Traffic Engineering & Transport Planning
STURGEON CONSULTING

Traffic Impact Assessment

for the

PROPOSED URBAN REVITALISATION PROJECT (PHASE 3 & 4) ON SEVERAL ERVEN, VREDENBURG, SALDANHA, WESTERN CAPE

Project No: STUR0416

June 2024
Final Report

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TITLE:
PROPOSED URBAN REVITALISATION PROJECT (PHASE 3 & 4) ON SEVERAL ERVEN, VREDENBURG, WESTERN CAPE: TRAFFIC IMPACT ASSESSMENT

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SYNOPSIS:
This report assesses the key transportation issues pertaining to the proposed urban revitalisation project (phase 3 & 4) which will consist of 209 erven allocated for Integrated Residential Development Programme (IRDP) units, 372 Finance Linked Individual Subsidy Programme (FLISP) housing units, 407 social housing units, a public primary school, a church, a crèche, offices, a taxi rank and retail space for businesses on several erven in Vredenburg, Western Cape.

SUMMARY SHEET

Report Type	Traffic Impact Assessment
Title	Proposed Urban Revitalisation Project (Phase 3 & 4), Several Erven
Location	Vredenburg, Western Cape
Client	CK Rumboll & Partners, Ms Zanelle Nortje
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Date	June 2024
Report Status	Final Report

This transport impact assessment has been prepared by a suitable qualified and registered professional traffic engineer. Details of any of the calculations on which the results of this report are based will be made available on request.

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Acronyms

AMG – Access Management Guidelines
TIA – Traffic Impact Assessment
TIS – Traffic Impact Statement
SDP – Site Development Plan
LOS – Level of Service
WCG – Western Cape Government
RNIS – Road Network Information System
FLISP - Finance Linked Individual Subsidy Programme
IRDP – Integrated Residential Development Programme
NMT – Non-Motorised Transport
PHF – Peak Hour Factor
AM – Morning
PM – Afternoon
d – Average delay in seconds
v/c – Volume/capacity ratio
vph – vehicles per hour
vpd – vehicles per day

Traffic Impact Assessment (TIA)

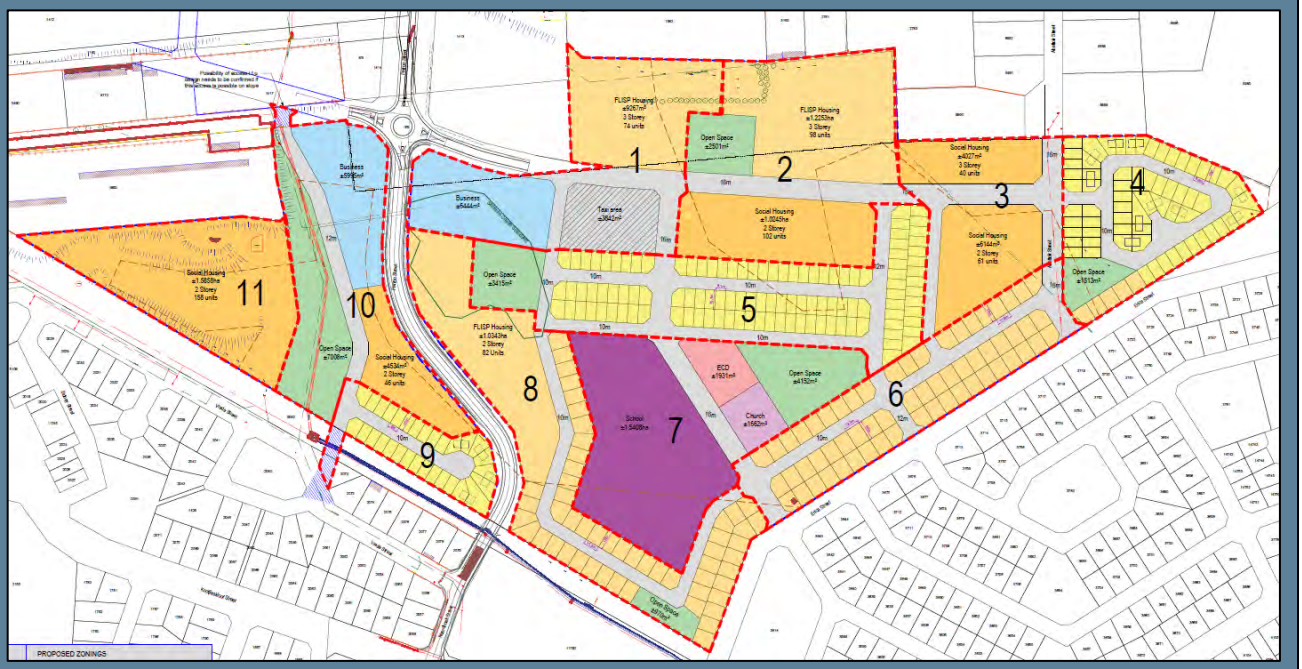
Proposed Urban Revitalisation Project (Phase 3 & 4) on several erven in Vredenburg, Western Cape

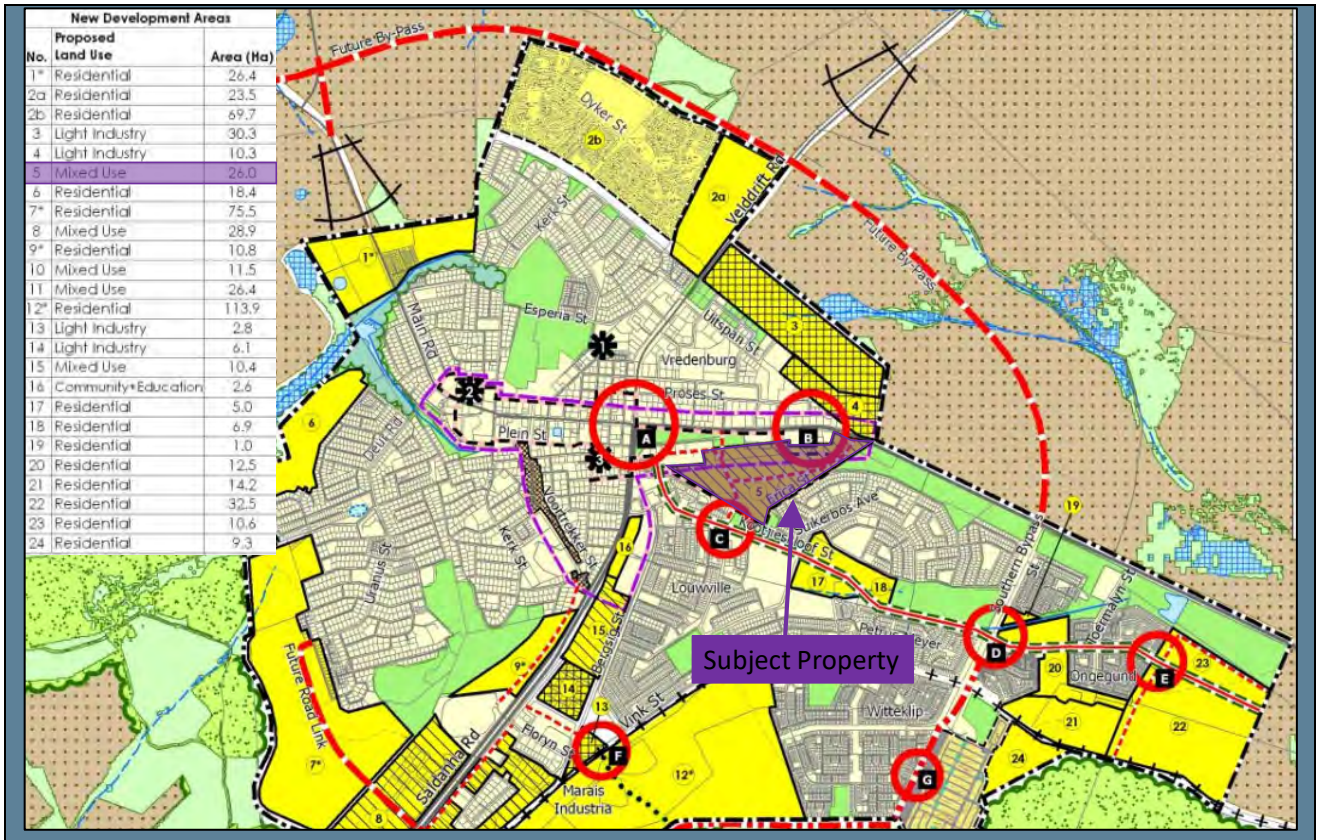
1. Purpose of Report	Sturgeon Consulting (Pty) Ltd was appointed by CK Rumboll & Partners to undertake the Traffic Impact Assessment for the proposed Urban Revitalisation Project (Phase 3 & 4) on several erven in Vredenburg. The proposed development will consist of 209 erven allocated for Integrated Residential Development Programme (IRDP) units, 372 Finance Linked Individual Subsidy Programme (FLISP) housing units, 407 social housing units, a public primary school, a church, a crèche, offices, a taxi rank and retail space for businesses. The proposed development will be divided into 11 sub-phases. The purpose of the report is to determine the expected transport related impacts of the proposed development on the surrounding road network. A TIA was submitted in July of 2017 by ITS. Due to changes in the Site Development Plan (SDP) and the time lapse between the previous submission, it was determined that an updated TIA be undertaken, which included updated traffic counts.
2. Locality *Reference: Figure 1*	The following erven in Vredenburg will be included: • Erf 16604 • Erf 16606 • Erf 16711 • Erf 16712 • Erf 16714 • Erf 1082 • Erf 1943 • Erf 3476 • Remainder of Erf 1003 **Description:** The subject property is located to the east of Vredenburg, east of Saldanha Road (Main Road 238 | R399) and south of Main Street (Main Road 21 | R45). The site is bordered by Main Street (Main Road 21 | R45) to the north and Erica Street to the southeast.

	An existing industrial area is located to the north of the site, residential/commercial area to the west and residential areas to the east and south. Refer to **Figure 1** in **Appendix A** for the Locality Plan.

3. Scope of Work	The scope of work included in this TIA covers the following traffic engineering aspects: • Site observations; • Existing traffic flows in the vicinity of the development; • Existing & future road network planning; • Trip generation for the proposed development; • Traffic flow analysis; • Recommended road upgrades if necessary; • Non-motorised Transport (NMT) and Public Transport; • Access assessment; and • Parking requirements.
4. Proposed Development *Reference: Figure 2*	The subject property is approximately 23ha in extent and is currently vacant. The proposed development will cover an area of approximately 21.3ha. According to the *Saldanha Bay Municipality Spatial Development Framework, May 2019* the location of the proposed development has been identified as land to be utilised for future mixed-use development. **The proposed development consists of a total of 209 erven allocated for IRDP units, 372 FLISP housing units, 407 social housing units, a**

	public primary school (approximately ±600 students), a church (approximately ±250 seats), a crèche (approximately ±150 students), offices (approximately ±3 180m² GLA), and retail space (approximately ±2 120m² GLA). Refer to **Figure 2** in **Appendix A** for the Site Development Plan.





5. Land Use/Zoning

The following existing zonings are applicable to the subject properties:

- Industrial Zone I
- Transport Zone II
- Transport Zone I
- Railway Purpose
- Public Open Space
- Government Purpose
- Light Industrial Zone I

The proposed development will require several different zonings to account for the mixed land-uses of the subject property. The following zonings are proposed:

Portions of Proposed Development	Proposed Zoning
Portion 1	Residential Zone III Business Zone I Transport Zone II
Portion 2	Residential Zone III Open Space Zone I Transport Zone II

	Portion 3	Residential Zone III Transport Zone II
	Portion 4	Residential Zone I Residential Zone II Open Space Zone I Transport Zone II
	Portion 5	Residential Zone II Open Space Zone I Transport Zone II
	Portion 6	Residential Zone I Transport Zone II
	Portion 7	Open Space Zone I Transport Zone II Institutional Zone I Institutional Zone II
	Portion 8	Residential Zone I Residential Zone III Open Space Zone I Transport Zone II
	Portion 9	Residential Zone II Transport Zone II
	Portion 10	Residential Zone III Business Zone I Open Space Zone I Transport Zone II
	Portion 11	Residential Zone III
6. Existing Access	Formal access to the subject property is currently only possible from Main Street, approximately 265m east of the Main Street / Abattoir Street intersection, from Abattoir Street and from Kootjieskloof Street via the industrial buildings. The locations of these existing formal accesses are indicated on the figure below in blue. The proposed accesses to the development will be further discussed in **Section 17**.	

7. Existing Roadways

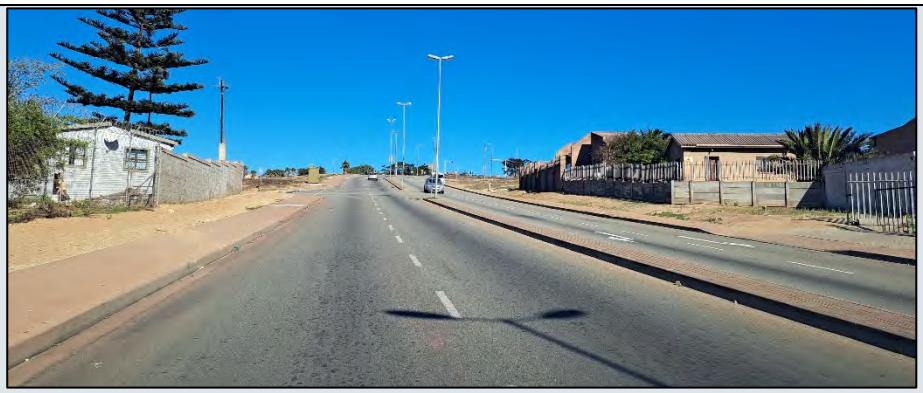
Main Street (Main Road 21 | R45): is an east-west four-lane undivided carriageway Class 2 major arterial with two lanes in each direction and an approximate width of ±12.20m east of the Main Street / Saldanha Road intersection. There are no shoulders along Main Street. Main Street has a posted speed limit of 60km/h in the vicinity of the site. Streetlights and paved sidewalks are present along both sides of the road.

Saldanha Road (Main Road 238 | R399): is a north-south four-lane divided carriageway Class 2 major arterial with two lanes in each direction and an approximate width of ±17.75m. There are no shoulders along Saldanha Road. Saldanha Road has no posted speed

limit in the vicinity of the site, it assumed to be 60km/h. Streetlights, paved sidewalks and embayed on-street parking are present along both sides of the road.

Velddrif Road (Main Road 21 | R399): is a north-south four-lane undivided carriageway Class 2 major arterial with two lanes in each direction and an approximate width of ±12.20m. There are no shoulders along Velddrif Road. Velddrif Road has a posted speed limit of 60km/h in the vicinity of the site. Streetlights and paved sidewalks are present along both sides of the road.

Hospital Street: is an east-west four-lane divided carriageway Class 3 minor arterial with two lanes per direction and an approximate width of ±17m east of the Saldanha Road / Hospital Street intersection. There are no shoulders along Hospital Street. Hospital Street has no posted speed limit in the vicinity of the site but is assumed to be 60km/h. Streetlights are present along the median and paved sidewalks are present along both sides of the road near the subject property.



Bester Street: is a Class 5 local street with one lane in each direction and an approximate width of ±6.80m. Bester Street has no posted speed limit or sidewalks in the vicinity of the site. Streetlights are present along the eastern side of the road.

Abattoir Street: is a Class 5 local street with one lane in each direction and an approximate width of ±7.20m. Abattoir Street has no posted speed limit. No sidewalks are present, but streetlights are present along the eastern side of the road.

Kootjieskloof Street: is an east-west single carriageway Class 3 minor arterial with one lane per direction and an approximate width of ±7.60m. There are no shoulders along Kootjieskloof Street.

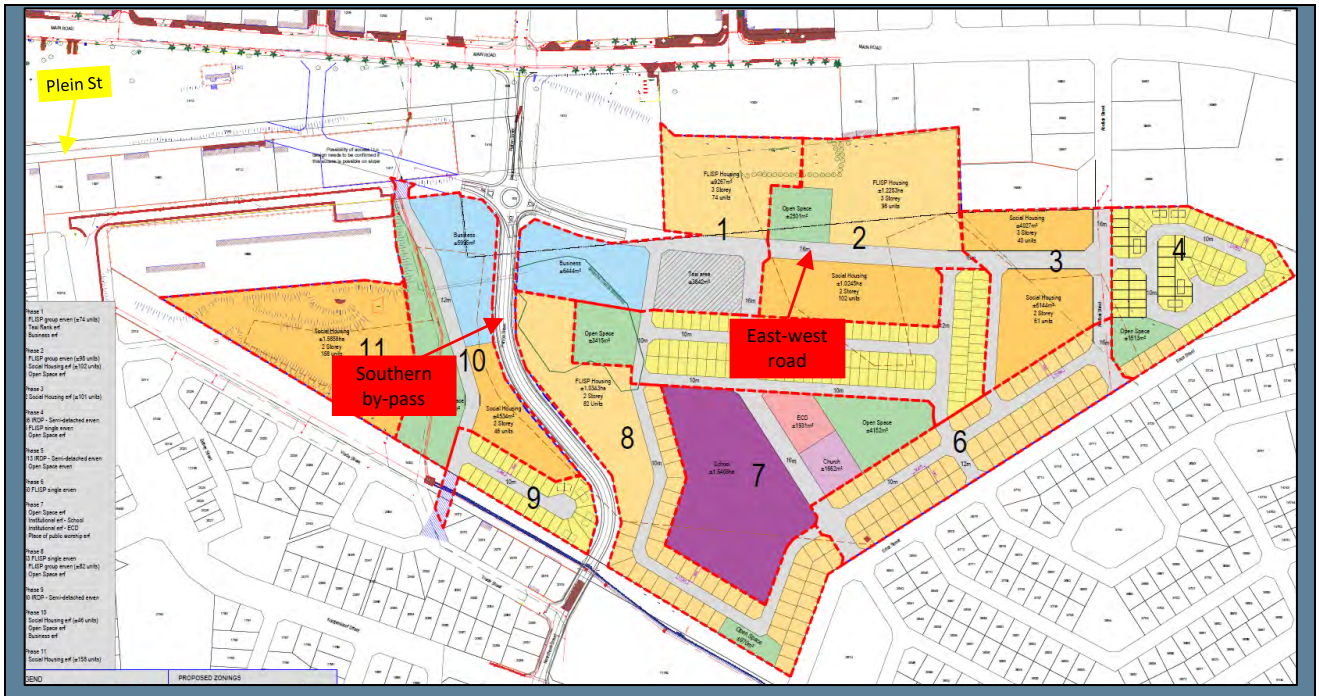
Kootjieskloof Street has no posted speed limit in the vicinity of the site but is assumed to be 60km/h. Streetlights are present along the southern side of the road and paved sidewalks are present ad-hoc along both sides.

6th Avenue: is a Class 4 collector street with one lane in each direction and an approximate width of ±6.40m. 6th Avenue has no posted speed limits in the vicinity of the site. Paved sidewalks are present ad-hoc along both sides of the road and streetlights are present along the eastern side of the road.

Erica Street: is a Class 4 collector street with one lane in each direction and an approximate width of ±6.40m. Erica Street has no posted speed limits in the vicinity of the site but is assumed to be 60km/h. No paved sidewalks are present, but streetlights are present along the southern side of the road.

	
8. Future Road Network	According to the *Saldanha Bay Municipality Spatial Development Framework, May 2019,* two service roads, a southern by-pass and an east-west road, are planned. Both of the planned future service roads will transverse the subject property and have been included in the design of the proposed development. Both of the service roads will be single carriageways with one lane per direction. The southern by-pass will link Main Street in the north with 6th Avenue in the south. The southern by-pass will form the southern approach at the Main Street / Bester Street intersection and join 6th Avenue north of the Kootjies Kloof / 6th Avenue intersection. The east-west road will link the proposed development in the east with Plein Street in the west. Plein Street is currently a gravel road and is the eastern approach at the Saldanha Road / Plein Street intersection, located approximately 130m south of the Main Street / Saldanha Road intersection. The east-west road will form the eastern and western approaches at the southern by-pass / east-west road intersection, which will be located approximately 125m south of the Main Street / Bester Street intersection. A roundabout will be utilised as the intersection control at the future southern by-pass / east-west road intersection. During the site visit it was observed that the construction of the southern by-pass and the east-west road has already begun. No other future road network changes are foreseen in the vicinity of the proposed development.


Proposals:
New Development Area (NDA) (Including Undeveloped Township) * - see EMF comments in Table 6.2.1
New Development Area - Mixed Use
New Development Area - Light Industr
Proposed Urban Edge
Development Node
Rapid Development Area
Main Street/Voortrekker/Long Precinct Plan
Restructuring Zone (SHRA 2017)
New Road
PT + NMT "Complete Street" Upgrading
Review Alignment + Timing Of Southern By-Pass Cutting Through Witteklip
Frontage/Service Roads - Direct Business Access
Walking / Cycling Trail
Remove Rail Line
CBA Corridor
River Corridor
Park + Cemetery Upgrade
High Density Redevelopment On Surrounding Vacant Land
Taxi Rank Upgrade
Gateway Impression - Give attention to building quality and landscaping
Long Term Growth Direction
Esperia St
Uitspan St
Vredenburg
Proses St
Plein St
Main Rd
Louwville
Witteklip
Nackerdien Ave
Petrus Meyer
Ongegund
Saldanha Rd
Marais Industria
Southern by-pass
East-west road
Subject Property



9. Scenarios Analysed	The following scenarios were analysed: • 2024 Present Traffic Demand • 2029 Background Traffic Demand (2029 traffic volumes escalated with a growth rate, as discussed in **Section 13**, including latent demand) • 2029 Total Traffic Demand (background traffic volumes including development trips) Intersection analyses were done using SIDRA Intersection 9.1 software.
10.Study Intersections	Based on our experience with similar traffic studies, the anticipated traffic impact on the surrounding road network and its location within the wider road network, the following intersections were included in the scope of the study: 1. Saldanha Road / Hospital Street (signalised) 2. Main Street / Saldanha Road / Velddrif Road (signalised) 3. Main Street / Bester Street (signalised) 4. Main Street / Abattoir Street (stop-controlled) 5. Hospital Street / Kootjieskloof Street (stop-controlled) 6. Kootjieskloof Street / 6th Avenue (All-way stop-controlled) 7. Kootjieskloof Street / Erica Street (stop-controlled)

11. Existing Operations

References: Figure 3 & 4, Table 1

Peak period traffic counts were conducted at the above-mentioned intersections on Wednesday 17 April 2024 between 06:00 and 09:00 (3 hours) in the morning and between 15:30 and 18:30 (3 hours) in the afternoon.

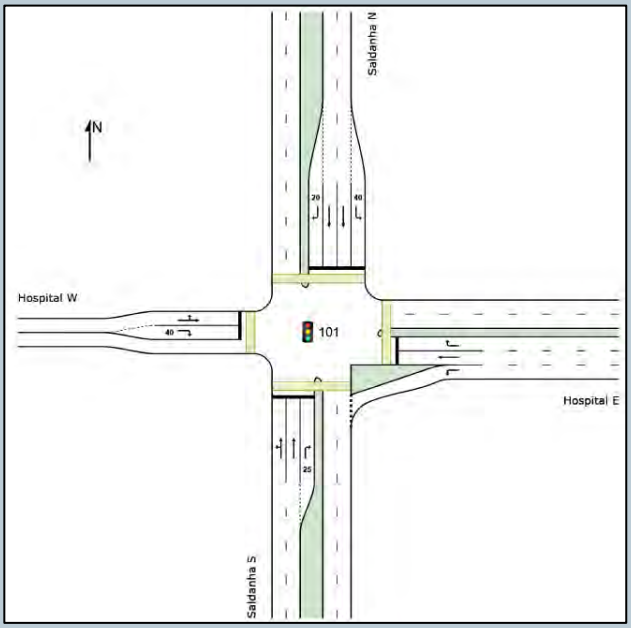
The peak hours are as follows:

- AM peak hour 07:15 – 08:15
- PM peak hour 16:30 – 17:30

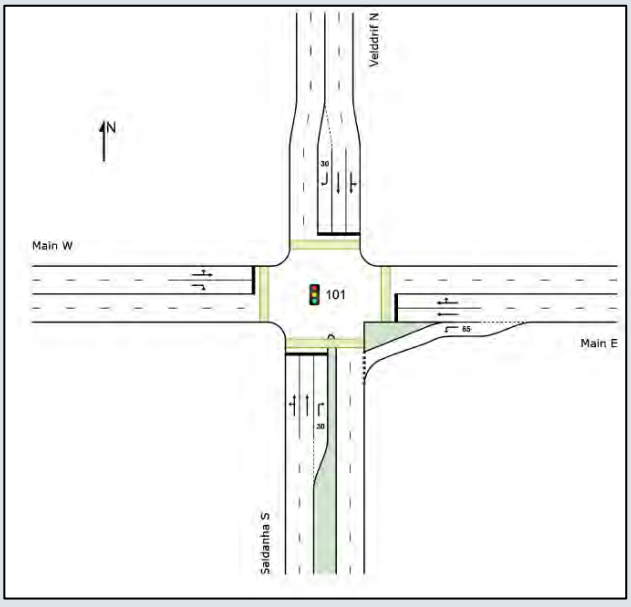
Refer to **Figure 3** and **Figure 4** for a summary of the existing traffic volumes at the study intersections.

The existing traffic operations at the study intersections were analysed using SIDRA Intersection 9.1 software. Optimal signal timings and assumed signal phasing were utilised for the capacity analyses of all signalised intersections.

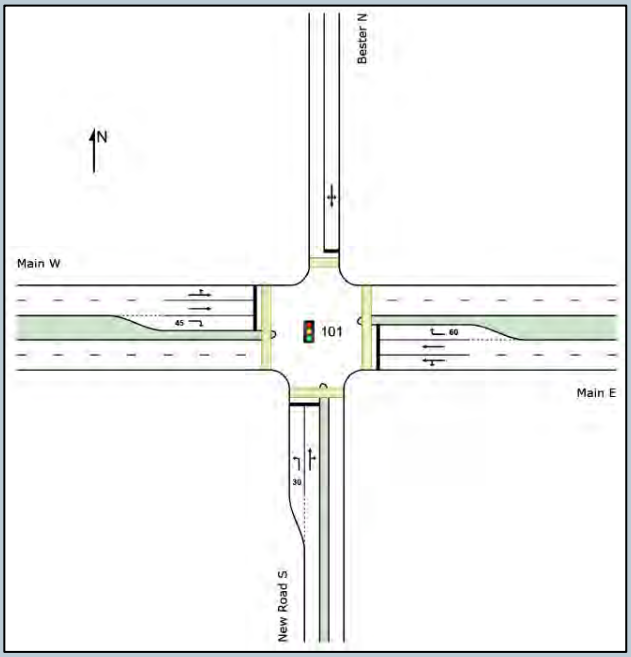
1. Saldanha Road / Hospital Street (Signalised)

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**AM Peak Hour:** Operates at acceptable Level of Service B. No capacity constraints along the critical southern approach (LOS B). **PM Peak Hour:** Operates at acceptable Level of Service B. No capacity constraints along the critical southern approach (LOS C).

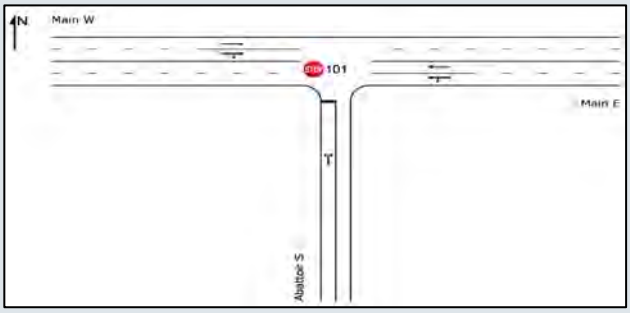
2. Main Street / Saldanha Road (Signalised)

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**AM Peak Hour:** Operates at acceptable Level of Service B. No capacity constraints along the critical southern approach (LOS C). **PM Peak Hour:** Operates at acceptable Level of Service C. No capacity constraints along the critical southern approach (LOS C).

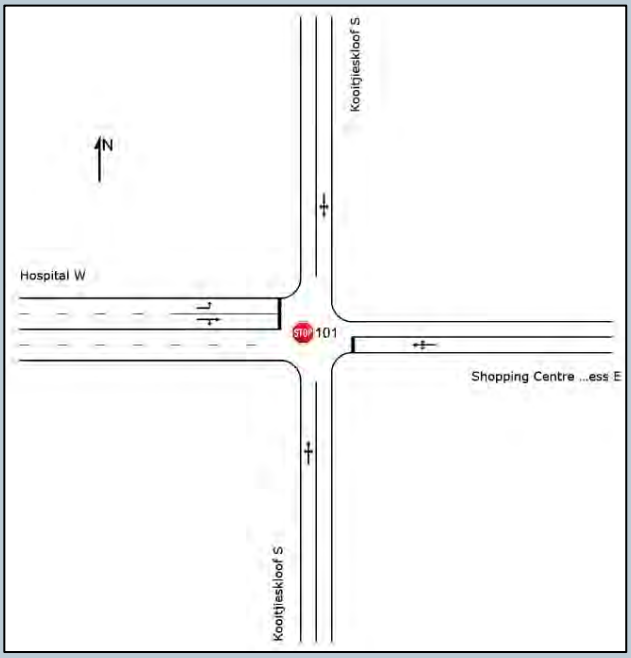
3. Main Street / Bester Street (Signalised)

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**AM Peak Hour:** Operates at acceptable Level of Service B. No capacity constraints along the critical northern approach (LOS C). **PM Peak Hour:** Operates at acceptable Level of Service B. No capacity constraints along the critical northern approach (LOS C).

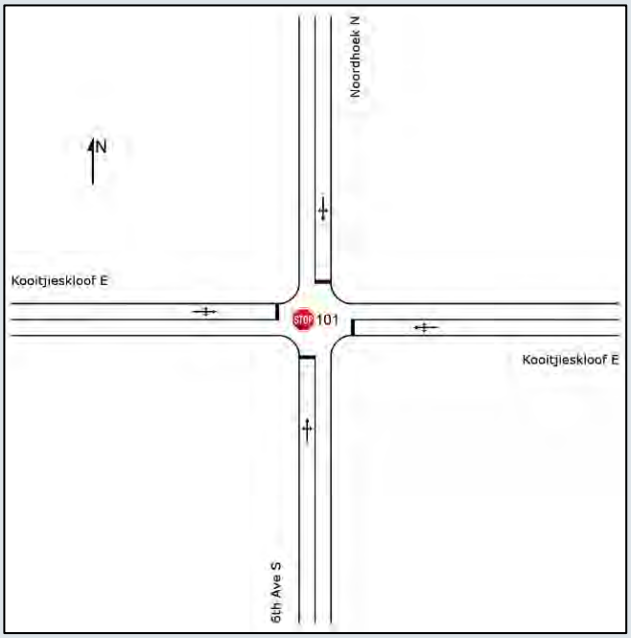
4. Main Street / Abattoir Street (Stop-controlled)

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**AM Peak Hour:** Operates at acceptable Level of Service. No capacity constraints along the critical southern approach (LOS B). **PM Peak Hour:** Operates at acceptable Level of Service. No capacity constraints along the critical southern approach (LOS B).

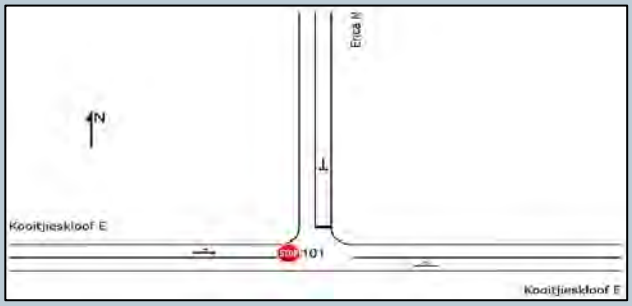
5. Hospital Street / Kootjieskloof Street (Stop-controlled)

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**AM Peak Hour:** Operates at acceptable Level of Service. No capacity constraints along the critical western approach (LOS A). **PM Peak Hour:** Operates at acceptable Level of Service. No capacity constraints along the critical western approach (LOS A).

6. Kootjieskloof Street / 6th Avenue (All-Way Stop-controlled)

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**AM Peak Hour:** Operates at acceptable Level of Service C. No capacity constraints along the critical southern approach (LOS D). **PM Peak Hour:** Operates at acceptable Level of Service B. No capacity constraints along the critical southern approach (LOS C).

7. Kootjieskloof Street / Erica Street (Stop-controlled)

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**AM Peak Hour:** Operates at acceptable Level of Service. No capacity constraints along the critical northern approach (LOS A). **PM Peak Hour:** Operates at acceptable Level of Service. No capacity constraints along the critical northern approach (LOS A).

No upgrades are required in these scenarios for any of the study intersections. See **Table 1** for the existing capacity analyses. Full details of the SIDRA analyses can be provided if required.

12. Approved Developments (Latent Rights)

The Witteklip housing development located on Portion 10 of Farm 132 has been approved in Vredenburg. The approved development includes 1 155 single residential erven, two churches (±560 seats), two creches (±280 children) and speciality retail (±1 604m² GLA).

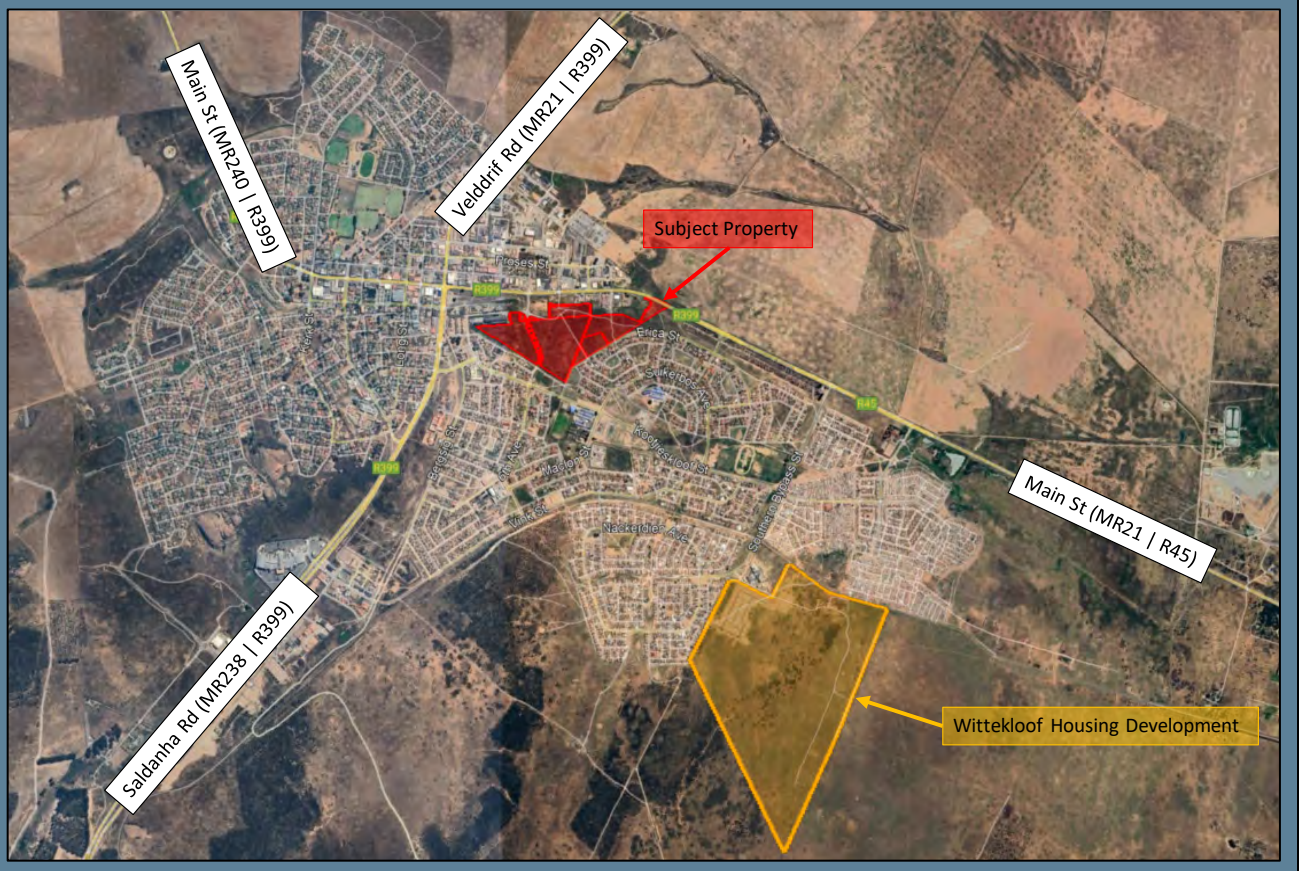
The Witteklip housing development is located to the southeast of the proposed development. The location of the Witteklip housing development is indicated on the figure below.

The expected trips that will be generated by the approved development during the AM and PM peak hours were included as the latent demand. This information was obtained from the *Traffic Impact Assessment for the Proposed Witteklip Housing Development (Portion 10 of Farm 132), Vredenburg, October 2017* undertaken by Sturgeon Consulting (Pty) Ltd. Trips from the Witteklip development were included in the background and total traffic operations in this report.

The Witteklip development is expected to generate the following peak hour trips:

Peak Hour	Inbound Trips	Outbound Trips	Total Trips
AM	120	294	414
PM	277	141	419

	There are no other known developments in the area that will have a significant impact on the existing and future traffic operations at such time.



13.2029 Background Traffic

References: Figure 5 & 6, Table 1

The 2024 counted traffic volumes were compared to the 2017 counted traffic volumes obtained from ITS and it was calculated that the total average growth rate in this area was approximately 3.0%. To determine the background 2029 traffic volumes, an average growth rate of **3.0% per annum** was used. This growth rate relates to traffic growth experienced in average growth rate areas and was deemed appropriate for this area.

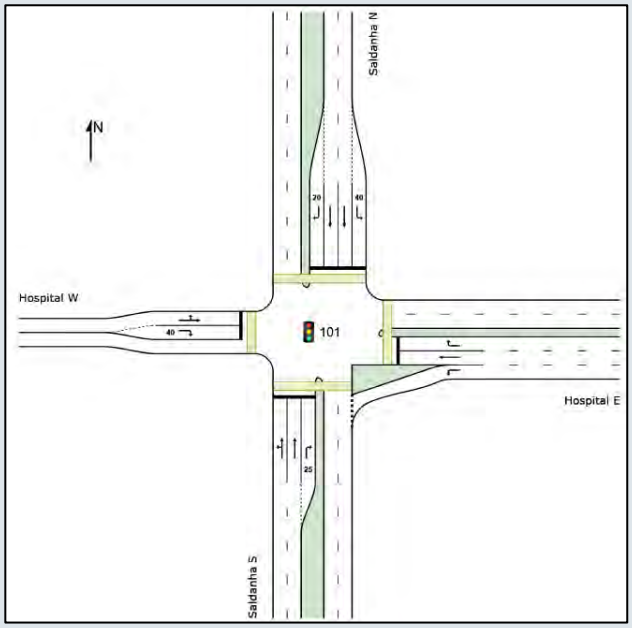
Development Area	Growth Rate
Low growth areas	0 – 3%
Average growth areas	3 – 4%
Above average growth areas	4 – 6%
Fast growing areas	6 – 8%

Exceptionally high growth areas	>8%
Source: City Council of Pretoria (1998)	

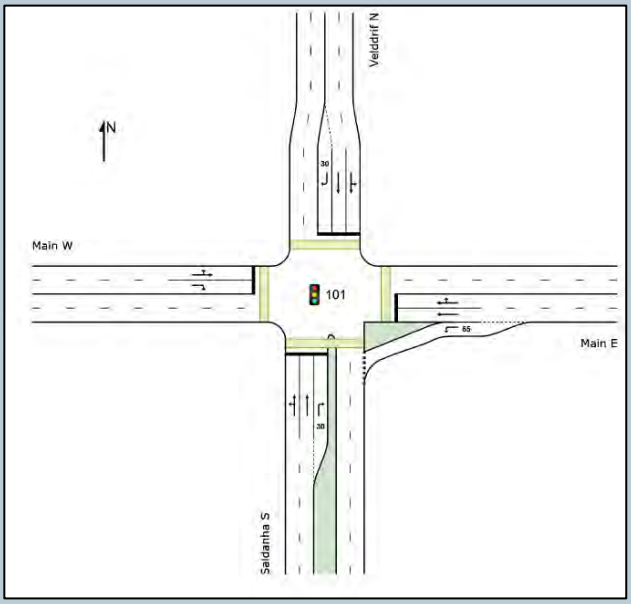
The estimated 2029 AM and PM peak hour background traffic volumes including latent demands are shown in **Figure 5** and **Figure 6**.

The background traffic operations at the study intersections were analysed using SIDRA Intersection 9.1 software. Optimal signal timings and assumed signal phasing were utilised for the capacity analyses of all signalised intersections.

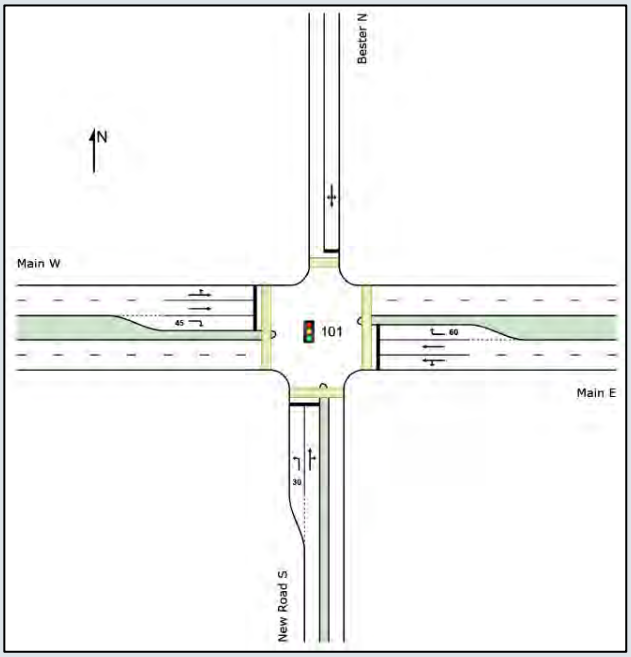
1. <u>Saldanha Road / Hospital Street (Signalised)</u>

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**<u>AM Peak Hour:</u>** Expected to operate at acceptable Level of Service B. No capacity constraints expected along the critical southern approach (LOS C). **<u>PM Peak Hour:</u>** Expected to operate at acceptable Level of Service B. No capacity constraints expected along the critical southern approach (LOS C).

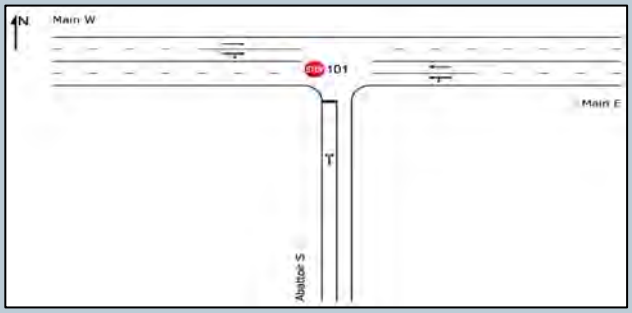
2. Main Street / Saldanha Road (Signalised)

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**AM Peak Hour:** Expected to operate at acceptable Level of Service C. No capacity constraints expected along the critical southern approach (LOS D). **PM Peak Hour:** Expected to operate at acceptable Level of Service C. No capacity constraints expected along the critical southern approach (LOS C).

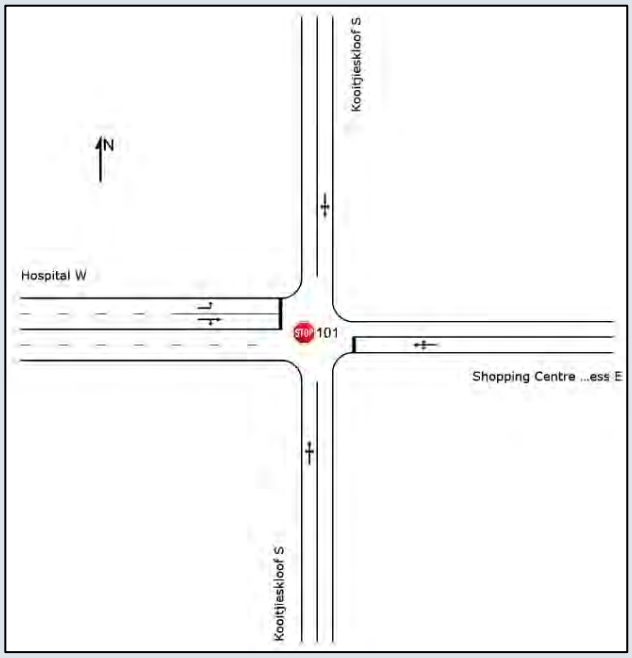
3. Main Street / Bester Street (Signalised)

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**AM Peak Hour:** Expected to operate at acceptable Level of Service A. No capacity constraints expected along the critical northern approach (LOS D). **PM Peak Hour:** Expected to operate at acceptable Level of Service A. No capacity constraints expected along the critical northern approach (LOS D).

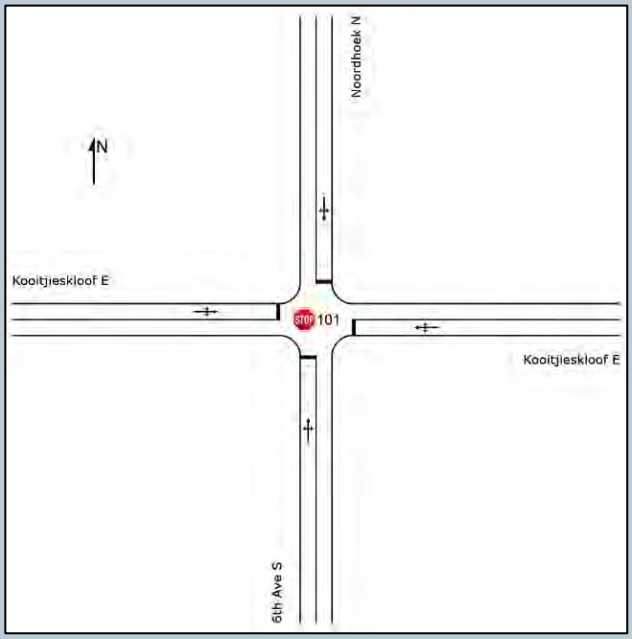
4. Main Street / Abattoir Street (Stop-controlled)

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**AM Peak Hour:** Expected to operate at acceptable Level of Service. No capacity constraints expected along the critical southern approach (LOS B). **PM Peak Hour:** Expected to operate at acceptable Level of Service. No capacity constraints expected along the critical southern approach (LOS B).

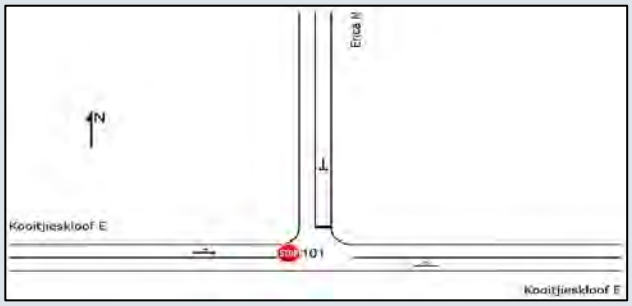
5. Hospital Street / Kootjieskloof Street (Stop-controlled)

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**AM Peak Hour:** Expected to operate at acceptable Level of Service. No capacity constraints expected along the critical western approach (LOS A). **PM Peak Hour:** Expected to operate at acceptable Level of Service. No capacity constraints expected along the critical western approach (LOS A).

6. Kootjieskloof Street / 6th Avenue (All-Way Stop-controlled)

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**AM Peak Hour:** Expected to operate at acceptable Level of Service C. No capacity constraints expected along the critical southern approach (LOS D). **PM Peak Hour:** Expected to operate at acceptable Level of Service B. No capacity constraints expected along the critical southern approach (LOS C).

7. Kootjieskloof Street / Erica Street (Stop-controlled)

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**AM Peak Hour:** Expected to operate at acceptable Level of Service. No capacity constraints expected along the critical northern approach (LOS A). **PM Peak Hour:** Expected to operate at acceptable Level of Service. No capacity constraints expected along the critical northern approach (LOS A).

	No upgrades are required in these scenarios for any of the study intersections. Refer to **Table 1** for a summary of the SIDRA results. Full details of the SIDRA analyses can be provided if required.
14.Trip Generation Rates	The additional vehicle trips that will be generated by the proposed development were calculated using the trip generation rates as provided in the *TMH17 South African Trip Data Manual (Committee*

References: Table 2

Draft 2.1, June 2020) published by the Committee of Transport Officials (COTO) as well as the trip generation rates provided in the *Trip Generation Manual 9th Edition, 2012* published by the Institute of Transport Engineers (ITE).

The recommended peak hour trip generation rates are shown in the table below:

Land Use	Peak Hour	Trip Generation Rate	Directional Split	
			In [%]	Out [%]
Single Dwelling Units (COTO210)	AM	1.00	25%	75%
	PM	1.00	70%	30%
Multi-level Townhouses (COTO232)	AM	0.75	25%	75%
	PM	0.75	70%	30%
Public Primary School (COTO520)	AM	0.85	50%	50%
	PM	0.30	50%	50%
Place of Public Worship (Weekday) (COTO561)	AM	0.05	50%	50%
	PM	0.05	50%	50%
Pre-school (Day Care Centre) (COTO656)	AM	1.00	50%	50%
	PM	0.80	50%	50%
Offices (COTO710)	AM	2.10	85%	15%
	PM	2.10	20%	80%
Retail/Line Shops (ITE826)	AM	0.68	48%	52%
	PM	2.71	44%	56%

It was assumed that the business erven area, approximately ±12 439m², will have a coverage (bulk) of 50% and that the GLA would consist of 85% of the bulk. Therefore, the business erven will have an

<table>
<tr><td></td><td>approximate GLA of ±5 300m² which makes up a 60:40 split of office and small shops/retail component.

To account for the mixed-use nature of the development and the low vehicle ownership in the area the following reductions, as per Table 3.2 in the TMH17, were applied to the trip generation rates:

<table>
<tr><th rowspan="2">Land Use</th><th colspan="2">Reductions [%]</th></tr>
<tr><th>Mixed-use</th><th>Low Vehicle Ownership</th></tr>
<tr><td>Single Dwelling Units (COTO210)</td><td>10%</td><td>40%</td></tr>
<tr><td>Multi-level Townhouses (COTO232)</td><td>15%</td><td>30%</td></tr>
<tr><td>Public Primary School (COTO520)</td><td>30%</td><td>50%</td></tr>
<tr><td>Place of Public Worship (Weekday) (COTO561)</td><td>10%</td><td>50%</td></tr>
<tr><td>Pre-school (Day Care Centre) (COTO656)</td><td>5%</td><td>50%</td></tr>
<tr><td>Offices (COTO710)</td><td>20%</td><td>20%</td></tr>
<tr><td>Retail/Line Shops (ITE826)</td><td>10%</td><td>30%</td></tr>
</table>

Refer to Table 2 for a summary of the Trip Generation Rates and Estimated Peak Hour Trips.</td></tr>
<tr><td>15.Development Trips
References: Figures 7 & 8, Table 2</td><td>To account for the worst-case scenario the entire proposed development (Phase 3 & 4) was included to determine the expected development trips during the peak hours. Therefore, the total expected peak hour trips likely to be generated by the development during the AM and PM peak hours are:

• 767 total AM trips (283 inbound, 484 outbound)
• 688 total PM trips (420 inbound, 268 outbound)

Refer to Table 2 for a summary of the Trip Generation Rates and Estimated Peak Hour Trips.</td></tr>
<tr><td>16.Trip Distribution</td><td>The generated traffic associated with the proposed development has been distributed onto the surrounding road network taking the following into account:

• Present traffic conditions;
• The nature of the development; and</td></tr>
</table>

- Trip attractions within the area.

Based on the above, the following distribution was used to assign the development traffic to the surrounding network for both of the peak hours:

- 20% to/from the east along Main Street
- 15% to/from the north along Velddrif Road
- 20% to/from the west along Main Street
- 10% to/from the west along Hospital Street
- 20% to/from the south along Saldanha Road
- 10% to/from the east along Kootjieskloof Street
- 5% to/from the south along 6th Avenue

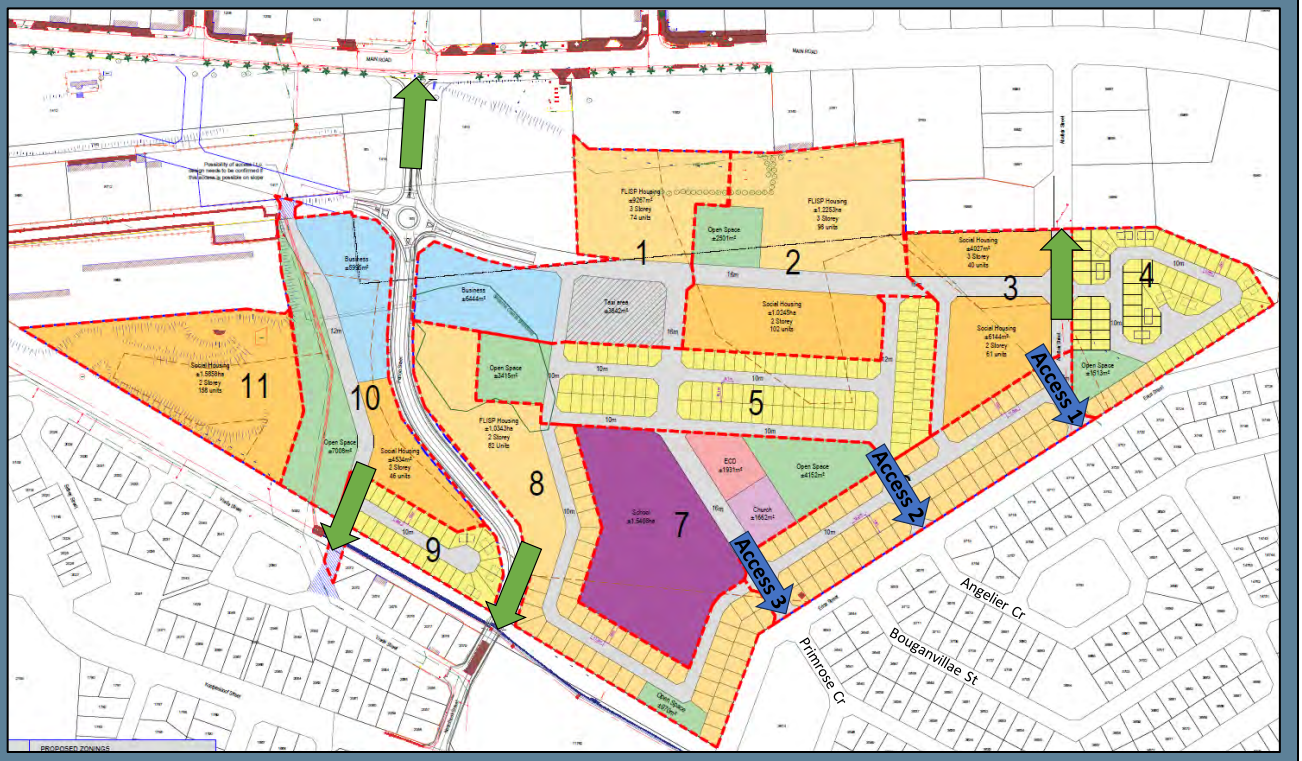
17. Site Access

Reference: Appendix C

The proposed development will take access from seven locations, three proposed accesses will be located off Erica Street and the remaining accesses will tie in to the existing road network at Abattoir Street, Kootjieskloof Street, 6th Avenue and Main Street.

All proposed accesses must have a two-lane cross-section with one lane in each direction. The proposed accesses along Erica Street must

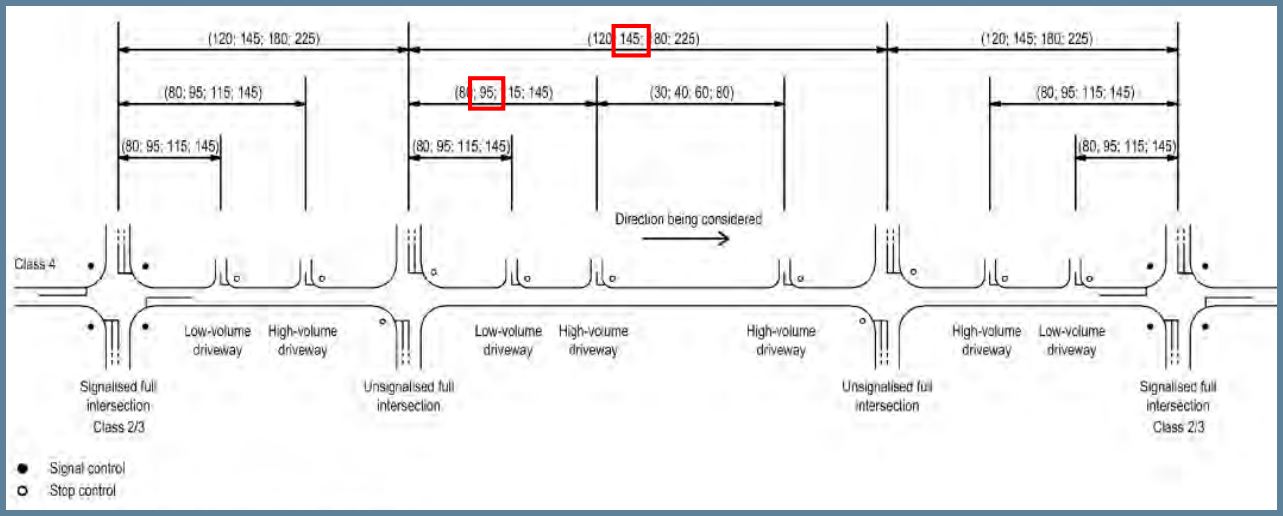
all be stop-controlled on the development side. The location of the proposed accesses along Erica Street (Access 1, Access 2 and Access 3) and the proposed accesses that will tie into the existing road network are illustrated on the figure below in blue and green, respectively.



Accesses must follow the spacing requirements set out in the *Access Management Guidelines, 2020* published by the Western Cape Government's Transport and Public Works Department. As previously mentioned, Erica Street is a Class 4 collector road. Once the development has been constructed the Roadside Development Environment (RDE) will become Intermediate.

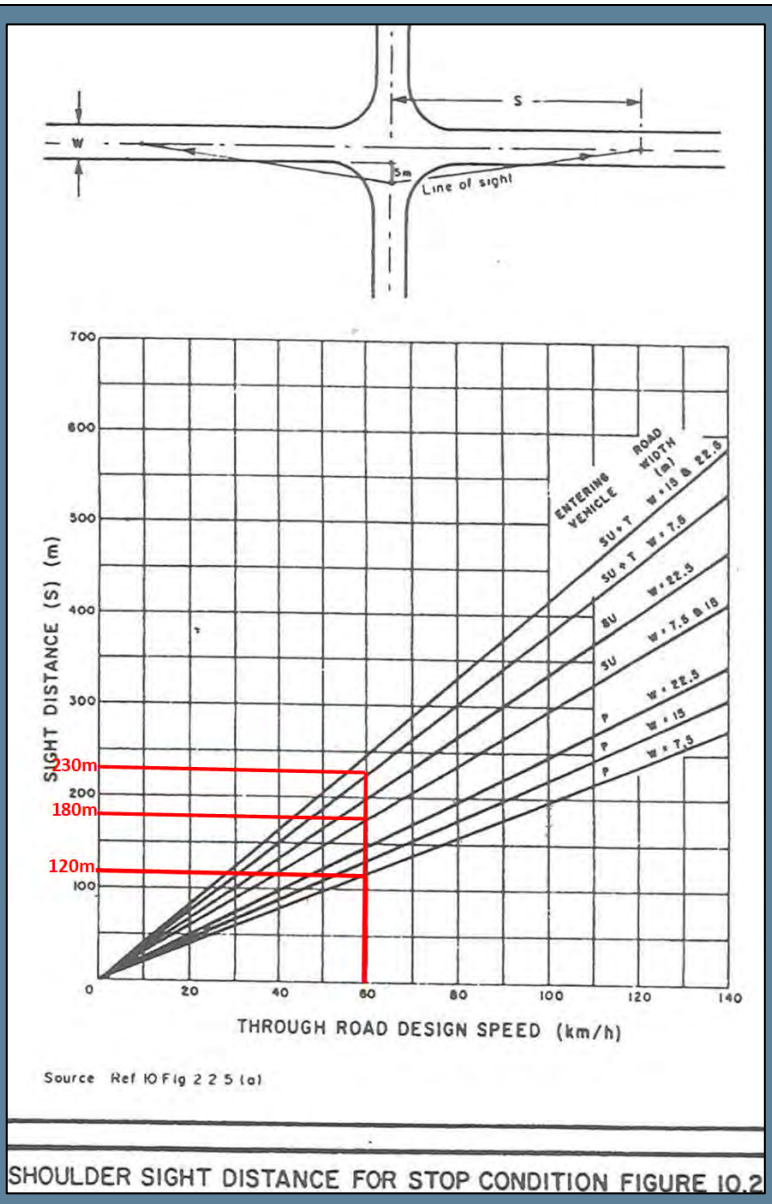
Due to the number of expected trips during the peak hours and the number of proposed accesses it was assumed that the proposed Access 1 along Erica Steet would be classified as high-volume driveway and proposed Access 2, and proposed Access 3 would form part of the existing full unsignalised intersections at Angelier Crescent and Primrose Crescent, respectively.

<u>Class 4 roads:</u> A minimum spacing of 145m is required between two full unsignalised intersections and a minimum spacing of 95m is required between a full unsignalised intersection and a high-volume driveway (HVD) in an Intermediate Roadside Development

	Environment.
	
	The available access spacing for the proposed accesses along Erica Street are shown on the figure below. Access 2 is proposed opposite Angelier Crescent and Access 3 is proposed opposite Primrose Crescent. Sufficient access spacing is available between Access 1 and Aandblom Street to the east along Erica Street as well as between Access 1 and Access 2 / Angelier Street to the southwest along Erica Street. Insufficient access spacing is available between Access 2 and Bougainvillae Street to the southwest along Erica Street. Insufficient access spacing is available between Access 3 and Bougainvillae Street to the northeast along Erica Street, but sufficient access spacing is available between Access 3 Koojtieskloof Street to the southwest along Erica Street. As mentioned above, Access 2 and Access 3 will be located opposite Angelier Crescent and Primrose Cresent, respectively, and will both have insufficient access spacing available between them and Bougainvillae Street. The locations of proposed Access 2 and Access 3 were deemed as the optimal locations to prevent staggered accesses along Erica Street. Therefore, the access spacing available at the proposed accesses, Access 1, Access 2 and Access 3, along Erica Street was deemed sufficient.

	No dedicated turning lanes would be warranted at any of the proposed accesses.

18. Shoulder Sight Distance	Shoulder sight distance (SSD) at an access/egress should be provided to enable drivers to enter the major road via a left or a right turn without impeding traffic on the major road. Due to the roadside development environment and the nature of the development it was assumed that a speed limit of 60km/h would be enforced along Erica Street in the vicinity of the site. The SSD required for a passenger vehicle (P), a single unit truck (SU) and a single unit truck plus trailer (SU + T) along roads with a design speed of 60km/h and a width of 7.5m is 120m, 180m and 230m respectively. Due to the development consisting of primarily residential a minimum SSD of 120m is required at each of the proposed accesses along Erica Street in both directions. It was determined that sufficient SSD is available for passenger vehicles at all proposed accesses along Erica Street in both directions.



SHOULDER SIGHT DISTANCE FOR STOP CONDITION FIGURE 10.2

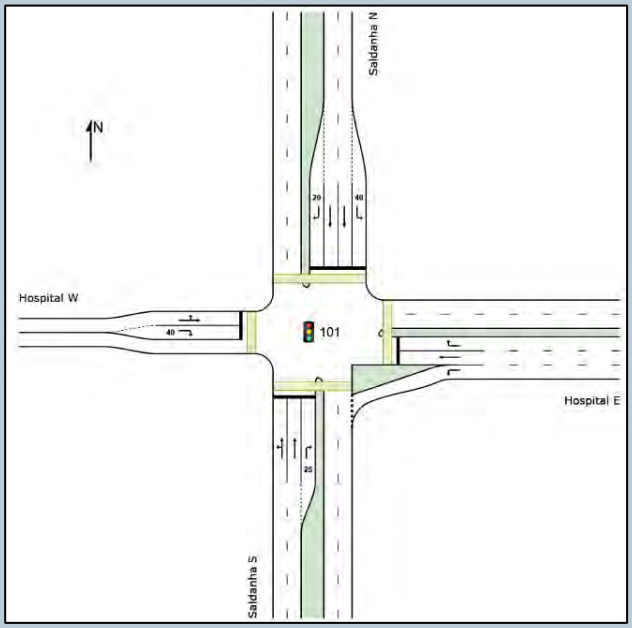
19. Impact of Development Traffic

References: Figures 9 & 10, Table 1

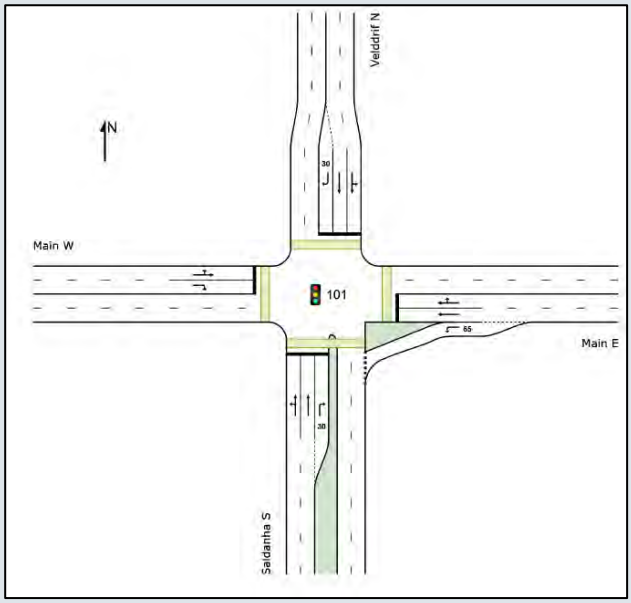
To assess the impact of the proposed development on the surrounding road network, the development traffic was added to the 2029 background traffic volumes. The total 2029 traffic volumes can be seen in **Figure 9** and **Figure 10**.

The total traffic operations at the study intersections were analysed using SIDRA Intersection 9.1 software. Optimal signal timings and assumed signal phasing were utilised for the capacity analyses of all signalised intersections.

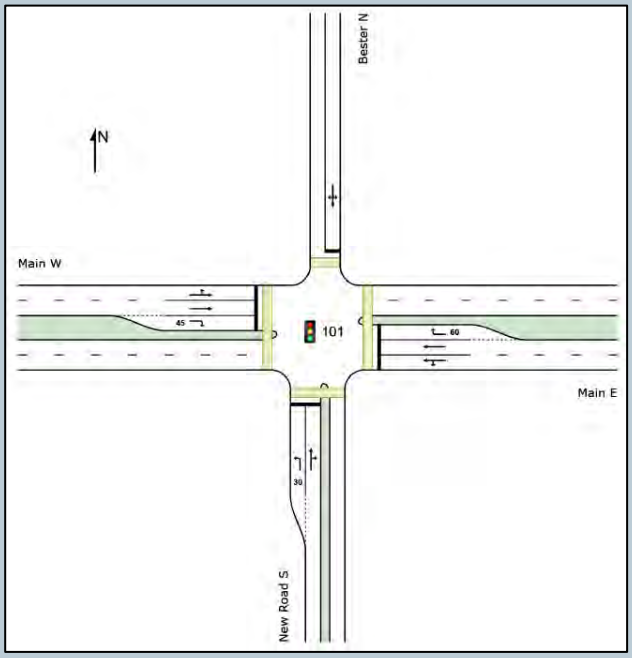
1. Saldanha Road / Hospital Street (Signalised)

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**AM Peak Hour:** Expected to operate at acceptable Level of Service B. No capacity constraints expected along the critical southern approach (LOS C). **PM Peak Hour:** Expected to operate at acceptable Level of Service C. No capacity constraints expected along the critical northern approach (LOS C).

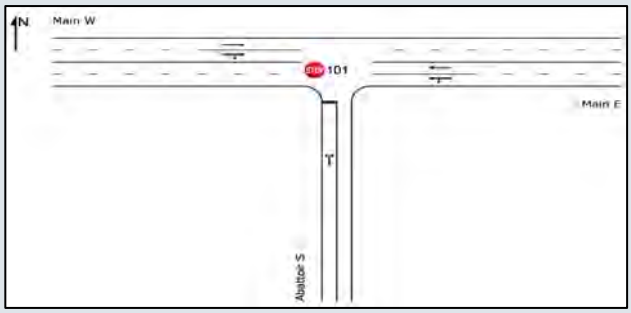
2. Main Street / Saldanha Road (Signalised)

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**AM Peak Hour:** Expected to operate at acceptable Level of Service C. No capacity constraints expected along the critical eastern approach (LOS D). **PM Peak Hour:** Expected to operate at acceptable Level of Service C. No capacity constraints expected along the critical northern approach (LOS C).

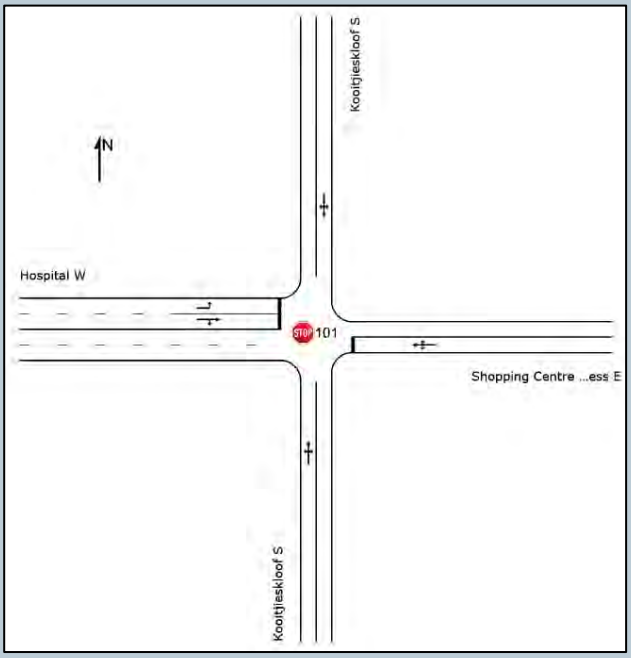
3. Main Street / Bester Street (Signalised)

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**AM Peak Hour:** Expected to operate at acceptable Level of Service B. No capacity constraints expected along the critical southern approach (LOS C). **PM Peak Hour:** Expected to operate at acceptable Level of Service B. No capacity constraints expected along the critical southern approach (LOS C).

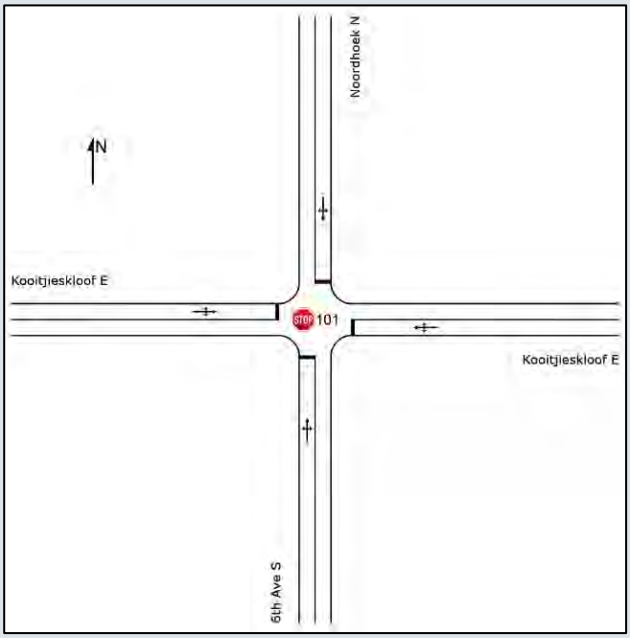
4. Main Street / Abattoir Street (Stop-controlled)

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**AM Peak Hour:** Expected to operate at acceptable Level of Service. No capacity constraints expected along the critical southern approach (LOS C). **PM Peak Hour:** Expected to operate at acceptable Level of Service. No capacity constraints expected along the critical southern approach (LOS C).

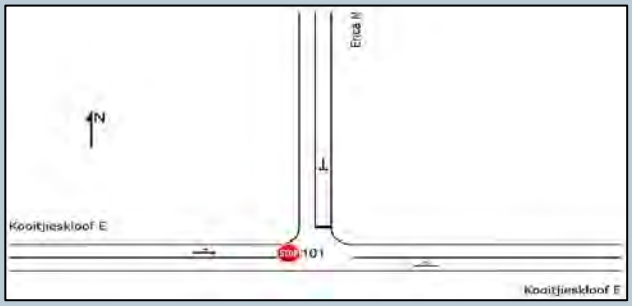
5. Hospital Street / Kootjieskloof Street (Stop-controlled)

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**AM Peak Hour:** Expected to operate at acceptable Level of Service. No capacity constraints expected along the critical western approach (LOS B). **PM Peak Hour:** Expected to operate at acceptable Level of Service. No capacity constraints expected along the critical western approach (LOS B).

6. Kootjieskloof Street / 6th Avenue (All-Way Stop-controlled)

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**AM Peak Hour:** Expected to operate at acceptable Level of Service C. No capacity constraints expected along the critical southern approach (LOS D). **PM Peak Hour:** Expected to operate at acceptable Level of Service C. No capacity constraints expected along the critical western approach (LOS C).

7. Kootjieskloof Street / Erica Street (Stop-controlled)

EXISTING GEOMETRY	CAPACITY ANALYSIS RESULTS
	**AM Peak Hour:** Expected to operate at acceptable Level of Service. No capacity constraints expected along the critical northern approach (LOS B). **PM Peak Hour:** Expected to operate at acceptable Level of Service. No capacity constraints expected along the critical northern approach (LOS A).

It should be noted that it is possible that there will be a redistribution of traffic volumes once the southern by-pass has been constructed. The capacity analyses of the total traffic operations indicated that the study intersections all have spare capacity once upgraded, therefore it is not anticipated that possible redistribution of traffic will lead to capacity constraints.

No upgrades are required in these scenarios for any of the study intersections. Refer to **Table 1** for a summary of the SIDRA results. Full details of the SIDRA analysis can be provided if necessary.

20. Parking Requirements

Parking provision for the proposed development should satisfy the requirements as suggested in the *Saldanha Bay Municipality Integrated Zoning Scheme By-Law, March 2020*. The following parking requirements are associated with the applicable land uses for the proposed development:

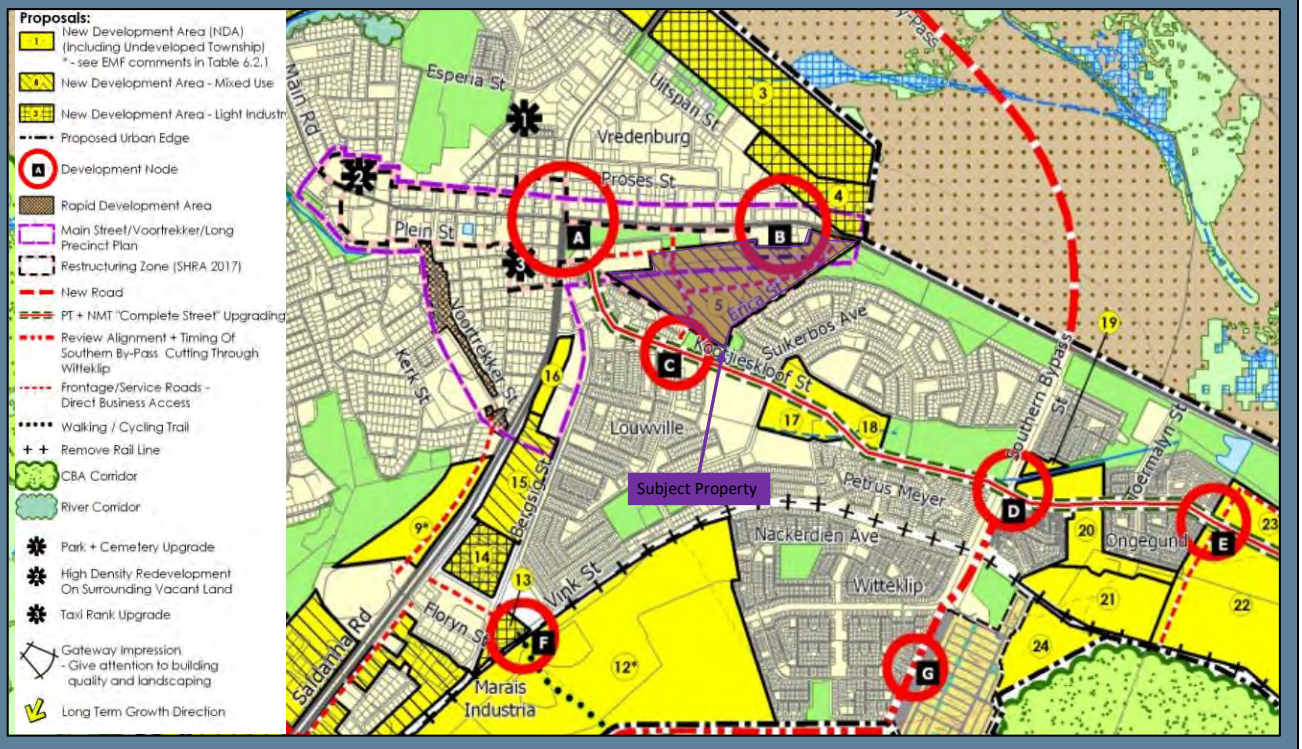
Land Use	Extent	Parking Ratio	Required Parking Bays
Dwelling House	208 units	2 bays/unit	416 bays
Group Housing	779 units	Residents: 2 bays/unit Visitors: 0.25 bays/unit	1 948 bays
Place of Education	600 students	2 bays/classroom plus 1 bay/staff	61 bays

Place of Worship	250 seats	1 bay/4 seats	63 bays
Day Care Facility	150 students	1 bay/staff plus 1 bay/6 children	15 bays
Businesses	5300m² GLA	1 bay/25m² GLA	212 bays
Total Parking Bays			**2 715 bays**

Therefore, **2 715 parking bays** are required for the proposed development. The parking layout will be addressed at the detailed precinct development planning and detailed design stage.

21. Non-Motorised Transport (NMT) and Public Transport

According to the *Saldanha Bay Municipality Spatial Development Framework, May 2019* Kootjieskloof Street will be upgraded to accommodate public – and non-motorised transport. The goal of the upgrades are to promote an urban development corridor from the industrial area to the CBD of Vredenburg.



A public transport embayment is located along the western side of Saldanha Road, approximately 270m north of the Saldanha Road / Hospital Street intersection. During the site visit minibus taxis were observed operating along Main Street, Saldanha Road and Hospital Street. No other public transport embayments are present in the

vicinity of the site.

Sidewalks are present along Main Street, Saldanha Road, Velddrift Road, Hospital Street, Kootjieskloof Street and 6th Avenue. An existing pedestrian crossing is present across Saldanha Road, near the existing public transport embayment, and an existing pedestrian crossing is present across Kootjieskloof Street, approximately 160m east of the Kootjieskloof Street / Erica Street intersection.

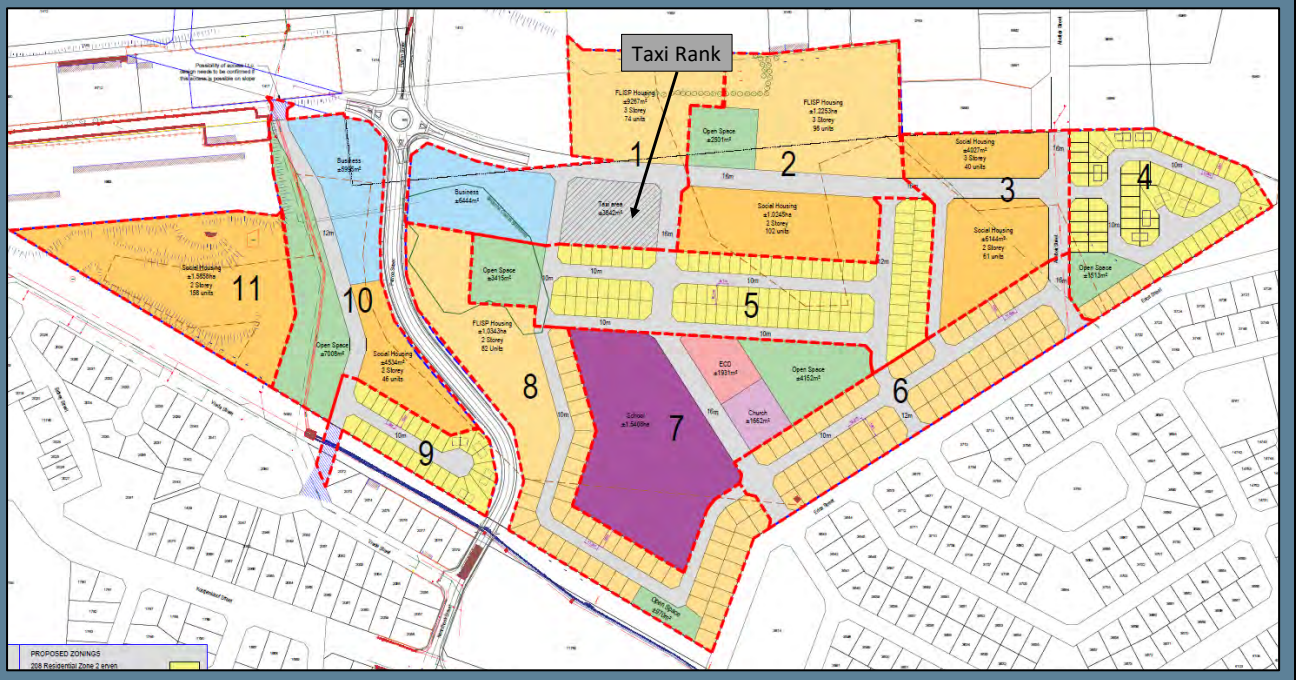
The location of the existing public transport embayment and pedestrian crossings are shown on the figure below.

Due to the low vehicle ownership in the area a large portion of the residents of the development will make use of public transportation. A taxi rank, with an approximate size of ±3 842m², is proposed within the development and no additional public transport facilities are proposed. The location of the taxi rank is indicated on an extract of the SDP below.

To accommodate the high number of expected non-motorised transport users in the vicinity of the site it is proposed that sidewalks be constructed along both sides of the southern by-pass and the east-

west road for the entirety of the roads. A sidewalk should be provided on the western side of Abattoir Street between Erica Street and Main Street and along Erica Street on the northwestern side between Abattoir Street and Kootjieskloof Street.

No other public transport – or non-motorised transport facilities are proposed in the vicinity of the site.



22.Conclusions

This report describes the investigation of transport implications of the proposed mixed-use development on several erven in Vredenburg. It summarises the existing transportation conditions within the site vicinity, provides an assessment of the transportation impacts of the proposed development on the surrounding road network, and recommendations about improvements to mitigate negative impacts, if relevant.

The main findings and conclusions are:

- This TIA is in support of the application for the proposed Urban Revitalisation Project (Phase 3 & 4) on several erven in Vredenburg.
- The proposed development will consist of a total of 209 erven allocated for IRDP housing units, 372 FLISP housing units, 407 social housing units, a public primary school (±600 students), a church (±250 seats), a crèche (±150 students), offices (±3 180m² GLA) and retail space (±2 120m² GLA).

	• The site is currently vacant and has existing accesses from Main Street, Abattoir Street and Kootjieskloof. • Two service roads, a southern by-pass and an east-west road is planned in the vicinity of the site. Both of the service roads will transverse the subject property and have a two-lane cross-section with one lane per direction. • During the site visit it was observed that the construction of the service roads has commenced. • The capacity analyses of the existing 2023 traffic operations indicated that all the study intersections are currently operating at acceptable levels of service (LOS) with minimal average delays during both peak hours. • The trips generated by the future Witteklip housing development located on Potion 10 of Farm 132 was included as the latent demand. • A growth rate of 3.0% per annum was used to determine the 2029 background traffic volumes. • The capacity analyses of the background 2029 traffic operations indicated that all the study intersections are expected to operate at acceptable levels of service (LOS) with minimal average delays during both peak hours. • The proposed development has the potential to generate **767 new trips** during the AM peak hour (283 in, 484 out) and **688 new trips** during the PM peak hour (420 in, 268 out). • The proposed development will have seven accesses. Three proposed accesses will be located along Erica Street and the remaining accesses will tie in to the existing road network at Abattoir Street, Kootjieskloof Street, 6th Avenue and Main Street. • All proposed accesses will have a two-lane cross-section with one lane per direction. • The proposed accesses along Erica Street must all be stop-controlled on the development side. • The access spacing available for the proposed accesses along Erica Street was deemed sufficient. • No dedicated turning lanes are warranted at any of the proposed accesses. • Sufficient SSD is available for passenger vehicles at all the proposed accesses along Erica Street in both directions. • The capacity analyses of the total 2029 traffic operations indicated that all the study intersections are expected to

	operate at acceptable levels of service (LOS) with minimal average delays during both peak hours. • Parking must satisfy the requirements as suggested in the *Saldanha Bay Municipality Integrated Zoning Scheme By-Law, March 2020*. • A total of 2 715 parking bays are required for the proposed development. The parking layout will be addressed at the detailed precinct development planning and detailed design stage. • A public transport embayment is located along the western side of Saldanha Road approximately ±270m north of the Saldanha Road / Hospital Street intersection. • Sidewalks are present along Main Street, Saldanha Road, Velddrift Road, Hospital Street, Kootjieskloof Street and 6th Avenue. • One pedestrian crossing is present across Saldanha Road in the vicinity of the public transport embayment and one pedestrian crossing is present across Kootjieskloof Street approximately 160m east of the Kootjieskloof / Erica Street intersection. • A taxi rank is proposed within the development and no further public transport facilities are proposed. • It is proposed that sidewalks be constructed along both sides of the southern by-pass and the east-west road for the entirety of the roads to accommodate the high volumes of expected non-motorised transport users. • A sidewalk must be constructed along the western side of Abattoir Street between Erica Street and Main Street as well as along the northwestern side of Erica Street between Abattoir Street and Kootjieskloof Street. • No other public transport – or non-motorised transport facilities are proposed in the vicinity of the site.
23.Recommendations	It is recommended that: • All proposed accesses have a two-lane cross-section with one lane per direction. • All proposed accesses along Erica Street be stop-controlled on the development side. • Parking be provided in accordance with the *Saldanha Bay Municipality Integrated Zoning Scheme By-Law, March 2020*.

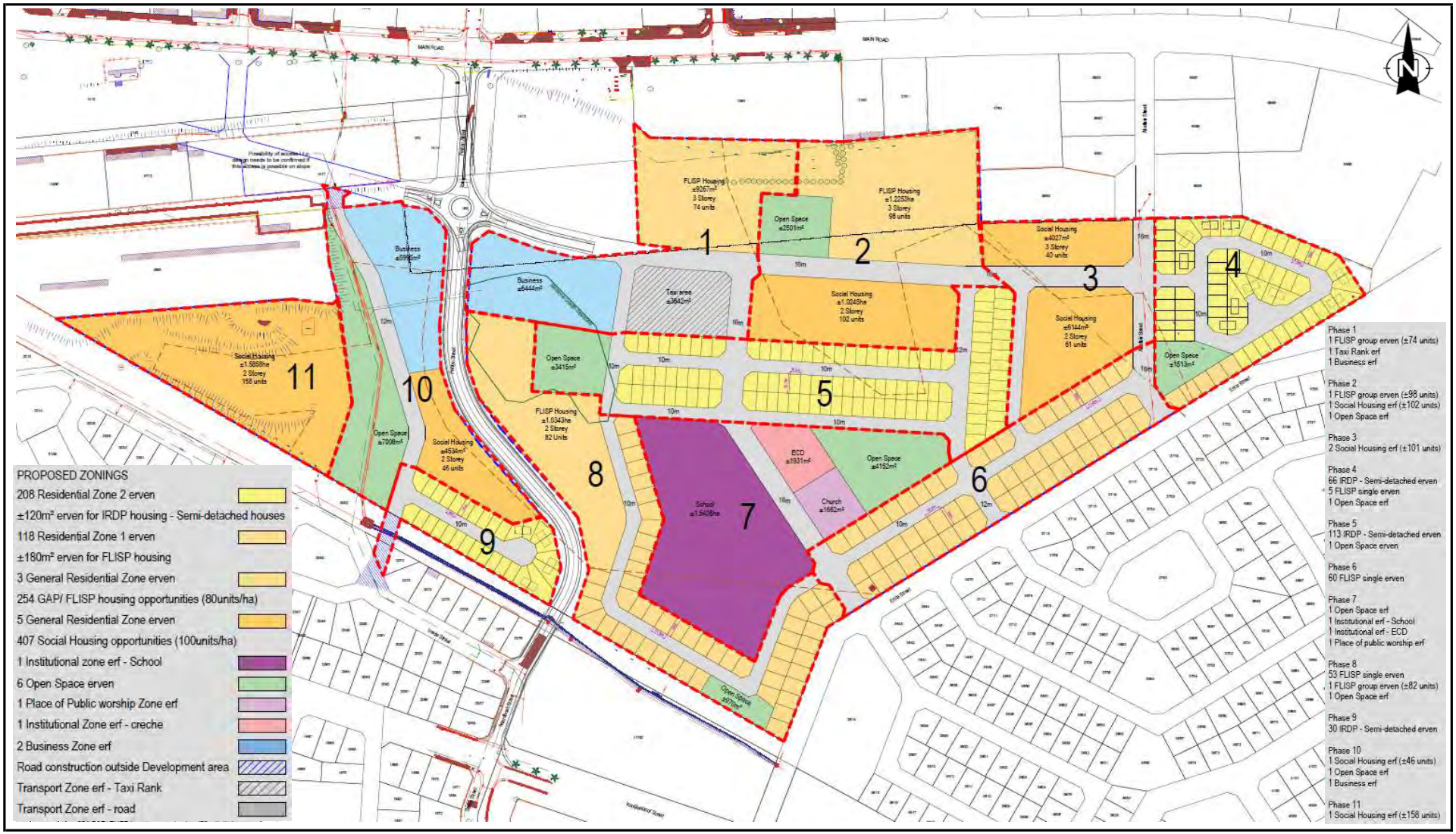
	• Sidewalks be constructed along both sides of the southern by-pass and the east-west road for the entirety of the roads. • A sidewalk be constructed along the western side of Abattoir Street between Erica Street and Main Street. • A sidewalk be constructed along the northwestern side of Erica Street between Abattoir Street and Kootjieskloof Street. • The cost of constructing the sidewalks be set-off against the development contributions payable to the municipality on this project. • The detailed design of the above-mentioned road infrastructure be approved by the relevant Road Authorities before construction commences. This report has shown that the proposed development can be accommodated by the adjacent transport network, provided the recommendations presented in the report are implemented. From a traffic engineering perspective, the approval of the application for this development is supported.

REFERENCES

1. Western Cape Government: Access Management Guidelines, Final AMG, 2020.
2. Department of Transport, Guidelines for Traffic Impact Studies, Report No. PR93/645, Pretoria, 1995.
3. Department of Transport, South African Trip Generation Rates, Report No. RR92/228, Pretoria, 1995.
4. Committee of Transport Officials (COTO), South African Trip Data Manual, TMH 17, Committee Draft 2.2, August 2020.
5. Committee of Transport Officials (COTO), South African Traffic Impact and Site Traffic Assessment Manual Standards and Requirements Manual, Volume 2 TMH 16, Committee Draft 2.0, October 2020.
6. Committee of Transport Officials (COTO), South African Traffic Impact and Site Traffic Assessment Manual, Volume 1 TMH 16, Committee Draft 2.0, May 2018.
7. Institute of Transport Engineers (ITE), Trip Generation Manual, 9th Edition, 2012.
8. Western Cape Government Environmental Affairs and Development Planning, Saldanha Bay Municipality Spatial Development Framework Report, Volume 2, May 2019.
9. Saldanha Bay Municipality, Integrated Zoning Scheme By-Law, Draft No. 3, March 2020.
10. Sturgeon Consulting (Pty) Ltd, Traffic Impact Assessment for the Proposed Witteklip Housing Development (Portion 10 of Farm 132), Vredenburg, October 2017.

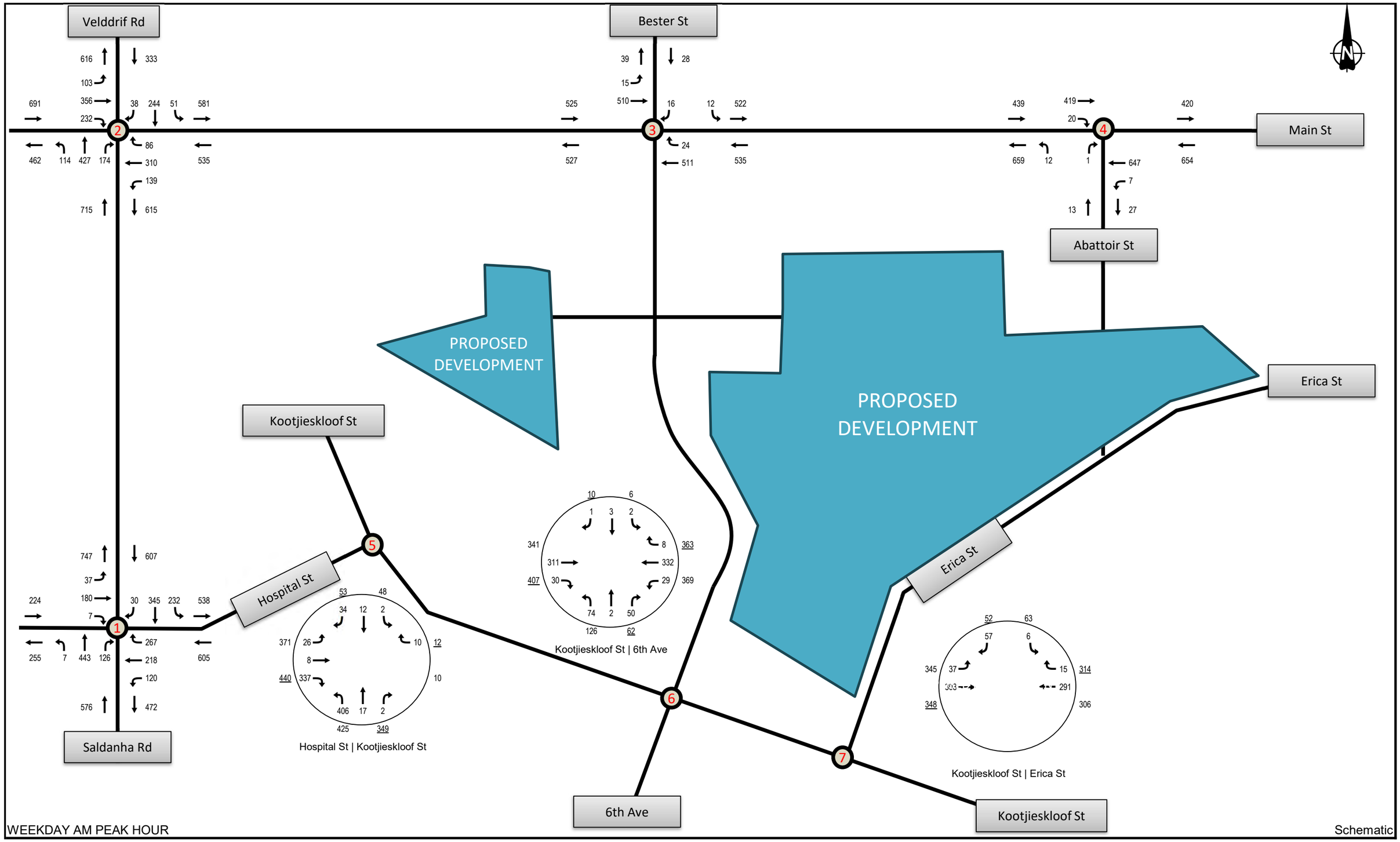
APPENDIX A: FIGURES

Traffic Engineering & Transport Planning STURGEON CONSULTING Transport Planning & Traffic Engineering 021 553 4167 / 083 701 2299	Project: PROPOSED URBAN REVITALISATION PROJECT (PHASE 1 - 4) ON SEVERAL ERVEN IN VREDENBURG, WESTERN CAPE TIA	Job No: STUR416
	LOCALITY PLAN	Figure: 1



Traffic Engineering & Transport Planning
STURGEON CONSULTING
Transport Planning & Traffic Engineering
021 553 4167 / 083 701 2299

Project: PROPOSED URBAN REVITALISATION PROJECT (PHASE 1 - 4) ON SEVERAL ERVEN IN VREDENBURG, WESTERN CAPE TIA	Job No: STUR416
SITE DEVELOPMENT PLAN (N.T.S)	Figure: 2



Traffic Engineering & Transport Planning STURGEON CONSULTING	Vredenburg Revitilisation Project	Job Ref No: **STUR0416**
	Present Traffic Demand (2024)	Fig: **3**

Velddrif Rd

Bester St

Main St

Abattoir St

Kootjieskloof St

Hospital St

Saldanha Rd

6th Ave

Erica St

Kootjieskloof St

PROPOSED DEVELOPMENT

PROPOSED DEVELOPMENT

1 2 3 4 5 6 7

460 87 543 238 218 88 332 47 468 467 547 172 315 183 58 287 193 538 670 743

28 9 443 23 17 460 40 452 459 19 436 455

498 486 12 490 460 19 4 441 443 2 23 14

621 25 169 7 201 34 481 291 567 806 144 11 403 107 193 99 98 390 521 586

Hospital St | Kootjieskloof St

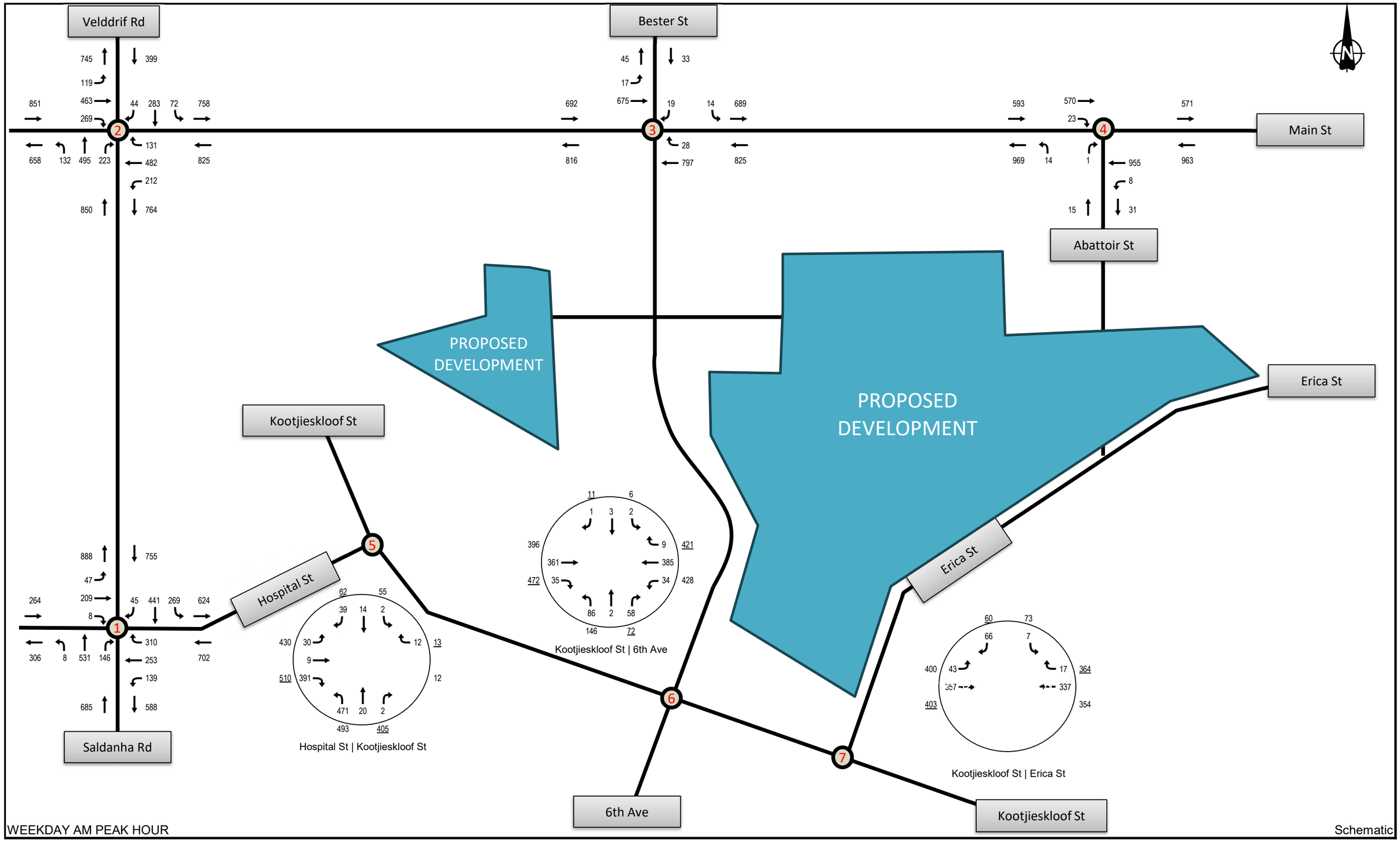
Kootjieskloof St | 6th Ave

Kootjieskloof St | Erica St

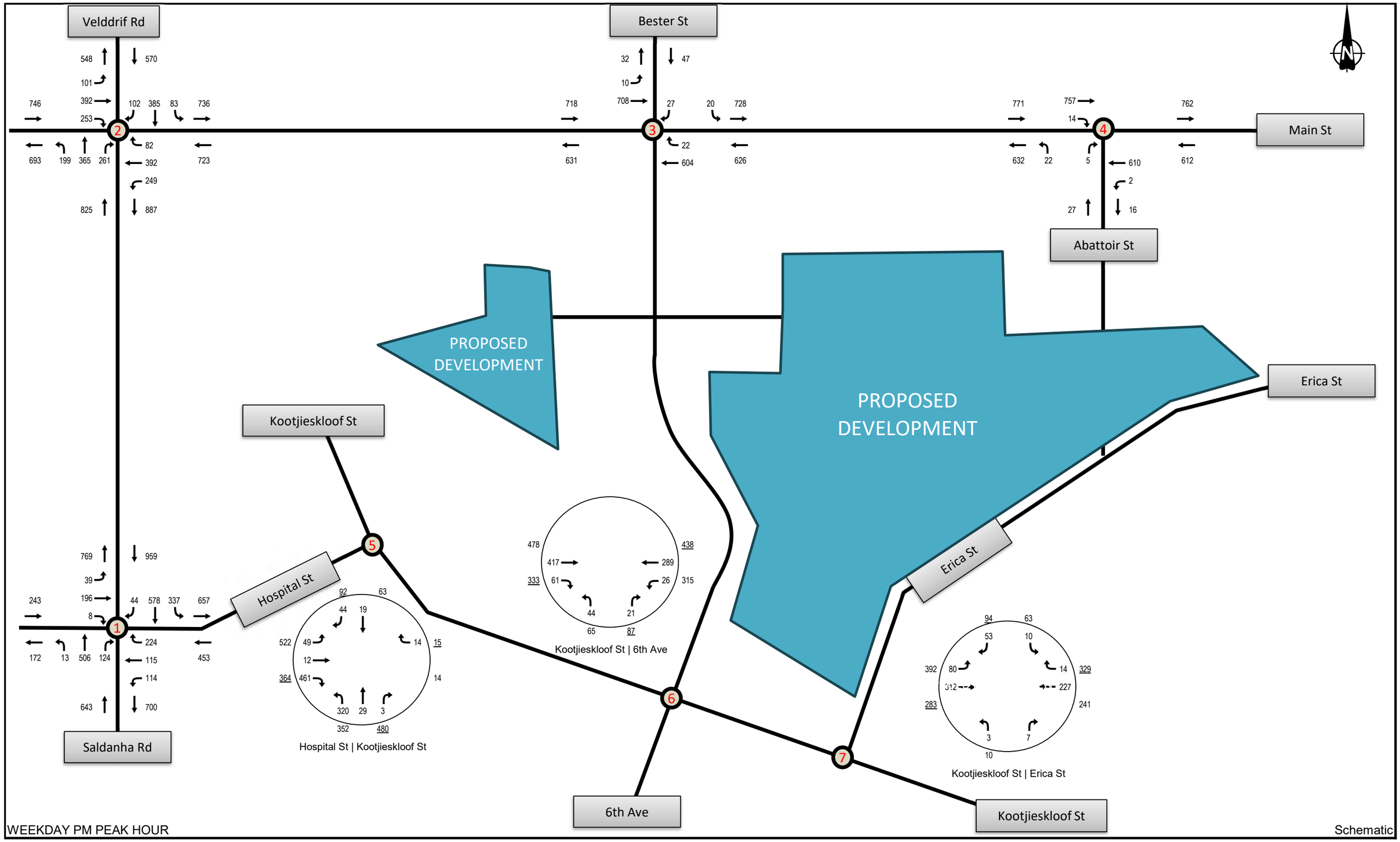
WEEKDAY PM PEAK HOUR

Schematic

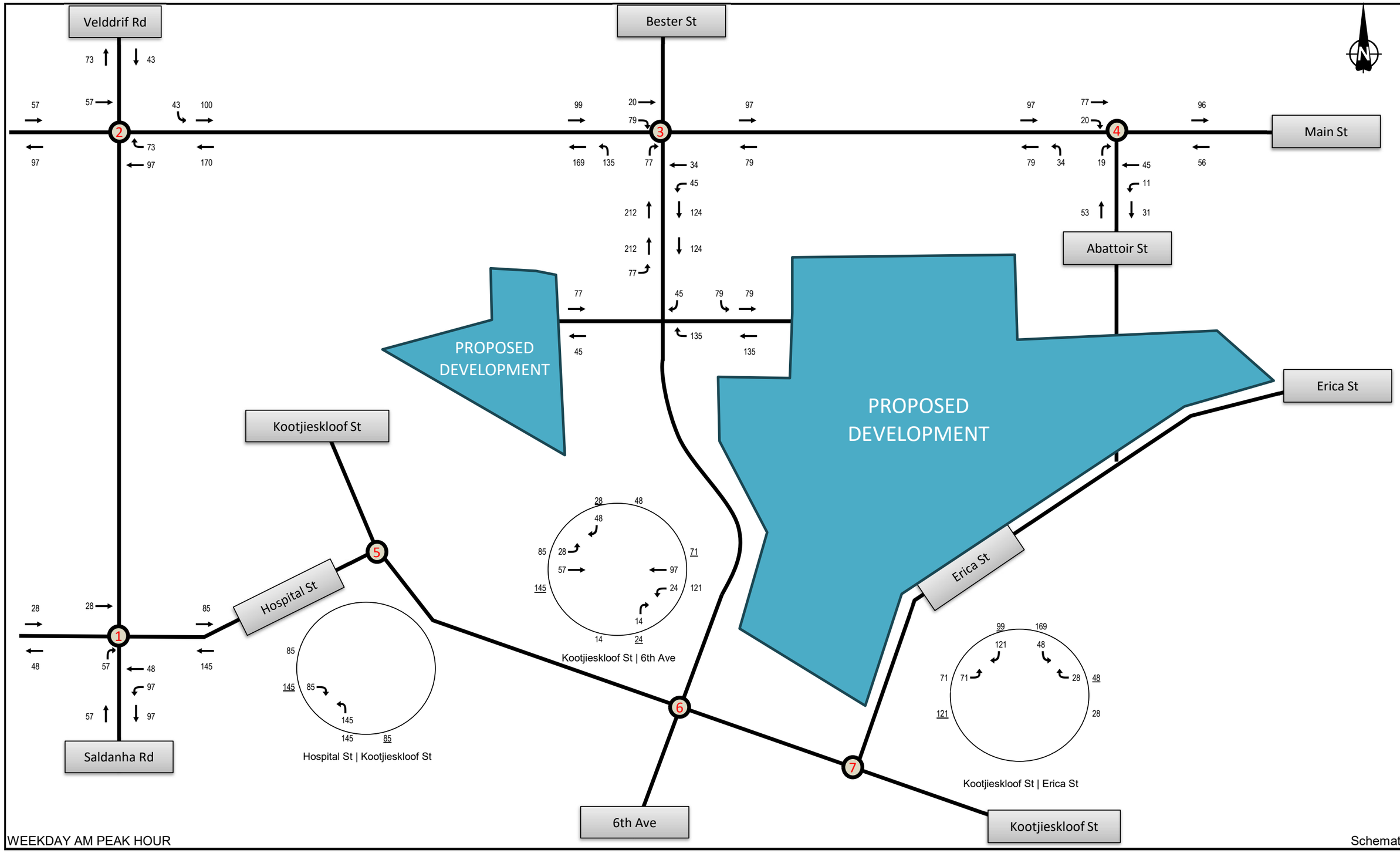
STURGEON CONSULTING	Vredenburg Revitilisation Project	Job Ref No: **STUR0416**
	Present Traffic Demand (2024)	Fig: **4**



STURGEON CONSULTING	Vredenburg Revitilisation Project	Job Ref No: **STUR0416**
	Expected 2029 Traffic Demand with Latent Rights	Fig: **5**



Traffic Engineering & Transport Planning STURGEON CONSULTING	Vredenburg Revitilisation Project	Job Ref No: **STUR0416**
	Expected 2029 Traffic Demand with Latent Rights	Fig: **6**



WEEKDAY AM PEAK HOUR

Schematic

Traffic Engineering & Transport Planning STURGEON CONSULTING	Vredenburg Revitilisation Project	Job Ref No: **STUR0416**
	Development Traffic: Phase 1	Fig: **7**

Velddrif Rd

Bester St

Main St

Abattoir St

Erica St

Kootjieskloof St

Hospital St

Saldanha Rd

6th Ave

PROPOSED DEVELOPMENT

PROPOSED DEVELOPMENT

Kootjieskloof St | 6th Ave

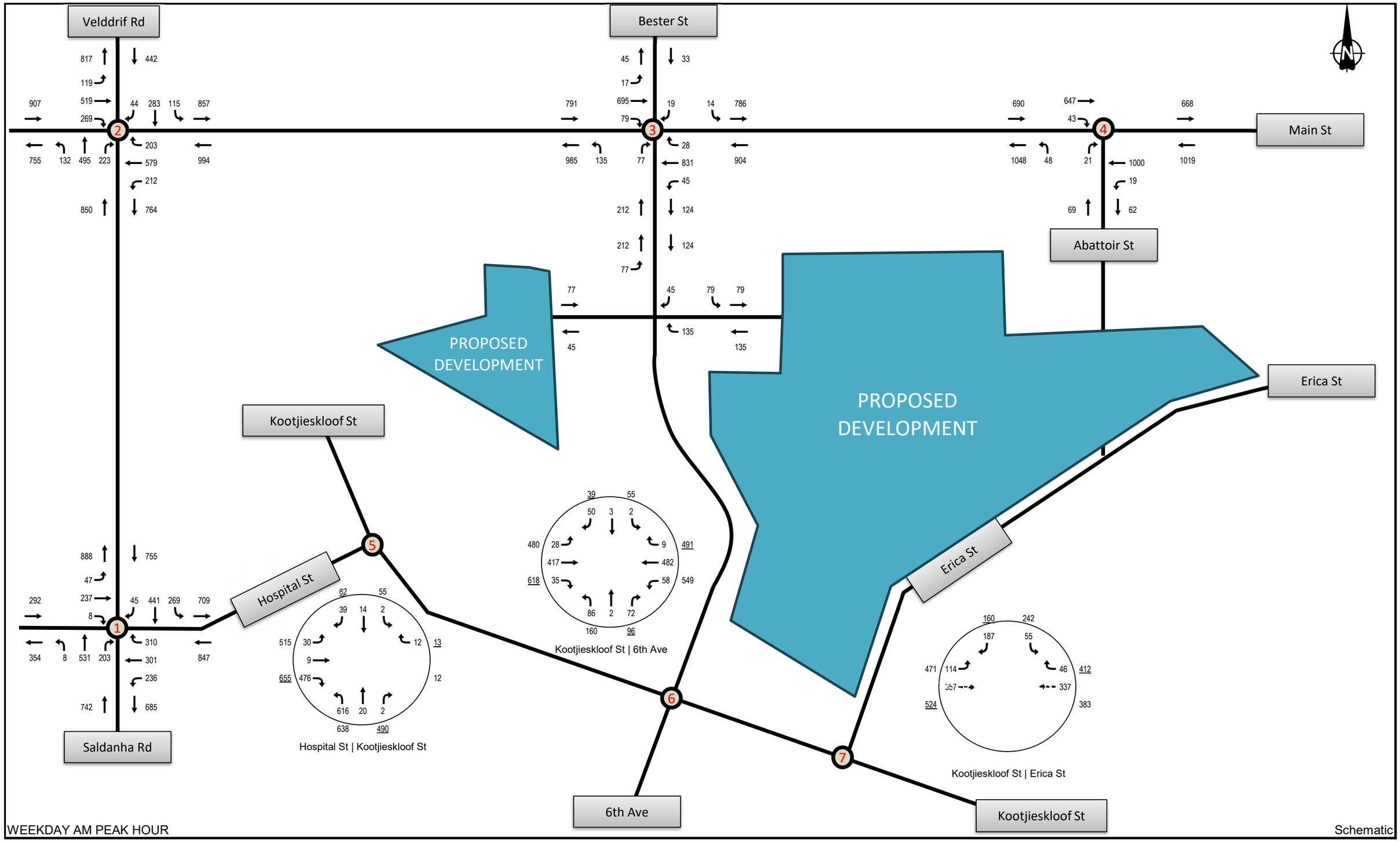
Hospital St | Kootjieskloof St

Kootjieskloof St | Erica St

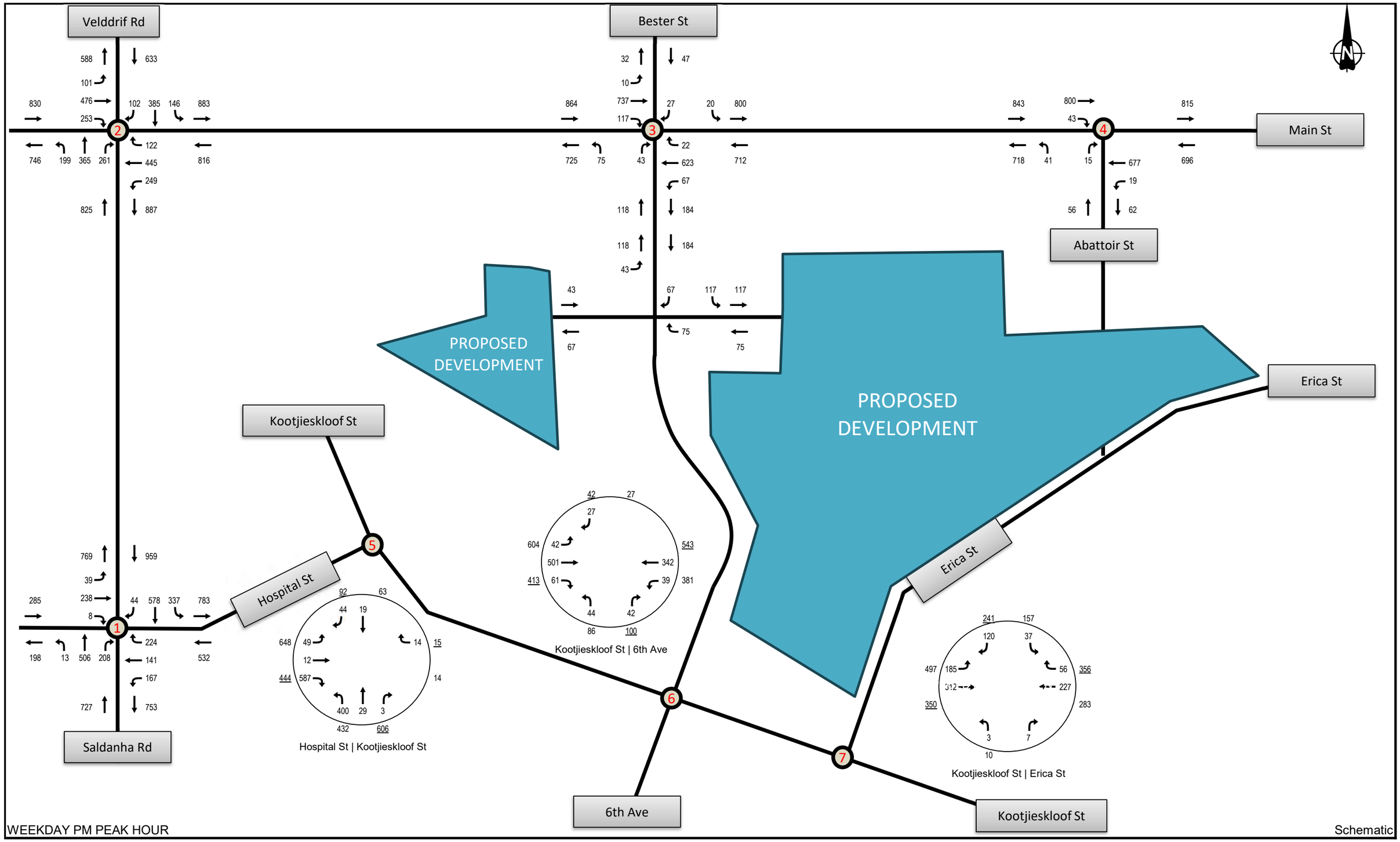
WEEKDAY PM PEAK HOUR

Schematic

STURGEON CONSULTING	Vredenburg Revitilisation Project	Job Ref No: **STUR0416**
	Development Traffic: Phase 1	Fig: **8**



STURGEON CONSULTING	Vredenburg Revitilisation Project	Job Ref No: **STUR0416**
	Expected 2029 Traffic Demand with Latent Rights plus Development Phase 1	Fig: **9**



WEEKDAY PM PEAK HOUR

Schematic

Traffic Engineering & Transport Planning STURGEON CONSULTING	Vredenburg Revitilisation Project	Job Ref No: **STUR0416**
	Expected 2029 Traffic Demand with Latent Rights plus Development Phase 1	Fig: **10**

APPENDIX B: TABLES

Table 1: Peak Hour Traffic Conditions

Study Intersection	Scenario	Intersection Control	Peak Hour	Intersection			Critical Approach			
				Ave Delay (s)	LOS	v/c	Approach	Ave Delay (s)	LOS	v/c
1. Saldanha Rd / Hospital St	Existing Traffic (2024)	Signalised	AM	17.0	B	0.549	South	19.5	B	0.511
	Background Traffic (2029)	Signalised		18.2	B	0.681	South	21.1	C	0.674
	Total Traffic (2029)	Signalised		18.3	B	0.823	South	20.5	C	0.809
	Existing Traffic (2024)	Signalised	PM	17.5	B	0.584	South	23.0	C	0.584
	Background Traffic (2029)	Signalised		19.0	B	0.758	South	25.2	C	0.758
	Total Traffic (2029)	Signalised		21.6	C	0.792	North	26.9	C	0.729
2. Main St / Saldanha Rd	Existing Traffic (2024)	Signalised	AM	19.7	B	0.749	South	28.1	C	0.749
	Background Traffic (2029)	Signalised		23.0	C	0.980	South	36.1	D	0.980
	Total Traffic (2029)	Signalised		27.3	C	0.942	East	35.3	D	0.937
	Existing Traffic (2024)	Signalised	PM	20.1	C	0.832	South	28.0	C	0.832
	Background Traffic (2029)	Signalised		24.3	C	0.965	South	34.7	C	0.965
	Total Traffic (2029)	Signalised		27.5	C	0.957	North	34.1	C	0.731

Study Intersection	Scenario	Intersection Control	Peak Hour	Intersection			Critical Approach			
				Ave Delay (s)	LOS	v/c	Approach	Ave Delay (s)	LOS	v/c
3. Main St / Bester St	Existing Traffic (2024)	Signalised	AM	10.1	B	0.291	North	21.8	C	0.064
	Background Traffic (2029)	Signalised		8.1	A	0.331	North	38.5	D	0.107
	Total Traffic (2029)	Signalised		12.8	B	0.483	South	22.9	C	0.255
	Existing Traffic (2024)	Signalised	PM	10.0	B	0.249	North	22.1	C	0.092
	Background Traffic (2029)	Signalised		8.6	A	0.307	North	36.4	D	0.146
	Total Traffic (2029)	Signalised		12.4	B	0.411	South	22.3	C	0.142
4. Main St / Abattoir St	Existing Traffic (2024)	Stop-controlled	AM	0.5	NA	0.180	South	10.5	B	0.015
	Background Traffic (2029)	Stop-controlled		0.8	NA	0.265	South	12.7	B	0.025
	Total Traffic (2029)	Stop-controlled		1.9	NA	0.280	South	21.3	C	0.245
	Existing Traffic (2024)	Stop-controlled	PM	0.4	NA	0.141	South	10.2	B	0.026
	Background Traffic (2029)	Stop-controlled		0.5	NA	0.219	South	12.6	B	0.046
	Total Traffic (2029)	Stop-controlled		1.2	NA	0.256	South	15.9	C	0.136
5. Hospi	Existing Traffic (2024)	Stop-controlled	AM	6.9	NA	0.317	West	8.9	A	0.317

Study Intersection	Scenario	Intersection Control	Peak Hour	Intersection			Critical Approach			
				Ave Delay (s)	LOS	v/c	Approach	Ave Delay (s)	LOS	v/c
	Background Traffic (2029)	Stop-controlled		7.2	NA	0.383	West	9.4	A	0.383
	Total Traffic (2029)	Stop-controlled		7.7	NA	0.499	West	10.5	B	0.499
	Existing Traffic (2024)	Stop-controlled	PM	7.1	NA	0.359	West	8.7	A	0.359
	Background Traffic (2029)	Stop-controlled		7.4	NA	0.429	West	9.2	A	0.429
	Total Traffic (2029)	Stop-controlled		8.1	NA	0.565	West	10.3	B	0.565
6. Kootjieskloof St / 6th Ave	Existing Traffic (2024)	Stop-controlled	AM	15.9	C	0.498	South	31.4	D	0.498
	Background Traffic (2029)	Stop-controlled		16.3	C	0.530	South	29.2	D	0.512
	Total Traffic (2029)	Stop-controlled		21.5	C	0.745	South	29.2	D	0.512
	Existing Traffic (2024)	Stop-controlled	PM	12.1	B	0.427	South	16.5	C	0.150
	Background Traffic (2029)	Stop-controlled		12.7	B	0.493	South	16.8	C	0.174
	Total Traffic (2029)	Stop-controlled		19.0	C	0.752	West	21.2	C	0.752
7. Kootjieskloof St / Erica St	Existing Traffic (2024)	Stop-controlled	AM	1.3	NA	0.188	North	9.1	A	0.061
	Background Traffic (2029)	Stop-controlled		1.4	NA	0.219	North	9.5	A	0.077

Study Intersection	Scenario	Intersection Control	Peak Hour	Intersection			Critical Approach			
				Ave Delay (s)	LOS	v/c	Approach	Ave Delay (s)	LOS	v/c
	Total Traffic (2029)	Stop-controlled		3.4	NA	0.260	North	10.2	B	0.260
	Existing Traffic (2024)	Stop-controlled	PM	1.6	NA	0.186	North	8.8	A	0.047
	Background Traffic (2029)	Stop-controlled		1.7	NA	0.215	North	9.1	A	0.058
	Total Traffic (2029)	Stop-controlled		3.4	NA	0.275	North	9.5	A	0.153

LOS – Level of Service, Delay in seconds per vehicle, V/C – Volume to Capacity Ratio
N/A – Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control

Table 2: Proposed Trip Generation Rates and Estimated Peak Hour Trips

Land Use	GLA / Number of Units	Peak Hour	Trip Generation Rate*	Split		Total Trips		Total Trips
				IN	OUT	IN	OUT	
Single Dwelling Units (COTO210)	208 units	AM	1.00	25%	75%	28	84	112
		PM	1.00	70%	30%	79	34	113
Multi-level Townhouses (COTO232)	779 units	AM	0.75	25%	75%	87	261	348
		PM	0.75	70%	30%	243	104	347
Public Primary School (COTO520)	600 students	AM	0.85	50%	50%	89	89	178
		PM	0.30	50%	50%	32	32	64
Place of Public Worship (Weekday) (COTO561)	250 seats	AM	0.05	50%	50%	3	3	6
		PM	0.05	50%	50%	3	3	6
Pre-school (Day Care Centre) (COTO656)	150 students	AM	1.00	50%	50%	36	36	72
		PM	0.80	50%	50%	29	29	58
Offices (COTO710)	3 180m²	AM	2.10	85%	15%	36	6	42
		PM	2.10	20%	80%	9	34	43
Retail/Line Shops (ITE826)	2 120m²	AM	0.68	48%	52%	4	5	9
		PM	2.71	44%	46%	25	32	57
Total AM						**283**	**484**	**767**
Total PM						**420**	**268**	**688**

*Reductions applied to the trip generation rates to account for mixed-use and low vehicle ownership