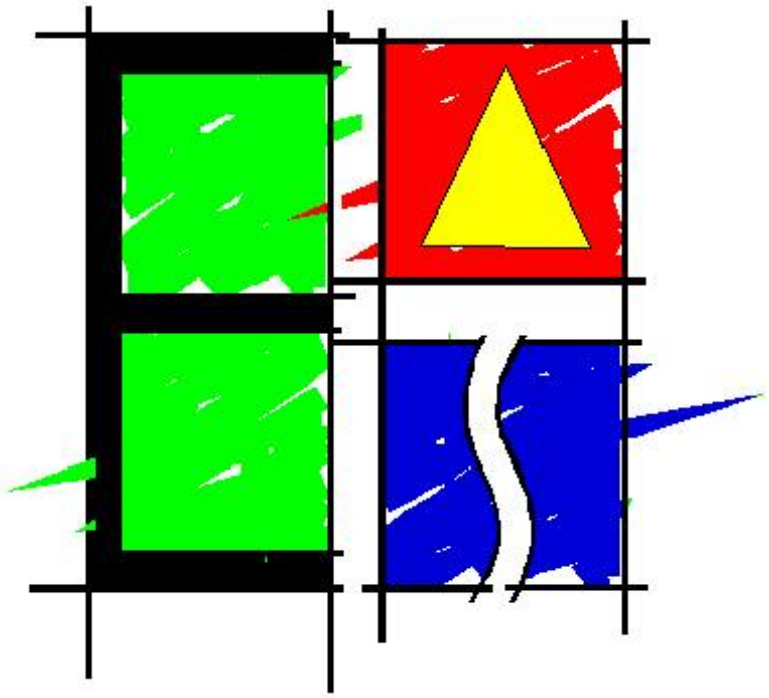
TRAFFIC IMPACT ASSESSMENT

FOR A RESIDENTIAL DEVELOPMENT ON ERF 325, THEESCOMBE, PORT ELIZABETH



November 2024

Prepared for: **C.G.S Property Trust**

Prepared by: **Engineering Advice and Services (Pty) Ltd**
(041) 5812421

DOCUMENT CONTROL SHEET

CLIENT REF: **C.G.S PROPERTY TRUST**

PROJECT NAME: **PROPOSED RESIDENTIAL DEVELOPMENT ON ERF 325, THEESCOMBE, PORT ELIZABETH**

DOCUMENT TITLE: **TRAFFIC IMPACT ASSESSMENT**

DOCUMENT FILE REF: F:\2200-2299\2219\Reports\REP001 - TIA Erf 325, Theescombe.docx

Version	**1**		
Compiled by	M Mallick Candidate Eng Technologist (2023404570)	November 2024	
Reviewed by	CGA Hastie Pr Tech. Eng (200070122)	November 2024	
Amendments made by			

DISTRIBUTION:
1) Original : Client – C.G.S Property Trust – Mr A Scribante
2) Copy : Route 2 EC - Ms M Weyers
3) Copy : Mr Z Kele – Transportation Planning NMBM
4) Copy : EAS File 2219

PREPARED BY : Engineering Advice and Services (Pty) Ltd
P O Box 13867
HUMEWOOD
6013

Telephone : 041 581 2421
Email : caryh@easpe.co.za

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ANNEXURES

ABBREVIATIONS

ADT	Average Daily Traffic
ADTT	Average Daily Truck Traffic
EAS	Engineering Advice & Services (Pty) Ltd
ECDoT	Eastern Cape Department of Transport
KM	Kouga Municipality
Km/h	kilometres per hour
LOS	Level of Service
LSDF	Local Spatial Development Framework
TIA	Traffic Impact Assessment
TMH	Technical Methods for Highways
TRH	Technical Recommendations for Highways

1 INTRODUCTION

1.1 BACKGROUND

Engineering Advice & Services (Pty) Ltd was appointed by C.G.S Property Trust during November 2023 to prepare a Traffic Impact Assessment for a proposed residential development on erf 325, Theescombe in Pari Park, Port Elizabeth, situated in the Nelson Mandela Bay Municipality. The location of the site is indicated on **Figure 1** overleaf.

View of site from Merle Road

1.2 OBJECTIVES OF THE STUDY

In broad terms, the purpose of the traffic assessment is to determine the extent and nature of the traffic generated by the proposed development, assess the impact of this traffic on the operation of the associated road network, and devise solutions for any problems identified. The following key elements, *inter alia*, are addressed in this traffic impact assessment:

- The suitability and safety of proposals for access to and egress from the site;
- The capacity of the existing and future road network within the influence radius; and
- The road upgrading measures required to accommodate traffic generated by the proposed development.

In general, this report serves to satisfy the Nelson Mandela Bay Municipality and other relevant authorities that the traffic impact of the envisaged development is within acceptable limits and that the suggested improvements conform to the standards and parameters set by the relevant authority.

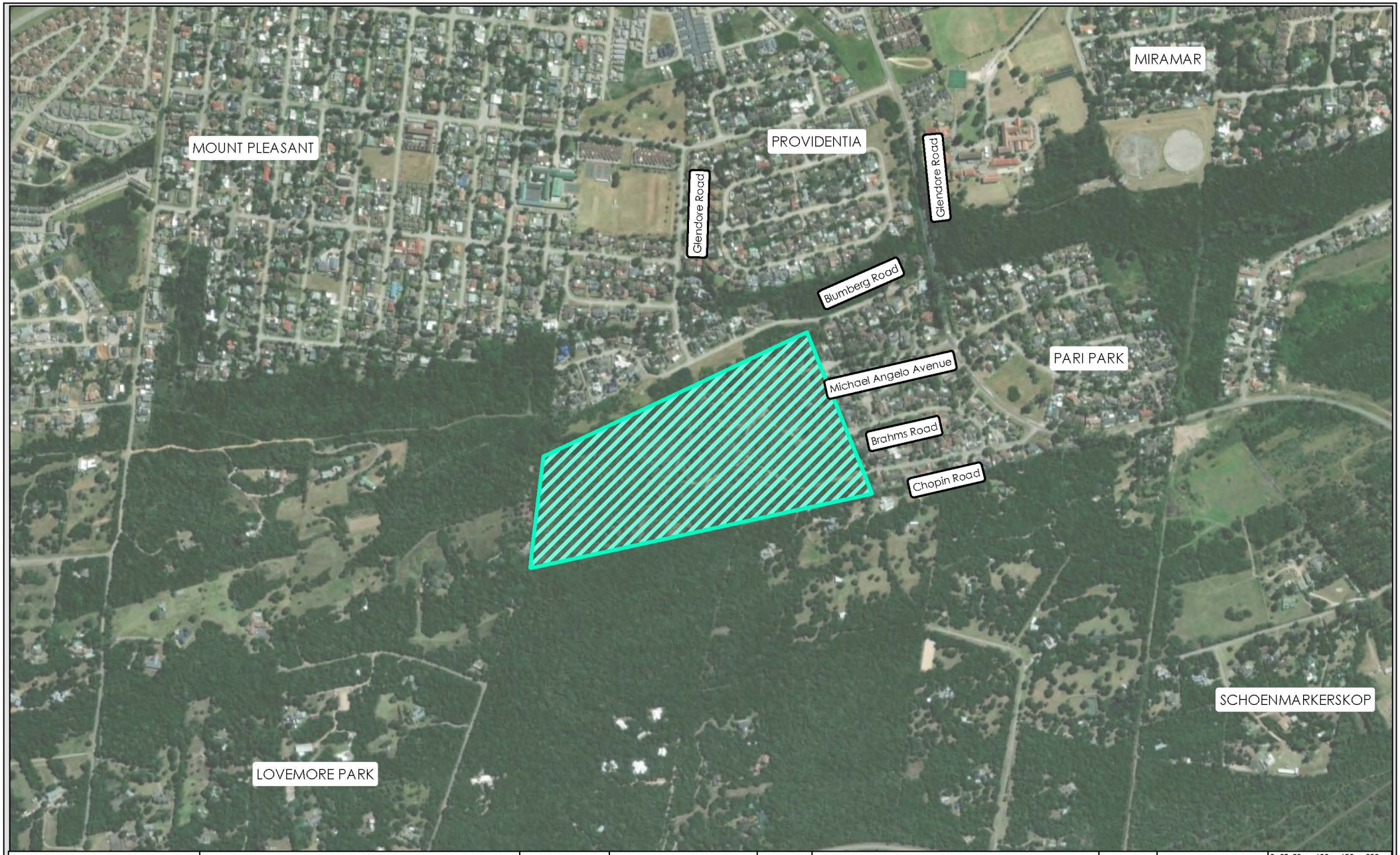
1.3 METHODOLOGY

The approach followed in conducting the traffic impact assessment was in accordance with the guidelines set by **TMH 16 Volume 1- South African Traffic Impact and Site Assessment Manual** [(1)].

Given the extent of the proposed development and in terms of the aforementioned guidelines, the development is considered to be a medium-sized development. As such, this assessment considered impact for both the development (assumed to be 2024) and development plus five-year (2029) horizons.

The methodology used was as follows:

- Present traffic flow patterns were obtained and the affected junctions analysed, where after recommendations were made on the present need for road network improvements, without taking the proposed development into account;
- Given the development extent, trips generated by the development were determined using applicable trip generation rates specified in **TMH 17 Volume 1 - South African Trip Data Manual** [(2)];
- The distribution of the generated trips was estimated where after the generated traffic was assigned to the surrounding road network;
- The proposed access points were assessed from operational and traffic safety perspectives in terms of TRH26: South African Road Classification and Access Management Manual [(3)];
- Operation of affected junctions and the existing access points was analysed to ensure that they operate safely at acceptable levels of service and recommendations made on the need for rationalisation taking cognisance of the proposed development for the 2024 and 2029 planning horizons;
- On-site circulation, parking and delivery aspects were assessed; and
- Taking into account the major findings of the study, conclusions were made regarding the financial responsibilities of the affected parties for required road upgrading measures.



Engineering Advice and Services
Tel: (041) 581 2421

N

Legend

Subject Site

Project Title: Traffic Impact Assessment for a Residential Development on ERF 325, Theescombe, Port Elizabeth	*Drawing No:* 2219-P-001
Drawing Title: Figure 1: Locality Plan	*Drawing Date:* February 2024

0 25 50 100 150 200 Meters

Scale 1 : 10 000

Prepared by : EHN

Checked by : CH

1.4 STUDY AREA

Based on the type and extent of the development the study area extended to the adjacent junctions of Merle Road and Michelangelo Avenue with Blumberg Road, Brahms Road with Chopin Road and Chopin Road and Michelangelo Avenue with Glendore Road as all trips generated by the proposed development will approach along these roads and through these junctions.

1.5 ASSUMPTIONS AND LIMITATIONS

The scope of this TIA is limited to the project as described in this report. The scope only deals with vehicular and pedestrian traffic related impacts in the Pari Park area and excludes consideration of the following:

- Any vehicular activity outside of a radius of 500m of the Pari Park precinct;

The report is based on a number of assumptions and is subject to certain limitations. These are as follows:

- That vehicle trips are based on development information supplied by the site owner / developer;
- That trips generated by the proposed development are distributed to and from the site based on the location of the development site, relative to trip attractors (e.g., employment areas, schools, shops) and the major road network; and
- That the site will be used for the purposes as planned by the developer.

Notwithstanding these assumptions and limitations, it is our view that this Traffic Impact Assessment provides the necessary framework to allow the developer to conduct activities within the necessary legal, planning and operational requirements set by the relevant road authority.

2 LAND USE RIGHTS, DEVELOPMENT AND ENVIRONS

2.1 CURRENT AND PROPOSED LAND –USE RIGHTS

Erf 325, Theescombe measures approximately 17.436ha in extent, is zoned for Single Residential Zone 2 purposes and is currently vacant. An application to rezone the property to General Residential Zone 1, will be submitted to the NMBM in due course. This TIA will address the impact of the proposed development on the surrounding road network.

The Informal Town Planning Enquiry form for erf 325 is attached as **Annexure A**.

2.2 DEVELOPMENT ENVIRONS

As can be seen from **Figure 1**, the development is situated on undeveloped land to the south of the Providentia residential suburb and to the west of the Pari Park residential suburbs respectively on the southern edge of Port Elizabeth. The land use abutting the site across to the north across Blumberg Road and to the east is residential in nature. To the immediate south and west of the site, the land use is low density rural residential in nature.

The Mount Pleasant Primary School is situated approximately 300m to the northwest of the site. The school sports fields are located alongside Merle Road. There is no primary access to the fields from Merle Road although emergency vehicle and pedestrian gates are located along the school fence.

2.3 OVERVIEW OF DEVELOPMENT

The proposed development comprises of 331 residential units of various types as indicated in **Table 1** and on **Figure 9**.

Table 1: Development Components

Component	No of Units	Description
Single Residential Units (210)	32	Double storey residential units
Townhouses (231)	174	Simplex / duplex townhouses
Multi-level townhouses (232)	56	Two-storey walk-up units
Retirement Village (251)	69	Single-storey retirement units
Total	**331**	

Access to the development is proposed from Blumberg Road opposite Merle Road from the north and via Chopin Road through Pari Park from the east.

3 DATA COLLECTION

3.1 PEAK HOUR TRAFFIC VOLUMES

Peak hour traffic turning movement counts were conducted during typical weekday morning and evening peak periods on Wednesday, 24 January 2024, at the following intersections:

- Glendore Road / Michaelangelo Avenue
- Glendore Road / Chopin Road
- Merle Road / Blumberg Road
- Brahms Road / Chopin Road

The detailed survey data is attached as **Annexure B** and summarised on **Figure 2** overleaf.

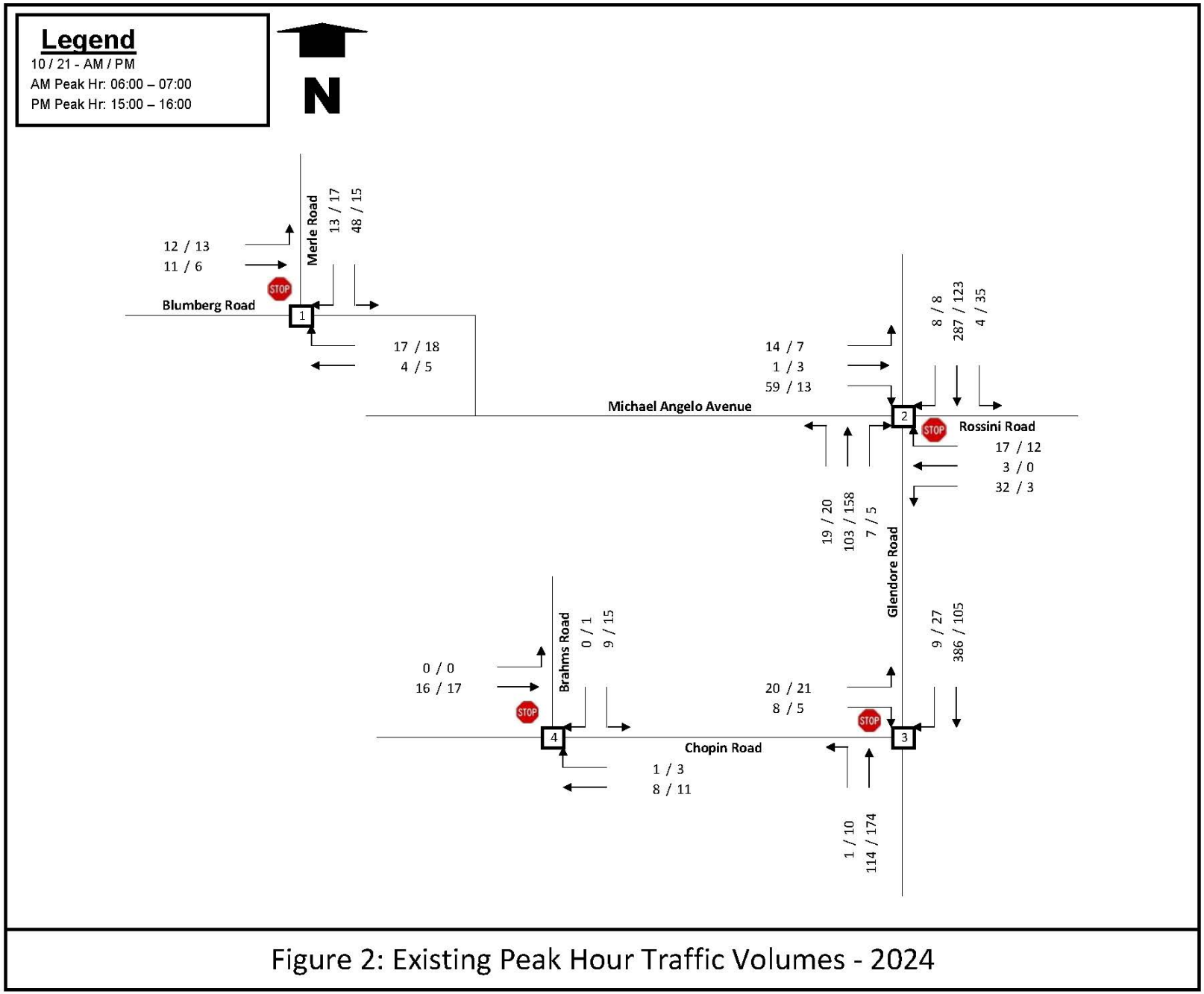


Figure 2: Existing Peak Hour Traffic Volumes - 2024

3.2 DAILY TRAFFIC VOLUMES

As this study will also analyse the impact of the development in 2029, under normal circumstances historical daily traffic volumes at count stations in the vicinity of the development would be sourced from the NMBM Transportation Planning Sub-Directorate in order to determine average traffic growth per annum.

Unfortunately, the most recent counts conducted at the nearest stations - A29 on Circular Drive at William Moffett Expressway and A35 on William Moffett Expressway south of Cape Road - were during 2009.

When considering both surveyed stations, traffic growth at these stations between 2001 and 2009 reflected average growth of 3.11% per annum.

It is considered that this growth is relatively high. However, it is noted that the Pari Park and surrounding area is close to its maximum development potential thus providing little scope for growth in traffic volumes over the next five years.

The background traffic volumes will thus be escalated by 2% per annum to reflect 2029 volumes and are indicated on **Figure 3** overleaf.

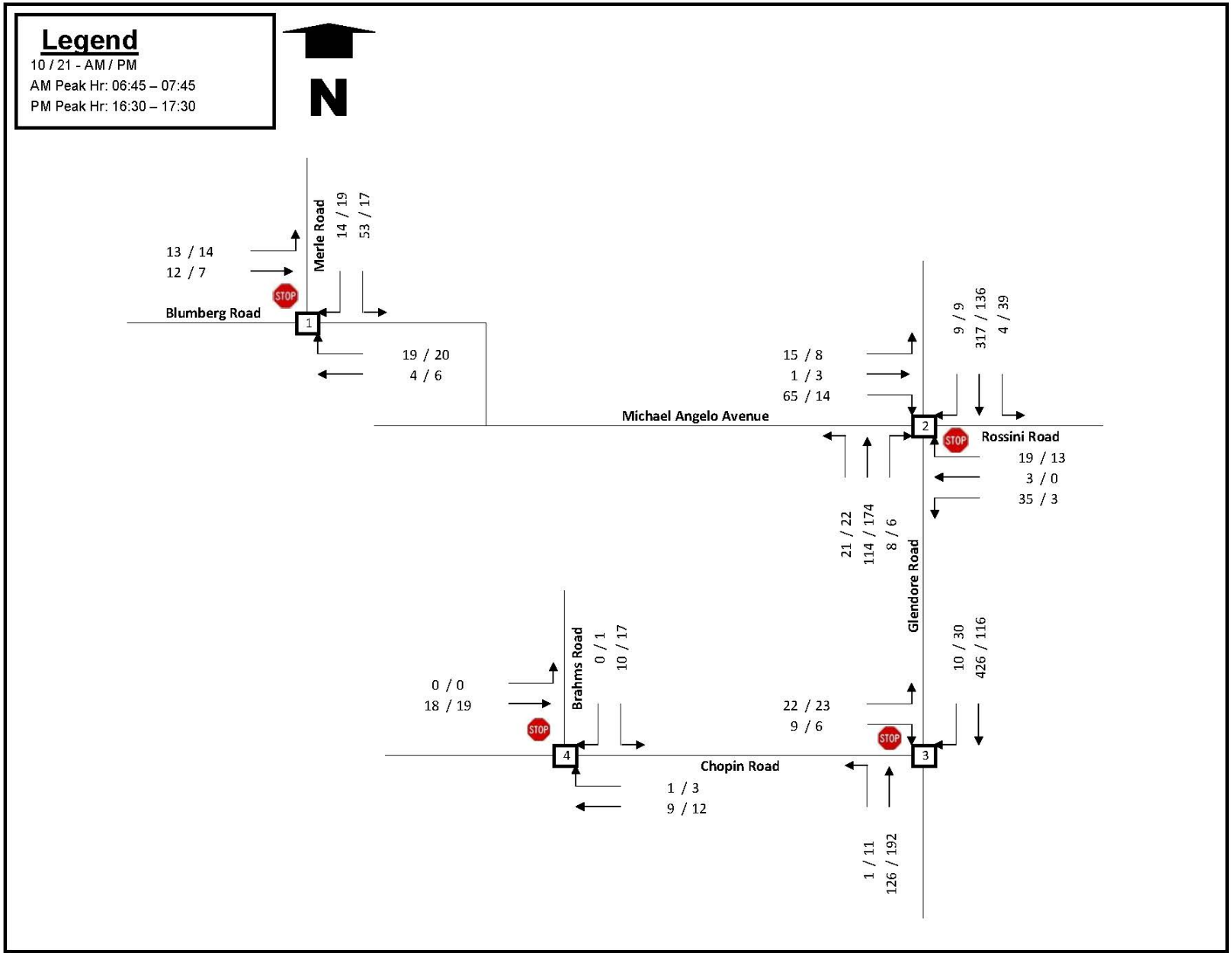


Figure 3: Escalated Peak Hour Traffic Volumes - 2029

3.3 ROAD NETWORK

3.3.1 Existing

The existing road network and intersection configuration were roughly measured up using aerial photography. The primary road network can briefly be described as follows:

- **Glendore Road (DR01905)** is a north-south class U4b residential collector/distributor road serving residential areas between the Buffelsfontein Road and Victoria Drive arterials. The road also serves as a link between the residential areas of Mount Pleasant, Charlo and Miramar, and the southern coastline in the Port Elizabeth area. The road consists of a single 3.7m wide lane per direction. In the vicinity of the Michaelangelo Road intersection, traffic calming measures comprising of a narrow median and low speed humps have been installed in order to slow traffic passing through the Pari Park residential area. The road is in a good condition with a posted speed limit of 60km/h, although the operational speed ranges from 40 to 60 km/h.

View of Glendore Road approaching Michaelangelo Avenue from the north

- **Michelangelo, Brahms and Chopin Roads** are class U5b residential streets providing portions of Pari Park access to Glendore Road. The roads have mountable kerbs and consist of a single 3.4m wide lane per direction. At present, Brahms and Chopin Roads simply terminate at the eastern boundary of erf 325, indicating the initial intention to extend into erf 325, while Michelangelo Road ends in a turning circle. The roads are in a fair condition.

View of Merle Road from Blumberg Road

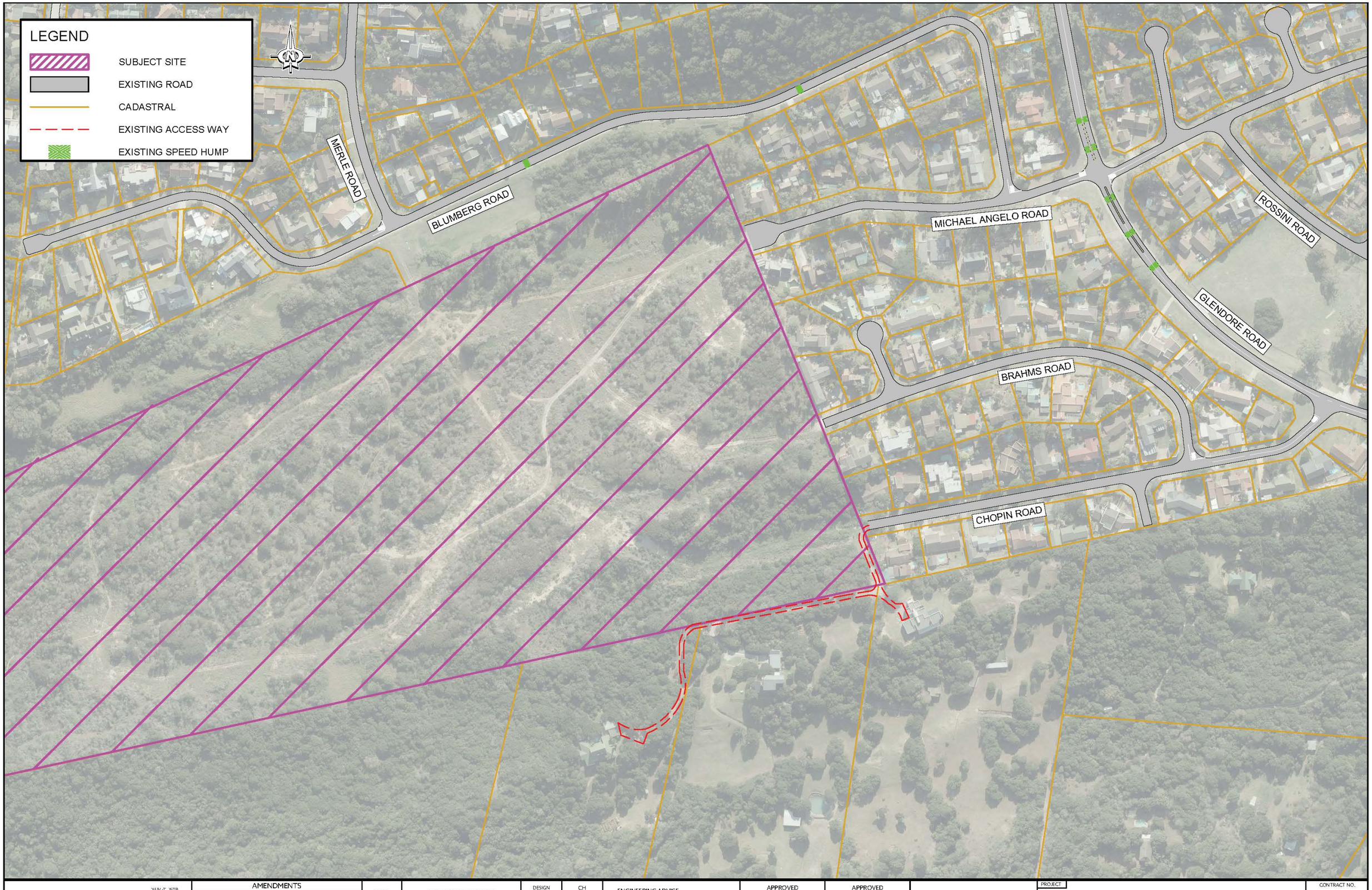
- **Blumberg Road** is a kerbed 6.8m wide surfaced Class U5b residential access street in a good condition. The road provides a link between Mount Pleasant and Providentia and Glendore Road via a short section of Michelangelo Road.
- **Merle Road** is a kerbed 6.8m wide surfaced Class U5b residential access street in a good condition linking Providentia and Mount Pleasant with Blumberg Road. The road has a steep gradient between Blumberg Road and Harry Road. At the intersection with Blumberg Road, the Blumberg Road west approach is stop controlled while the Merle Road and Blumberg Road west approaches are free-flow given the predominant flow between Providentia and Pari Park.

View of Chopin Road towards Glendore Road

The existing road and intersection configuration is indicated on **Figure 4**.

3.3.2 Future

The long-term road network proposals as contained in the Draft **NMBM Comprehensive Integrated Transport Plan** [4] indicate that Glendore Road will ultimately form part of a north-south link between Lorraine and the Driftsands Area southeast of Victoria Drive and ultimately Summerstrand. The upgrading of this link may result in increased traffic volumes through Pari Park in the longer term as motorists in the Lorraine and Charlo areas make use of this alternative route to Summerstrand.



FOR REPORT

AMENDMENTS			
NO.	DATE	DESCRIPTION	APPROVED

SCALE: 1 : 2500

SCALE ON REDUCED DRAWING

DESIGN	CH
DRAWN	EAR
APPROVED	CH
DATE	SEP 2024

ENGINEERING ADVICE AND SERVICES associated with ULWAZI
73 Heugh Road, Walmer
P.O. Box 13867
Humewood
Port Elizabeth
6013
tel/fax: (041) 581 2421

APPROVED — ENGINEER — DATE

APPROVED — CLIENT — DATE

PROJECT
TRAFFIC IMPACT ASSESSMENT FOR A RESIDENTIAL DEVELOPMENT ON ERF 325, THEESCOMBE, PORT ELIZABETH

CONTRACT NO.

DWG DESCRIPTION
FIGURE 4: EXISTING ROAD AND JUNCTION CONFIGURATION

DWG.NO.
2219-P-004

ISSUE

3.4 SPATIAL DEVELOPMENT FRAMEWORK

Figure 5 below is an extract of the **Greater Walmer and Fairview Spatial Development Framework** [5] prepared by Metroplan on behalf of the Nelson Mandela Bay Municipality. The SDF provides for low density residential use with a net density of 2 to 40 units per hectare in the area where the proposed development is located.

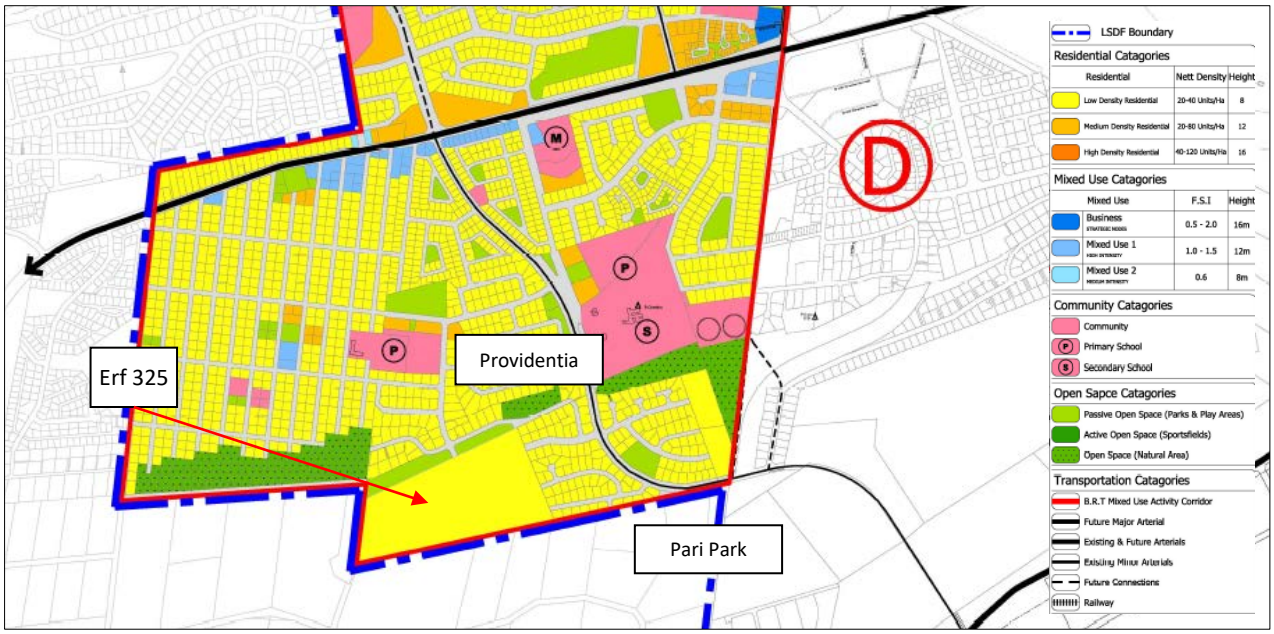


Figure 5: Greater Walmer Spatial Development Framework

3.5 PUBLIC TRANSPORT

No formal public transport facilities are in place in the immediate vicinity of the proposed development. However, public transport services in the form of scheduled bus and informal minibus taxi modes operate along Glendore Road through Pari Park and on Gladys Road, Merle Road and Cyril Street in Providentia.

Public Transport stops are located along Glendore Road at regular intervals.

3.6 NON-MOTORISED TRANSPORT

Pedestrian sidewalks are provided along Glendore Road from Marcia Way to the north of Pari Park to a point approximately 90m south of Michaelangelo Avenue.

4 CAPACITY ANALYSIS – BEFORE DEVELOPMENT

Level of Service (LOS) is defined as the operating condition that may occur at a junction when it accommodates various traffic volumes. LOS is a qualitative measure of the effect of speed, travel time, traffic interruptions, freedom to manoeuvre, safety, driving comfort and convenience, and operating costs. **LOS D** is considered an acceptable design standard. The LOS applicable to junctions under various control conditions, as defined in the **Highway Capacity Manual** [6] are indicated in **Table 2** below:

Table 2: Level of Service definitions for Vehicles (Highway Capacity Manual [6] method)

Level of Service	Control delay per vehicle in seconds (d) (Including geometric delay)		LOS Colour Rating
	Signals and Roundabouts	Stop Signs and Yield Signs	
A	d ≤ 10	d ≤ 10	Excellent
B	10 < d ≤ 20	10 < d ≤ 15	Very Good
C	20 < d ≤ 35	15 < d ≤ 25	Good
D	35 < d ≤ 55	25 < d ≤ 35	Acceptable
E	55 < d ≤ 80	35 < d ≤ 50	Poor
F	80 < d	50 < d	Very Poor

The traffic situation was analysed in order to determine the Level of Service at which the affected junctions would operate before development occurs for the 2024 development horizon.

The capacity analysis was undertaken using the **SIDRA Intersection 9 Network** [7] capacity analysis method but applying the **Highway Capacity Manual** [6] gap acceptance criteria for unsignalised junctions.

The results are shown in **Table 3** below and the detailed SIDRA output sheets attached as **Annexure C**.

Table 3: Results of Junction Capacity Analysis – 2024 Before Development

Intersection	Intersection				Side Road			
	Ave Delay (sec)		LOS *		Ave Delay (sec)		LOS	
	AM	PM	AM	PM	AM	PM	AM	PM
Glendore / Michaelangelo	2.7	1.6	A*	A*	10.7	9.7	B	A
Glendore / Chopin	0.7	1.5	A*	A*	10.5	9.3	B	A
Merle / Blumberg	5.3	5.1	A*	A*	5.2	5.3	A	A

* - **SIDRA Intersection Network** [7] does not calculate junction LOS for stop-controlled junctions. The LOS indicated is sourced from the **Highway Capacity Manual** [6] (**Table 1** above).

As can be seen from the results contained in **Table 3**, no capacity problems are experienced at the affected junctions under current conditions.

5 TRIP GENERATION

TMH 17 Volume 1 - South African Trip Data Manual [(2)] recommends the following peak hour trip generation rates for each category for the weekday AM and PM peak hours as indicated in **Table 4** below.

Table 4: Peak Hour Trip Generation Rates

Development Category	Trips Per Unit	% Split			
		AM		PM	
	AM/PM	IN	OUT	IN	OUT
Single Residential Units (210)	1 / Unit	25	75	70	30
Townhouses (231)	0.85 / Unit	25	75	70	30
Multi-level townhouses (232)	0.75 / Unit	25	75	70	30
Retirement Village (251)	0.35 / Unit	40	60	50	50

5.1 LOW DENSITY RESIDENTIAL – SINGLE DWELLING UNITS (CATEGORY 210)

For a development of 32 units this relates to the following peak hour trip generation:

TGR (Weekday AM/PM) = 1.0 * No of units

= 1.0 * 32

= **32 trips** (in and out)

5.2 TOWNHOUSES (CATEGORY 231)

For a development of 174 units this relates to the following peak hour trip generation:

TGR (Weekday AM/PM) = 0.85 * No of units

= 0.85 * 174

= **148 trips** (in and out)

5.3 MULTI-LEVEL TOWNHOUSES (CATEGORY 232)

For a development of 56 units this relates to the following peak hour trip generation:

TGR (Weekday AM/PM) = 0.75 * No of units

= 0.75 * 56

= **42 trips** (in and out)

5.4 RETIREMENT VILLAGE (CATEGORY 251)

For a development of 69 units this relates to the following peak hour trip generation:

TGR (Weekday AM/PM) = 0.35 * No of units

= 0.35 * 69

= **24 trips** (in and out)

5.5 SUMMARY OF TRIPS

A summary of generated trips for the proposed development is indicated in **Table 5** below.

Table 5: Peak Hour Trip Generation Summary

Category	AM		PM	
	Trips In	Trips Out	Trips In	Trips Out
Single Residential Units (210)	8	24	22	10
Townhouses (231)	37	111	104	44
Multi-level townhouses (232)	11	32	29	13
Retirement Village (251)	10	14	12	12
Total	**65**	**181**	**167**	**79**

6 TRIP DISTRIBUTION

The distribution of trips to and from the development were determined by using the observed traffic flows at the surveyed intersections as a basis, as well as the location of employment areas, shops and schools in relation to the development. The following distribution has been assumed:

AM Peak Hour

- Merle Road – 60% of traffic of which:
  - 80% to/from north via Merle Road; and
  - 20% to/from east via Blumberg Road and Michelangelo Avenue.
- Chopin Road – 40% of traffic of which:
  - 20% to/from south via Glendore Road; and
  - 80% to/from north via Glendore Road.

PM Peak Hour

- Merle Road – 60% of traffic of which:
  - 80% to/from north via Merle Road; and
  - 20% to/from east via Blumberg Road and Michelangelo Avenue.
- Chopin Road – 40% of traffic of which:
  - 20% to/from south via Glendore Road; and
  - 80% to/from north via Glendore Road.

Using these assignments, the projected traffic volumes generated by the development and the projected volumes added to the existing (2024) background traffic are indicated.

The generated peak hour trips are indicated on **Figure 6**.

The generated trips added to the normal weekday AM and PM peak hour volumes for the 2024 and 2029 development horizon are indicated on **Figure 7** and **Figure 8** respectively overleaf.

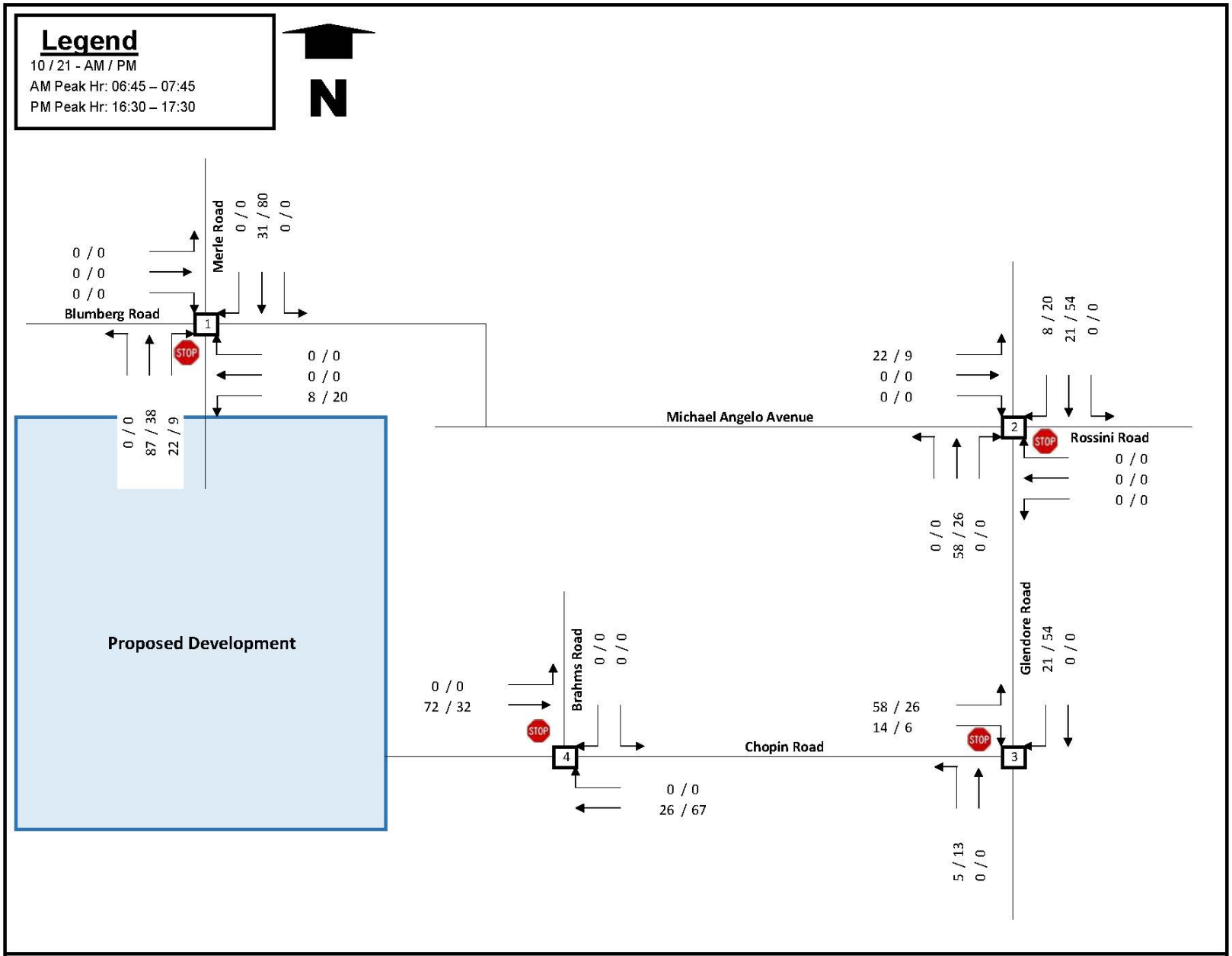


Figure 6: Generated Peak Hour Traffic Volumes - Development

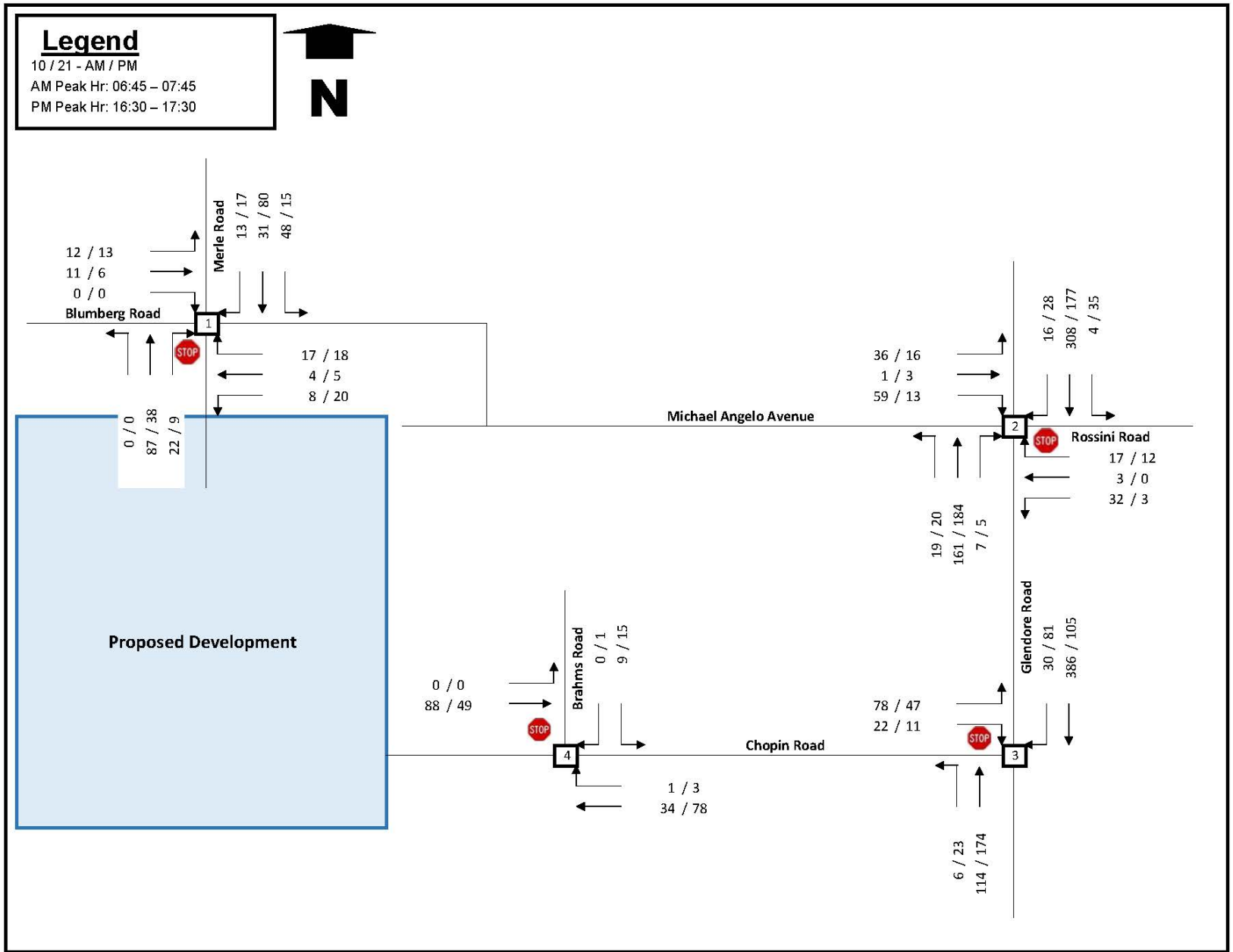


Figure 7: Peak Hour Traffic Volumes after Development - 2024

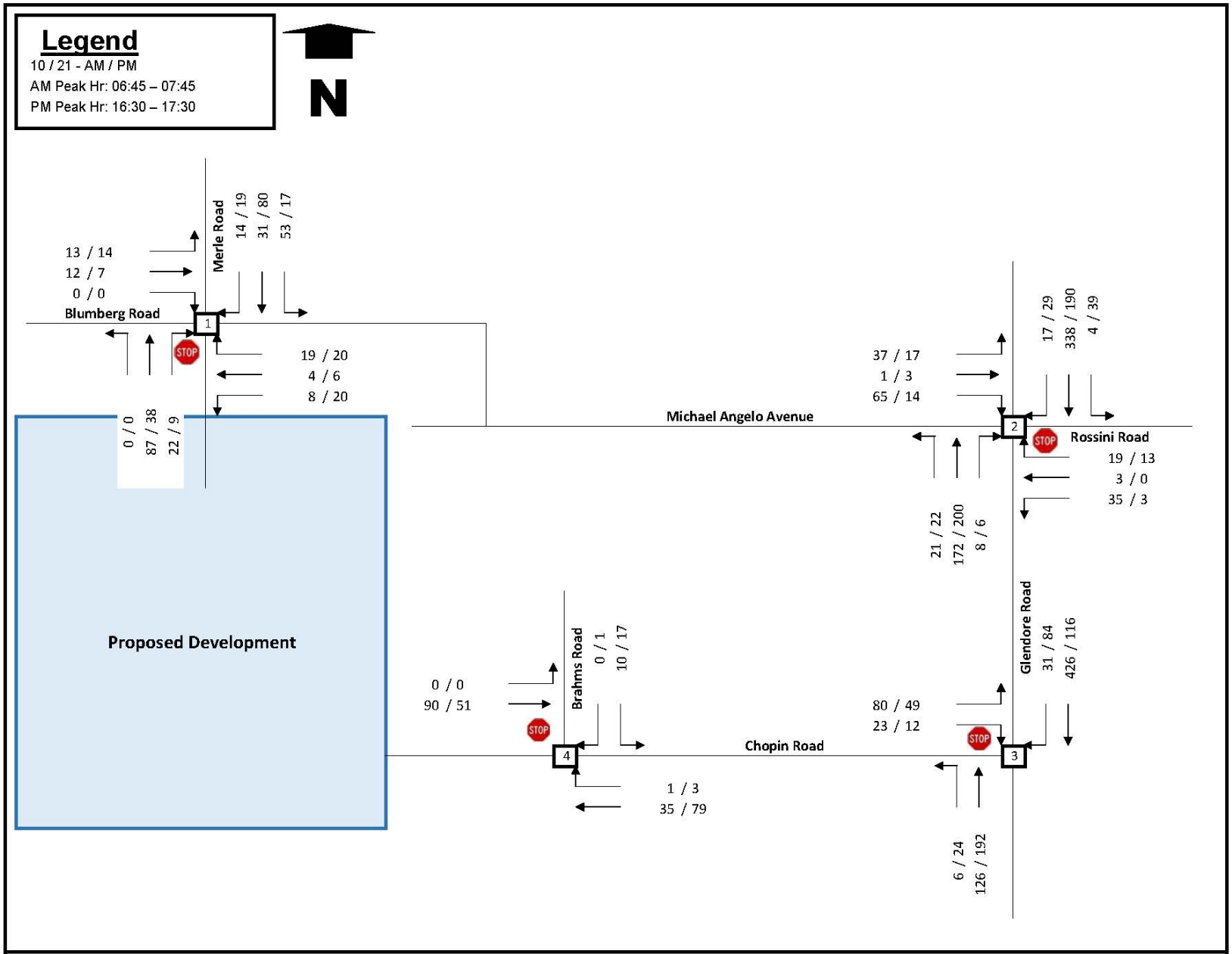


Figure 8: Peak Hour Traffic Volumes after Development - 2029

7 ACCESS ARRANGEMENTS

7.1 LOCATION

Access to the development is proposed from Blumberg Road opposite Merle Road and via Chopin Road at the eastern boundary of erf 325 as indicated on **Figure 9**.

It is noted that current peak hour traffic volumes on Blumberg Road, Merle Road, Chopin Road and Michaelangelo Avenue are low, commensurate with quiet residential roads with little through traffic. Further these streets are residential in character and every effort should be made to minimise impact on the existing environment.

As such, access to the development has been planned such that traffic will approach along the most practical and direct routes from Glendore Road, namely Merle Road via Gladys Road, Blumberg Road via Michelangelo Avenue and Chopin Road. This will ensure that impact on these streets is kept to a minimum while at the same time evenly distributed.

Access to properties south of erf 325 is currently obtained from Chopin Road, and provision for this access to remain in place has been made in the proposed development layout.

Chopin Road currently terminates at the eastern boundary of erf 325 and will extend into erf 325 as part of the development, increasing traffic along Chopin Road and changing its character from a cul-de-sac to a through road. As such, it is proposed that the developer provide traffic calming measures in the form of speed humps along Chopin Road as indicated on **Figure 9** to ensure that the additional traffic moves at acceptable speeds.

Given that the main traffic movement at the Merle Road / Blumberg Road intersection is currently between Merle Road and Blumberg Road east, there are no controls on these two approaches. However, with the planned new access on Blumberg Road, it will be necessary to provide stop control on the Merle Road approach given that vehicles accessing the development will conflict with vehicles turning right from Blumberg Road to Merle Road, as indicated on **Figure 9**.

Traffic calming measures in the form of speed humps do currently do exist on Blumberg Road.

View towards access from Chopin Road

View towards access from Merle Road

View towards access from east along Blumberg Road

7.2 ACCESS CONFIGURATION

The access points were assessed in terms of in terms of **TRH26: South African Road Classification and Access Management Manual** [3].

Given that a maximum of 246 peak hour trips would be generated by the development, of which a maximum of 100 vehicles would enter from Blumberg Road and 67 vehicles from Chopin Road during the PM peak hour, this relates to between 1 and 2 vehicles entering the site every minute (one vehicle every 40 seconds) on average.

Service flow rates at access-controlled entrances in vehicles / hour from Table 30 of **TMH 16 Vol 2 - South African Traffic Impact and Site Assessment Standards and Requirements Manual** [8] are indicated in **Table 6** below.

As noted, the flow rates range from the slowest throughput – 50 vph in the case of intercom operated gates to 480 vph in the case of swiping magnetic cards. The higher the service flow rate, the less likely that there will be congestion at the entrance.

Table 6: Access Control Service Flow Rates

Service flow rates (veh/h) for different control types	
Control type	**Service flow (vph)**
Swipe magnetic card	480
Remote controlled gates	450
Ticket dispenser: Automatic	390 -450
Ticket dispenser: Push button	220 - 360
Pin number operated gates	150
Pay fee on entry	120
Cell-phone operated gates (gate opens when a call is received)	100
Manual recording, Visitor completes form	80
Intercom operated gates (visitor contacts resident by intercom)	50

The number of entry lanes and the number of vehicles queuing in each lane are calculated after determining a Traffic Ratio over all entry lanes using the following formula:

$$\text{Traffic ratio} = \frac{\text{Total Volume / PHF}}{\text{Service flow rate}} \cdot 100$$

The number of lanes and queue length is then determined from **Table 7** below (Table 31 in TM16 Vol 2).

Table 7: Access Control Queue Lengths

95th Percentile queue length (vehicles per channel) at controlled accesses						
Storage (Vehs)	Traffic ratio (Percentage) for different Numbers of Channels					
N_{Que}	1 Channel	2 Channel	3 Channel	4 Channel	5 Channel	6 Channel
1	23	58	97	140	188	235
2	39	94	155	220	292	363
3	49	115	186	261	341	421
4	56	128	205	283	367	449
5	61	137	216	297	382	466
6	65	143	224	306	392	476
7	68	147	229	312	399	484
8	70	151	233	317	403	489
9	71	153	236	321	407	493
10	73	155	239	324	410	496

Given a peak hour volume of 100 vehicles entering the residential development from Blumberg Road and 67 from Chopin Road the traffic ratios for each control type are indicated in **Table 8** and **Table 9** below.

Table 8: Access Control Queue Lengths for erf 325, Theescombe – Blumberg Road

Peak Hour Trips - IN	100	Traffic ratio	Table 5	Q-Length Veh	Lanes Required	Q-Length m
Access Control Options	Flow - Vph					
Swipe Magnetic card	480	23.1	39.0	2	1	13
Remote controlled gates	450	24.7	39.0	2	1	13
Pin number operated gates	150	74.1	94.0	2	2	13
Cell-phone operated gates (gate opens when a call is received)	100	111.1	115.0	4	2	26
Manual Recording (Visitor Completes form)	80	138.9	140.0	2	3	13
Intercom Operated Gates (Visitor contacts resident by Intercom)	50	222.2	224.0	3	4	19.5

Table 9: Access Control Queue Lengths for erf 325, Theescombe – Chopin Road

Peak Hour Trips - IN	67	Traffic ratio	Table 5	Q-Length Veh	Lanes Required	Q-Length m
Access Control Options	Flow - Vph					
Swipe Magnetic card	480	15.5	23.0	1	1	6.5
Remote controlled gates	450	16.5	23.0	1	1	6.5
Pin number operated gates	150	49.6	58.0	1	2	6.5
Cell-phone operated gates (gate opens when a call is received)	100	74.4	94.0	2	2	13
Manual Recording (Visitor Completes form)	80	93.1	94.0	2	2	13
Intercom Operated Gates (Visitor contacts resident by Intercom)	50	148.9	151.0	2	3	13.

Should the access be security controlled, the optimum solution would be to configure as either magnetic cards, remote-controlled or pin entry gates with two entering lanes and stacking distance of a minimum of 13m (2 vehicles) for the Blumberg Road access and 2 lanes with 1 vehicle stacking distance for the Chopin Road access as indicated in **Table 8** and **Table 9** above

Provision has been made for two entering lanes at the Blumberg Road and Chopin Road accesses with a stacking distance of 3 and 1 vehicle respectively vehicles per lane and as indicated on **Figure 9**.

8 CAPACITY ANALYSIS – AFTER DEVELOPMENT

8.1 2024 AFTER DEVELOPMENT

After adding generated peak hour traffic volumes to the peak hour volumes, the traffic situation was analysed in order to determine the LOS at which the affected junctions and access point would operate during a normal weekday after development occurs.

The results are shown in **Table 10** below and the detailed SIDRA output sheets attached as **Annexure D.**

Table 10: Results of Junction Capacity Analysis – 2024 After Development

Intersection	Intersection				Side Road			
	Ave Delay (sec)		LOS *		Ave Delay (sec)		LOS	
	AM	PM	AM	PM	AM	PM	AM	PM
Glendore / Michaelangelo	2.8	1.7	A*	A*	11.0	10.7	B	B
Glendore / Chopin	2.0	2.9	A*	A*	10.5	9.6	C	A
Merle / Blumberg	7.5	7.3	A*	A*	8.2	8.2	A	A

* - **SIDRA Intersection Network** [7] does not calculate junction LOS for stop-controlled junctions. The LOS indicated is sourced from the **Highway Capacity Manual** [6] (**Table 2** above).

As can be seen from the results contained in **Table 10**, the additional traffic generated by the proposed development has little or no impact on the operation of the affected junctions in terms of capacity.

8.2 2029 AFTER DEVELOPMENT

After adding generated peak hour traffic volumes to the escalated background peak hour volumes during a normal weekday, the traffic situation was analysed in order to determine the LOS at which the affected junctions and access point would operate after development occurs for the 2029 development horizon.

The results are shown in **Table 11** below and the detailed SIDRA output sheets attached as **Annexure E**.

Table 11: Results of Junction Capacity Analysis – 2029 After Development

Intersection	Intersection				Side Road			
	Ave Delay (sec)		LOS *		Ave Delay (sec)		LOS	
	AM	PM	AM	PM	AM	PM	AM	PM
Glendore / Michaelangelo	2.9	1.7	A*	A*	11.6	11.1	B	B
Glendore / Chopin	2.0	2.9	A*	A*	11.0	9.9	B	A
Merle / Blumberg	7.6	7.3	A*	A*	8.2	8.2	A	A

* - **SIDRA Intersection Network** [7] does not calculate junction LOS for stop-controlled junctions. The LOS indicated is sourced from the **Highway Capacity Manual** [6] (**Table 2** above).

As can be seen from the results contained in **Table 11**, the additional traffic generated by the development has little or no impact on the operation of the affected junctions in terms of capacity.

LEGEND

- SITE BOUNDARY
- EXISTING ROAD
- CADASTRAL
- EXISTING ACCESS WAY
- EXISTING SPEED HUMP
- PROPOSED SPEED HUMP
- PROPOSED ROAD

MERLE ROAD
BLUMBERG ROAD
MICHAEL ANGELO ROAD
ROSSINI ROAD
GLENDORE ROAD
BRAHMS ROAD
CHOPIN ROAD
ROAD
CLUBHOUSE

PROTECTED OPEN SPACE A
28 600m2

PROTECTED OPEN SPACE B
11 700m2

PROTECTED OPEN SPACE C
26 500m2

PROTECTED OPEN SPACE D
5900m2

PROTECTED OPEN SPACE

VILLAGE A
20 UNITS

VILLAGE B
65 UNITS

VILLAGE C
56 UNITS

VILLAGE D
69 UNITS

VILLAGE E
61 UNITS

VILLAGE F
48 UNITS

VILLAGE G
12 UNITS

FOR REPORT

AMENDMENTS			
NO.	DATE	DESCRIPTION	APPROVED

SCALE: 1 : 2500

SCALE ON REDUCED DRAWING

DESIGN	CH
DRAWN	EAR
APPROVED	CH
DATE	SEP 2024

ENGINEERING ADVICE AND SERVICES associated with ULWAZI
73 Heugh Road, Walmer
P.O. Box 13867
Humewood
Port Elizabeth
6013
tel/fax: (041) 581 2421

APPROVED
ENGINEER
DATE

APPROVED
CLIENT
DATE

PROJECT
TRAFFIC IMPACT ASSESSMENT FOR A RESIDENTIAL DEVELOPMENT ON ERF 325, THEESCOMBE, PORT ELIZABETH

CONTRACT NO.

DWG DESCRIPTION
FIGURE 9: PROPOSED SITE AND ACCESS CONFIGURATION

DWG.NO.
2219-P-009

ISSUE

9 PUBLIC TRANSPORT OPERATIONS AND PEDESTRIAN ARRANGEMENTS

No additional public transport facilities are required.

Provision for pedestrian movement has been made on the site to access buildings.

The proposals are indicated on **Figure 9**.

10 PARKING AND SERVICE VEHICLE REQUIREMENTS

10.1 PARKING REQUIREMENTS

The parking requirement as specified in the NMBM Zoning Scheme (based on **National Department of Transport standards** [9]) for residential developments ranges from 1 to 1.5 bays plus 0.5 bays visitor bays per unit depending on the number of habitable rooms in the unit.

2 bays per unit will be provided for both the single residential and townhouse units. The required parking bays will be indicated on the site development plan.

10.2 SERVICE VEHICLE REQUIREMENTS

Suitable arrangements have been made to accommodate service vehicles in the development layout vehicles will be able to access the development from Merle and Glendore Roads.

11 CONCLUSIONS

The following conclusions can thus be drawn from the study:

- Based on historical growth per annum and development potential in the area background traffic can escalate at 2.0% per annum;
- Under existing traffic conditions no problems are experienced at the affected junctions in terms of capacity;
- The proposed development generates a total of 246 peak hour vehicle trips during typical weekday AM and PM peak hours;
- The expected peak hour traffic volumes are well withing the design capacity for residential streets;
- Access to the development can safely be accommodated from Blumberg Road and Chopin Road as indicated on **Figure 9** in order to minimise the impact of the additional traffic on existing residential streets adjacent to the proposed development. Additional stop control will be provided on the Merle Road approach to improve safety at the access intersection;
- Given that 100 vehicles would enter from Blumberg Road and 67 vehicles from Chopin Road during the PM peak hour access control by means of magnetic swipe cards, remote-controlled or pin entry gates with two entering lanes and stacking distance of a minimum of 13m (2 vehicles) for the Blumberg Road access and 2 lanes with 1 vehicle stacking distance for the Chopin Road access would be required to prevent traffic impacting on municipal streets;
- When considering the traffic generated by the proposed development added to existing traffic, the affected intersections and access point all operate at acceptable Levels of Service in terms of capacity for both the 2024 and 2029 development horizons;
- While delays are experienced by traffic entering Glendore Road (LOS B) during the PM peak hour, gaps are created in the Glendore Road traffic as a result of the traffic calming measures in place on both Glendore Road approaches to Michaelangelo Avenue;
- Additional traffic generated by the proposed development has little impact on the affected intersections, thus the additional traffic will not significantly reduce available intersection capacity and as such no improvements are required at the affected intersections due to the additional traffic generated by the proposed development; and
- As access to the development is also provided from Chopin Road, traffic along this road will increase, changing it character as a cul-de-sac and requiring traffic calming measures in the form of speed humps as indicated on **Figure 9** to ensure that the impact of additional traffic is minimized.

12 RECOMMENDATIONS

In view of the findings of this study, it is recommended that:

- This TIA be approved by the Nelson Mandela Bay Municipality;
- The access to the proposed development be obtained from Blumberg Road opposite Merle Road and Chopin Road with the access points configured as indicated on **Figure 9**;
- The access points be configured with a minimum of two entering lanes and stacking distance of a minimum of 13m (2 vehicles) for both the Blumberg Road access and the Chopin Road access;
- The developer installs traffic calming measures in the form of speed humps on Chopin Road as indicated on **Figure 9**; and
- All costs related to the provision of the access points and traffic calming measures, including the provision of road signs and markings are to be met by the developer.

13 REFERENCES

1. *Joubert, Sampson, et al,* **TMH 16 Volume 1- South African Traffic Impact and Site Assessment Manual,** COTO, September 2013.
2. *Joubert, Sampson, et al,* **TMH 17 Volume 1- South African Trip Data Manual**, COTO, September 2013.
3. *COTO,* **TRH 26 - South African Road Classification and Access Management Manual**, SANRAL, August 2012.
4. *RGM Consortium,* **NMBM Comprehensive Integrated Transport Plan 2023/2028,** NMBM, November 2023.
5. *Metroplan, et al*, **Greater Walmer Local Spatial Development Framework**, NMBM, 2013.
6. *Transportation Research Board,* **Highway Capacity Manual**, 2000.
7. *Akcelik & Associates (Pty) Ltd*, **SIDRA Junction Network 9 User Guide**, SIDRA Solutions, April 2019.
8. *Joubert, Sampson, et al,* **TMH 16 Volume 2- South African Traffic Impact and Site Assessment Standards and Requirements Manual**, COTO, September 2013.
9. *Bruinette Kruger Stoffberg Inc*, **Parking Standards (Second Edition)**, Department of Transport, November 1985.

ANNEXURE A
Land Use
Rights

INFORMAL TOWN PLANNING ENQUIRY

Allotment Area:	THEESCOMBE	**Erf Number:**	325	**Sub Number:**	0
Consolidated:		**Subdivided:**			
Area:	174370 m2	**Proclaimed Main Road:**		**History:**	
		Structure Plan:	0	**Registered:**	
				Parking:	
Consent:		**N-Tie:**		**Corner:**	
		CBD:			

Zone Information:

Zone	Building Line	Coverage	Side and Rear Space	Height Restriction	Density	RVA	NCU	FSI	Area (m2)
Single Residential Zone 2								0.00	174,370.00
Single Residential Zone 2								0.00	0.00
Single Residential Zone 2								0.00	0.00
Single Residential Zone 2								0.00	0.00

Notes:

ERF FALLS WITHIN THE LOVEMORE PARK SCHEME AREA
TPA 5600 PENDING
APPLICATION WAS MADE TO REZONE SUBDIVIDE + INCORPORATE THIS ERF INTO THE MUNICIPAL AREA IN 1998 - NEVER FINALISED
NEW APPLICATION SUBMITTED IN 2004 - ERF NOW PART OF METRO SUBDIVISION APPLICATION NO. 5571
SEE TPA 8478 & HYBRID SUBDIVISION NO. 7266 FOR ALL DETAILS

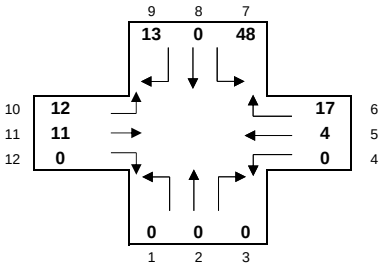
ANNEXURE B
Peak Hour
Traffic Counts

Project :	TIA : PROPOSED DEVELOPMENT IN THEESCOMBE																Day & date :	24/01/2024		
Intersection :	MERLE ROAD / BLUMBERG ROAD								NO. 1								Time period:	06:00 - 09:00		

STARTING TIME	- Northbound				BLUMBERG ROAD Westbound				MERLE ROAD Southbound				BLUMBERG ROAD Eastbound				INTER-SECTION	
	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Total	Hour
6:00	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	
6:15	0	0	0	0	0	0	1	1	2	0	0	2	0	0	0	0	3	
6:30	0	0	0	0	0	0	2	2	7	0	1	8	1	0	0	1	11	
6:45	0	0	0	0	0	2	2	4	8	0	2	10	1	2	0	3	17	32
7:00	0	0	0	0	0	0	7	7	14	0	5	19	8	5	0	13	39	70
7:15	0	0	0	0	0	1	8	9	18	0	1	19	3	1	0	4	32	99
7:30	0	0	0	0	0	1	0	1	8	0	5	13	0	3	0	3	17	105
7:45	0	0	0	0	0	0	1	1	7	0	2	9	1	1	0	2	12	100
8:00	0	0	0	0	0	1	3	4	2	0	1	3	4	1	0	5	12	73
8:15	0	0	0	0	0	0	1	1	2	0	3	5	1	0	0	1	7	48
8:30	0	0	0	0	0	0	0	0	2	0	1	3	2	0	0	2	5	36
8:45	0	0	0	0	0	1	2	3	0	0	2	2	4	1	0	5	10	34
Total	0	0	0	0	0	6	27	33	70	0	24	94	25	14	0	39	166	
Peak hour	0	0	0	0	0	4	17	21	48	0	13	61	12	11	0	23	105	
Peak 15 min				0				9				19				13	39	
PHF				#DIV/0!				0.58				0.80				0.44	0.67	

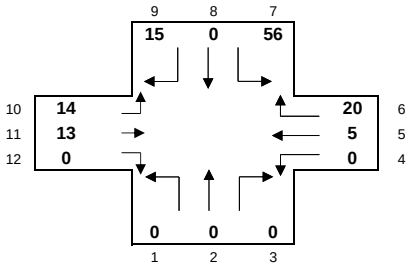
0

AM PEAK HOUR
2024



-

AM PEAK HOUR
2029



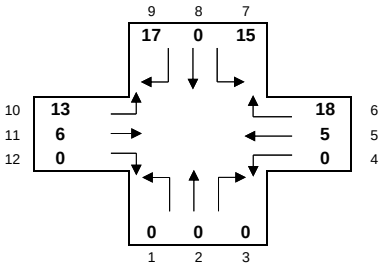
-

Project :	TIA : PROPOSED DEVELOPMENT IN THEESCOMBE																Day & date :	24/01/2024		
Intersection :	MERLE ROAD / BLUMBERG ROAD								NO. 1								Time period:	15:00 - 18:00		

STARTING TIME	- Northbound				BLUMBERG ROAD Westbound				MERLE ROAD Southbound				BLUMBERG ROAD Eastbound				INTER-SECTION	
	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Total	Hour
15:00	0	0	0	0	0	1	2	3	2	0	2	4	4	1	0	5	12	
15:15	0	0	0	0	0	0	2	2	3	0	3	6	3	1	0	4	12	
15:30	0	0	0	0	0	0	4	4	5	0	3	8	1	0	0	1	13	
15:45	0	0	0	0	0	1	3	4	0	0	1	1	1	0	0	1	6	43
16:00	0	0	0	0	0	0	3	3	2	0	1	3	1	0	0	1	7	38
16:15	0	0	0	0	0	0	2	2	3	0	2	5	2	0	0	2	9	35
16:30	0	0	0	0	0	1	2	3	8	0	6	14	4	0	0	4	21	43
16:45	0	0	0	0	0	3	2	5	2	0	2	4	2	0	0	2	11	48
17:00	0	0	0	0	0	0	7	7	3	0	4	7	1	1	0	2	16	57
17:15	0	0	0	0	0	1	7	8	2	0	5	7	6	5	0	11	26	74
17:30	0	0	0	0	0	1	3	4	1	0	3	4	4	0	0	4	12	65
17:45	0	0	0	0	0	0	0	0	1	0	2	3	1	0	0	1	4	58
Total	0	0	0	0	0	8	37	45	32	0	34	66	30	8	0	38	145	
Peak hour	0	0	0	0	0	5	18	23	15	0	17	32	13	6	0	19	74	
Peak 15 min				0				8				14				11	26	
PHF				#DIV/0!				0.72				0.57				0.43	0.71	

PM PEAK HOUR
2024

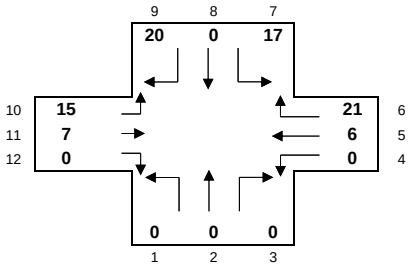
MERLE ROAD



-

PM PEAK HOUR
2029

MERLE ROAD

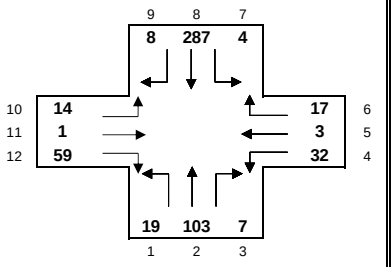


-

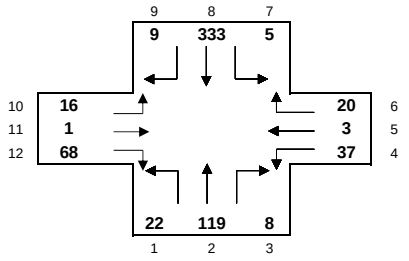
Project : TIA : PROPOSED DEVELOPMENT IN THEESCOMBE
Intersection : GLENDORE ROAD / MICHAELANGELO AVENUE NO. 2
Day & date : 24/01/2024
Time period: 06:00 - 09:00

STARTING TIME	GLENDORE ROAD Northbound				ROSSINI ROAD Westbound				GLENDORE ROAD Southbound				MICHAELANGELO AVENUE Eastbound				INTER-SECTION	
	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Total	Hour
6:00	0	10	0	10	0	0	1	1	0	5	1	6	0	0	0	0	17	
6:15	1	16	0	17	5	1	2	8	0	7	1	8	1	0	1	2	35	
6:30	1	24	0	25	8	0	3	11	1	23	2	26	2	0	8	10	72	
6:45	5	31	0	36	12	0	1	13	1	48	3	52	4	0	11	15	116	240
7:00	5	20	0	25	6	2	10	18	0	100	4	104	4	0	20	24	171	394
7:15	6	20	1	27	7	1	1	9	1	77	0	78	3	1	14	18	132	491
7:30	3	32	6	41	7	0	5	12	2	62	1	65	3	0	14	17	135	554
7:45	1	23	1	25	5	0	3	8	0	41	6	47	3	0	7	10	90	528
8:00	2	13	2	17	4	0	1	5	2	36	2	40	3	0	5	8	70	427
8:15	1	20	0	21	2	0	1	3	1	15	0	16	2	1	1	4	44	339
8:30	1	17	0	18	4	0	0	4	3	27	2	32	1	0	3	4	58	262
8:45	0	22	0	22	5	0	0	5	2	25	2	29	2	0	0	2	58	230
Total	26	248	10	284	65	4	28	97	13	466	24	503	28	2	84	114	998	
Peak hour	19	103	7	129	32	3	17	52	4	287	8	299	14	1	59	74	554	
Peak 15 min				41				18				104				24	171	
PHF				0.79				0.72				0.72				0.77	0.81	

AM PEAK HOUR 2024



AM PEAK HOUR 2029

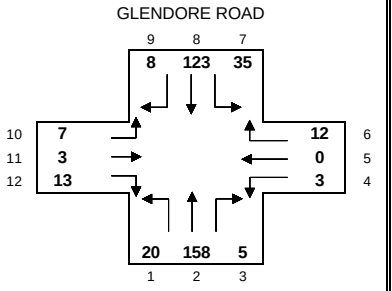


N

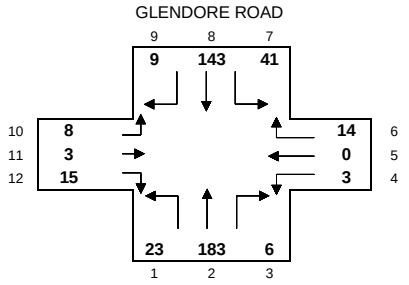
Project : TIA : PROPOSED DEVELOPMENT IN THEESCOMBE
Intersection : GLENDORE ROAD / MICHAELANGELO AVENUE NO. 2
Day & date : 24/01/2024
Time period: 15:00 - 18:00

STARTING TIME	GLENDORE ROAD Northbound				ROSSINI ROAD Westbound				GLENDORE ROAD Southbound				MICHAELANGELO AVENUE Eastbound				INTER-SECTION	
	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Total	Hour
15:00	2	24	2	28	7	0	5	12	5	36	1	42	0	0	2	2	84	
15:15	4	36	0	40	0	0	8	8	2	28	2	32	2	0	4	6	86	
15:30	3	20	1	24	0	0	2	2	5	19	3	27	2	2	3	7	60	
15:45	3	29	2	34	0	2	3	5	2	19	2	23	0	0	0	0	62	292
16:00	4	35	4	43	3	0	4	7	0	24	2	26	1	0	1	2	78	286
16:15	2	29	3	34	1	0	1	2	11	28	2	41	0	0	1	1	78	278
16:30	4	46	1	51	0	0	3	3	11	41	1	53	5	1	6	12	119	337
16:45	4	37	1	42	0	0	2	2	3	29	1	33	0	1	0	1	78	353
17:00	7	45	2	54	2	0	6	8	8	23	3	34	1	0	3	4	100	375
17:15	5	30	1	36	1	0	1	2	13	30	3	46	1	1	4	6	90	387
17:30	3	28	0	31	0	2	3	5	8	24	6	38	2	0	1	3	77	345
17:45	1	20	1	22	0	0	1	1	6	19	3	28	2	0	1	3	54	321
Total	42	379	18	439	14	4	39	57	74	320	29	423	16	5	26	47	882	
Peak hour	20	158	5	183	3	0	12	15	35	123	8	166	7	3	13	23	387	
Peak 15 min				54				8				53				12	119	
PHF				0.85				0.47				0.78				0.48	0.81	

PM PEAK HOUR 2024



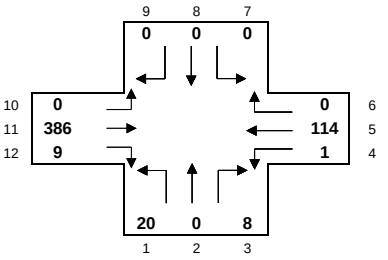
PM PEAK HOUR 2029



Project : TIA : PROPOSED DEVELOPMENT IN THEESCOMBE
Intersection : GLENDORE ROAD / CHOPIN ROAD
NO. 3
Day & date : 24/01/2024
Time period: 06:00 - 09:00

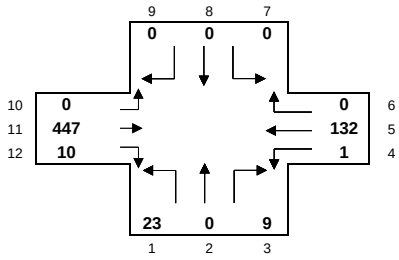
STARTING TIME	CHOPIN ROAD Northbound				GLENDORE ROAD Westbound				- Southbound				GLENDORE ROAD Eastbound				INTER-SECTION	
	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Total	Hour
6:00	1	0	0	1	0	7	0	7	0	0	0	0	0	5	0	5	13	
6:15	3	0	1	4	0	16	0	16	0	0	0	0	0	14	3	17	37	
6:30	7	0	0	7	0	15	0	15	0	0	0	0	0	25	1	26	48	
6:45	5	0	6	11	0	31	0	31	0	0	0	0	0	60	1	61	103	201
7:00	8	0	2	10	0	19	0	19	0	0	0	0	0	141	2	143	172	360
7:15	5	0	0	5	1	24	0	25	0	0	0	0	0	86	2	88	118	441
7:30	2	0	0	2	0	40	0	40	0	0	0	0	0	99	4	103	145	538
7:45	2	0	0	2	0	21	0	21	0	0	0	0	0	43	0	43	66	501
8:00	2	0	2	4	1	12	0	13	0	0	0	0	0	29	1	30	47	376
8:15	1	0	3	4	1	19	0	20	0	0	0	0	0	23	0	23	47	305
8:30	3	0	1	4	0	15	0	15	0	0	0	0	0	27	3	30	49	209
8:45	4	0	0	4	0	15	0	15	0	0	0	0	0	24	2	26	45	188
Total	43	0	15	58	3	234	0	237	0	0	0	0	0	576	19	595	890	
Peak hour	20	0	8	28	1	114	0	115	0	0	0	0	0	386	9	395	538	
Peak 15 min				11				40				0				143	172	
PHF				0.64				0.72				#####				0.69	0.78	

AM PEAK HOUR 2024



CHOPIN ROAD

AM PEAK HOUR 2029



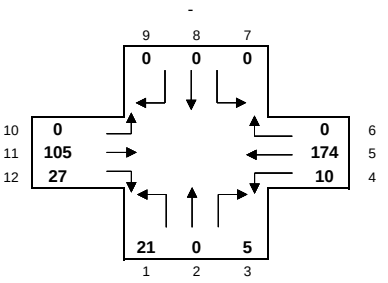
CHOPIN ROAD

N

Project : TIA : PROPOSED DEVELOPMENT IN THEESCOMBE
Intersection : GLENDORE ROAD / CHOPIN ROAD
NO. 3
Day & date : 24/01/2024
Time period: 15:00 - 18:00

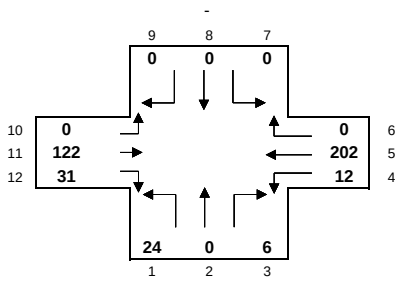
STARTING TIME	CHOPIN ROAD Northbound				GLENDORE ROAD Westbound				- Southbound				GLENDORE ROAD Eastbound				INTER-SECTION	
	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Total	Hour
15:00	5	0	2	7	1	20	0	21	0	0	0	0	0	29	9	38	66	
15:15	1	0	0	1	0	27	0	27	0	0	0	0	0	26	2	28	56	
15:30	2	0	0	2	2	38	0	40	0	0	0	0	0	22	3	25	67	
15:45	3	0	2	5	2	27	0	29	0	0	0	0	0	14	1	15	49	238
16:00	2	0	1	3	1	36	0	37	0	0	0	0	0	24	4	28	68	240
16:15	2	0	0	2	1	37	0	38	0	0	0	0	0	32	2	34	74	258
16:30	1	0	2	3	2	58	0	60	0	0	0	0	0	30	7	37	100	291
16:45	7	0	2	9	2	51	0	53	0	0	0	0	0	21	8	29	91	333
17:00	6	0	1	7	5	28	0	33	0	0	0	0	0	23	6	29	69	334
17:15	7	0	0	7	1	37	0	38	0	0	0	0	0	31	6	37	82	342
17:30	2	0	0	2	0	24	0	24	0	0	0	0	0	22	5	27	53	295
17:45	0	0	0	0	1	20	0	21	0	0	0	0	0	21	2	23	44	248
Total	38	0	10	48	18	403	0	421	0	0	0	0	0	295	55	350	819	
Peak hour	21	0	5	26	10	174	0	184	0	0	0	0	0	105	27	132	342	
Peak 15 min				9				60				0				37	100	
PHF				0.72				0.77				#####				0.89	0.86	

PM PEAK HOUR 2024



CHOPIN ROAD

PM PEAK HOUR 2029

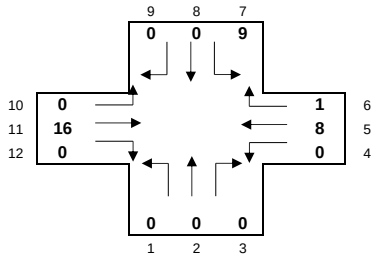


CHOPIN ROAD

Project : TIA : PROPOSED DEVELOPMENT IN THEESCOMBE
Intersection : BRAHMS ROAD / CHOPIN ROAD
NO. 4
Day & date : 24/01/2024
Time period: 06:00 - 09:00

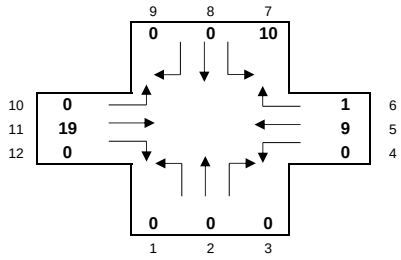
STARTING TIME	- Northbound				CHOPIN ROAD Westbound				BRAHMS ROAD Southbound				CHOPIN ROAD Eastbound				INTER-SECTION	
	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Total	Hour
6:00	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	
6:15	0	0	0	0	0	3	2	5	1	0	0	1	1	1	0	2	8	
6:30	0	0	0	0	0	2	1	3	1	0	3	4	0	2	0	2	9	
6:45	0	0	0	0	0	1	0	1	2	0	0	2	0	8	0	8	11	29
7:00	0	0	0	0	0	2	0	2	4	0	0	4	0	5	0	5	11	39
7:15	0	0	0	0	0	3	0	3	2	0	0	2	0	2	0	2	7	38
7:30	0	0	0	0	0	2	1	3	1	0	0	1	0	1	0	1	5	34
7:45	0	0	0	0	0	0	1	1	3	0	1	4	0	1	0	1	6	29
8:00	0	0	0	0	0	1	0	1	3	0	1	4	0	1	0	1	6	24
8:15	0	0	0	0	0	2	0	2	2	0	0	2	0	1	0	1	5	22
8:30	0	0	0	0	0	0	3	3	2	0	0	2	0	4	0	4	9	26
8:45	0	0	0	0	0	3	0	3	4	0	0	4	0	1	0	1	8	28
Total	0	0	0	0	0	19	8	27	26	0	5	31	1	27	0	28	86	
Peak hour	0	0	0	0	0	8	1	9	9	0	0	9	0	16	0	16	34	
Peak 15 min				0				3				4				8	11	
PHF				#DIV/0!				0.75				0.56				0.50	0.77	

AM PEAK HOUR
2024



-

AM PEAK HOUR
2029



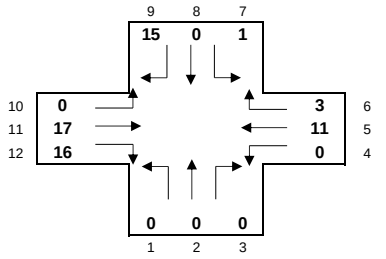
-

Project : TIA : PROPOSED DEVELOPMENT IN THEESCOMBE
Intersection : BRAHMS ROAD / CHOPIN ROAD
NO. 4
Day & date : 24/01/2024
Time period: 15:00 - 18:00

STARTING TIME	- Northbound				CHOPIN ROAD Westbound				BRAHMS ROAD Southbound				CHOPIN ROAD Eastbound				INTER-SECTION	
	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Total	Hour
15:00	0	0	0	0	0	3	0	3	0	0	3	3	0	4	7	11	17	
15:15	0	0	0	0	0	1	0	1	0	0	1	1	0	1	2	3	5	
15:30	0	0	0	0	0	22	8	30	6	0	8	14	0	2	8	10	54	
15:45	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	2	3	79
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	4	4	66
16:15	0	0	0	0	0	1	1	2	0	0	1	1	0	2	1	3	6	67
16:30	0	0	0	0	0	1	2	3	0	0	2	2	0	7	3	10	15	28
16:45	0	0	0	0	0	4	0	4	0	0	4	4	0	2	4	6	14	39
17:00	0	0	0	0	0	6	0	6	1	0	4	5	0	5	3	8	19	54
17:15	0	0	0	0	0	0	1	1	0	0	5	5	0	3	6	9	15	63
17:30	0	0	0	0	0	1	0	1	0	0	1	1	0	3	2	5	7	55
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3	44
Total	0	0	0	0	0	39	12	51	7	0	30	37	0	35	39	74	162	
Peak hour	0	0	0	0	0	11	3	14	1	0	15	16	0	17	16	33	63	
Peak 15 min				0				6				5				10	19	
PHF				#DIV/0!				0.58				0.80				0.83	0.83	

PM PEAK HOUR
2024

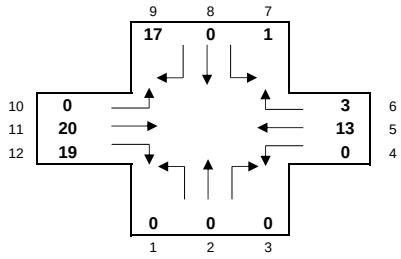
BRAHMS ROAD



-

PM PEAK HOUR
2029

BRAHMS ROAD



-

ANNEXURE C
SIDRA
OUTPUT
SHEETS 2024
Before
Development

MOVEMENT SUMMARY

Site: 03 [[01] 01 am nd (Site Folder: 2024 Before Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TIA for Proposed Residential Development on Erf 325, Theescombe - 2024 Before Development
Site Category: Base Year
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Blumberg Road															
5	T1	All MCs	4	0.0	4	0.0	0.015	0.1	LOS A	0.1	0.4	0.11	0.46	0.11	55.6
6	R2	All MCs	18	0.0	18	0.0	0.015	5.6	LOS A	0.1	0.4	0.11	0.46	0.11	53.2
Approach			22	0.0	22	0.0	0.015	4.5	NA	0.1	0.4	0.11	0.46	0.11	53.6
North: Merle Road															
7	L2	All MCs	51	0.0	51	0.0	0.052	5.6	LOS A	0.2	1.4	0.06	0.56	0.06	52.7
9	R2	All MCs	14	0.0	14	0.0	0.052	5.5	LOS A	0.2	1.4	0.06	0.56	0.06	52.5
Approach			64	0.0	64	0.0	0.052	5.6	NA	0.2	1.4	0.06	0.56	0.06	52.7
West: Blumberg Road															
10	L2	All MCs	13	0.0	13	0.0	0.013	5.5	LOS A	0.0	0.0	0.00	0.57	0.00	53.1
11	T1	All MCs	12	0.0	12	0.0	0.013	4.9	LOS A	0.0	0.0	0.00	0.57	0.00	53.1
Approach			24	0.0	24	0.0	0.013	5.2	NA	0.0	0.0	0.00	0.57	0.00	53.1
All Vehicles			111	0.0	111	0.0	0.052	5.3	NA	0.2	1.4	0.06	0.54	0.06	52.9

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

MOVEMENT SUMMARY

Site: 03 [[01] 01 pm nd (Site Folder: 2024 Before Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TIA for Proposed Residential Development on Erf 325, Theescombe - 2024 Before Development
Site Category: Base Year
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Blumberg Road															
5	T1	All MCs	5	0.0	5	0.0	0.016	0.1	LOS A	0.1	0.5	0.11	0.45	0.11	55.7
6	R2	All MCs	19	0.0	19	0.0	0.016	5.6	LOS A	0.1	0.5	0.11	0.45	0.11	53.3
Approach			24	0.0	24	0.0	0.016	4.4	NA	0.1	0.5	0.11	0.45	0.11	53.8
North: Merle Road															
7	L2	All MCs	16	0.0	16	0.0	0.026	5.6	LOS A	0.1	0.7	0.05	0.57	0.05	52.8
9	R2	All MCs	18	0.0	18	0.0	0.026	5.5	LOS A	0.1	0.7	0.05	0.57	0.05	52.5
Approach			34	0.0	34	0.0	0.026	5.5	NA	0.1	0.7	0.05	0.57	0.05	52.6
West: Blumberg Road															
10	L2	All MCs	14	0.0	14	0.0	0.011	5.5	LOS A	0.0	0.0	0.00	0.57	0.00	53.0
11	T1	All MCs	6	0.0	6	0.0	0.011	4.9	LOS A	0.0	0.0	0.00	0.57	0.00	53.0
Approach			20	0.0	20	0.0	0.011	5.3	NA	0.0	0.0	0.00	0.57	0.00	53.0
All Vehicles			78	0.0	78	0.0	0.026	5.1	NA	0.1	0.7	0.05	0.53	0.05	53.1

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

MOVEMENT SUMMARY

Site: 01v [[01] 02 am nd (Site Folder: 2024 Before Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TIA for Proposed Residential Development on Erf 325, Theescombe - 2024 Before Development
Site Category: Base Year
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Glendore Road															
1	L2	All MCs	20	0.0	20	0.0	0.073	3.7	LOS A	0.1	0.5	0.07	0.13	0.07	38.6
2	T1	All MCs	108	0.0	108	0.0	0.073	0.1	LOS A	0.1	0.5	0.07	0.13	0.07	39.6
3	R2	All MCs	7	0.0	7	0.0	0.073	4.6	LOS A	0.1	0.5	0.07	0.13	0.07	39.0
Approach			136	0.0	136	0.0	0.073	0.9	NA	0.1	0.5	0.07	0.13	0.07	39.4
East: Rossini Road															
4	L2	All MCs	34	0.0	34	0.0	0.069	9.6	LOS A	0.3	1.9	0.46	0.88	0.46	50.2
5	T1	All MCs	3	0.0	3	0.0	0.069	10.8	LOS B	0.3	1.9	0.46	0.88	0.46	45.3
6	R2	All MCs	18	0.0	18	0.0	0.069	11.4	LOS B	0.3	1.9	0.46	0.88	0.46	50.0
Approach			55	0.0	55	0.0	0.069	10.2	LOS B	0.3	1.9	0.46	0.88	0.46	49.9
North: Glendore Road															
7	L2	All MCs	4	0.0	4	0.0	0.163	3.5	LOS A	0.1	0.5	0.02	0.02	0.02	39.4
8	T1	All MCs	302	0.0	302	0.0	0.163	0.0	LOS A	0.1	0.5	0.02	0.02	0.02	39.9
9	R2	All MCs	8	0.0	8	0.0	0.163	3.7	LOS A	0.1	0.5	0.02	0.02	0.02	38.9
Approach			315	0.0	315	0.0	0.163	0.2	NA	0.1	0.5	0.02	0.02	0.02	39.9
West: Michaelangelo Road															
10	L2	All MCs	15	0.0	15	0.0	0.119	8.4	LOS A	0.4	2.9	0.44	0.90	0.44	44.8
11	T1	All MCs	1	0.0	1	0.0	0.119	10.4	LOS B	0.4	2.9	0.44	0.90	0.44	44.8
12	R2	All MCs	62	0.0	62	0.0	0.119	11.2	LOS B	0.4	2.9	0.44	0.90	0.44	44.5
Approach			78	0.0	78	0.0	0.119	10.7	LOS B	0.4	2.9	0.44	0.90	0.44	44.5
All Vehicles			583	0.0	583	0.0	0.163	2.7	NA	0.4	2.9	0.13	0.25	0.13	41.0

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

MOVEMENT SUMMARY

Site: 01v [[01] 02 pm nd (Site Folder: 2024 Before Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TIA for Proposed Residential Development on Erf 325, Theescombe - 2024 Before Development
Site Category: Base Year
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Glendore Road															
1	L2	All MCs	21	0.0	21	0.0	0.102	3.5	LOS A	0.0	0.3	0.02	0.07	0.02	38.8
2	T1	All MCs	166	0.0	166	0.0	0.102	0.0	LOS A	0.0	0.3	0.02	0.07	0.02	39.8
3	R2	All MCs	5	0.0	5	0.0	0.102	3.8	LOS A	0.0	0.3	0.02	0.07	0.02	39.2
Approach			193	0.0	193	0.0	0.102	0.5	NA	0.0	0.3	0.02	0.07	0.02	39.7
East: Rossini Road															
4	L2	All MCs	3	0.0	3	0.0	0.023	8.6	LOS A	0.1	0.6	0.39	0.85	0.39	50.4
5	T1	All MCs	1	0.0	1	0.0	0.023	9.8	LOS A	0.1	0.6	0.39	0.85	0.39	45.6
6	R2	All MCs	13	0.0	13	0.0	0.023	10.0	LOS A	0.1	0.6	0.39	0.85	0.39	50.2
Approach			17	0.0	17	0.0	0.023	9.7	LOS A	0.1	0.6	0.39	0.85	0.39	50.0
North: Glendore Road															
7	L2	All MCs	37	0.0	37	0.0	0.092	3.5	LOS A	0.1	0.6	0.05	0.14	0.05	39.1
8	T1	All MCs	129	0.0	129	0.0	0.092	0.0	LOS A	0.1	0.6	0.05	0.14	0.05	39.5
9	R2	All MCs	8	0.0	8	0.0	0.092	4.1	LOS A	0.1	0.6	0.05	0.14	0.05	38.3
Approach			175	0.0	175	0.0	0.092	1.0	NA	0.1	0.6	0.05	0.14	0.05	39.4
West: Michaelangelo Road															
10	L2	All MCs	7	0.0	7	0.0	0.029	8.6	LOS A	0.1	0.7	0.35	0.87	0.35	46.0
11	T1	All MCs	3	0.0	3	0.0	0.029	9.5	LOS A	0.1	0.7	0.35	0.87	0.35	46.0
12	R2	All MCs	14	0.0	14	0.0	0.029	9.5	LOS A	0.1	0.7	0.35	0.87	0.35	45.7
Approach			24	0.0	24	0.0	0.029	9.2	LOS A	0.1	0.7	0.35	0.87	0.35	45.8
All Vehicles			408	0.0	408	0.0	0.102	1.6	NA	0.1	0.7	0.07	0.18	0.07	40.1

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

MOVEMENT SUMMARY

Site: 02 [[01] 03 pm nd (Site Folder: 2024 Before Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TIA for Proposed Residential Development on Erf 325, Theescombe - 2024 Before Development
Site Category: Base Year
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Glendore Road															
1	L2	All MCs	11	0.0	11	0.0	0.098	5.6	LOS A	0.0	0.0	0.00	0.03	0.00	57.2
2	T1	All MCs	183	0.0	183	0.0	0.098	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	59.7
Approach			194	0.0	194	0.0	0.098	0.3	NA	0.0	0.0	0.00	0.03	0.00	59.5
North: Glendore Road															
8	T1	All MCs	111	0.0	111	0.0	0.080	0.3	LOS A	0.2	1.5	0.16	0.19	0.16	58.3
9	R2	All MCs	28	0.0	28	0.0	0.080	6.3	LOS A	0.2	1.5	0.16	0.19	0.16	55.7
Approach			139	0.0	139	0.0	0.080	1.5	NA	0.2	1.5	0.16	0.19	0.16	57.7
West: Chopin Road															
10	L2	All MCs	22	0.0	22	0.0	0.032	8.9	LOS A	0.1	0.8	0.33	0.86	0.33	50.6
12	R2	All MCs	5	0.0	5	0.0	0.032	11.1	LOS B	0.1	0.8	0.33	0.86	0.33	50.4
Approach			27	0.0	27	0.0	0.032	9.3	LOS A	0.1	0.8	0.33	0.86	0.33	50.6
All Vehicles			360	0.0	360	0.0	0.098	1.5	NA	0.2	1.5	0.09	0.16	0.09	58.0

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

MOVEMENT SUMMARY

Site: 02 [[01] 03am nd (Site Folder: 2024 Before Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TIA for Proposed Residential Development on Erf 325, Theescombe - 2024 Before Development
Site Category: Base Year
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Glendore Road															
1	L2	All MCs	1	0.0	1	0.0	0.061	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	57.4
2	T1	All MCs	120	0.0	120	0.0	0.061	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.9
Approach			121	0.0	121	0.0	0.061	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.9
North: Glendore Road															
8	T1	All MCs	406	0.0	406	0.0	0.212	0.0	LOS A	0.1	0.6	0.02	0.02	0.02	59.8
9	R2	All MCs	9	0.0	9	0.0	0.212	5.6	LOS A	0.1	0.6	0.02	0.02	0.02	57.0
Approach			416	0.0	416	0.0	0.212	0.1	NA	0.1	0.6	0.02	0.02	0.02	59.7
West: Chopin Road															
10	L2	All MCs	21	0.0	21	0.0	0.043	8.6	LOS A	0.2	1.1	0.35	0.84	0.35	49.8
12	R2	All MCs	8	0.0	8	0.0	0.043	15.3	LOS C	0.2	1.1	0.35	0.84	0.35	49.6
Approach			29	0.0	29	0.0	0.043	10.5	LOS B	0.2	1.1	0.35	0.84	0.35	49.8
All Vehicles			566	0.0	566	0.0	0.212	0.7	NA	0.2	1.1	0.03	0.06	0.03	59.2

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

ANNEXURE D
SIDRA
OUTPUT
SHEETS 2024
After
Development

MOVEMENT SUMMARY

Site: 03 [[02] 01 am ad (Site Folder: 2024 After Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TIA for Proposed Residential Development on Erf 325, Theescombe -
2024 After Development
Site Category: Base Year
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Merle Road															
1	L2	All MCs	1	0.0	1	0.0	0.127	8.1	LOS A	0.6	3.9	0.20	0.94	0.20	51.2
2	T1	All MCs	92	0.0	92	0.0	0.127	8.1	LOS A	0.6	3.9	0.20	0.94	0.20	51.2
3	R2	All MCs	23	0.0	23	0.0	0.127	8.7	LOS A	0.6	3.9	0.20	0.94	0.20	51.0
Approach			116	0.0	116	0.0	0.127	8.2	LOS A	0.6	3.9	0.20	0.94	0.20	51.1
East: Blumberg Road															
4	L2	All MCs	8	0.0	8	0.0	0.019	5.6	LOS A	0.1	0.6	0.09	0.49	0.09	53.3
5	T1	All MCs	4	0.0	4	0.0	0.019	0.1	LOS A	0.1	0.6	0.09	0.49	0.09	55.4
6	R2	All MCs	18	0.0	18	0.0	0.019	5.5	LOS A	0.1	0.6	0.09	0.49	0.09	53.0
Approach			31	0.0	31	0.0	0.019	4.8	NA	0.1	0.6	0.09	0.49	0.09	53.4
North: Merle Road															
7	L2	All MCs	51	0.0	51	0.0	0.095	8.1	LOS A	0.4	2.7	0.11	0.95	0.11	51.1
8	T1	All MCs	33	0.0	33	0.0	0.095	8.1	LOS A	0.4	2.7	0.11	0.95	0.11	51.1
9	R2	All MCs	14	0.0	14	0.0	0.095	8.8	LOS A	0.4	2.7	0.11	0.95	0.11	50.9
Approach			97	0.0	97	0.0	0.095	8.2	LOS A	0.4	2.7	0.11	0.95	0.11	51.1
West: Blumberg Road															
10	L2	All MCs	13	0.0	13	0.0	0.013	5.5	LOS A	0.0	0.0	0.00	0.57	0.00	53.1
11	T1	All MCs	12	0.0	12	0.0	0.013	4.9	LOS A	0.0	0.0	0.00	0.57	0.00	53.1
12	R2	All MCs	1	0.0	1	0.0	0.013	5.5	LOS A	0.0	0.0	0.00	0.57	0.00	52.8
Approach			25	0.0	25	0.0	0.013	5.2	NA	0.0	0.0	0.00	0.57	0.00	53.1
All Vehicles			268	0.0	268	0.0	0.127	7.5	NA	0.6	3.9	0.14	0.86	0.14	51.5

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

MOVEMENT SUMMARY

Site: 03 [[02] 01 pm ad (Site Folder: 2024 After Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TIA for Proposed Residential Development on Erf 325, Theescombe -
2024 After Development
Site Category: Base Year
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Merle Road															
1	L2	All MCs	1	0.0	1	0.0	0.056	8.1	LOS A	0.2	1.6	0.19	0.94	0.19	51.2
2	T1	All MCs	40	0.0	40	0.0	0.056	8.1	LOS A	0.2	1.6	0.19	0.94	0.19	51.2
3	R2	All MCs	9	0.0	9	0.0	0.056	8.8	LOS A	0.2	1.6	0.19	0.94	0.19	50.9
Approach			51	0.0	51	0.0	0.056	8.2	LOS A	0.2	1.6	0.19	0.94	0.19	51.1
East: Blumberg Road															
4	L2	All MCs	21	0.0	21	0.0	0.027	5.6	LOS A	0.1	0.7	0.07	0.50	0.07	53.2
5	T1	All MCs	5	0.0	5	0.0	0.027	0.0	LOS A	0.1	0.7	0.07	0.50	0.07	55.3
6	R2	All MCs	19	0.0	19	0.0	0.027	5.5	LOS A	0.1	0.7	0.07	0.50	0.07	52.9
Approach			45	0.0	45	0.0	0.027	4.9	NA	0.1	0.7	0.07	0.50	0.07	53.3
North: Merle Road															
7	L2	All MCs	16	0.0	16	0.0	0.124	8.1	LOS A	0.5	3.8	0.16	0.95	0.16	51.2
8	T1	All MCs	84	0.0	84	0.0	0.124	8.2	LOS A	0.5	3.8	0.16	0.95	0.16	51.2
9	R2	All MCs	18	0.0	18	0.0	0.124	8.2	LOS A	0.5	3.8	0.16	0.95	0.16	50.9
Approach			118	0.0	118	0.0	0.124	8.2	LOS A	0.5	3.8	0.16	0.95	0.16	51.1
West: Blumberg Road															
10	L2	All MCs	14	0.0	14	0.0	0.011	5.5	LOS A	0.0	0.0	0.00	0.57	0.00	53.0
11	T1	All MCs	6	0.0	6	0.0	0.011	4.9	LOS A	0.0	0.0	0.00	0.57	0.00	53.0
12	R2	All MCs	1	0.0	1	0.0	0.011	5.5	LOS A	0.0	0.0	0.00	0.57	0.00	52.8
Approach			21	0.0	21	0.0	0.011	5.3	NA	0.0	0.0	0.00	0.57	0.00	53.0
All Vehicles			235	0.0	235	0.0	0.124	7.3	NA	0.5	3.8	0.14	0.83	0.14	51.7

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

MOVEMENT SUMMARY

Site: 01v [[02] 02 am ad (Site Folder: 2024 After Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TIA for Proposed Residential Development on Erf 325, Theescombe - 2024 After Development
Site Category: Base Year
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Glendore Road															
1	L2	All MCs	20	0.0	20	0.0	0.105	3.8	LOS A	0.1	0.6	0.05	0.10	0.05	38.8
2	T1	All MCs	169	0.0	169	0.0	0.105	0.1	LOS A	0.1	0.6	0.05	0.10	0.05	39.7
3	R2	All MCs	7	0.0	7	0.0	0.105	4.7	LOS A	0.1	0.6	0.05	0.10	0.05	39.1
Approach			197	0.0	197	0.0	0.105	0.6	NA	0.1	0.6	0.05	0.10	0.05	39.6
East: Rossini Road															
4	L2	All MCs	34	0.0	34	0.0	0.076	9.7	LOS A	0.3	2.1	0.50	0.89	0.50	49.8
5	T1	All MCs	3	0.0	3	0.0	0.076	11.8	LOS B	0.3	2.1	0.50	0.89	0.50	44.8
6	R2	All MCs	18	0.0	18	0.0	0.076	12.8	LOS B	0.3	2.1	0.50	0.89	0.50	49.6
Approach			55	0.0	55	0.0	0.076	10.9	LOS B	0.3	2.1	0.50	0.89	0.50	49.5
North: Glendore Road															
7	L2	All MCs	4	0.0	4	0.0	0.180	4.0	LOS A	0.1	1.0	0.04	0.05	0.04	39.4
8	T1	All MCs	324	0.0	324	0.0	0.180	0.0	LOS A	0.1	1.0	0.04	0.05	0.04	39.8
9	R2	All MCs	17	0.0	17	0.0	0.180	4.2	LOS A	0.1	1.0	0.04	0.05	0.04	38.8
Approach			345	0.0	345	0.0	0.180	0.3	NA	0.1	1.0	0.04	0.05	0.04	39.8
West: Michaelangelo Road															
10	L2	All MCs	38	0.0	38	0.0	0.153	8.7	LOS A	0.6	3.9	0.47	0.89	0.47	44.5
11	T1	All MCs	1	0.0	1	0.0	0.153	11.3	LOS B	0.6	3.9	0.47	0.89	0.47	44.5
12	R2	All MCs	62	0.0	62	0.0	0.153	12.4	LOS B	0.6	3.9	0.47	0.89	0.47	44.3
Approach			101	0.0	101	0.0	0.153	11.0	LOS B	0.6	3.9	0.47	0.89	0.47	44.4
All Vehicles			698	0.0	698	0.0	0.180	2.8	NA	0.6	3.9	0.14	0.25	0.14	40.8

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

MOVEMENT SUMMARY

Site: 01v [[02] 02 pm ad (Site Folder: 2024 After Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TIA for Proposed Residential Development on Erf 325, Theescombe - 2024 After Development
Site Category: Base Year
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Glendore Road															
1	L2	All MCs	21	0.0	21	0.0	0.116	3.5	LOS A	0.1	0.4	0.03	0.07	0.03	38.9
2	T1	All MCs	194	0.0	194	0.0	0.116	0.0	LOS A	0.1	0.4	0.03	0.07	0.03	39.8
3	R2	All MCs	5	0.0	5	0.0	0.116	4.0	LOS A	0.1	0.4	0.03	0.07	0.03	39.2
Approach			220	0.0	220	0.0	0.116	0.5	NA	0.1	0.4	0.03	0.07	0.03	39.7
East: Rossini Road															
4	L2	All MCs	3	0.0	3	0.0	0.026	8.8	LOS A	0.1	0.7	0.47	0.87	0.47	49.8
5	T1	All MCs	1	0.0	1	0.0	0.026	10.6	LOS B	0.1	0.7	0.47	0.87	0.47	44.8
6	R2	All MCs	13	0.0	13	0.0	0.026	11.2	LOS B	0.1	0.7	0.47	0.87	0.47	49.6
Approach			17	0.0	17	0.0	0.026	10.7	LOS B	0.1	0.7	0.47	0.87	0.47	49.4
North: Glendore Road															
7	L2	All MCs	37	0.0	37	0.0	0.136	3.8	LOS A	0.3	1.9	0.12	0.18	0.12	39.0
8	T1	All MCs	186	0.0	186	0.0	0.136	0.1	LOS A	0.3	1.9	0.12	0.18	0.12	39.4
9	R2	All MCs	29	0.0	29	0.0	0.136	4.3	LOS A	0.3	1.9	0.12	0.18	0.12	38.1
Approach			253	0.0	253	0.0	0.136	1.2	NA	0.3	1.9	0.12	0.18	0.12	39.2
West: Michaelangelo Road															
10	L2	All MCs	17	0.0	17	0.0	0.041	8.8	LOS A	0.1	1.0	0.38	0.87	0.38	45.7
11	T1	All MCs	3	0.0	3	0.0	0.041	10.3	LOS B	0.1	1.0	0.38	0.87	0.38	45.7
12	R2	All MCs	14	0.0	14	0.0	0.041	10.4	LOS B	0.1	1.0	0.38	0.87	0.38	45.4
Approach			34	0.0	34	0.0	0.041	9.6	LOS A	0.1	1.0	0.38	0.87	0.38	45.6
All Vehicles			523	0.0	523	0.0	0.136	1.7	NA	0.3	1.9	0.11	0.20	0.11	40.0

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

MOVEMENT SUMMARY

Site: 02 [[02] 03 am ad (Site Folder: 2024 After Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TIA for Proposed Residential Development on Erf 325, Theescombe -
2024 After Development
Site Category: Base Year
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Glendore Road															
1	L2	All MCs	6	0.0	6	0.0	0.064	5.6	LOS A	0.0	0.0	0.00	0.03	0.00	57.2
2	T1	All MCs	120	0.0	120	0.0	0.064	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	59.7
Approach			126	0.0	126	0.0	0.064	0.3	NA	0.0	0.0	0.00	0.03	0.00	59.6
North: Glendore Road															
8	T1	All MCs	406	0.0	406	0.0	0.230	0.1	LOS A	0.3	1.9	0.05	0.06	0.05	59.4
9	R2	All MCs	32	0.0	32	0.0	0.230	6.1	LOS A	0.3	1.9	0.05	0.06	0.05	56.7
Approach			438	0.0	438	0.0	0.230	0.5	NA	0.3	1.9	0.05	0.06	0.05	59.2
West: Chopin Road															
10	L2	All MCs	82	0.0	82	0.0	0.145	8.6	LOS A	0.6	3.9	0.36	0.86	0.36	49.8
12	R2	All MCs	23	0.0	23	0.0	0.145	17.1	LOS C	0.6	3.9	0.36	0.86	0.36	49.6
Approach			105	0.0	105	0.0	0.145	10.5	LOS B	0.6	3.9	0.36	0.86	0.36	49.8
All Vehicles			669	0.0	669	0.0	0.230	2.0	NA	0.6	3.9	0.09	0.18	0.09	57.5

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

MOVEMENT SUMMARY

Site: 02 [[02] 03 pm ad (Site Folder: 2024 After Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TIA for Proposed Residential Development on Erf 325, Theescombe -
2024 After Development
Site Category: Base Year
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Glendore Road															
1	L2	All MCs	24	0.0	24	0.0	0.105	5.6	LOS A	0.0	0.0	0.00	0.07	0.00	56.9
2	T1	All MCs	183	0.0	183	0.0	0.105	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	59.3
Approach			207	0.0	207	0.0	0.105	0.7	NA	0.0	0.0	0.00	0.07	0.00	59.0
North: Glendore Road															
8	T1	All MCs	111	0.0	111	0.0	0.129	0.6	LOS A	0.6	4.0	0.29	0.36	0.29	56.7
9	R2	All MCs	85	0.0	85	0.0	0.129	6.4	LOS A	0.6	4.0	0.29	0.36	0.29	54.2
Approach			196	0.0	196	0.0	0.129	3.1	NA	0.6	4.0	0.29	0.36	0.29	55.6
West: Chopin Road															
10	L2	All MCs	49	0.0	49	0.0	0.074	9.0	LOS A	0.3	1.9	0.36	0.87	0.36	50.4
12	R2	All MCs	12	0.0	12	0.0	0.074	12.3	LOS B	0.3	1.9	0.36	0.87	0.36	50.2
Approach			61	0.0	61	0.0	0.074	9.6	LOS A	0.3	1.9	0.36	0.87	0.36	50.4
All Vehicles			464	0.0	464	0.0	0.129	2.9	NA	0.6	4.0	0.17	0.30	0.17	56.3

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

ANNEXURE E
SIDRA
OUTPUT
SHEETS 2029
After
Development

MOVEMENT SUMMARY

Site: 03 [[03] 01 am ad (Site Folder: 2029 After Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TIA for Proposed Residential Development on Erf 325, Theescombe -
2029 After Development
Site Category: Base Year
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Merle Road															
1	L2	All MCs	1	0.0	1	0.0	0.128	8.1	LOS A	0.6	4.0	0.20	0.94	0.20	51.2
2	T1	All MCs	92	0.0	92	0.0	0.128	8.1	LOS A	0.6	4.0	0.20	0.94	0.20	51.2
3	R2	All MCs	23	0.0	23	0.0	0.128	8.8	LOS A	0.6	4.0	0.20	0.94	0.20	50.9
Approach			116	0.0	116	0.0	0.128	8.3	LOS A	0.6	4.0	0.20	0.94	0.20	51.1
East: Blumberg Road															
4	L2	All MCs	8	0.0	8	0.0	0.021	5.6	LOS A	0.1	0.6	0.09	0.49	0.09	53.2
5	T1	All MCs	4	0.0	4	0.0	0.021	0.1	LOS A	0.1	0.6	0.09	0.49	0.09	55.3
6	R2	All MCs	20	0.0	20	0.0	0.021	5.5	LOS A	0.1	0.6	0.09	0.49	0.09	53.0
Approach			33	0.0	33	0.0	0.021	4.9	NA	0.1	0.6	0.09	0.49	0.09	53.3
North: Merle Road															
7	L2	All MCs	56	0.0	56	0.0	0.101	8.1	LOS A	0.4	2.9	0.12	0.94	0.12	51.1
8	T1	All MCs	33	0.0	33	0.0	0.101	8.1	LOS A	0.4	2.9	0.12	0.94	0.12	51.1
9	R2	All MCs	15	0.0	15	0.0	0.101	8.8	LOS A	0.4	2.9	0.12	0.94	0.12	50.8
Approach			103	0.0	103	0.0	0.101	8.2	LOS A	0.4	2.9	0.12	0.94	0.12	51.1
West: Blumberg Road															
10	L2	All MCs	14	0.0	14	0.0	0.014	5.5	LOS A	0.0	0.0	0.00	0.57	0.00	53.1
11	T1	All MCs	12	0.0	12	0.0	0.014	4.9	LOS A	0.0	0.0	0.00	0.57	0.00	53.1
12	R2	All MCs	1	0.0	1	0.0	0.014	5.5	LOS A	0.0	0.0	0.00	0.57	0.00	52.8
Approach			26	0.0	26	0.0	0.014	5.3	NA	0.0	0.0	0.00	0.57	0.00	53.1
All Vehicles			278	0.0	278	0.0	0.128	7.6	NA	0.6	4.0	0.14	0.86	0.14	51.5

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

MOVEMENT SUMMARY

Site: 03 [[03] 01 pm ad (Site Folder: 2029 After Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TIA for Proposed Residential Development on Erf 325, Theescombe -
2029 After Development
Site Category: Base Year
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Merle Road															
1	L2	All MCs	1	0.0	1	0.0	0.056	8.1	LOS A	0.2	1.6	0.20	0.94	0.20	51.2
2	T1	All MCs	40	0.0	40	0.0	0.056	8.1	LOS A	0.2	1.6	0.20	0.94	0.20	51.2
3	R2	All MCs	9	0.0	9	0.0	0.056	8.9	LOS A	0.2	1.6	0.20	0.94	0.20	50.9
Approach			51	0.0	51	0.0	0.056	8.3	LOS A	0.2	1.6	0.20	0.94	0.20	51.1
East: Blumberg Road															
4	L2	All MCs	21	0.0	21	0.0	0.030	5.6	LOS A	0.1	0.8	0.07	0.49	0.07	53.2
5	T1	All MCs	6	0.0	6	0.0	0.030	0.1	LOS A	0.1	0.8	0.07	0.49	0.07	55.4
6	R2	All MCs	21	0.0	21	0.0	0.030	5.5	LOS A	0.1	0.8	0.07	0.49	0.07	53.0
Approach			48	0.0	48	0.0	0.030	4.8	NA	0.1	0.8	0.07	0.49	0.07	53.4
North: Merle Road															
7	L2	All MCs	18	0.0	18	0.0	0.129	8.1	LOS A	0.6	4.0	0.17	0.95	0.17	51.2
8	T1	All MCs	84	0.0	84	0.0	0.129	8.2	LOS A	0.6	4.0	0.17	0.95	0.17	51.2
9	R2	All MCs	20	0.0	20	0.0	0.129	8.3	LOS A	0.6	4.0	0.17	0.95	0.17	50.9
Approach			122	0.0	122	0.0	0.129	8.2	LOS A	0.6	4.0	0.17	0.95	0.17	51.1
West: Blumberg Road															
10	L2	All MCs	15	0.0	15	0.0	0.012	5.5	LOS A	0.0	0.0	0.00	0.57	0.00	53.0
11	T1	All MCs	7	0.0	7	0.0	0.012	4.9	LOS A	0.0	0.0	0.00	0.57	0.00	53.0
12	R2	All MCs	1	0.0	1	0.0	0.012	5.5	LOS A	0.0	0.0	0.00	0.57	0.00	52.8
Approach			23	0.0	23	0.0	0.012	5.3	NA	0.0	0.0	0.00	0.57	0.00	53.0
All Vehicles			244	0.0	244	0.0	0.129	7.3	NA	0.6	4.0	0.14	0.82	0.14	51.7

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

MOVEMENT SUMMARY

Site: 01v [[03] 02 am ad (Site Folder: 2029 After Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TIA for Proposed Residential Development on Erf 325, Theescombe - 2029 After Development
Site Category: Base Year
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Glendore Road															
1	L2	All MCs	22	0.0	22	0.0	0.113	3.8	LOS A	0.1	0.7	0.06	0.10	0.06	38.7
2	T1	All MCs	181	0.0	181	0.0	0.113	0.1	LOS A	0.1	0.7	0.06	0.10	0.06	39.7
3	R2	All MCs	8	0.0	8	0.0	0.113	4.9	LOS A	0.1	0.7	0.06	0.10	0.06	39.1
Approach			212	0.0	212	0.0	0.113	0.7	NA	0.1	0.7	0.06	0.10	0.06	39.6
East: Rossini Road															
4	L2	All MCs	37	0.0	37	0.0	0.089	10.0	LOS A	0.3	2.4	0.53	0.91	0.53	49.5
5	T1	All MCs	3	0.0	3	0.0	0.089	12.4	LOS B	0.3	2.4	0.53	0.91	0.53	44.4
6	R2	All MCs	20	0.0	20	0.0	0.089	13.6	LOS B	0.3	2.4	0.53	0.91	0.53	49.3
Approach			60	0.0	60	0.0	0.089	11.3	LOS B	0.3	2.4	0.53	0.91	0.53	49.3
North: Glendore Road															
7	L2	All MCs	4	0.0	4	0.0	0.197	4.1	LOS A	0.2	1.1	0.04	0.05	0.04	39.4
8	T1	All MCs	356	0.0	356	0.0	0.197	0.1	LOS A	0.2	1.1	0.04	0.05	0.04	39.8
9	R2	All MCs	18	0.0	18	0.0	0.197	4.3	LOS A	0.2	1.1	0.04	0.05	0.04	38.8
Approach			378	0.0	378	0.0	0.197	0.3	NA	0.2	1.1	0.04	0.05	0.04	39.8
West: Michaelangelo Road															
10	L2	All MCs	39	0.0	39	0.0	0.177	8.8	LOS A	0.6	4.5	0.51	0.90	0.51	44.1
11	T1	All MCs	1	0.0	1	0.0	0.177	11.9	LOS B	0.6	4.5	0.51	0.90	0.51	44.1
12	R2	All MCs	68	0.0	68	0.0	0.177	13.2	LOS B	0.6	4.5	0.51	0.90	0.51	43.8
Approach			108	0.0	108	0.0	0.177	11.6	LOS B	0.6	4.5	0.51	0.90	0.51	43.9
All Vehicles			758	0.0	758	0.0	0.197	2.9	NA	0.6	4.5	0.15	0.26	0.15	40.8

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

MOVEMENT SUMMARY

Site: 01v [[03] 02 pm ad (Site Folder: 2029 After Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TIA for Proposed Residential Development on Erf 325, Theescombe - 2029 After Development
Site Category: Base Year
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Glendore Road															
1	L2	All MCs	23	0.0	23	0.0	0.127	3.6	LOS A	0.1	0.5	0.03	0.07	0.03	38.9
2	T1	All MCs	211	0.0	211	0.0	0.127	0.0	LOS A	0.1	0.5	0.03	0.07	0.03	39.8
3	R2	All MCs	6	0.0	6	0.0	0.127	4.2	LOS A	0.1	0.5	0.03	0.07	0.03	39.2
Approach			240	0.0	240	0.0	0.127	0.5	NA	0.1	0.5	0.03	0.07	0.03	39.7
East: Rossini Road															
4	L2	All MCs	3	0.0	3	0.0	0.030	8.9	LOS A	0.1	0.7	0.49	0.88	0.49	49.6
5	T1	All MCs	1	0.0	1	0.0	0.030	11.0	LOS B	0.1	0.7	0.49	0.88	0.49	44.5
6	R2	All MCs	14	0.0	14	0.0	0.030	11.6	LOS B	0.1	0.7	0.49	0.88	0.49	49.4
Approach			18	0.0	18	0.0	0.030	11.1	LOS B	0.1	0.7	0.49	0.88	0.49	49.2
North: Glendore Road															
7	L2	All MCs	41	0.0	41	0.0	0.146	3.8	LOS A	0.3	2.0	0.12	0.18	0.12	39.0
8	T1	All MCs	200	0.0	200	0.0	0.146	0.2	LOS A	0.3	2.0	0.12	0.18	0.12	39.4
9	R2	All MCs	31	0.0	31	0.0	0.146	4.4	LOS A	0.3	2.0	0.12	0.18	0.12	38.1
Approach			272	0.0	272	0.0	0.146	1.2	NA	0.3	2.0	0.12	0.18	0.12	39.2
West: Michaelangelo Road															
10	L2	All MCs	18	0.0	18	0.0	0.045	8.8	LOS A	0.2	1.1	0.40	0.87	0.40	45.6
11	T1	All MCs	3	0.0	3	0.0	0.045	10.6	LOS B	0.2	1.1	0.40	0.87	0.40	45.6
12	R2	All MCs	15	0.0	15	0.0	0.045	10.8	LOS B	0.2	1.1	0.40	0.87	0.40	45.3
Approach			36	0.0	36	0.0	0.045	9.8	LOS A	0.2	1.1	0.40	0.87	0.40	45.5
All Vehicles			565	0.0	565	0.0	0.146	1.7	NA	0.3	2.0	0.11	0.20	0.11	39.9

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

MOVEMENT SUMMARY

Site: 02 [[03] 03 am ad (Site Folder: 2029 After Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TIA for Proposed Residential Development on Erf 325, Theescombe -
2029 After Development
Site Category: Base Year
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Glendore Road															
1	L2	All MCs	6	0.0	6	0.0	0.070	5.6	LOS A	0.0	0.0	0.00	0.03	0.00	57.2
2	T1	All MCs	133	0.0	133	0.0	0.070	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	59.7
Approach			139	0.0	139	0.0	0.070	0.3	NA	0.0	0.0	0.00	0.03	0.00	59.6
North: Glendore Road															
8	T1	All MCs	448	0.0	448	0.0	0.252	0.1	LOS A	0.3	2.1	0.05	0.06	0.05	59.4
9	R2	All MCs	33	0.0	33	0.0	0.252	6.1	LOS A	0.3	2.1	0.05	0.06	0.05	56.7
Approach			481	0.0	481	0.0	0.252	0.5	NA	0.3	2.1	0.05	0.06	0.05	59.2
West: Chopin Road															
10	L2	All MCs	84	0.0	84	0.0	0.160	8.7	LOS A	0.6	4.3	0.39	0.85	0.39	49.5
12	R2	All MCs	24	0.0	24	0.0	0.160	19.1	LOS C	0.6	4.3	0.39	0.85	0.39	49.3
Approach			108	0.0	108	0.0	0.160	11.0	LOS B	0.6	4.3	0.39	0.85	0.39	49.5
All Vehicles			728	0.0	728	0.0	0.252	2.0	NA	0.6	4.3	0.09	0.17	0.09	57.6

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

MOVEMENT SUMMARY

Site: 02 [[03] 03 pm ad (Site Folder: 2029 After Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TIA for Proposed Residential Development on Erf 325, Theescombe -
2029 After Development
Site Category: Base Year
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Glendore Road															
1	L2	All MCs	25	0.0	25	0.0	0.115	5.6	LOS A	0.0	0.0	0.00	0.07	0.00	56.9
2	T1	All MCs	202	0.0	202	0.0	0.115	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	59.3
Approach			227	0.0	227	0.0	0.115	0.6	NA	0.0	0.0	0.00	0.07	0.00	59.1
North: Glendore Road															
8	T1	All MCs	122	0.0	122	0.0	0.140	0.7	LOS A	0.6	4.3	0.30	0.36	0.30	56.7
9	R2	All MCs	88	0.0	88	0.0	0.140	6.5	LOS A	0.6	4.3	0.30	0.36	0.30	54.2
Approach			211	0.0	211	0.0	0.140	3.1	NA	0.6	4.3	0.30	0.36	0.30	55.6
West: Chopin Road															
10	L2	All MCs	52	0.0	52	0.0	0.081	9.1	LOS A	0.3	2.1	0.38	0.88	0.38	50.3
12	R2	All MCs	13	0.0	13	0.0	0.081	12.9	LOS B	0.3	2.1	0.38	0.88	0.38	50.1
Approach			64	0.0	64	0.0	0.081	9.9	LOS A	0.3	2.1	0.38	0.88	0.38	50.3
All Vehicles			502	0.0	502	0.0	0.140	2.9	NA	0.6	4.3	0.17	0.29	0.17	56.3

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