

kma@telkomsa.net

REPORT SHEET

Property Description:	Ezonzoloni Wordon
Property Description.	
Municipal Area:	Phumelela Local Municipality
•	
Application:	Township Establishment
Type of Report:	Traffic Impact Study
Project Number:	6785.03
Declaration	I, Koot Marais, author of this traffic impact study, hereby certify
	that I am a professional traffic engineer (registration No
	in the field of traffic and transportation angineering as required
	by the Engineering Council of South Africa (ECSA) to compile
	this traffic impact study and I take full responsibility for the
	content, including all calculations, conclusions and
	recommendations made herein.
Compiled By:	Koot Marais Pr Eng
Signed:	
	920023
Date:	October 2013

PREPARED BY:



P.O. Box 52054, Langenhovenpark, 9330 12 AG Visser St, Langenhoven Park, Bloemfontein, 9301 ((051) 446 2647 ((051) 446 2647 (051) 446 2647 (053) 381 5884 kma@telkomsa.net

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1. INTRODUCTION

1.1 Aim of the Study

The aim of this study is to determine the traffic impact of an intended township establishment at **Ezenzeleni (Warden)** in the Phumelela Local Municipality area.

1.2 Background

It is the intention to extend the existing Ezenzeleni residential area to the south and east.

The developer is as follows:

Phumelela Local Municipality Private Bag x 5, Vrede, 9835

The aim of this document is to report on the traffic impact in support of the township establishment.

1.3 Study Area



Figure 1.1 Location Plan



Figure 1.2 Planned Layout

The development is situated to the south and east of the existing Ezenzeleni and to the northeast of the main town. The township is situated on both sides of the S807, but mainly on the southern side of the road.

1.4 Proposed Development

The development will mainly consist of the following:

Residential	Business	Crèche	Church	School	Cemetery
1877	8	5	9	3	1
1877	8	5	9	3	1

Apart from the residential development, other land uses are not expected to result in significant trip generation on the external road network, and mainly serve the immediate area. Although provision is made for eight business erven, individual erven are relatively small and will mostly be "corner shop" type shops.

1.5 Scope of Analysis

a) Period for Analysis

Based on the type of proposed development and the nature of traffic flow in the area, both the morning and afternoon peak periods need to be investigated.

b) Warrants for a Traffic Impact Study

The development could generate in excess of 150 peak hour trips and according to the "Manual for Traffic Impact Studies"¹, a Traffic Impact Study is warranted.

c) Extent of Analysis

All intersections where the increase in the critical lane volumes is expected to exceed 75, within 1.5 km of the development, should normally be analysed. Given the road network in the area, the intersections shown below were investigated.



Figure 1.3 Intersections Investigated

d) Assessment Years

Both the base year and five years after the base year have been analysed.

1.6 Available Information

a) Traffic Counts

Traffic counts were undertaken on 17 September 2013. Horizon year traffic counts were determined by using a generally accepted 3% growth rate.

2. BACKGROUND INFORMATION

2.1 Existing Road Network

The most important roads in the area are as follows:

a) A38

This two-lane paved road functions as the access from Ezenzeleni to the main town.

b) S807

The A38 becomes the S807 to the east of the access to Ezenzeleni. The road is a gravel road.

c) S1378

This is the main access to Ezenzeleni from the A38 and is a paved two-lane road.

d) Piet Retief Street / A142

This is the main access to Warden from the north. The first portion of the street is the A142 and it is a paved two-lane road.

e) Other Roads

All other roads in the area are two-lane undivided roads.

2.2 Existing Land Use

The area is mostly vacant with some informal animal shelters as shown below.



Photo 1: Development site as seen from the S807 towards the south

2.3 Road Planning

There is no known road planning that will directly affect the development under consideration.

3. TRIP GENERATION

3.1 Trip Generation Rates

Trip generation rates based on the document "The South African Trip Generation Rates"² for low-income housing are as follows:

AM Peak	=	0.5 trips/erf	Directional Split 35:65
PM Peak	=	0.5 trips/erf	Directional Split 65:35

Actual surveys done as part of various traffic impact studies undertaken in the Free State showed that these rates are in general an overestimation of the expected trip generation in most areas and that actual rates could be as low as 0.03 trips per erf, such as in Memel where the main mode of transport is walking. Based on the different surveys, it is unlikely that actual trip generation will exceed the following:

AM Peak	=	0.25 trips/erf	
PM Peak	=	0.25 trips/erf	

Directional Split 35:65 Directional Split 65:35

Based on traffic counts in the area and observations of movement this is still an overestimation, as the main mode of transport is walking as can be seen in the photograph below.



Photo 2: Walking as the main mode of transport (A38)

3.2 Trips Generated

Based on the calculated trip generation rates, the development could generate the following trips.

Table 3.1: Trip generation of proposed development

				A	M PEAK		PM PEAK							
Land Use	Size	Unit	TGR	Split	AM Trips	In	Out	TGR	Split	PM Trips	In	Out		
Residential	1877	unit	0.250	35:65	469	164	305	0.250	65:35	469	305	164		
Total					469	164	305			469	305	164		

4. TRIP DISTRIBUTION

Trip distributions for the morning and afternoon peak periods are shown in the figures below. Trip distribution was based on the analogue method with consideration of gravitational distributions.



Figure 4.1a AM Trip Distribution



Figure 4.1b AM Trip Distribution



Figure 4.2a PM Trip Distribution



Figure 4.2b PM Trip Distribution

5. TRIP ASSIGNMENT

The generated trips have been assigned to the background traffic volumes. The following figures show the traffic volumes for the different peak periods and scenarios.



Figure 5.1 2013 AM Peak Hour Traffic Volumes







Figure 5.3 2018 AM Peak Hour Traffic Volumes







Figure 5.5 2013 PM Peak Hour Traffic Volumes



Figure 5.6 2013 PM Peak Hour Traffic Volumes with Development



Figure 5.7 2018 PM Peak Hour Traffic Volumes



Figure 5.8 2018 PM Peak Hour Traffic Volumes with Development

6. CAPACITY ANALYSIS

Capacity analyses were performed by means of the SIDRA program. The tables below show the Levels of Service of the different traffic movements. Levels of Service (LOS) give an indication of operational characteristics in a traffic stream and their perception by motorists and passengers. Levels of service A to D are usually assumed to be acceptable, with LOS E regarded as the maximum flow rate, or capacity of the facility.

The analysed intersections are shown below.



6.1 Intersection A

The expected layout will be as follows:



Photo 3: Position of Intersection A

Levels of service for the worst-case scenarios will be as follows:

Intersection A		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
4	2018 AM Peak with development	Α	Α	Α	Α	А	А	Α	А	А	А	А	Α
8	2018 PM Peak with development	А	А	Α	Α	Α	А	Α	А	А	А	А	А

Levels of service will be high for all scenarios.

6.2 Intersection B

The layout will be as follows:



Photo 4: Position of Intersection B

Levels of service for the worst-case scenarios will be as follows:

Intersection B		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
4	2018 AM Peak with development				А	А		В		В		А	А
8	2018 PM Peak with development				А	А		В		В		А	А

Levels of service will be high for all scenarios.

6.3 Intersection C

The layout is as follows:



Current Layout



Photo 5: Intersection C as seen from the west

Levels of service for the worst-case scenarios will be as follows:

Intersection C		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
4	2018 AM Peak with development	С		В		А	А				А	А	
8	2018 PM Peak with development	С		В		А	А				А	А	

Levels of service will remain acceptable for all scenarios.

The layout is as follows:



Current Layout



Photo 6: Intersection D as seen from the west

Levels of service for the worst-case scenarios will be as follows:

Intersection D		North			East			South			We		
		L	T	R	L	T	R	L	T	R	L	T	R
4	2018 AM Peak with development				А	А		А		В		А	В
8	2018 PM Peak with development				А	А		А		В		А	А

Levels of service will be high for all scenarios.

7. SITE DEVELOPMENT PLAN



The following aspects of the site development plan are of importance:

7.1 General Layout

The development will consist of a township with internal streets and separate erven and is in principle an extension of the existing residential area to the north of the S807, and a new area to the south of the S807.

7.2 Access

Accesses to the development are from the S807 and are appropriately spaced. Sight distances at these positions are acceptable.

7.3 Road Network

The following aspects concerning the road network are of importance:

a) General Layout

The layout makes provision for a relative standard grid pattern with reasonably spaced intersections. Most intersections intersect at right angles or close to 90[°].

b) Road Reserves

Road reserves are 12m as a minimum, which are acceptable.

7.4 Other Road and Traffic Aspects

Other aspects of importance in developing the area are as follows:

a) Topography

The development area has a relatively steep slope towards the south as shown in the photo below. Although acceptable gradients of roads should be possible, storm water management and the effect of this on roads and road surfaces should be carefully considered in the design.



Photo 7: Relative steep slope

The photo below shows an example of a storm water structure that has been implemented to accommodate storm water from the existing area.



Photo 8: Storm water structure

b) Provision for Pedestrians

Due to design of the A38 with portions in cut and portions in fill, no provision is made for pedestrians and large volumes of pedestrians walk on the roadway as shown below. This should ideally at some stage be addressed by providing a proper walkway/sidewalk.



Photo 9: Pedestrians walking on the roadway

c) Provision for Public Transport

Some provision should preferably be made in the final road design for lay-bys at the appropriate locations, although limited taxi operations were observed in the area. With a relatively long walking distance between the new area and the main town, it can be expected that taxi operations will increase, depending on affordability and availability of services.

d) Road Conditions

The main roads are mostly in a reasonable condition.

8. CONCLUSIONS AND RECOMMENDATIONS

The following conclusions can be made from the study:

- a) The development is not expected to generate more than 469 trips during the peak hours.
- b) All analysed intersections are expected to continue to operate at high levels of service.
- c) The site development plan, with consideration of the aspects discussed in Chapter 7, is acceptable from a traffic point of view.

Based on the conclusions, it is recommended that the development be approved from a traffic point of view.

9. REFERENCES

- 1.
- 2.
- Manual for Traffic Impact Studies, Department of Transport, Pretoria, 1995 South African Trip Generation Rates, Department of Transport, Pretoria, 1995 ITE Trip Generation Rates, 6th Edition, Institute of Transportation Engineers, 3. Washington, 1998