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C2885/01TIA

Proposed Cemetery to be located on the Remainder of Erf 13 of the Farm Putfontein 26-IR, Shangrila Benoni, Ekurhuleni

Traffic Impact Assessment (TIA) – *Draft*

December 2020

CIVIL CONCEPTS CONSULTING ENGINEERS, Civil Concepts (Pty) Ltd, 50, 15th Street, Menlo Park, PO BOX 36148, Menlo Park, 0102, Tel: 012 460 0008, Fax: 012 460 0005, mail@civilconcepts.co.za

REPORT SHEET

PROJECT TITLE: PROPOSED CEMETERY TO BE LOCATED ON THE REMAINDER OF ERF 13 OF THE FARM PUTFONTEIN 26-IR, SHANGRILA BENONI, EKURHULENI

TRAFFIC IMPACT ASSESSMENT (TIA) - *Draft*

PREPARED FOR: KAMADI CONSULTING (PTY) LTD

PREPARED BY: CIVIL CONCEPTS (PTY) LTD

PROJECT TEAM: MM GOUNDEN TRAFFIC ENGINEER

LE NDLOVU TECHNOLOGIST

Copy	Date	Done By	Checked	Approved
V1 Draft 1	2020/12/07	LE Ndlovu	MM Gounden	MM Gounden
V2				

DECLARATION

I certify that this study has been prepared under my immediate supervision and that I have experience and training in the field of traffic and transportation engineering.

Signed: 

Name: MM Gounden

Qualification: BSc Eng (Civil) Pr Eng

Registration Number: ECSA 2013 0143

DISCLAIMER

GAUTENG PROVINCE
ROADS AND TRANSPORT
REPUBLIC OF SOUTH AFRICA

City of Ekurhuleni

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EXECUTIVE SUMMARY

This study analysed the traffic impact of the proposed cemetery to be located on the Remainder of Erf 13 of the Farm Putfontein 26-IR, in the Eastern Part of Ekurhuleni, Shangrila, North of Benoni.

The extent of the proposed cemetery is ± 32 ha.

This Traffic Impact Assessment (TIA) was prepared to determine the impact of the traffic to be generated by the proposed cemetery development, on the surrounding road network. This study was done in accordance with the Committee of Transport Officials (COTO) TMH17 Trip Data Manual, (COTO) TRH26 – South African Road Classification and Access Management Manual, COTO TMH15 South African Engineering Service Contribution Manual for Municipal Road Infrastructure, Ver 1.0, dated September 2012, (COTO) THM16 Volume 2 Traffic Impact and Site Traffic Assessment Standards and Requirements Manual, AutoJ Technical Manual, Aimsun Next 8.4 Application Guide and the Highway Capacity Manual (2010).

It is anticipated that the proposed development may generate **218 trips** during the Saturday peak hour. A 15% trip reduction was applied to account for public transport trips.

Saturday classified traffic counts were done at three existing junctions on the 28th of November 2020 by Trafsol Data Specialists.

A five-year horizon (2026), was considered for capacity analysis.

No information on latent rights was received from the local municipality. The traffic counts were therefore escalated at a 3% annual growth rate to account for any unknown latent rights within the vicinity of the proposed development and to account for an increase in vehicle ownership.

Access to the proposed cemetery site will be provided off Springs Road in the form of a priority-controlled T-junction.

Four (4) junctions including the proposed were analysed in this traffic study. The Aimsun Next 8.4.3 and Auto J Intersection developed by Dr. John Sampson software programs were used for the capacity analysis calculations.

The capacity analysis results indicate that road upgrades are required at the Springs Road / Pretoria Road (M44) junction due to the escalated 2026 Saturday peak hour background traffic WITHOUT development trips. It is proposed that the junction be converted to a single roundabout to mitigate the existing 2026 background traffic problems. It is the responsibility of the City of Ekurhuleni to upgrade this junction.

The capacity analysis results also shows that the Springs Road / Kingsway Road / Durandt Road / Kerk Street junction experiences delay problems on the side roads (Springs Road and Kerk Street) during the Saturday peak hour due to the stop control, however queues dissipate quickly. There are no delays or queues along Kingsway Road.

It is recommended that the City of Ekurhuleni investigate the Springs Road / Kingsway Road / Durandt Road / Kerk Street junction capacity during the weekday peak hours to determine if signalisation is required.

The Springs Road / Combrink Street junction will operate satisfactorily with the existing lane configuration. No road upgrades are required.

No additional road upgrades are required at the analysed junctions to accommodate the proposed development traffic. The access will operate satisfactorily with the proposed lane configurations.

Parking will be provided by the developer in consultation with the relevant departments of the City of Ekurhuleni (CoE) as per the current town planning guidelines.

This Traffic Impact Assessment will be submitted to the City of Ekurhuleni (CoE) and Gauteng Province: Department of Road and Transport (GPDRT) for approval.

1. INTRODUCTION

1.1 Background

Civil Concepts (Pty) Ltd was appointed by Kamadi Consulting (Pty) Ltd to prepare a Traffic Impact Assessment (TIA) in support of the proposed cemetery development to be located on the Remainder of Erf 13 of the Farm Putfontein 26-IR, in the Eastern Part of Ekurhuleni, Shangrila, north of Benoni.

The extent of the proposed cemetery is ± 32 ha.

The extent of the study area was determined in consultation with the City of Ekurhuleni officials, by identifying the junctions near the proposed development on which the traffic to be generated by the development may have a significant impact. The trips generated by the proposed cemetery development were discussed and agreed with the City of Ekurhuleni officials. The consultation process was done as prescribed in Section 4.2 of the TMH 16 Volume 1 South African Traffic Impact and Site Traffic Assessment Manual (refer to ***ANNEXURE A*** for CoE mail correspondence).

The objective of this traffic assessment is to determine the impact of the proposed land-use development trips on the surrounding road network. The land-use rights and trip generation are described first. This is followed by a description of the existing and proposed traffic volumes and the road network. The traffic operations at the junctions are calculated and upgrading proposals made. Conclusions and recommendations are made at the end of the report.

1.2 Location

The development site is located in the eastern quadrant of the Springs Road /Combrink Street junction. It will be bordered by the Springs Road to the west and Combrink Street to the north as shown in Figure 1.1.

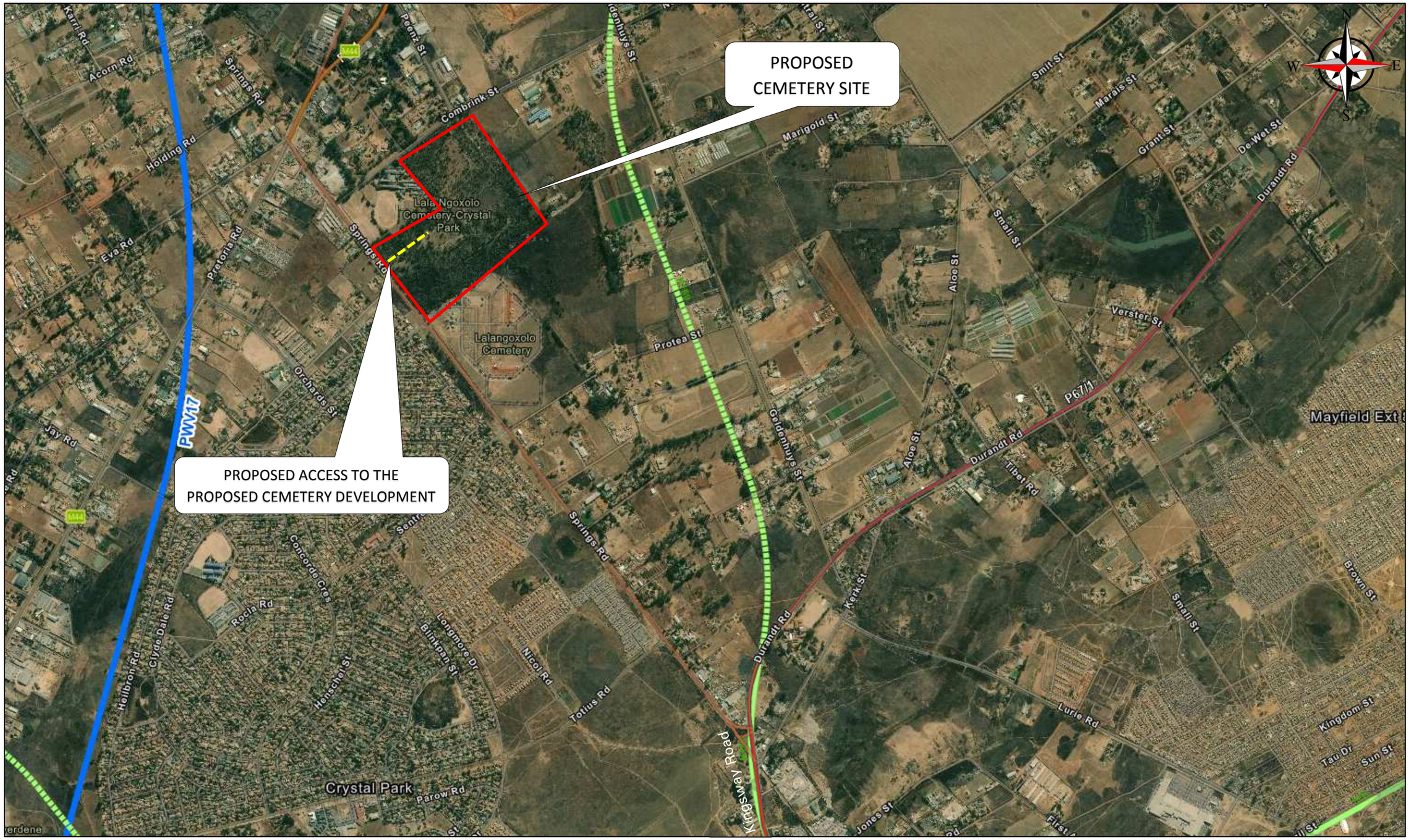


Figure 1.1: Locality Plan

1.3 Definitions

1.3.1 2010 Highway Capacity Manual

The following definitions from the 2010 Highway Capacity Manual are applicable to this report:

Level of Service (LOS)

Level of Service is defined in terms of delay. Delay is a measure of driver discomfort, frustration, fuel consumption and lost travel time. The levels of Service for junctions as defined in the 2010 Highway Capacity Manual are shown in Table 1.1 below.

TABLE 1.1: LEVEL OF SERVICE DEFINITIONS

Level of Service	Control delay per vehicle (s/veh)	
	Signalised junctions	Unsignalised junctions
A	< 10	< 10
B	10 to 20	10 to 15
C	20 to 35	15 to 25
D	35 to 55	25 to 35
E	55 to 80	35 to 50
F	> 80	> 50

Capacity

The maximum hourly rate at which vehicles can reasonably be expected to traverse a lane or roadway during a given period under prevailing roadway, traffic and control conditions.

Volume

The hourly rate (v/h), the actual flow rate for an approach or lane.

Volume to capacity ratio (V/C)

The ratio of flow to capacity.

1.3.2 Aimsun Next 8.4.3 Application Guide

Aimsun Next is traffic modelling software that allows you to model anything from a single intersection to an entire region. With thousands of licensed users in government agencies, consultancies and universities all over the world, Aimsun Next stands out for the exceptionally high speed of its simulations and for fusing travel demand modelling, static and dynamic traffic assignment with mesoscopic, microscopic and hybrid simulation – all within a single software application.

Highway Capacity Manual Statistics

Aimsun Next provides HCM 2010 compliant statistics. The statistics are calculated on approaches, weaving areas, merge/diverge areas and sections categorised as Urban, Freeway, and Multilane Highway. The HCM calculations are documented in the HCM Algorithms Section.

An approach to a signalised intersection is defined, in HCM, to be extended backward from the stop line a sufficient distance to include the maximum queue during the study period, and in any case at least 250ft. Note that, approaches are also built when there's a downstream Yield or Stop sign, even if the junction is not signalised.

The HCM statistics are as follows. Depending on each type, a different table for LOS is applied.

- Density: number of vehicles in each lane, dividing by the length of the lanes and dividing by the heavy vehicle adjustment factor.
- Level of Service: determined based on density in PCU/mi/ln
- Maximum Back of Queue: maximum queue length in feet.
- Mean Back of Queue: average queue length in feet
- Number of Stops: number of stops in the approach
- Overflow: Percentage of time that the queue is under an overflow status.
- Queue Delay: amount of time that vehicles remain under queueing status measured in seconds/veh.
- Queue Length: average queue length in number of vehicles.
- Segment Delay: average delay time for each vehicle in seconds.
- Slow Vehicle Proportion: percentage of slow vehicles.
- Stopped Delay: average time of vehicles being in stopped state.

Simulation Delay Time and/ Level of Service (LOS)

Traffic conditions on transportation facilities are commonly defined by using the delay and Level of Service (LOS) concept.

Aimsun Next defines HCM statistics based on colour coding of the traffic stream and links to indicate which parts of the network have the best and worst results for each overlay (seconds/veh etc, density in PCU/mi/ln etc) as shown in Table 1.2 below. The traffic operations are included in **Section 5** of this report.

TABLE 1.2: SIMULATION DELAY TIME DEFINITIONS

Colour	Mean delay per pcu (s/veh)	Colours Explanation
	-1 to 0	Describes operations with a very low delay. This occurs when progression is extremely favourable.
	0 to 25	Generally, occurs with good progression and/or short traffic signal cycle lengths.
	25 to 50	Has higher delays than level of service colour green These higher delays may result from fair progression and/or longer cycle lengths.
	50 to 75	Influence of congestion has become more noticeable.
	75 to 90	Considered the limit of acceptable delay. These high delay values generally indicate poor progression.
	> 90	Has delays that are considered unacceptable to most driver.

1.4 Peak Hour Factor (PHF) and Base Saturation flow

1.4.1 Peak Hour Factor (PHF)

Peak rates of flow are related to hourly volumes using the Peak-Hour Factor (PHF). This factor is defined as the ratio of total hourly volume to the peak rate of flow within the hour:

PHF = Total Hourly Volume/ (4 x Highest 15 min. volume)

The peak hour factors per approach were however calculated at the junctions analysed as shown in Figure 3.2. These PHF were used to calibrate the SIDRA model for the junctions analysed.

Model calibration is the adjustment of constants and other model parameters in estimated or asserted models to make the models replicate observed data for a base year or otherwise produce more reasonable results.

1.4.2 Basic Saturation Flow

The base saturation flow is a very important road traffic performance measure of the maximum rate of flow of traffic.

In AutoJ, the HCM 2000 [4] follow up times have mainly been adopted. These were then compared with saturation flows reported in other literature (S = 3600 / tf) and after simulation, the values listed in Table 4.3 of the AutoJ Technical Manual, page 15 were found to be best. The all-way stop values were derived from first principles based on the fact that vehicles at an all-way stop do not have to take gaps but operate on a first-come first-served basis, which, in the absence of conflicting traffic, is how quickly they can stop, look and proceed. Further research may refine these values.

For multiple approach lanes, each additional lane does not have the same saturation flow as a single lane. Due to turning visibility and the difficulty of more than one vehicle taking the same gap in multi-lane turning situations, each additional lane was considered to add 95% of a single lane to the capacity, depending on the turning movement. In addition, left and right turning lane capacities are reduced by 3% and 6% times the number of lanes for yield and stop streets respectively.

1.5 Time Horizon

The base year is 2021. A 5-year horizon (2026) was analysed as part of this Traffic Impact Assessment (TIA) to determine transportation improvements that are required to accommodate the proposed development as prescribed in in the Committee of Transport Officials' (COTO) TMH 16, Volume 1 – South African Traffic Impact and Site Traffic Assessment Manual, Version 1.0 (dated August 2012).

1.6 Determination of Road Upgrading

The COTO TMH15 South African Engineering Service Contribution Manual for Municipal Road Infrastructure, Ver 1.0, dated September 2012 states:

Engineering services are classified as internal or external in accordance with the requirements of this manual.

The Applicant is responsible for the installation and provision of internal engineering services. This includes the provision of land required to accommodate such services.

The Municipality is responsible for the installation and provision of external services (including the expropriation of land required by such services). The Applicant, however, will contribute to

the cost incurred by the Municipality to install and provide external engineering services, including the land required to accommodate such services.

External road improvements required by a development may be established by means of a Traffic Impact Assessment which is required to determine the traffic impact of a land development proposal and whether such development can be accommodated by the transportation system.

The recommended criteria that should be used to measure the level of upgrading/ improvement required, is the LOS and the v/c ratio.

The level of service provided by a transportation facility is deemed acceptable when the requirements provided below are met during the worst 15-minute time period during the assessment hours prescribed in Volume 1 of the TMH 16 South African Manual for Traffic Impact and Site Traffic Assessments (COTO 2012). Assessment hours are defined for Normal and Abnormal days.

The requirements of the capacity analysis standards must be met for each individual traffic stream or movement at all critical locations in the transportation and the assessment may NOT be based on the average level of service for all movements at the facility.

In general, and where not otherwise specified in this chapter, traffic operations are acceptable when, during the peak 15-minute period:

a) The volume/capacity ratio does not exceed a maximum of 1.0 (demand volume does not exceed the capacity of the facility); and

b) The Level of Service (LOS), as defined by the Highway Capacity Manual, is not worse than the service levels given in Table 1.3 below. Right-turn movements at traffic signal-controlled junctions may, however, operate at a LOS E provided that sufficient provision is made for accommodating the queue lengths (90th percentile).

TABLE 1.3: CAPACITY ANALYSIS ACCEPTABLE LEVELS OF SERVICE

Acceptable Level of Service for Normal and Abnormal Days		
Area/Road Class	**Normal Days**	**Abnormal Days**
Urban	LOS D	LOS E
Rural Classes 3 – 5	LOS C	LOS D
Rural Classes 1 - 2	LOS B	LOS C

Definitions of Normal and Abnormal days are provided in TRH 17 South African Trip Data Manual (COTO 2012).

Additional requirements are provided in subsequent section 3 of the TMH 16 Volume 2 South African Traffic Impact and Site Impact Assessment Standards and Requirements Manual for the following transportation elements:

a) Priority controlled junctions and roundabouts (also mini circles).

b) Traffic signal-controlled junctions.

c) Basic two-lane road segments.

d) Public transport facilities and services.

2. PROPOSED LAND-USE RIGHTS AND TRIP GENERATION

2.1 Introduction

The proposed land-use rights of the site are described first. This is followed by the trip generation of the proposed rights. Trip assignments and distributions are then provided.

2.2 Proposed Land-Use Rights

Proposed land-use rights are provided in Table 2.1 below.

TABLE 2.1: PROPOSED LAND-USE RIGHTS

Farm	Land-Use	Extent
Remainder of Erf 13 of the Farm Putfontein 26-IR	Proposed Cemetery	32 hectares (ha)

2.3 Trip Generation

2.3.1 Introduction

The trip generation rates in the Committee of Transport Officials "TMH17 - South African Trip Data Manual, Version 1.0 (dated September 2013) were used to calculate the proposed cemetery development trips. Cemetery peak hour trips normally occur during Saturday morning; therefore, it was the only peak hour considered in this study.

A 15% trip reduction was applied in this study to account for public transport (hired buses or mini-bus taxis will transport mourners to and from Cemeteries for burial from point of origin).

2.3.2 Trip Generation

The Saturday peak hour development trips are shown in Table 2.2 below.

TABLE 2.2: SATURDAY PEAK HOUR TRIP GENERATION

Land-Use Rights	Extent	Trip Rate	Split		Trip Reduction	Peak Hour Trips		
			In	Out		In	Out	Total
Cemetery	32 hectares	8 / 1 ha	50%	50%	15%	109	109	218

2.4 Trip Distribution and Assignment

The proposed development trips were distributed and assigned to the adjacent road network based on the expected origins and destinations to and from the development as well as existing traffic counts.

The road network, trip distribution assignment and the development framework information of the study area are shown on schematic diagrams as required in TMH 16 South African Traffic Impact and Site Traffic Assessment Manual, Version 1.0, August 2012 (refer to Figure 2.1 and Figures 3.1 to 3.4 for the schematic plans).

The Saturday peak hour development trip distributions and assignments for the proposed cemetery development are shown in Figure 2.1.

3. TRAFFIC AND THE ROAD NETWORK

3.1 Traffic Counts

Trafsol Data Specialists carried out the Saturday peak hour classified traffic counts on 28th November 2020 at the following junctions:

- Springs Road / Pretoria Road (M44);
- Springs Road / Combrink Street; and
- Springs Road / Kingsway Road / Durandt Road / Kerk Street.

The classified traffic counts were converted to Passenger Car Units (PCUs) using the following factors:

- 1 for a car;
- 1.5 for a taxi; and
- 3 for heavies (buses and trucks).

The 2020 Saturday peak hour traffic counts (PCUs) are shown in Figure 3.1.

3.2 Peak Flow Rate Traffic Volumes

The 2020 Saturday peak hour traffic counts (PCUs) were adjusted according to the calculated peak hour factors per approach to obtain the 2020 peak flow rate traffic volumes.

The 2020 Saturday peak flow rate traffic volumes are shown in Figure 3.2.

3.3 Latent Rights

No information on latent rights was received from the local municipality. The traffic counts were therefore escalated at a 3% annual growth rate to account for any unknown latent rights within the vicinity of the proposed development and to account for an increase in vehicle ownership.

3.4 2026 Background Traffic Volumes

The 2020 Saturday peak flow rate traffic volumes were escalated at a 3% annual growth rate over 6 years to obtain the 2026 peak hour background (escalated) traffic volumes.

The 2026 Saturday peak hour background (escalated) traffic volumes are shown in Figure 3.3.

3.5 2026 Background and Development Traffic Volumes

The Saturday peak hour development trips were added to the 2026 background peak hour volumes to obtain the 2026 background and development peak hour volumes.

The 2026 Saturday peak hour background and development traffic volumes are shown in Figure 3.4.

3.6 Road Network

3.6.1 Existing Road Network- *According to the City of Ekurhuleni ArcGIS Road Masterplan by Ekurhuleni and 2010 Gauteng Strategic Road Network by GSTN Joint Venture*

- **Kingsway Road /Durandt Road** is a class 2 major arterial road that runs in a north-south direction and lies east of the proposed development site. It serves an important mobility function within the area.
- **Pretoria Road (M44)** is a class 3 minor arterial road that runs in a north-south direction and lies west of the proposed development site. It serves an important mobility function within the area. It intersects with Springs Road in the form of a 4-legged All-way stop.
- **Springs Road** is a class 3 minor arterial road that runs in a north-west and south-east direction and lies south of the proposed development. Access to the proposed development site will be gained off this road.
- **Combrink Street** is a class 5a road that runs in an east-west direction and it lies to the north of the proposed development. It intersects with Springs Road in the form of a priority-controlled T-junction.
- **Kerk Street** is a class 5a road that lies to the east of the proposed development. It intersects with Kingsway Road and Springs Road.

3.6.2 Future Road Network

There is planned/ future road network proposed within the vicinity of the site according to the City of Ekurhuleni ArcGIS Road Masterplan and 2010 Gauteng Strategic Road Network, as shown in Figures 3.5 and 3.6, respectively.

- **P67/1 – K161** (Kingsway Road /Durandt Road) will in future be aligned and upgraded to K-route standards. It will change to K169 from its junction with Springs Road towards the north.
- **K68** (class 2 major arterial road) is planned to the north of the proposed development site. It will run in an east-west direction intersecting with the planned K169 to the north of the proposed development site.
- **PWV17** (class 1 principle arterial road) is planned to the west of the proposed development site. It will run in a north-south direction parallel to the planned K169/K161.
- **Concorde Street** will in future be extended towards the east to link with Geldenhuys Road opposite Marigold Road. It will border the proposed development site to the south.
- **Peenz Street** will in future be extended southwards to link with Concorde Street extension. This road extension will border the proposed development to the east.

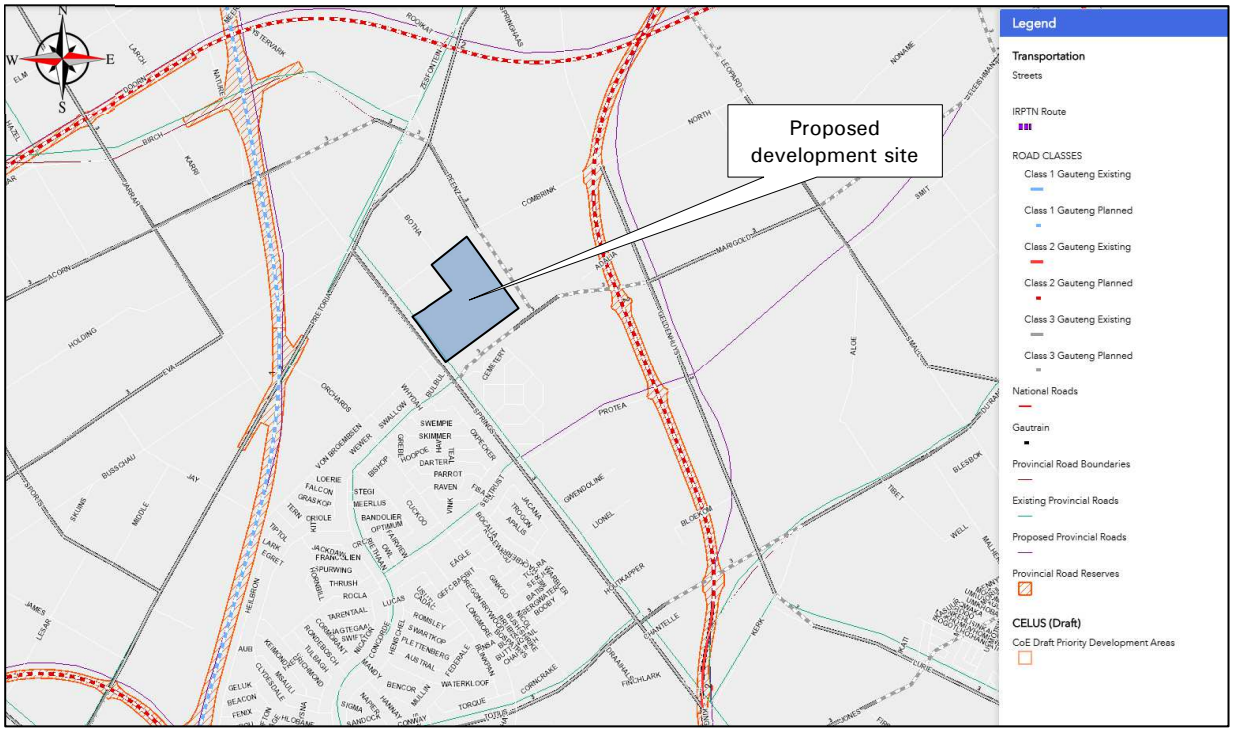


Figure 3.5: Extract of the City of Ekurhuleni ArcGIS Road Masterplan

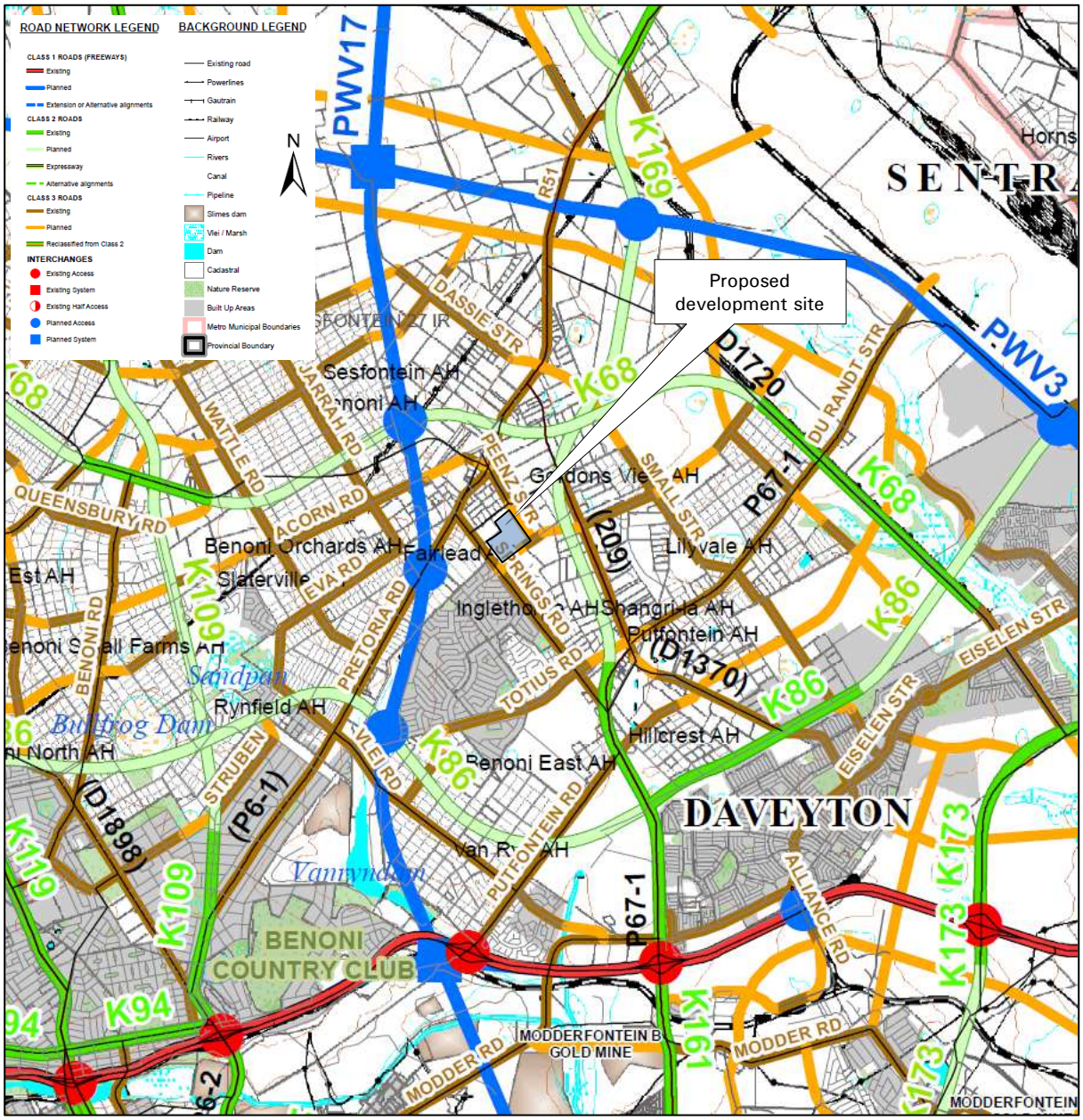


Figure 3.6: Extract of the 2010 Gauteng Strategic Road Network

3.6.3 Proposed Upgrading of the Road Network (Refer to **Section 5** for the traffic operations)

3.6.3.1 Background Traffic Scenario (WITHOUT DEVELOPMENT)

- **Springs Road / Pretoria Road (M44)**

  The capacity results show that the road upgrades are required at this junction due to the existing (escalated) 2026 Saturday peak hour background traffic. It is proposed that the junction be converted to a single roundabout to mitigate the existing 2026 background traffic problems.

  It is the responsibility of the City of Ekurhuleni to upgrade this junction.

- **Springs Road / Kingsway Road / Durandt Road / Kerk Street**

  The results show that this junction experiences delay problems on the side roads (Springs Road and Kerk Street) during the Saturday peak hour due to the stop control, however queues dissipate quickly. There are no delays/queues along Kingsway Road.

  It is recommended that the City of Ekurhuleni monitor this junction during the weekday peak hours to determine if the installation of traffic signals are warranted.

- **Springs Road / Combrink Street**

  The results show that the junction will operate satisfactorily with the existing lane configuration. No road upgrades are required.

3.6.3.2 Background and Development Traffic Scenario (WITH DEVELOPMENT)

No additional road upgrades are required to accommodate the additional traffic by the proposed cemetery development.

The developer will construct the access to the development as described in **Section 6 and 9** of this report.

4. SITE INVESTIGATION

4.1 Introduction

Site visits were done on 20th and 28th November 2020 to obtain the existing lane configurations of the junctions to be analysed and observe the existing traffic operations within the subject area.

The information regarding the site investigation is provided below. The pedestrian and public transport facilities are addressed in **Section 8** of this traffic report.

4.2 Modes of Transport

Kingsway Road, Durandt Road, Springs Road and Pretoria Road (M44) are main roads that serve an important mobility function within the Benoni area. These roads are used by all modes of transport (public and private transport) to commute and transport goods to and from Benoni and beyond.

4.3 Road Conditions

The road surfaces are in a fair to good condition along all roads. The road markings are visible at all approaches to the junctions.

The photos (Figures 4.1 to 4.3) illustrate that the roads are in a fair to good condition, with sufficient stopping sight distances whilst the road markings are visible to both pedestrian and motorists at all junctions.

Figure 4.1: Springs Road / Pretoria Road (M44) Junction

Figure 4.2: Springs Road / Combrink Street Junction

Figure 4.3: Springs Road / Kingsway Road / Durandt Road / Kerk Street Junction

4.4 Traffic Operations

4.4.1 Online Traffic Operation Information

An online traffic analysis was done to observe the traffic using Google map live traffic application during the Saturday peak hour at the Springs Road / Pretoria Road (M44); Springs Road / Combrink Street and Springs Road / Kingsway Road / Durandt Road / Kerk Street junctions.

Table 4.1 below shows live traffic analysis recorded from each approach for the Saturday peak hour.

TABLE 4.1: SATURDAY PEAK HOUR AVERAGE QUEUE LENGTH

JUNCTION	APPROACH	SATURDAY PEAK HOUR QUEUE LENGTH
Springs Road / Pretoria Road (M44)	**SOUTH-EAST** (Springs Road)	Free Flow
	NORTH-EAST (Pretoria Road)	Moderate Flow
	SOUTH-WEST (Pretoria Road)	Free Flow
	NORTH-WEST (Springs Road)	Free Flow
Springs Road / Combrink Street	**NORTH-WEST** (Springs Road)	Free Flow
	NORTH-EAST (Combrink Street)	Free Flow
	SOUTH-EAST (Springs Road)	Free Flow
Springs Road / Kingsway Road / Durandt Road / Kerk Street	**EAST** (Kerk Street)	Moderate Flow
	NORTH (Durandt Road)	Free Flow
	WEST (Springs Road)	Moderate Flow
	SOUTH (Kingsway Road)	Moderate Flow

4.4.2 Site Traffic Observation

During traffic investigations the traffic volumes were not heavy. There was good traffic progression on most of the roads.

Minor queues were observed at the Springs Road / Kingsway Road junction western approach leg (refer to Figure 4.4). The queues however dissipate quickly.

Figure 4.4: Springs Road (Western Approach) Traffic Queues

5. TRAFFIC OPERATIONS

5.1 Introduction

The Aimsun Next 8.4.3 and Auto J Intersection developed by Dr. John Sampson, software programs were used for the capacity analysis calculations.

The following junctions were analysed as part of the study:

- Springs Road / Pretoria Road (M44);
- Springs Road / Combrink Street;
- Springs Road / Kingsway Road / Durandt Road / Kerk Street - *Aimsun Next was used for the analysis of this junction ONLY due to the staggered lane configuration*; and
- Springs Road / Proposed Access to the Proposed Cemetery Development.

The average capacity results per junction are given in this section, however in accordance with Section 3.3.2 of the TMH16 Volume 2 – South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual (Version 1.0, August 2012) as published by the Committee of Transport Officials (COTO), detailed capacity analysis results for all individual movements of the junctions are provided in ***ANNEXURE B*** *of this report*.

5.2 Auto J Capacity Analysis Comparison Results

The capacity analysis results per approach for the background and background WITH development traffic scenarios are shown below in Table 5.1 for the Saturday peak hour, for year 2020 and 2026.

TABLE 5.1: 2020 AND 2026 BACKGROUND AND BACKGROUND *WITH* DEVELOPMENT COMPARISON

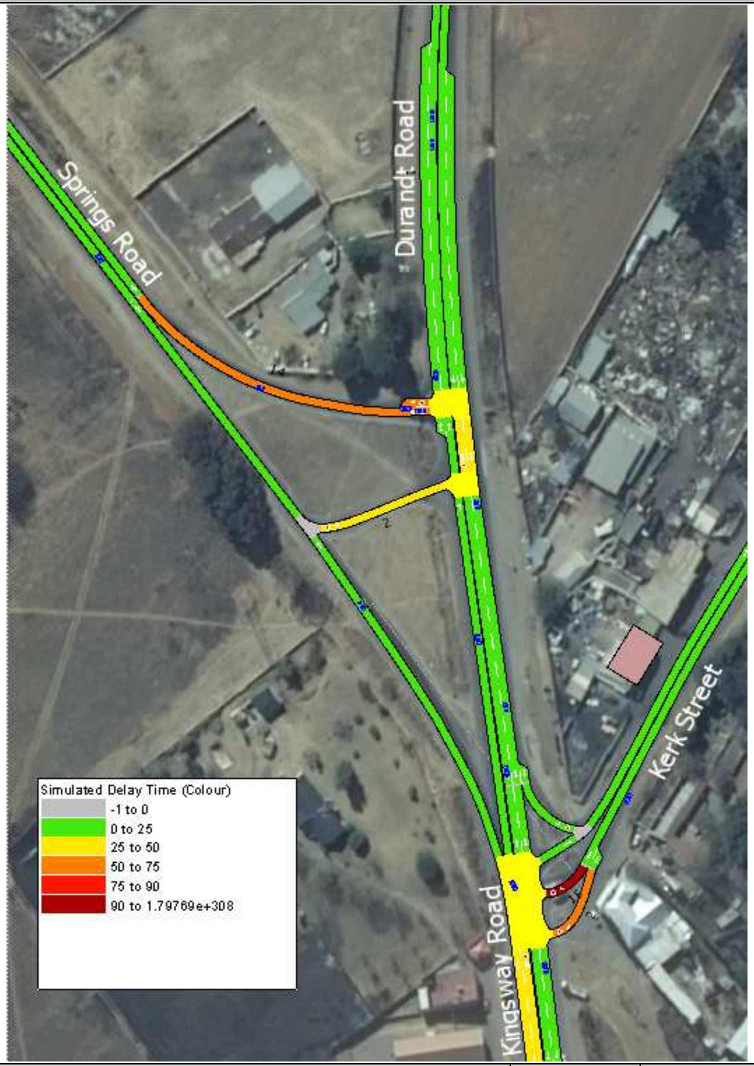
JUNCTION		APPROACH	2020	2026	
			Background (Base model)	Background	Background and Development
Springs Road / Pretoria Road (M44)	V/c Ratio	SOUTH	0.330	0.370	0.420
	Mean Delay/Veh(sec)		10	5.0	6.0
	Level of Service (LOS)		B	A	A
	V/c Ratio	EAST	0.370	0.420	0.450
	Mean Delay/Veh(sec)		10.0	6.0	6.0
	Level of Service (LOS)		B	A	A
	V/c Ratio	NORTH	0.110	0.190	0.200
	Mean Delay/Veh(sec)		8.0	5.0	5.0
	Level of Service (LOS)		A	A	A
	V/c Ratio	WEST	0.760	0.560	0.610
	Mean Delay/Veh(sec)		26.0	7.0	8.0
	Level of Service (LOS)		C	A	A
Springs Road / Combrink Street	V/c Ratio	SOUTH	0.240	0.290	0.320
	Mean Delay/Veh(sec)		1.0	1.0	1.0
	Level of Service (LOS)		A	A	A
	V/c Ratio	EAST	0.00	0.00	0.00
	Mean Delay/Veh(sec)		8.0	8.0	8.0
	Level of Service (LOS)		A	A	A
	V/c Ratio	NORTH	0.190	0.230	0.260
	Mean Delay/Veh(sec)		0.0	0.0	1.0
	Level of Service (LOS)		A	A	A
Springs Road / Proposed Access to the Proposed Cemetery Development	V/c Ratio	SOUTH	N/A	N/A	0.330
	Mean Delay/Veh(sec)		N/A	N/A	1.0
	Level of Service (LOS)		N/A	N/A	A
	V/c Ratio	EAST	N/A	N/A	0.00
	Mean Delay/Veh(sec)		N/A	N/A	8.0
	Level of Service (LOS)		N/A	N/A	A
	V/c Ratio	NORTH	N/A	N/A	0.260
	Mean Delay/Veh(sec)		N/A	N/A	1.0
	Level of Service (LOS)		N/A	N/A	A

N/A – Not Applicable

5.3 Aimsun Next Capacity Analysis Comparison Results

The capacity analysis Aimsun results for the background and background WITH development traffic scenarios at the Springs Road / Kingsway Road / Durandt Road / Kerk Street are shown below in Table 5.2 for the Saturday peak hour, for year 2020 and 2026.

TABLE 5.2: CONTINUED

<table>
<tr><th rowspan="2">JUNCTION</th><th colspan="3">2020</th><th colspan="6">2026</th></tr>
<tr><th colspan="3">Background (Base model)</th><th colspan="3">Background</th><th colspan="3">Background and Development</th></tr>
<tr><td>Springs Road / Kingsway Road / Durandt Road / Kerk Street</td>
<td colspan="3"> 
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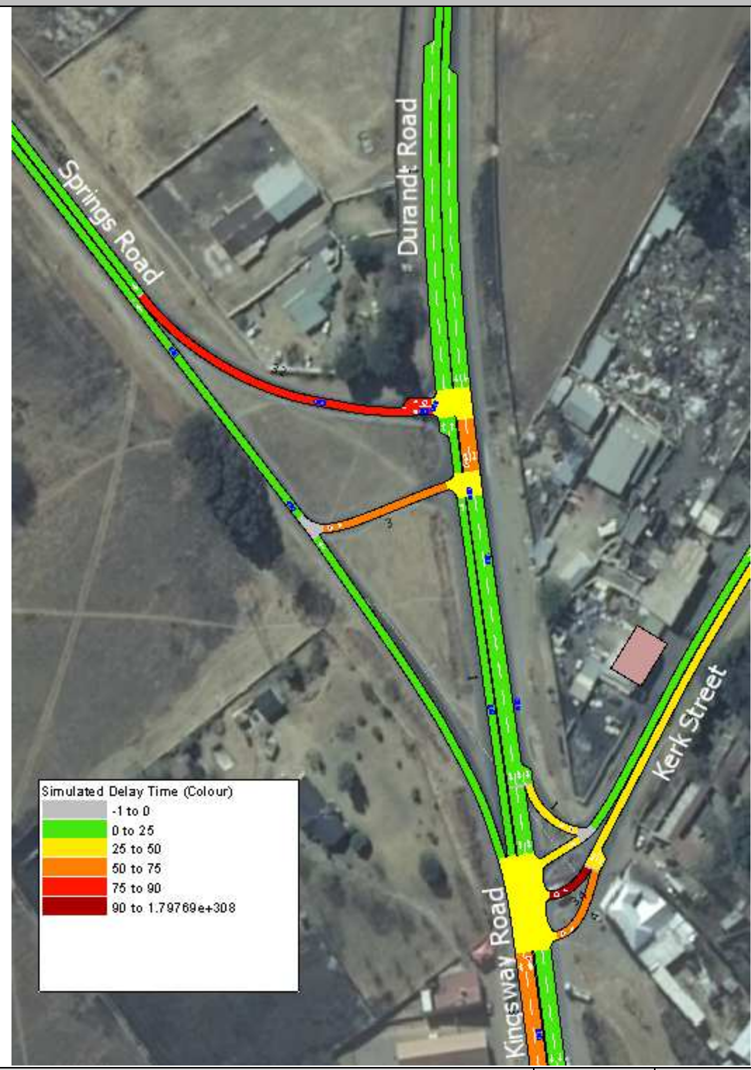
<td colspan="3"> 
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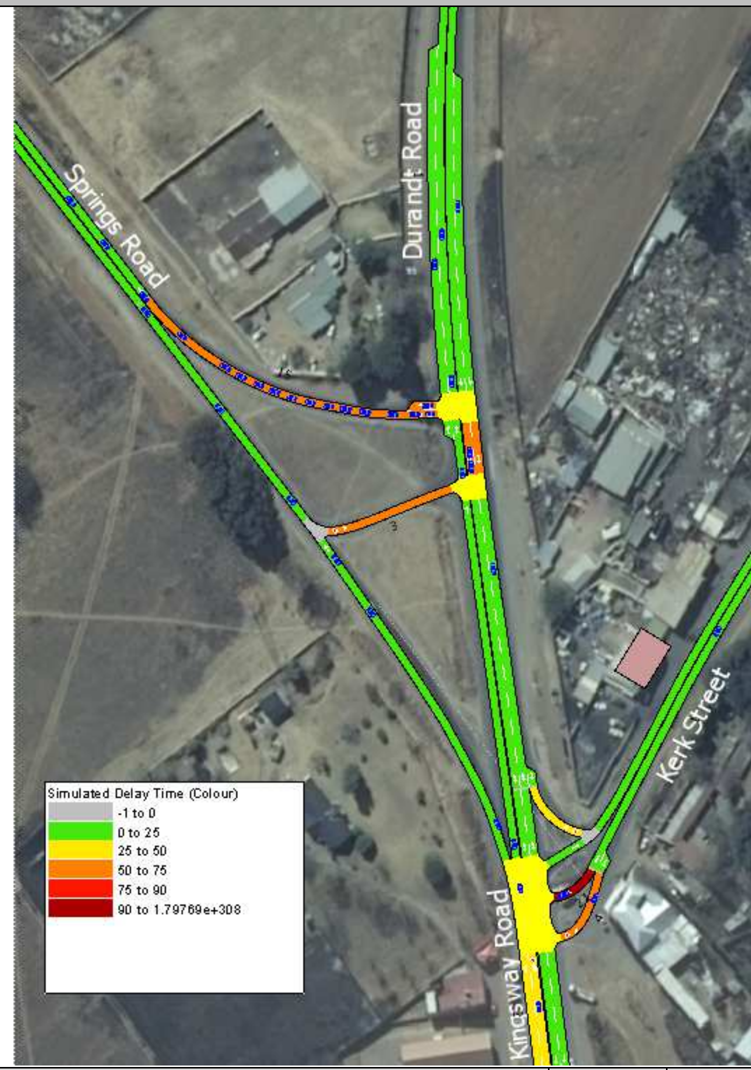
<td colspan="3"> 
</td></tr>
<tr><td rowspan="11">Summary Output of the Junction/Network</td><th>Time Series</th><th>Value</th><th>Units</th><th>Time Series</th><th>Value</th><th>Units</th><th>Time Series</th><th>Value</th><th>Units</th></tr>
<tr><td>Delay Time – Car</td><td>16.71</td><td>sec/km</td><td>Delay Time – Car</td><td>27.53</td><td>sec/km</td><td>Delay Time – Car</td><td>28.71</td><td>sec/km</td></tr>
<tr><td>Density – Car</td><td>5.4</td><td>veh/km</td><td>Density – Car</td><td>7.54</td><td>veh/km</td><td>Density – Car</td><td>8.13</td><td>veh/km</td></tr>
<tr><td>Flow – Car</td><td>1965</td><td>veh/h</td><td>Flow – Car</td><td>2328</td><td>veh/h</td><td>Flow – Car</td><td>2413</td><td>veh/h</td></tr>
<tr><td>Max. Virtual Queue – Car</td><td>4</td><td>veh</td><td>Max. Virtual Queue – Car</td><td>4</td><td>veh</td><td>Max. Virtual Queue – Car</td><td>3</td><td>veh</td></tr>
<tr><td>Mean Queue – Car</td><td>1.51</td><td>veh</td><td>Mean Queue – Car</td><td>4.04</td><td>veh</td><td>Mean Queue – Car</td><td>4.53</td><td>veh</td></tr>
<tr><td>Speed – Car</td><td>62.12</td><td>km/h</td><td>Speed – Car</td><td>57.49</td><td>km/h</td><td>Speed – Car</td><td>56.97</td><td>km/h</td></tr>
<tr><td>Stop Time – Car</td><td>7.68</td><td>sec/km</td><td>Stop Time – Car</td><td>16.61</td><td>sec/km</td><td>Stop Time – Car</td><td>17.60</td><td>sec/km</td></tr>
<tr><td>Total Distance Travelled – Car</td><td>733.12</td><td>km</td><td>Total Distance Travelled – Car</td><td>878.99</td><td>km</td><td>Total Distance Travelled – Car</td><td>920.31</td><td>km</td></tr>
<tr><td>Total Number of Stops – Car</td><td>756</td><td>N/A</td><td>Total Number of Stops – Car</td><td>1143</td><td>N/A</td><td>Total Number of Stops - Car</td><td>1206</td><td>N/A</td></tr>
<tr><td>Travel Time – Car</td><td>64.04</td><td>sec/km</td><td>Travel Time – Car</td><td>74.76</td><td>sec/km</td><td>Travel Time – Car</td><td>75.91</td><td>sec/km</td></tr>
</table>

The 2026 Background and Background and Development Traffic Results:

- **Springs Road / Pretoria Road (M44)**

  The results show that the junction experiences delay problems due to the existing 2026 Saturday peak hour background traffic. It is proposed that the junction be converted to a single roundabout to mitigate the existing 2026 background traffic problems. Weekday peak hours should also be analysed to determine if the single roundabout will also be adequate.

  It is the responsibility of the City of Ekurhuleni to upgrade this junction.

- **Springs Road / Combrink Street**

  The results show that the junction will operate satisfactorily with the existing lane configuration. No road upgrades are required.

- **Springs Road / Kingsway Road / Durandt Road / Kerk Street**

  The results show that the junction experiences delay problems on the side roads (Springs Road and Kerk Street) during the Saturday peak hour due to the stop control, however queues dissipate. There are no delays/queues along Kingsway Road.

  It is recommended that the City of Ekurhuleni install traffic signals at this junction when warranted.

6. ACCESS

6.1 Introduction

Access to the development will be provided off Springs Road as shown in Figure 6.1 below. Refer to **Section 9** for the SIDRA layout configuration.

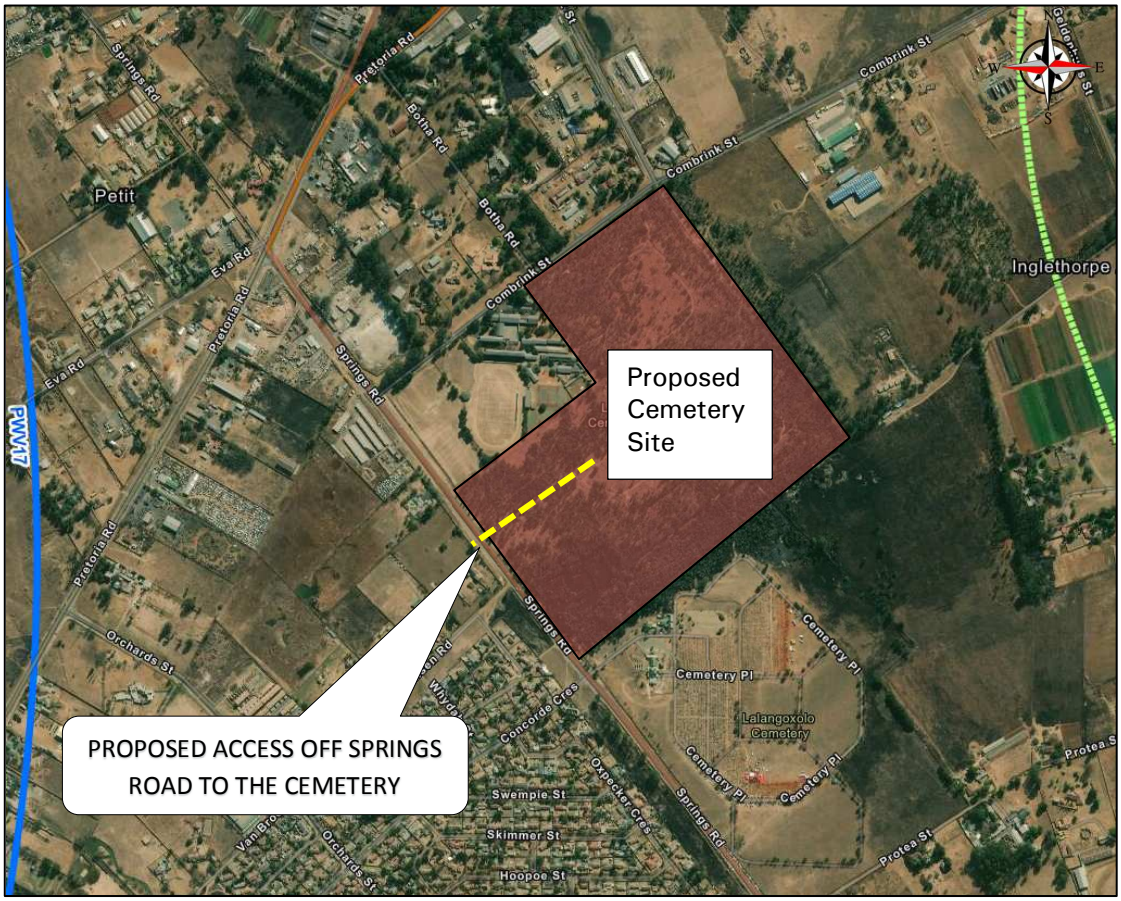


Figure 6.1: Proposed Access to the Development Site

The access arrangements are described below.

6.2 Proposed Full Access off Springs Road

Access to the cemetery development will be provided off Springs Road approximately 345m between the Springs Road /Combrink Street and Springs Road /Concorde Crescent junctions.

6.3 Access Control

The access will be controlled by a security gate and will only be opened during the cemetery operating times.

7. PARKING PROVISION

Parking will be provided within the site in accordance with the current Ekurhuleni Town Planning Scheme 2014 (Promulgation Date – 14 January 2015).

8. PUBLIC TRANSPORT AND NON-MOTORISED FACILITIES

8.1 Public Transport Facilities

Kingsway Road, Durandt Road, Springs Road and Pretoria Road (M44) are main roads that serve an important mobility function within the Benoni area. These road are used by all modes of transport (public and private transport) to commute and transport goods to and from Benoni and beyond.

There are no existing public transport facilities within the vicinity of the development site. All public transport vehicles that will be transporting mourners to and from the cemetery will park within the cemetery parking area.

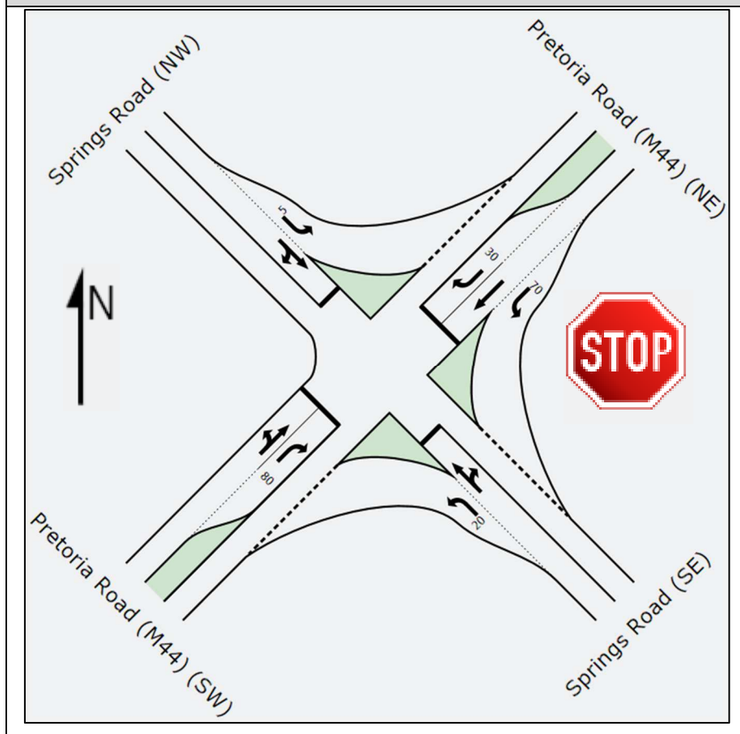
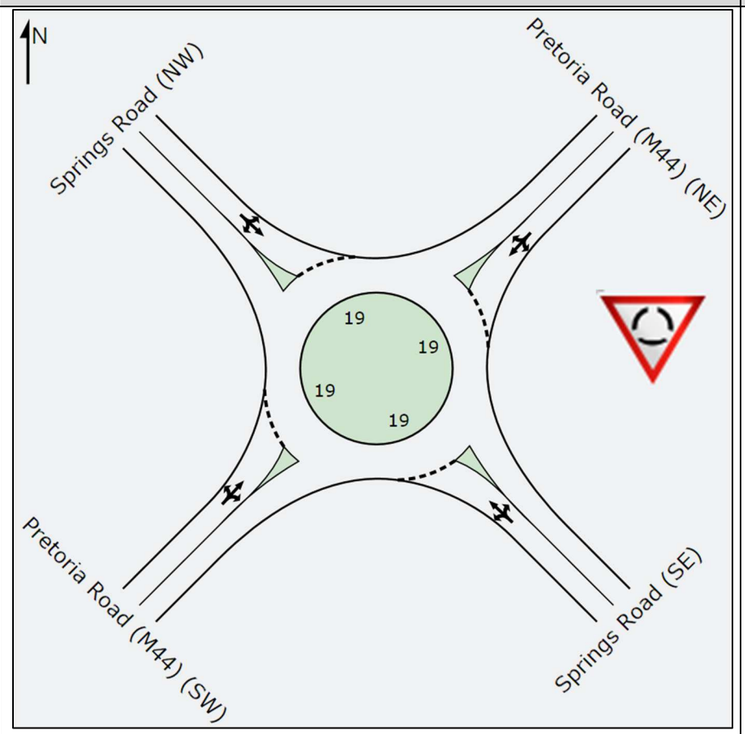
No additional public transport facilities are proposed.

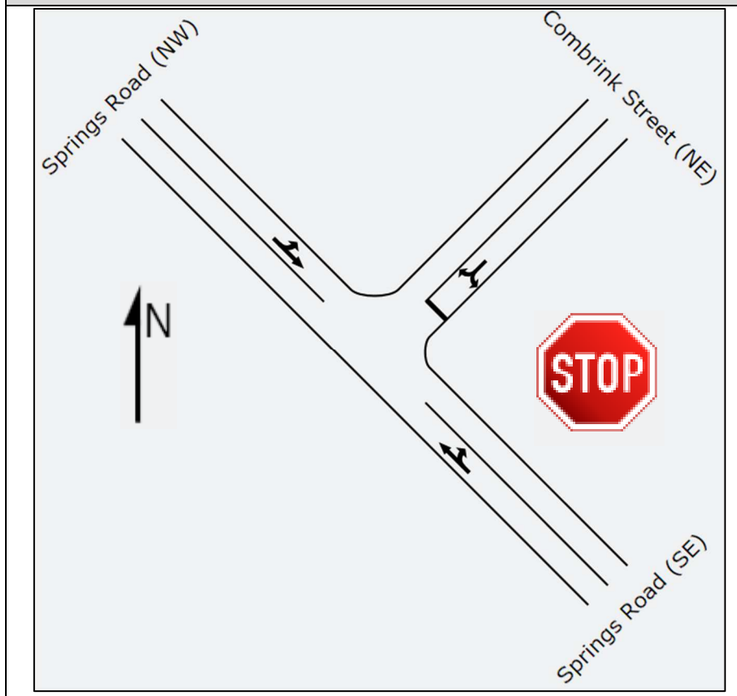
8.2 Non-Motorised Transport (NMT) Facilities

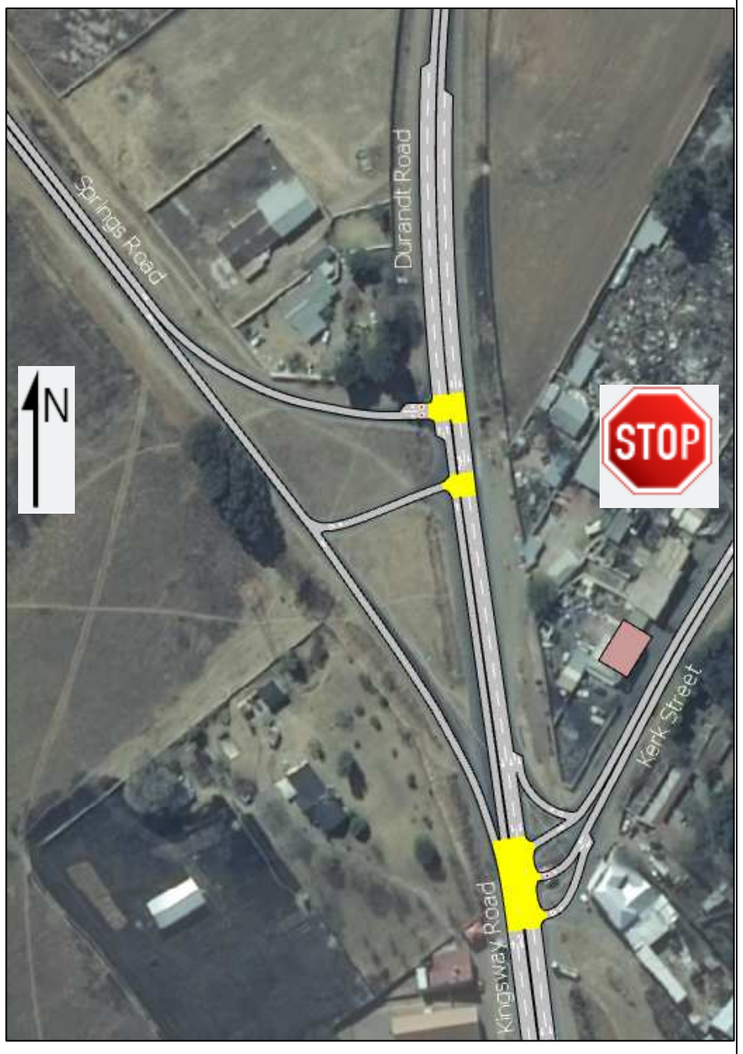
There are no existing paved pedestrian walkways along Kingsway Road / Durandt Road, Springs Road / Pretoria Road (M44), Combrink Street and within the vicinity of the development site.

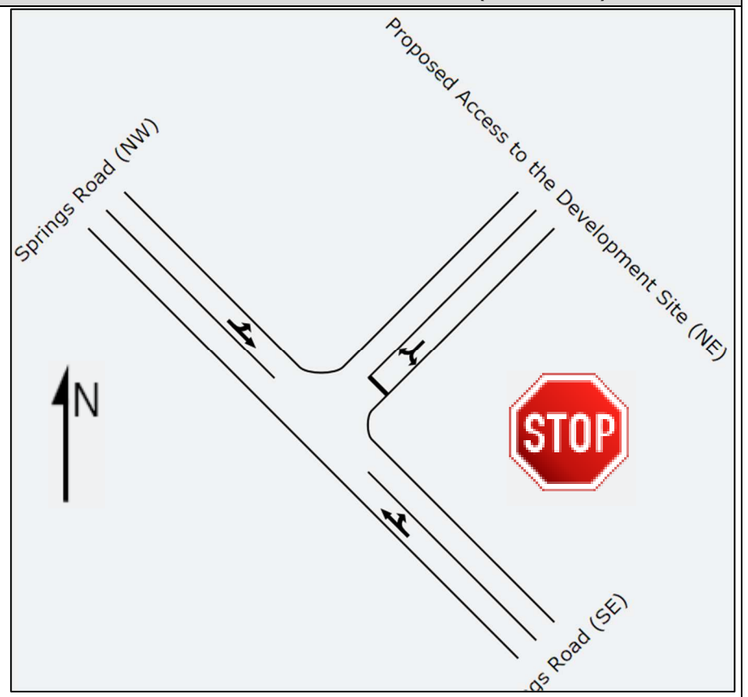
No NMT facilities are proposed since mourners will arrive by motorised transport due to the location of the site.

9. SUMMARY OF ROAD UPGRADES

PROPOSED DEVELOPMENT: EXISTING AND PROPOSED CONFIGURATION (N.B SIDRA/AIMSUN NEXT DIAGRAMS ARE SCHEMATIC REPRESENTATION)		
1 Springs Road / Pretoria Road (M44)		
EXISTING	BACKGROUND (CITY OF EKURHULENI)	BACKGROUND AND DEVELOPMENT (DEVELOPER)
		**NO ADDITIONAL ROAD UPGRADES ARE REQUIRED.**
	It is proposed that the junction be converted to a single roundabout to mitigate the existing 2026 background traffic problems. ***It is the responsibility of the City of Ekurhuleni to upgrade this junction.***	

2 Springs Road / Combrink Street		
EXISTING	BACKGROUND (CITY OF EKURHULENI)	BACKGROUND AND DEVELOPMENT (DEVELOPER)
	**NO ROAD UPGRADES ARE REQUIRED.** The junction will operate satisfactorily with the existing lane configuration	**NO ROAD UPGRADES ARE REQUIRED.** The junction will operate satisfactorily with the existing lane configuration.

3 Springs Road / Kingsway Road / Durandt Road / Kerk Street		
EXISTING	BACKGROUND (CITY OF EKURHULENI)	BACKGROUND AND DEVELOPMENT (DEVELOPER)
	Capacity analysis results indicate that this junction experiences delay problems on the side roads (Springs Road and Kerk Street) during the Saturday peak hour due to the stop control, however queues dissipate quickly. There are no delays/queues along Kingsway Road. It is recommended that the City of Ekurhuleni investigates the junction further during the weekday morning and afternoon peak hours to determine the impact of the existing background traffic. The installation of traffic signals with provision of right-turn lanes (re-configuration) may be warranted at this junction due to weekday peak hour traffic.	**NO ROAD UPGRADES ARE PROPOSED.** The junction will operate at the same LOS and v/c ratio with development traffic.

4 Springs Road / Proposed Access to the Proposed Cemetery Development		
EXISTING	BACKGROUND (CITY OF EKURHULENI)	BACKGROUND AND DEVELOPMENT (DEVELOPER)
N/A	**N/A**	 The proposed access to the proposed cemetery development has to be provided in the form of a priority-controlled T-junction as shown in the schematic diagram. Refer to **ANNEXURE C** for the access conceptual layout plan.

10. CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

The proposed cemetery with an extent of approximately 32 hectares will be developed on the Remainder of Erf 13 of the Farm Putfontein 26-IR, in the Eastern Part of Ekurhuleni, Shangrila, North of Benoni.

It is anticipated that the proposed development may generate **218** trips during the Saturday peak hour. Trip reduction was applied to account for public transport.

Access to the proposed cemetery development will be provided off Springs Road approximately 345m between Springs Road /Combrink Street and Springs Road /Concorde Crescent junctions.

The capacity analysis results indicate that the Springs Road / Pretoria Road (M44) junction requires road upgrades due to the existing 2026 Saturday peak hour background traffic WITHOUT development traffic. It is proposed that the junction be converted to a single roundabout to mitigate the existing 2026 background traffic problems. The weekday peak hours should be analysed to determine if the singe roundabout will be adequate. It is the responsibility of the City of Ekurhuleni to upgrade this junction.

The Springs Road / Kingsway Road / Durandt Road / Kerk Street junction experiences delay problems on the side roads (Springs Road and Kerk Street) during the Saturday peak hour due to the stop control, however queues dissipate quickly. There are no delays/queues along Kingsway Road.

It is recommended that the City of Ekurhuleni investigates the Springs Road / Kingsway Road / Durandt Road / Kerk Street junction further during the weekday peak hours to determine if the installation of traffic signals is warranted.

The Springs Road / Combrink Street junction will operate satisfactorily with the existing lane configurations. No road upgrades are required.

No additional road upgrades are required at the analysed junctions to accommodate the proposed development traffic. The proposed access will operate satisfactorily with the proposed lane configurations.

10.2 Recommendations

It is recommended that:

- *the City of Ekurhuleni carry out the proposed road upgrades and investigations as stated in Section 3 and 9 of this report;*
- *the developer constructs an access off Springs Road and provide adequate parking facilities in consultation with the relevant departments of CoE; and*
- *this Traffic Impact Assessment (TIA) in support of the proposed cemetery development to be located on the Remainder of Erf 13 of the Farm Putfontein 26-IR, in the Eastern Part of Ekurhuleni, Shangrila, North of Benoni, be approved.*

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