

Klip Road Cemetery Extension

Traffic Impact Assessment

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List of Abbreviations and Acronyms

AMG	Access Management Guidelines
CCT	City of Cape Town
GLA	Gross Leasable Area
HVD	High Volume Driveway
LOS	Level of Service
LVD	Low Volume Driveway

MBT	Minibus Taxi
NMT	Non-motorised Transport
PT	Public Transport
RAG	Road Access Guidelines
TIA	Traffic Impact Assessment

1 Introduction

Zutari (Pty) Ltd is currently appointed on the City of Cape Town Contract 266C/2021/22: professional services with feasibility study in order to extend the existing Klip Road Cemetery. A portion of Erf 75562 and a portion of Erf 75567 which currently form part of existing cemetery buffer and a parking area should be investigated for further burial opportunities, roads or parking provision.

This project entails the extension of the existing Klip Road Cemetery (hereafter referred to as the Klip Road development). The proposed extension is to take place on Erf 75570, located along Klip Road in Grassy Park, a portion of Remainder Erf 75569 located along Victoria Road in Grassy Park as well as on Erf 75571 located between Victoria Road, Klip Road and Prince George Drive in Grassy Park. The extension of the cemetery exceeds 2500m² and the existing cemetery itself was previously extended and is therefore a listed activity in terms of the National Environmental Management Act. A portion of Erf 75562 and a portion of Erf 75567, which currently form part of existing cemetery, buffers a parking area and should be investigated for further burial opportunities, roads or parking provision.

A Traffic Impact Assessment (TIA) is required to inform the subsequent land use regulatory process as well as the formulation of eventual land release conditions.

1.1 Objectives

The primary purpose of this TIA is to examine the implications of trips generated by the Klip Road development and the impact this will have on the adjacent road network. This assessment will identify any necessary road network improvements that might be needed.

2 Site Description

2.1 Locality

The location of the proposed development site is in Grassy Park and falls within the jurisdiction of the City of Cape Town Municipality. The location of the existing cemetery and the proposed extension is shown in Figure 1. The site is approximately 28.94 hectares in extent, bounded by access routes Prince George Drive, Klip Road and Victoria Road.

For this TIA the site boundary excluded the roadway. A consolidation and subdivision planning application will be required. This falls outside the scope of this study.



Figure 1: Proposed location and property boundaries

2.2 Property Details and Land Use

Figure 1 shows that the Klip Road development area transverses five properties. The majority of the site lies on Erf 75571 and Erf 75569-RE with smaller portions located on Erf 75570, Erf 755670 and Erf 75562. Figure 2 shows the zoning map of Klip Road Cemetery which was obtained from the City of Cape Town Map Viewer website. The properties under consideration are currently zoned as Public Open Space 2.

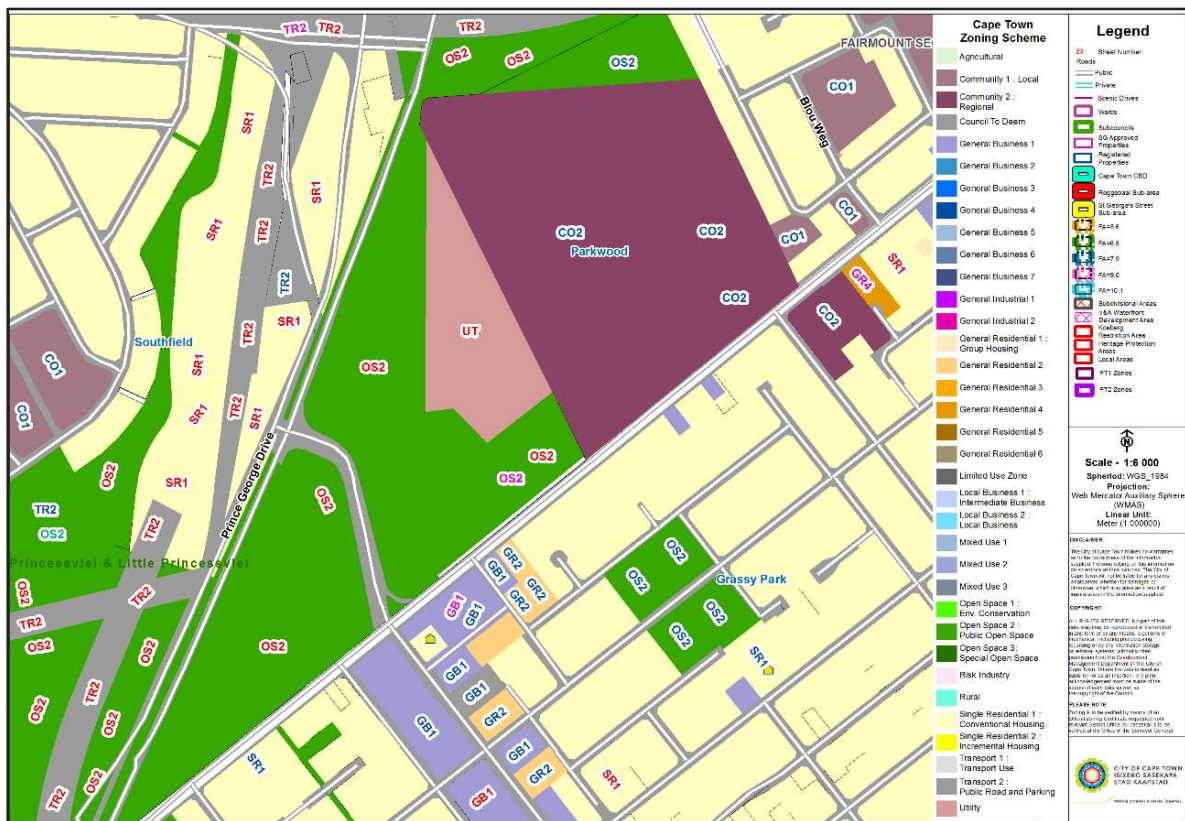


Figure 2: Zoning map

Considering that the proposed extension falls within the Open Space 2: Public Open Space classification, rezoning will not be required.

2.3 Developments in the area

It was assumed that there are no other planned developments within the study area.

3 Methodology

A typical TIA process involves the estimation of additional private vehicle, public transport (PT) and non-motorised transport (NMT) trips and the identification and analyses of remedial measures to mitigate potential impacts. This typically requires the construction of new roads and improvements at intersections with the provision of NMT and PT infrastructure. The impact on the external traffic on the road network will be investigated for the study areas as identified in Section **Error! Reference source not found.** of this report.

The following traffic engineering aspects were undertaken when preparing this TIA:

- ▶ Site observations.
- ▶ Traffic counts at five intersections during the AM and PM peak periods.
- ▶ Gathering of additional background information (planning information, geometry, parking survey data).
- ▶ Analysis of the existing traffic conditions and the capacity of the existing road network in the vicinity of the development. The status quo of intersection performance.
- ▶ Trip generation, distribution and assignment calculations.
- ▶ Test the impact of development traffic on intersection performance (considering a 3-year and 5-year post development horizon).
- ▶ Identify and recommend road upgrades, if necessary, ensure that this ties in with the Bellville Future City Masterplan. Recommendations and mitigation of traffic impacts where required.
- ▶ NMT and PT considerations (ensuring there are sufficient PT and NMT facilities within the study area).
- ▶ Access management, taking into consideration sight distance and intersection spacing criteria.
- ▶ Parking assessment.

4 Status Quo Assessment

4.1 Existing Road Network

The proposed Klip Road development is expected to have an impact on the surrounding road network. The roads that will be considered in this study, surrounding and impacting on the development site are shown in Figure 3. The development site is bounded by De Waal Road in the north, Prince George Drive in the east, Klip Road in the southeast and the site is bisected by Victoria Road.



Figure 3: Road network classification

The configuration and classification (based on the Access Management Guidelines (AMG, 2020)¹) of the roads are summarised in Table 1 and images of the roads are shown in Figure 4 to Figure 7. Prince George Drive is owned by the City of Cape Town whereas Klip Road and Victoria Road are owned by provincial government.

Table 1: Road classification and configuration

No	Road	Class	Geometry
1	De Waal Road (M38)	Class 2 Major Arterial	Single carriageway, 2 lanes per direction
2	Prince George Drive (M5)	Class 1 Principle Arterial	Dual carriageway, 2 lanes per direction
3	Klip Road (M55)	Class 3 Minor Arterial	Single carriageway, 1 lane per direction
4	Victoria Road	Class 3 Minor Arterial	Single carriageway, 1 lane per direction

¹ Access Management Guidelines, Second Edition, 2020



Figure 4: Prince George Drive, northbound



Figure 5: De Waal Road, westbound



Figure 6: Victoria Road, westbound



Figure 7: Klip Road, southwestbound

4.2 Study Intersections

Figure 8 shows the five critical intersections which will be impacted by the traffic generated from the proposed Klip Road development.



Figure 8: Location of study intersections

The geometric layout and control type of the study intersections are detailed in Table 2.

Table 2: Control type and geometry of study intersections

Intersecting Roads			Intersection Control Type	Intersection Geometry
1	De Waal Road East (M38)	Prince George Drive (M5)	Full signalised intersection	
2	De Waal Road West (M38)	Prince George Drive (M5)	Full signalised intersection	

3	Prince George Drive (M5)	Victoria Road	T-junction signalised intersection	
4	Klip Road (M55)	Victoria Road	Full signalised intersection	
5	Prince George Drive (M5)	Klip Road (M55)	Half signalised intersection	

4.3 Existing NMT and Public Transport Facilities

There are paved walkways along most of the roads considered in this study that are shown in Figure 9 to Figure 12. The signalised intersections provide safe means of crossing for pedestrians and the walkway network is mostly universally accessible with access ramps provided at almost all the intersections. The interchange between De Waal Road and Prince George Drive has a walkway on the northern side with ramps and safe places to cross at the signalised intersections. Victoria Road has walkways on both sides of the road, along the entire length of road. Prince George Drive has no NMT facilities other than safe places to cross at the signalised intersection with Victoria Road.



Figure 9: Existing NMT facilities along De Waal Road, eastbound



Figure 10: Existing NMT facilities along Victoria Road, northbound

Klip Road has paved walkways along the entire length of road on both sides of the road. The walkway on one side of Klip Road is shared by pedestrians and cyclists (see Figure 11).



Figure 11: Existing NMT facilities along Klip Road, northbound



Figure 12: NMT Facilities along cemetery along Klip Road, southbound

There are multiple existing minibus taxi (MBT) routes that run along the road network surrounding the development which are shown in Figure 13. There is one Golden Arrow Bus route that runs through Grassy Park.

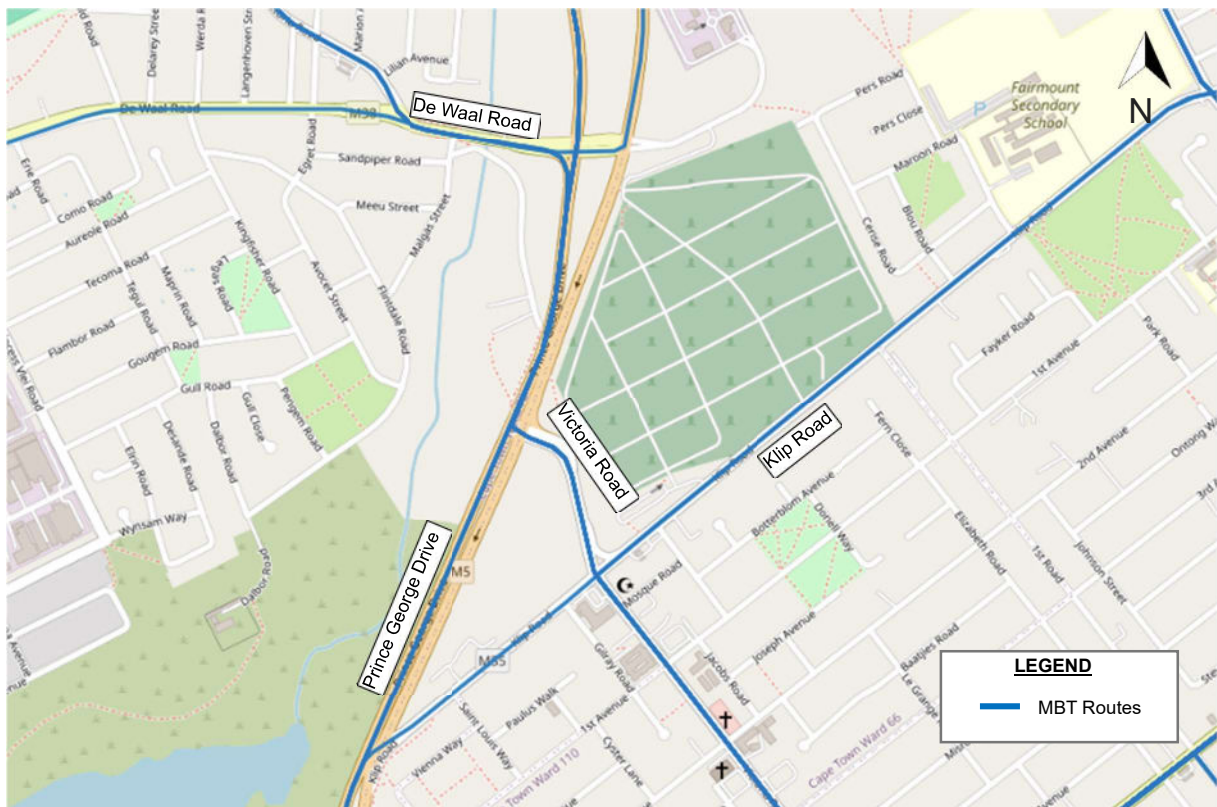


Figure 13: Existing minibus taxi routes

4.4 Existing Parking

There are multiple off-street parking facilities in the vicinity of the development. There is a parking area, shown in Figure 14, on the southern side of the existing Klip Road cemetery that is adjacent to Klip Road and Victoria Road. This is the main parking area of the existing cemetery. There is an unsurfaced parking area, see Figure 15, that is located on the northern side of the existing cemetery, adjacent to De Waal Road and Prince George Drive.



Figure 14: Existing parking along Klip Road



Figure 15: Existing gravel parking along De Waal Road

There are on-street parking facilities along Klip Road shown in Figure 16. Figure 17 shows a parking area that is situated in front of the cemetery's office building.



Figure 16: On-street parking, Klip Road, north-bound



Figure 17: Parking bays in front of cemetery office

Figure 18 is an aerial photograph showing how the main parking area at Klip Road Cemetery is utilised when multiple funeral services are in procession. During funeral services, private vehicles, minibus taxis and busses can be observed to be parking at the cemetery. On average, 6 to 10 busses per Saturday can be observed parking at the cemetery and in some cases, private vehicles and busses park directly on Klip Road or the walkway adjacent to it. Klip Road is wide enough to allow traffic to pass while vehicles are parked on the road, however this arrangement causes delays for the traffic travelling along Klip Road. The parking challenge experienced at this cemetery will have to be addressed, especially if there are plans to repurpose existing parking areas into new burial grounds.



Figure 18: Parking area utilisation during multiple funeral services

4.5 Existing Access

There are 3 vehicle access points and 1 pedestrian access point into the existing cemetery which are shown in Figure 19. Access 1 on the northern edge of the existing cemetery is closed. Street view of the access points are shown in Figure 20 to Figure 23.



Figure 19: Existing access points into cemetery



Figure 20: Closed access gate to cemetery from De Waal Road, Access 1



Figure 21: Pedestrian gate from Klip Road, Access 4



Figure 22: Vehicle access to cemetery's main parking lot from Klip Road, Access 2



Figure 23: Vehicle access from Klip Road, Access 3

4.6 Traffic Counts

Traffic counts were conducted at the study intersections on Saturday, 3 February 2024, as it was observed that there were funerals taking place during that time. The counts were done between 09:00 and 12:00 as this is the period during which the trips to/from the cemetery are expected to be at their highest. It should be noted, during this period approximately 20 funeral services took place.

Figure 24 indicates the locations where the traffic surveys were undertaken. Full intersection counts were done at all five study intersections and can be found in [Appendix A](#).



Figure 24 Traffic survey locations

From the traffic count surveys it was found that the AM peak hour occurred from 10:30 to 11:30 as shown in Table 3.

Table 3: AM Movements at study intersections

AM		Point 1	Point 2	Point 3	Point 4	Point 5	Total
09:00	10:00	3423	2276	3913	2542	2655	14809
09:15	10:15	3490	2316	4004	2588	2694	15092
09:30	10:30	3511	2364	4077	2616	2738	15306
09:45	10:45	3548	2436	4144	2635	2842	15605
10:00	11:00	3537	2531	4197	2620	2977	15862
10:15	11:15	3511	2608	4220	2571	3082	15992
10:30	11:30	3485	2682	4237	2489	3163	16056
10:45	11:45	3425	2705	4179	2358	3123	15790
11:00	12:00	3398	2697	4120	2229	3053	15497

5 Proposed Development

5.1 Detail of Development

Figure 25 shows the extent of the proposed Klip Road development. For the purpose of this analysis, the proposed development was divided into two segments where each segment was treated separately, generating their own trips with their own areas and access points.

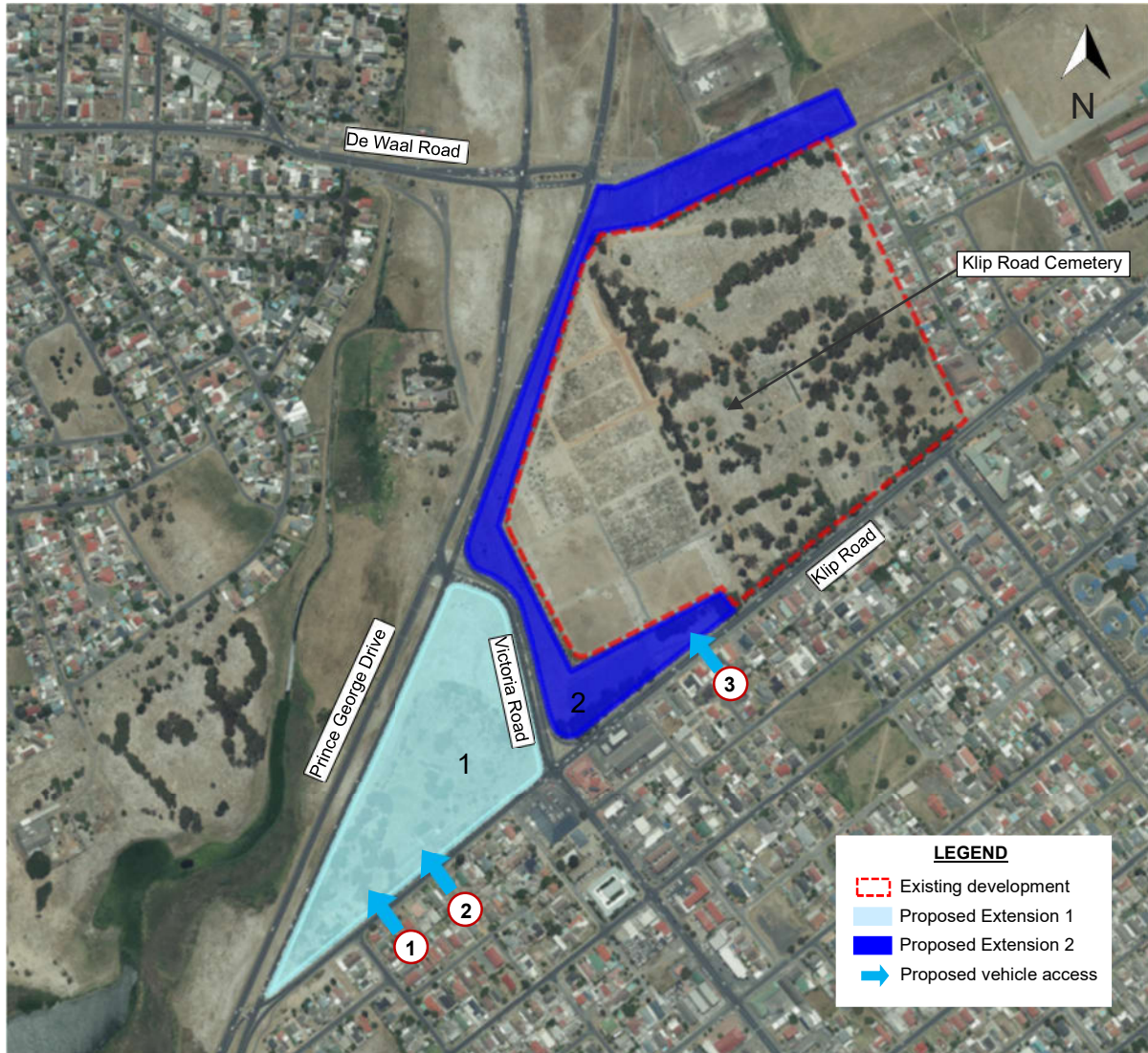


Figure 25: Proposed development extent

Table 4 shows the land use budget for the proposed Klip Road development presented in Figure 25.

Table 4: Land use budget

Land use	GLA (ha)
Cemetery extension 1 (Erf 75571)	5.33
Cemetery extension 2	4.23
Total	9.56

5.1.1 Proposed Vehicular Access

There are two proposed access driveways for Extension 1 of the proposed development that are shown in Figure 26. There is one proposed access driveway for Extension 2 of the proposed development (the access is an existing access point into the existing cemetery, see Figure 22).



Figure 26: Proposed access points into extension 1 (Access 1 and 2)

Table 5 shows the access classifications of the proposed access points according to the Access Management Guidelines (2020). In the AMG, low volume driveways are not permitted on Class 3 roads therefore all proposed accesses should be high volume driveways or equivalent collectors. The classifications were predominantly based on the observation found in Figure 18, which showed that approximately more than 100 vehicles per hour will use the parking facilities during funeral services on Saturdays.

Table 5: Proposed access classification

Proposed access	Development environment	Access type (AMG)
Access 1	Intermediate	Equivalent Collector
Access 2	Intermediate	Equivalent Collector
Access 3	Intermediate	Equivalent Collector

Table 6 shows the spacing compliance for the proposed accesses on Klip Road relative to Prince George Drive and Victoria Road. The position of Access 1 relative to the Prince George Drive / Klip Road intersection, does not meet the minimum spacing requirements as set out in the AMG. It is therefore proposed that Access 1 is closed, and Access 2 is made to be the main access point to Extension 1. Access 2 relative to Victoria Road does not meet the minimum spacing requirements as set out in the AMG. It is therefore recommended that Access 2 is moved 20-40m southwest of Klip Road in order to meet the AMG spacing requirements.

Table 6: Proposed access spacings along Klip Road

From	To	Development environment	Minimum recommended distance	Proposed distance
Prince George Drive	Access 1 (Equivalent Collector)	Intermediate	180m	170m
Prince George Drive	Access 2 (Equivalent Collector)	Intermediate	180m	285m
Victoria Road	Access 2 (Equivalent Collector)	Intermediate	180m	160m

Victoria Road	Access 3 (Equivalent Collector)	Intermediate	180m	230m
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5.2 Trip Generation

Trip generation rates were obtained from the South African Committee of Transport Officials (COTO) Trip Data Manual, TMH 17, Volume 1 (2013). The trip generation rates used are shown in Table 7.

Table 7: Applied trip generation rates

Land use	COTO code	Trip rate				Directional split			
		AM	PM	Midday	Sat	AM	PM	Midday	Sat
Cemetery	566	0.2	0.2	4	8	70:30	35:65	75:25	50:50

The TMH17 trip reduction rates for mixed use development, low vehicle ownership and for the development in the vicinity of a transit node were assumed to not be applicable for this development because public transport runs less frequently on Saturdays, so high vehicle use is expected.

Based on the Saturday trip generation rates and proposed land use, it is estimated that the extended portion of the cemetery will generate the trips as shown in Table 8.

Table 8 Generated trips

Land use	GLA (ha)	Saturday	
		IN	OUT
Cemetery extension 1	5.33	21	21
Cemetery extension 2	4.23	17	17
Total	9.56	38	38

5.3 Trip Distribution and Assignment

The trips generated by the proposed development were distributed onto the existing road network. The assumed trip distribution is shown in [Appendix B](#).

The assignment exercise was based on the following assumptions for Extension 1:

- **Incoming traffic:** It was assumed that 50% of the trips attracted to the development will be generated from the southern side of the development coming from Prince George Drive and 50% will be generated from the northern side of the development coming from Klip Road and Victoria Road.
- **Outgoing traffic:** The distribution of the outgoing traffic will be the reverse of the incoming traffic. It is assumed that 50% of the trips will turn right to go towards Prince George Drive and 50% will turn left to go towards Klip Road and Victoria Road.

The assignment exercise was based on the following assumptions for Extension 2:

- **Incoming traffic:** It was assumed that 50% of the trips attracted to the development will be generated from the northern side of the development coming from Klip Road and 50% will be generated from the southern side of the development coming from Victoria Road and Prince George Drive.

- **Outgoing traffic:** The distribution of the outgoing traffic will be the reverse of the incoming traffic. 50% of the trips will turn left to Klip Road and 50% will turn right to go onto Victoria Road and Prince George Road.

6 Network Analysis

6.1 Analysis Criteria

The impact on capacity and intersection operation was analysed using SIDRA Intersection 9 software (hereafter referred to as Sidra), reporting on the following aspects:

- ▶ Level-of-Service (LOS, see Table 9 for details);
- ▶ Average Delay per Vehicle (Seconds); and
- ▶ Degree of Saturation (v/c ratio).

6.1.1 Level of Service

The intersections analysed in this report have been measured according to “Level of Service” (LOS) with LOS A being the best condition with lower average delay and LOS F being the worst, usually indicating that the intersection is currently operating over capacity.

Table 9: Level of service (LOS) definition

Level of Service (LOS)	Intersection Type	
	Signals & Traffic Circles (Delay in Seconds)	Sign Control (Delay in Seconds)
A	$d < 10$	$d < 10$
B	$10 < d < 20$	$10 < d < 15$
C	$20 < d < 35$	$15 < d < 25$
D	$35 < d < 55$	$25 < d < 35$
E	$55 < d < 80$	$35 < d < 50$
F	$80 < d$	$50 < d$

The acceptable level of service for intersections is generally accepted to be LOS D. LOS E and F represent unstable conditions with longer queues and higher than tolerable delays. With LOS E and F most cycles fail to clear their associated queues, and the queue length increases with each progressive cycle.

6.1.2 Traffic Growth

In order to estimate the future traffic conditions, it was necessary to apply a growth rate to the existing (2024) traffic. The TMH 17 provides typical growth rates for low growth areas as 0-3% as shown in Table 10.

Table 10: TMH17 Typical traffic growth rates

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%

A growth rate of 2.7% was selected for the following reasons:

- The surrounding area is considered to be a low growth area (because there is lots of open land and the majority of housing is low density).
- The City of Cape Town's 2022-2027 Integrated Development Plan (IDP), indicated that the city's population grew at an average rate of 2.7% from 2011 to 2021.

This growth rate was applied to the background traffic over a 1-year and 5-year period respectively.

6.2 Analysis Scenarios

This study will analyse the key intersections for the following scenarios shown in Table 11.

Table 11: Summary of analysis scenarios

Scenario	Description	Traffic	Road network
Scenario 0	Existing traffic (2024) conditions	2024 Existing Traffic Conditions.	Existing road network.
Scenario 1	Implementation year (2025) without development traffic	2025 Traffic (Existing traffic conditions adjusted with growth rate of 2.7% per annum over a one-year period) without the planned development.	Existing road network. Optimised signal timings. Future road network: Klip Road / Victoria Road intersection
Scenario 2	Implementation year (2025) with development traffic	2025 Traffic (Existing traffic conditions adjusted with growth rate of 2.7% per annum over a one-year period) with the planned development.	Existing road network. Optimised signal timings. Future road network: Klip Road / Victoria Road intersection
Scenario 3	Five-year post implementation year (2030) without development traffic	2030 Traffic (2025 traffic conditions adjusted with growth rate of 2.7% per annum over a five-year period) without the planned development.	Existing road network. Optimised signal timings. Future road network: Klip Road / Victoria Road intersection
Scenario 4	Five-year post implementation year (2030) with development traffic	2030 Traffic (2025 traffic conditions adjusted with growth rate of 2.7% per annum over a five-year period) with the planned development.	Existing road network. Optimised signal timings. Future road network: Klip Road / Victoria Road intersection

7 Intersection Analysis

The study intersections have been analysed using SIDRA Intersection 9.1 software (the detailed output is provided in [Appendix C](#)). The Sidra results are summarised in the following sections. The intersection performance was considered in terms of overall LOS for each approach.

7.1 Scenario 0: Existing Traffic (2024) Conditions

The intersections listed in Table 12 were analysed with Sidra, using the existing geometric layouts and the 2024 traffic counts as a starting point so that the level of service (LOS) could be determined for each intersection. Signal timing settings, as received from the City of Cape Town (CCT), were used to analyse the 2024 Existing Traffic conditions.

Table 12: Existing Traffic (2024) intersection analysis summary

No.	Intersection	Ave. Delay (s)	v/c Ratio	Overall LOS	LOS per approach			
					South	East	North	West
1	De Waal Road West / Prince George Drive	25.3	0.86	C	C	B	-	C
2	De Waal Road East / Prince George Drive	44.4	1.01	D	-	D	B	F
3	Prince George Drive / Victoria Road	21.9	0.80	C	B	D	B	-
4	Klip Road / Victoria Road	556.8	2.25	F	C	F	B	F
5	Prince George Drive / Klip Road	83.4	1.23	F	F	A	B	-

From the Sidra analysis results it is noted:

- **De Waal Road West / Prince George Drive:** This intersection operates at a LOS C in the AM peak hour. An overall LOS C in the AM peak hour is considered acceptable.
- **De Waal Road East / Prince George Drive:** This intersection operates at an overall LOS D in the AM peak hour. The degree of saturation is 1.01 during the AM peak hour, indicating that the intersection operates at capacity. It is also noted that the western approach of this intersection operates at LOS F conditions. To address this issue, optimised signal timings will be used when analysing all other scenarios.
- **Prince George Drive / Victoria Road:** This intersection operates at an overall LOS C during the AM peak hour. The southeastern approach (east) to this intersection operates at LOS D in the AM peak hour. To address this issue, optimised signal timings will be used when analysing all other scenarios.
- **Klip Road / Victoria Road:** This intersection operates at a LOS F in the AM peak hour and this LOS is based on the northeastern (east) and southwestern (west) legs of the intersection which have the worst LOS ratings. The v/c ratio indicates that this intersection is operating well above capacity and will require future upgrading. To address this issue optimised signalised timings will be used when analysing all other scenarios and lane configuration changes were proposed.
- **Prince George Drive / Klip Road:** This intersection operates at a LOS F in the AM peak hour and this LOS is based on the worst leg which is the right-turn southern leg of the intersection. The degree of saturation is 1.23 during the AM peak hour, indicating that the intersection operates 23% above capacity. To improve the existing operation conditions, Sidra optimum cycle time will be used to test future scenarios.

Table 13 shows more detailed Sidra outputs of De Waal Road East / Prince George Drive, Klip Road / Victoria Road and Prince George Drive / Klip Road intersections.

Table 13: Detailed analysis of De Waal Road East / Prince George Drive, Klip Road / Victoria Road and Prince George Drive / Klip Road (Scenario 0)

	LOS	Queue Length (s)	V/C
	Colour code based on Level of Service LOS A LOS B LOS C LOS D LOS E LOS F	Colour code based on Queue Storage Ratio [<0.6] [0.6-0.7] [0.7-0.8] [0.8-0.9] [0.9-1.0] [>1.0] Queue Model: SIDRA Standard.	Colour code based on Degree of Saturation [<0.8] [0.8-0.7] [0.7-0.8] [0.8-0.9] [0.9-1.0] [>1.0]
De Waal Road East / Prince George			
Victoria Road / Klip Road			
Prince George Drive / Klip Road			

7.1.1 Proposed Mitigation Measures

To enhance the performance of all the intersections, optimised signal timings were used when analysing all other scenarios. Optimised signal timings were assumed to have a maximum cycle of 120 seconds. From the detailed analysis Sidra results, it is clear that the intersection between Klip Road and Victoria Road is operating above capacity during the AM peak hour, therefore infrastructure upgrades to the intersection are deemed necessary. To address the poor performance of the Klip Road / Victoria Road

intersection the following intersection configuration changes were proposed to be implemented in all future scenarios in Figure 27 and Figure 28.

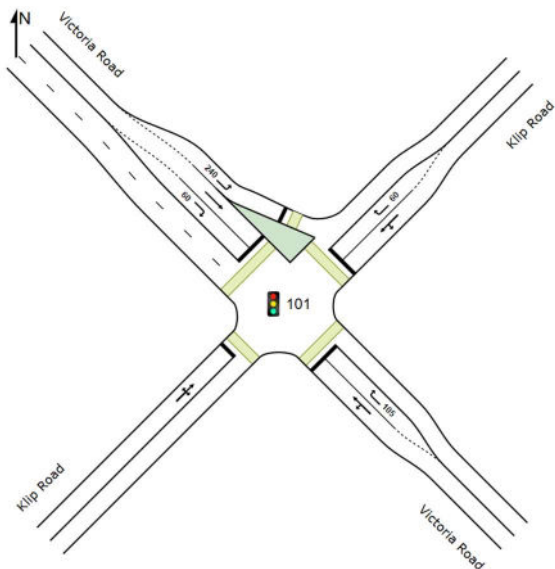


Figure 27 Current Victoria / Klip intersection configuration

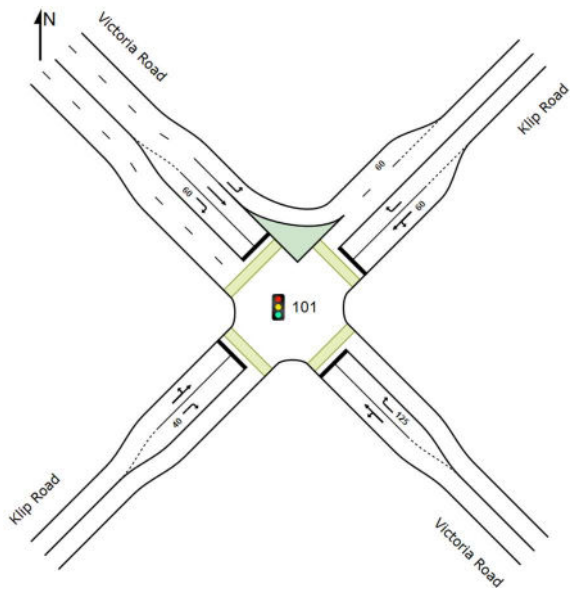
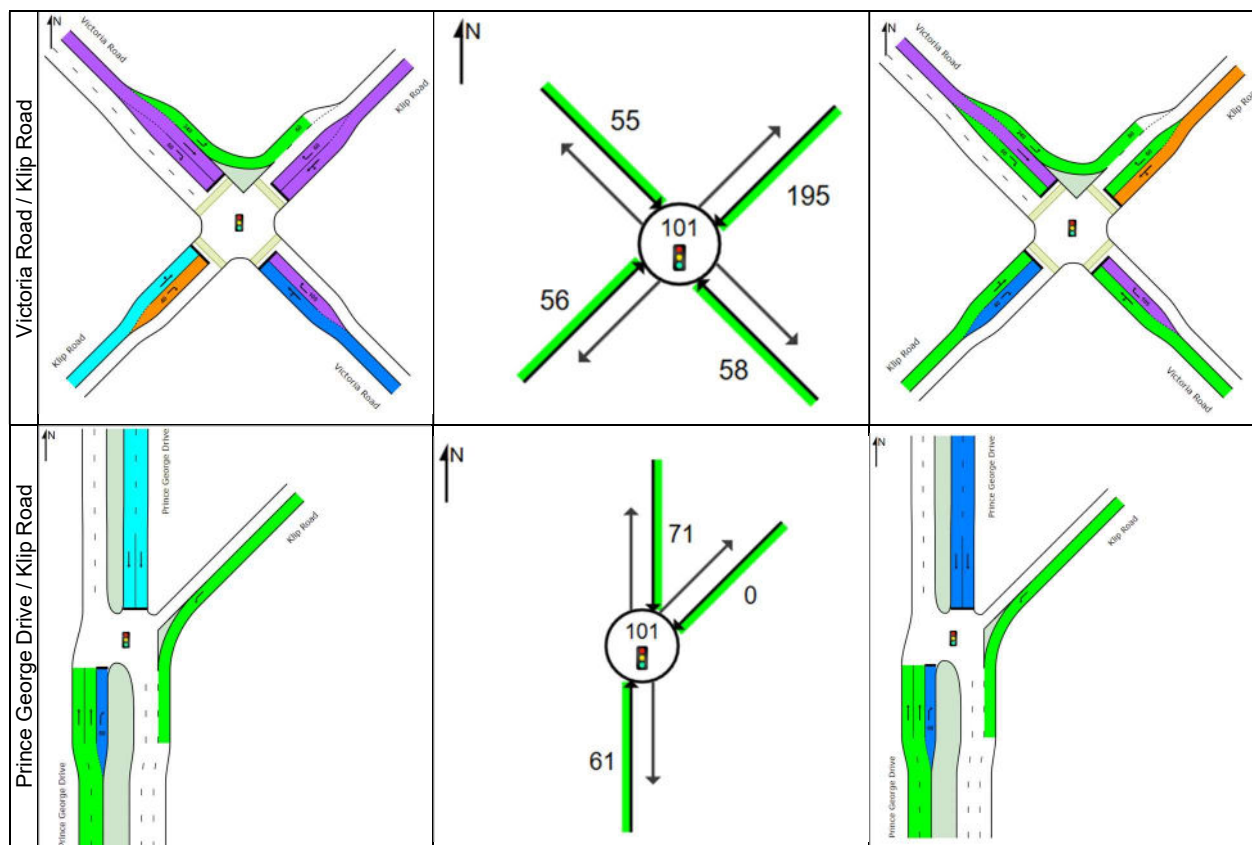


Figure 28 Proposed Victoria / Klip intersection configuration

Table 14 shows a more detailed Sidra outputs of De Waal Road East / Prince George Drive, Klip Road / Victoria Road and Prince George Drive / Klip Road intersections after mitigation measures were applied.

Table 14: Detailed analysis of De Waal Road East / Prince George Drive, Klip Road / Victoria Road and Prince George Drive / Klip Road (Scenario 0) after mitigation measures are applied.

	LOS	Queue Length (s)	V/C
	Colour code based on Level of Service LOS A LOS B LOS C LOS D LOS E LOS F	Colour code based on Queue Storage Ratio [< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Queue Model: SIDRA Standard.	Colour code based on Degree of Saturation [< 0.8] [0.8 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0]
De Waal Road East / Prince George			



- **De Waal Road East / Prince George Drive:** This intersection operates at an overall LOS C in the AM peak hour. An overall LOS C in the AM peak hour is considered acceptable.
- **Klip Road / Victoria Road:** This intersection operates at a LOS D. The v/c ratio of 0.91 indicates that this intersection is almost operating at capacity.
- **Prince George Drive / Klip Road:** This intersection operates at a LOS B in the AM peak hour which is considered acceptable.
- All other intersections operate at an acceptable LOS level.

7.2 Scenario 1: 2025 Implementation Year without Development Traffic

A 2.7% annual growth rate was applied to the 2024 background traffic to estimate the 2025 background traffic. The study intersections were analysed in Sidra using the grown traffic volumes, optimised signal timings and proposed infrastructure changes. The results are summarised in Table 15 and the worst movement LOS are shown in brackets using the following terminology to identify the movements: Right Turn (RT), Left Turn (LT) and Through (T).

Table 15: Implementation traffic (2025) without development intersection analysis summary

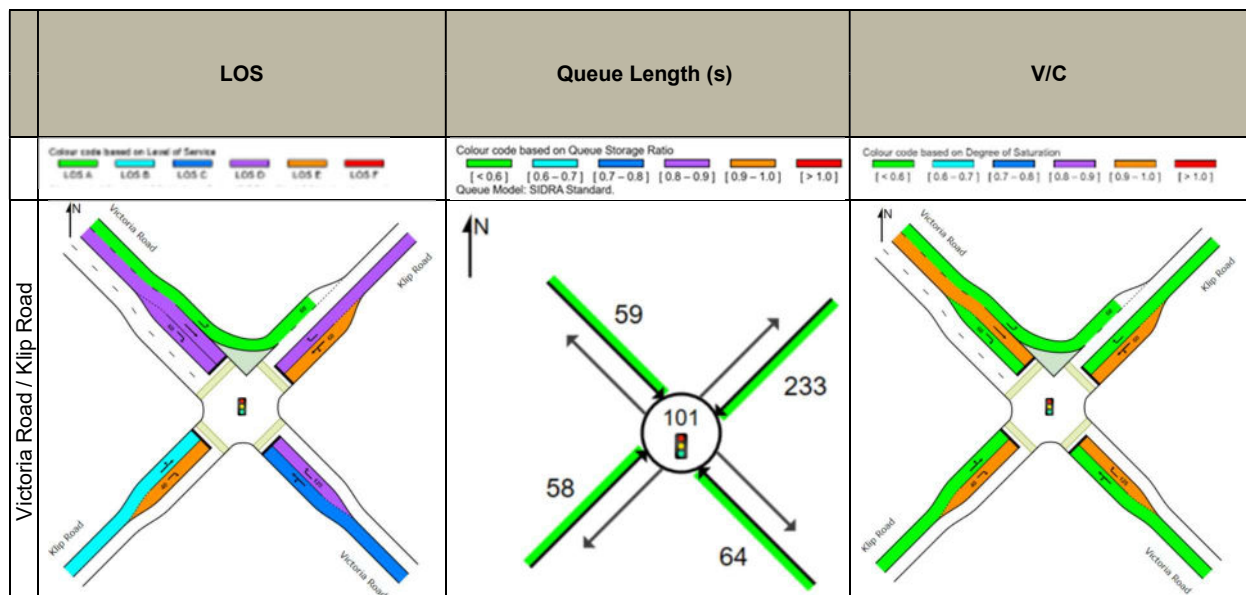
No.	Intersection	Ave. Delay (s)	v/c Ratio	Overall LOS	LOS per approach (Worst performing movement: LOS)			
					South	East	North	West
1	De Waal Road West / Prince George Drive	14.4	0.79	B	B	B	-	B
2	De Waal Road East / Prince George Drive	28.6	0.83	C	-	D	C	D
3	Prince George Drive / Victoria Road	16.8	0.82	B	B (RT: C)	C	B	-

4	Klip Road / Victoria Road	45.1	0.95	D	C (RT: E)	D	E	D
5	Prince George Drive / Klip Road	11.2	0.77	B	A	A	B	-

From the Sidra analysis results it is noted:

- **De Waal Road West / Prince George Drive:** This intersection operates at an overall LOS B which is considered acceptable.
- **De Waal Road East / Prince George Drive:** This intersection operates at a LOS C in the AM peak hour which is considered acceptable.
- **Prince George Drive / Victoria Road:** This intersection operates at a LOS B in the AM peak hour which is considered acceptable.
- **Klip Road / Victoria Road:** This intersection operates at an overall LOS D condition during the AM peak hour. The average delay and v/c ratio have significantly decreased from scenario 0 with the proposed mitigation measures and the background traffic for 1 year. The intersection is almost operating at capacity and experiences an average delay of 45.1s.
- **Prince George Drive / Klip Road:** This intersection operates at a LOS B in the AM peak hour which is considered acceptable.

Table 16: Detailed analysis of Klip Road / Victoria Road (Scenario 1)



7.3 Scenario 2: 2025 Implementation Year with Development Traffic

The development trips were added to the expected 2025 background traffic. The study intersections were modelled in Sidra and the results are summarised in Table 17.

Table 17: Implementation traffic (2025) with development intersection analysis summary

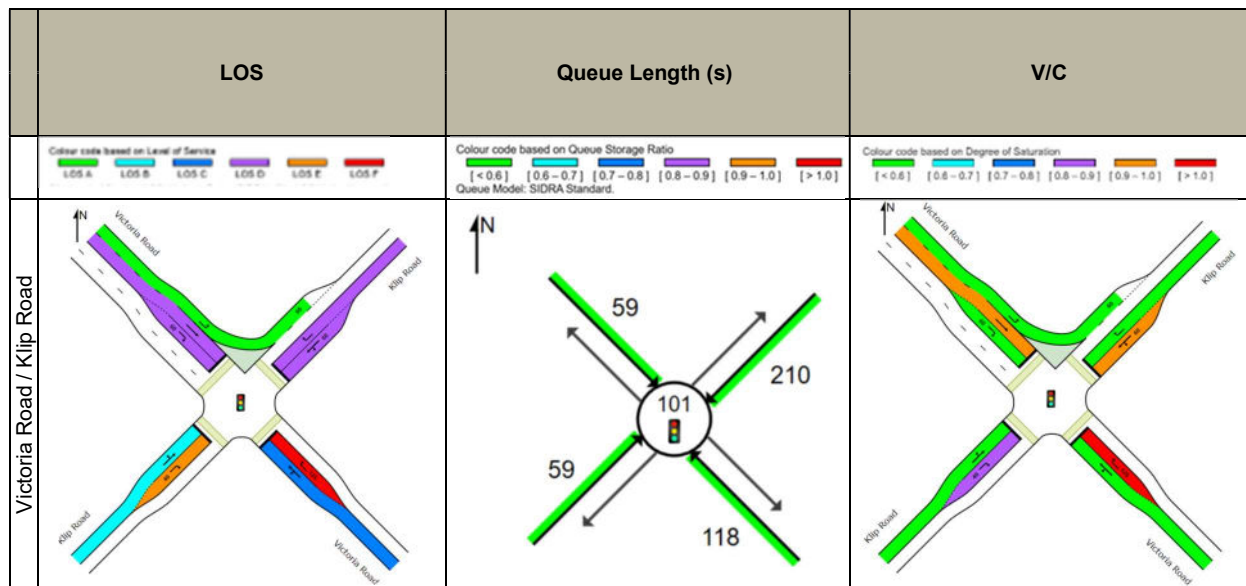
No.	Intersection	Ave. Delay (s)	v/c Ratio	Overall LOS	LOS per approach (Worst performing movement: LOS)			
					South	East	North	West
1	De Waal Road West / Prince George Drive	14.4	0.79	B	B	B	-	B
2	De Waal Road East / Prince George Drive	28.7	0.84	C	-	D	C	D
3	Prince George Drive / Victoria Road	16.8	0.82	B	B (RT: C)	C	B	-

4	Klip Road / Victoria Road	51.7	1.04	D	C (RT: E)	F	D (T: E)	D
5	Prince George Drive / Klip Road	11.7	0.82	B	A	A	B	-

From the Sidra analysis results it is noted:

- **Klip Road / Victoria Road:** This intersection still operates at a level of service D in the AM peak hour. This is acceptable however there are two through movements on Klip Road that experiences LOS E which may become a problem in the future.
- All other intersections were found to operate under acceptable conditions.

Table 18: Detailed analysis of Klip Road / Victoria Road (Scenario 2)



7.4 Scenario 3: Five years post implementation year (2030) without Development Traffic

A 2.7% annual growth rate was applied to the 2025 background traffic to estimate the 2030 background traffic. The study intersections were analysed in Sidra using the grown traffic volumes. The results are summarised in Table 19.

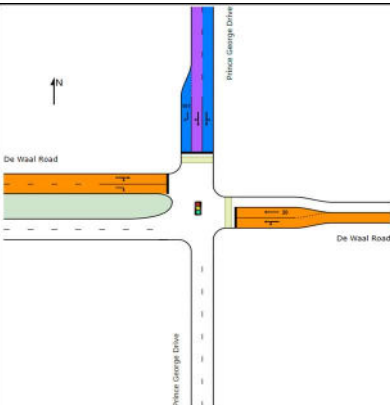
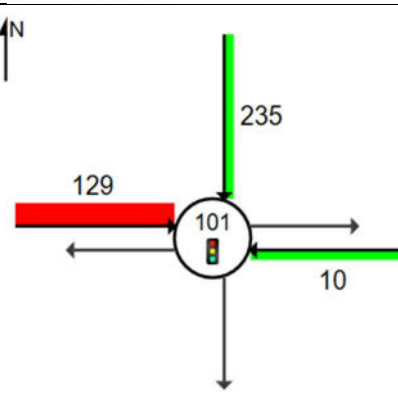
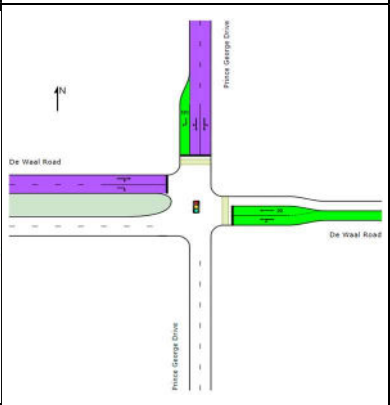
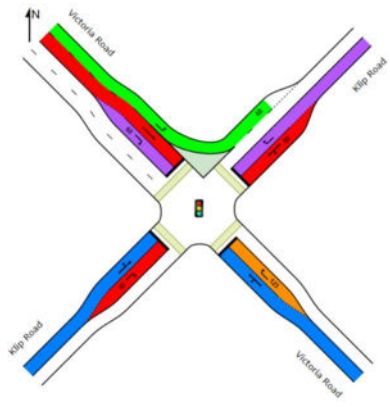
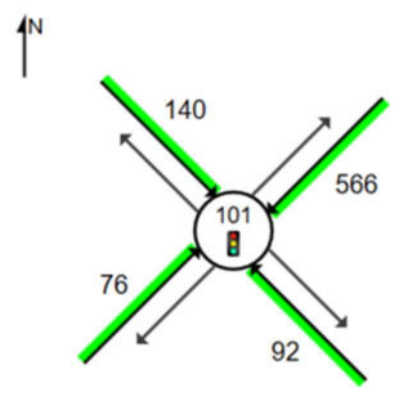
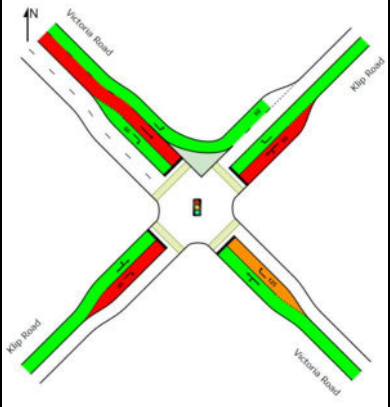
Table 19: Implementation year traffic (2025) without development intersection analysis summary

No.	Intersection	Ave. Delay (s)	v/c Ratio	Overall LOS	LOS per approach (Worst performing movement: LOS)			
					South	East	North	West
1	De Waal Road West / Prince George Drive	17.9	0.84	B	B (R: C)	B	-	C
2	De Waal Road East / Prince George Drive	43.7	0.89	D	-	E	D	E
3	Prince George Drive / Victoria Road	21.9	0.83	C	B (RT: D)	D	B	-
4	Klip Road / Victoria Road	133.3	1.20	F	F	D (RT: E)	F	F
5	Prince George Drive / Klip Road	18.8	0.92	B	B	A	C	-

From the Sidra analysis results it is noted:

- **De Waal Road East / Prince George Drive:** This intersection operates at a LOS D in the AM peak hour which is considered acceptable. The western approach experiences queue lengths that are not acceptable.
- **Klip Road / Victoria Road:** This intersection operates at a LOS F in the AM peak hour. The degree of saturation is 1.20 during the AM peak hour, indicating that the intersection operates at 15% above capacity and experiences an average delay of 133.3s. The intersection may need future upgrades.
- All other intersections were found to operate under acceptable conditions.

Table 20: Detailed analysis of De Waal Road East / Prince George Drive and Klip Road / Victoria Road (Scenario 3)

	LOS	Queue Length (s)	V/C
	Colour code based on Level of Service LOS A LOS B LOS C LOS D LOS E LOS F	Colour code based on Queue Storage Ratio Queue Model: SIDRA Standard. [< 0.6] [0.6 - 0.7] [0.7 - 0.8] [0.8 - 0.9] [0.9 - 1.0] [> 1.0]	Colour code based on Degree of Saturation [< 0.6] [0.6 - 0.7] [0.7 - 0.8] [0.8 - 0.9] [0.9 - 1.0] [> 1.0]
De Waal Road East / Prince George			
Victoria Road / Klip Road			

7.5 Scenario 4: Five years post implementation year (2030) with Development Traffic

The development trips were added to the expected 2030 traffic. The study intersections were modelled in Sidra and the results are summarised in Table 21.

Table 21: Implementation year traffic (2030) with development intersection analysis summary

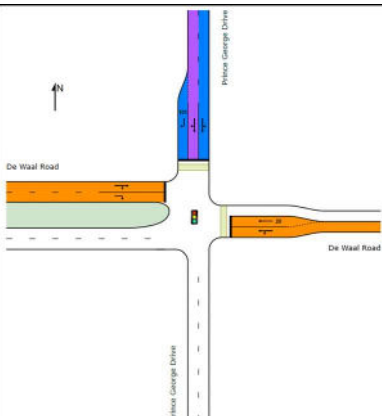
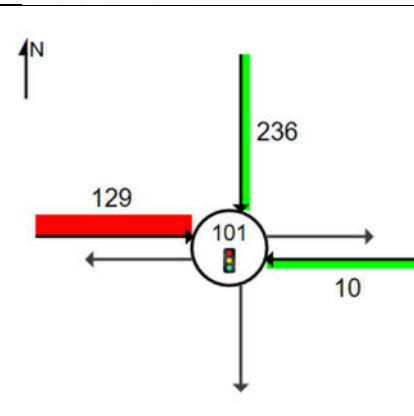
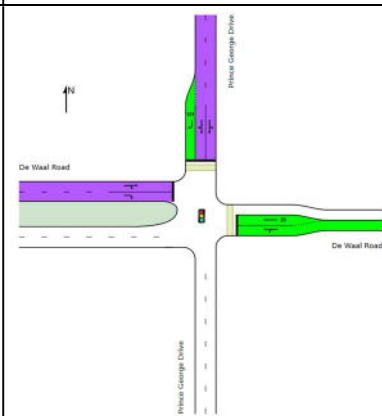
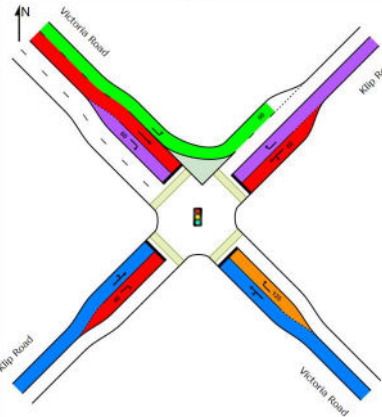
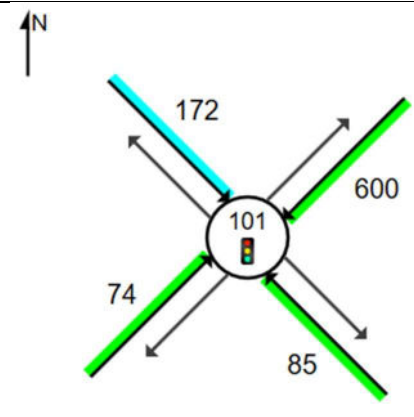
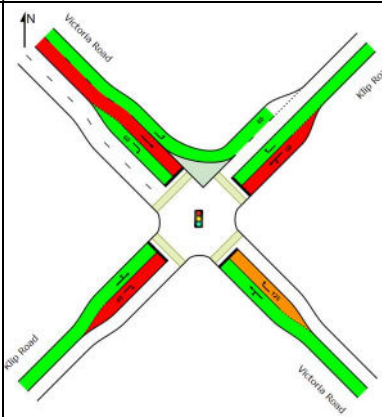
No.	Intersection	Ave. Delay (s)	v/c Ratio	Overall LOS	LOS per approach (Worst performing movement: LOS)			
					South	East	North	West
1	De Waal Road West / Prince George Drive	18.0	0.84	B	B (RT: C)	B	-	C
2	De Waal Road East / Prince George Drive	43.8	0.89	D	-	E	D	E

3	Prince George Drive / Victoria Road	21.9	0.83	C	B (RT: D)	D	B	-
4	Klip Road / Victoria Road	144.7	1.12	F	E (RT: F)	D (RT: E)	F	F
5	Prince George Drive / Klip Road	19.7	0.93	B	B (RT: D)	A	C	-

From the Sidra analysis results it is noted:

- **De Waal Road East / Prince George Drive:** This intersection operates at a LOS D in the AM peak hour which is considered acceptable. The western approach experiences queue lengths that exceed the space available
- **Klip Road / Victoria Road:** This intersection still operates at a level of service F in the AM peak hour. This is not acceptable. The average delay is 144.7s and the v/c ratio indicates that the intersection operates 12% above capacity. This intersection may require future upgrades.
- All other intersections were found to operate under acceptable conditions.

Table 22: Detailed analysis of De Waal Road East / Prince George Drive and Klip Road / Victoria Road (Scenario 4)

	LOS	Queue Length (s)	V/C
	Colour code based on Level of Service LOS A LOS B LOS C LOS D LOS E LOS F	Colour code based on Queue Storage Ratio Queue Model: SIDRA Standard. [< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0]	Colour code based on Degree of Saturation [< 0.8] [0.8 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0]
De Waal Road East / Prince George Drive			
Victoria Road / Klip Road			

8 Non-motorised Transport

There are adequate NMT facilities along the access points to the proposed development.

9 Public Transport

There is adequate taxi route provision along roads in the vicinity of the development. Future provision should be made for bus and MyCiTi routes.

10 Parking

The number of parking bays that a particular land use requires is calculated based on parking rates provided in policy documents. The City of Cape Town Municipal Planning Amendment Bylaw (2019) provides such rates for various land-uses except a cemetery. It was assumed that a self-storage facility will attract the same traffic as a cemetery (as it is a large amount of space that attracts a few visitors).

For the purpose of this report, it is assumed that the proposed development falls within a standard area where standard parking ratios are applicable. The parking ratios used and the estimated number of parking bays needed are shown in Table 23.

Table 23: Parking requirement

Land Use	Source	Recommended Parking Rate	Estimated parking Bays
Self-storage	CoCT Municipal Planning Amendment Bylaw 2019	0.2 bays per 100m ²	Extension 1: 107 Extension 2: 85

The parking lot of the existing cemetery will become part of cemetery extension and so parking must be provided for within the extensions.

11 Conclusions

Table 24 summarises the conclusions of this report.

Table 24: Summary of conclusions

Item	Conclusion
Proposed Development	Recreation and Parks is looking to extend the cemetery The proposed extension of the cemetery will generate approximately 77 trips on a Saturday – this is the maximum number of trips the cemetery is expected to generate.
Access	Existing access routes will be maintained, and a new vehicular access route will be opened on Klip Road to extension 1
Proposed development Parking	Number of parking bays provided (off street parking area): 107 bays in extension 1 and 85 bays in extension 2
Impact on road network	The TIA showed that the cemetery development traffic has a nominal impact on the service levels of the intersections surrounding the development.

12 Recommendations

This TIA supports the extension of the development. However, it is recommended that the City proposes hard or soft infrastructure measures to accommodate the growth of the background traffic especially on the intersection between Klip Road and Victoria Road since the development has a minimal impact on the current service levels of the intersection.

Stagger funerals services, to avoid too many funeral services occurring in a short amount of time. This will alleviate some traffic from the surrounding road network on days which funerals take place, when the development generates/produces the majority of its trips. Funerals should be staggered such that parking can accommodate the number of vehicles that will park for the funeral. To avoid vehicle overflowing into Klip Road.

In diversity there is beauty and
there is strength.

MAYA ANGELOU

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