

**PROPOSED SECONDARY STEEL FOUNDRY  
ON PTN 155 OF THE FARM RIET VALLEI No  
851, AT CATO RIDGE, KWAZULU-NATAL**

**TRAFFIC IMPACT ASSESSMENT**

APRIL 2012



**ASANTA SANA**

**PROPOSED SECONDARY STEEL FOUNDRY  
ON PTN 155 OF THE FARM RIET VALLEI No 851, AT CATO  
RIDGE, KWAZULU-NATAL**

**TRAFFIC IMPACT ASSESSMENT**

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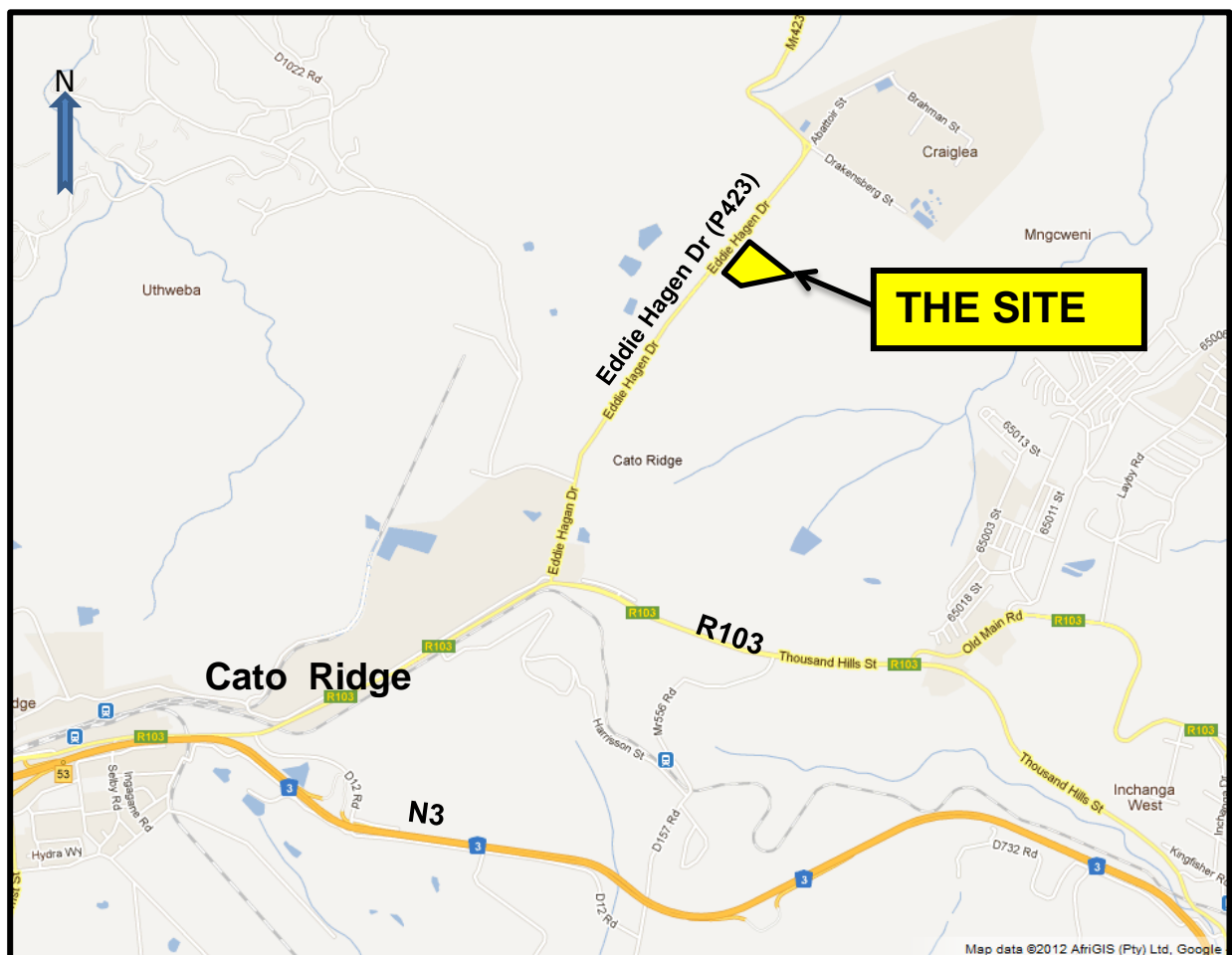
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## 1.0 INTRODUCTION

### 1.1 Purpose of Report

The purpose of this report is to assess the likely traffic impact of the proposal to establish a secondary steel foundry, on the property described as Portion 155 of the Farm Riet Vallei No 851, at Cato Ridge, KwaZulu-Natal. The site is situated on the south-eastern side of Eddie Hagan Drive (also known as Provincial Main Road 423) approximately 2.7km north-east of the R103, also known as Provincial Main Road 1. The site falls within the eThekweni Municipality. This report takes cognisance of both existing and future road and traffic conditions with a view to providing comment on the traffic and access conditions that will prevail on completion of the project.



Locality Plan



**Area Plan**

**1.2 Need for a Traffic Assessment**

According to the *Manual for Traffic Impact Studies (RR93/635)* issued by the Department of Transport a *Traffic Impact Statement* is required in this instance. (Refer Table 1 below.) However, given the importance of this area as an industrial growth point, along with the many other new developments in close proximity, a full traffic impact assessment has been carried out.

**Table 1: Threshold Value for a Traffic Impact Study**

***Recommended Threshold***

- i) More than 150 peak hour trips – prepare a Traffic Impact Study (TIS).*
- ii) Less than 150 and more than 50 peak hour trips – prepare a Traffic Impact Statement (TISm).*
- iii) Less than 50 peak hour trips – no study required except if the surrounding road network is operating at or above capacity.*
- iv) Discretion of the responsible authority.*

**1.3 Study Objectives**

The objectives of this study are:

- (i) Assess the existing traffic conditions on the existing road network in the vicinity of the proposed development.
- (ii) Assess the traffic generation effects of the proposal.
- (iii) Superimpose (ii) on (i) and reassess the traffic operational conditions on the road network.
- (iv) Assess the interface conditions between the road network and the site.
- (v) Evaluate any other transport related aspect relevant to the proposed development such as road safety, public transport and pedestrian activity.
- (vi) Highlight any traffic related concerns resulting from the proposed development.
- (vii) If required, assess the on-site traffic arrangements and conditions.
- (viii) Make recommendations in terms of mitigation measures.

## **1.4 Study Area**

The study area has been defined as the road network in the immediate vicinity of the site and includes the following elements:

- i) R103 (Provincial Main Road 1 Section 3)
- ii) Eddie Hagen Drive (Provincial Main Road 423);
- iii) Provincial Main Road 245 (P245);
- iv) Drakensberg Street (not impacted);
- v) Abbatoir Street (not impacted);
- vi) Intersection of R103 and Eddie Hagen Drive;
- vii) Intersection of Eddie Hagen Dr, P423, Abbatoir St and Drakensberg St (not impacted);
- viii) Intersection of Eddie Hagen Dr and the Site Access.

## **1.5 Executive Summary**

*The traffic impact assessment comprising the subject of this report has been undertaken according to accepted procedures in the field of traffic engineering. The following summary is drawn:-*

- i) Existing traffic flows on the adjacent road system are moderate with acceptable levels of service being experienced.*
  - ii) The proposed development has the potential to generate a modest traffic volume which will be comfortably accommodated by the existing road system.*
  - iii) Access to the development is proposed to be onto the Eddie Hagen Drive.*
  - iv) The intersection of the R103 and Eddie Hagen Drive will require upgrading.*
- 

## **2.0 PROPOSED DEVELOPMENT**

### **2.1 The Site**

The proposed development is situated on the property described as Portion 155 of the Farm Riet Vallei No 851 at Cato Ridge, KwaZulu-Natal.

The property forms part of a local industrial area and is approximately 4 hectares in extent. It is bounded on three sides by the vacant land and on the north-western side by Eddie Hagen Drive.

The site is located within the municipal area of the eThekweni Municipality.

## **2.2 Development Details**

The proposed development comprises a secondary steel foundry in which scrap steel is brought in and processed into re-usable steel. The development is to be phased. Below is a description of the proposed development:

- i) Phase 1 – 90 000 metric tons per annum;
- ii) Phase 2 – a further 90 000 metric tons per annum;
- iii) Factory and product sheds ( $\pm 12500\text{m}^2$ );
- iv) Scrap yards;
- v) Offices associated with the factory;
- vi) Parking for staff and visitors.

The traffic impact assessment detailed in this report covers both phases i.e. the fully completed development.

## **2.3 Access**

Access to the site is to be provided from Eddie Hagen Drive at a point approximately 750m south-west of Drakensberg Street.

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## **3.0 EXISTING AREA CONDITIONS**

### **3.1 Roads**

The road elements affected by the proposed development are (in order of hierarchy):

**(i) R103 –**

This is a high order blacktop Provincial main road with reasonable geometry and good carrying capacity. All intersections along it are



of a reasonable standard. This road generally runs parallel to the N3 between the Durban area and the outskirts of Pietermaritzburg. It is the only continuous east-west alternative route to the N3 and, as such, occasionally acts as an alternative route to the N3 in emergency situations. A number of minor accesses occur along it. The road comprises either two or three lanes and is moderately winding with flat to medium gradients in this vicinity.

The speed limit along this section of the road varies between 80km/h and 60km/h.

- (ii) Eddie Hagen Drive (P423)** – This two lane road is an important link between the R103 and the industries located at its north-eastern end. It has wide lanes and 1.5m wide shoulders. The road continues northwards towards the rural residential areas as Provincial Main Road 423.

The road is in good condition except at the southern end near its intersection with the R103 where the surface is showing signs of distress.

The speed limit is 80km/h.

- (iii) P245** – This road is a second order provincial main road which connects P1-3 to the N3 at the Hammarsdale Interchange. The road is in generally good condition although there are some isolated areas of structural failure in the pavement. There is a climbing lane for the east to west direction of flow between Inchanga Station and Inchanga Park. It is generally curvilinear with flat to medium steep gradients.

The speed limit is 100km/h.

- (iv) Intersection of R103 and Eddie Hagen Drive** – This intersection is a high standard KZN Department of Transport (KZNDOT) Type A2 intersection with the side road, Eddie Hagen Drive, being subject to the stop condition.

The R103 approaches are subject to a 60km/h speed limit. The Eddie Hagen approach has two sets of severe speed humps to warn of the approaching stop at the intersection.

- (v) Intersection of R103 and P245** – This intersection is also a high standard KZN Department of Transport Type A2 intersection with the R103 forming the side road approach from the north-east and hence being subject to the stop condition.

### **3.2 Traffic**

Traffic conditions in this area can generally be categorised into four different types:

- Peak hour flows – typical weekday, morning and afternoon;
- Off peak flows – typical weekday;
- After work hours flows
- Week-end flows.

As the roads described above are in a semi-urban environment the peak hour flows are relevant for investigation and analysis. The selection of a period for analysis should be based on an assessment of when the combined effects of the traffic generated by the proposed development and the existing traffic are at their worst on a regular basis. For a development of this nature a regularly repeated worst case condition would be the morning and afternoon peak hours.

Quantification of the traffic operational conditions has been undertaken using appropriate technology with the results of the analysis for the design peak periods under existing conditions being described below showing the traffic volumes used in the analysis. The criteria for assessment are principally delay and volume to capacity ratio (V/C Ratio). Delay is in turn expressed in terms of Level of Service (LOS). Level of Service is a qualitative measure describing operational conditions with a traffic stream and their perception/tolerance by the driver and is stated in terms of a scale from A through F, with A displaying the highest quality and F the lowest, a point at which excessive delays occur. The LOS is dependent on certain average delay thresholds when applied to intersections. The results of the analysis of the operational efficiency of the selected intersections are tabulated below.

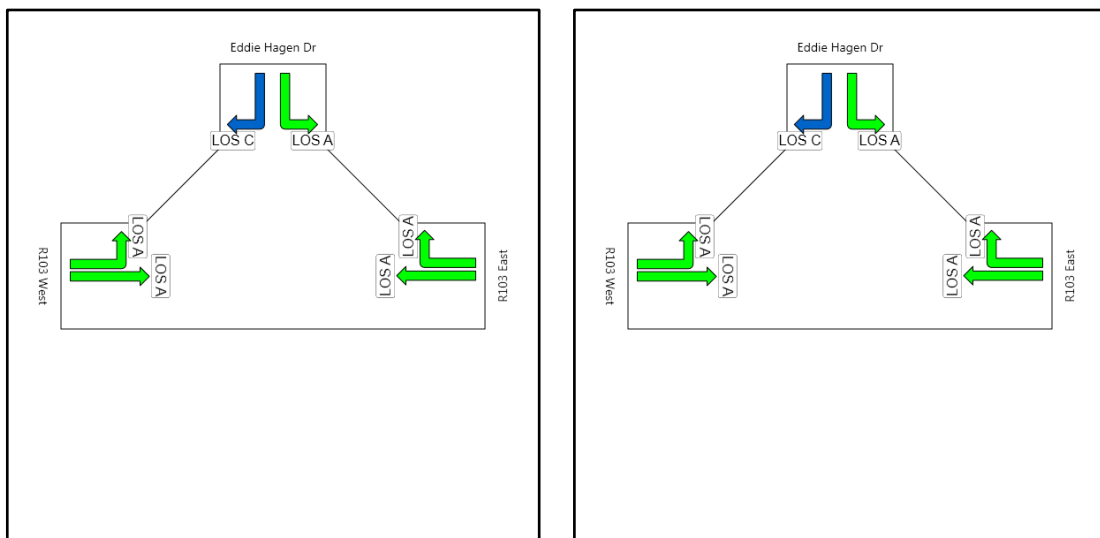
The table below gives an indication of the daily and peak hour flows on the road network.

**Table 2: Existing Traffic Flows**

Road	Daily Flow (2-way)	Peak Flow(2-way)	
		AM	PM
R103	4900	500	360
Eddie Hagen Drive	5200	490	480
P245	3300	340	310
Drakensberg Street	650	90	45
Abattoir Street	1580	170	160

The intersection analysis which follows covers only the R103 / Eddie Hagen Drive intersection since the impacts on the Eddie Hagen / P423 / Abattoir / Drakensberg intersection is so small as to render a technical analysis futile.

The operational performance of the impacted intersection under **existing conditions** is indicated diagrammatically below:



**AM**

**PM**

**R103 / Eddie Hagen Drive Intersection – Existing Conditions**

Scrutiny of these traffic conditions reveals that the intersection is operating well below capacity. Given the low peak hour volumes at the

intersection all of the intersection movements are operating at a good level of service (LOS) with the worst level of service being LOS C on the non-priority right turn movement from Eddie Hagen Drive. This is to be expected.

### **3.3 Pedestrians and Public Transport**

There is some pedestrian activity in the vicinity of the site all of which takes place within the roadway shoulder as the verges and/or sidewalks are overgrown with shrubs and grass.

Public transport activity takes the form of mini-bus taxis and a few large buses and is of moderate proportions.

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## **4.0 FUTURE AREA CONDITIONS**

### **4.1 Future Roads**

No immediate new road proposals have been identified. The form of the future road network is probably best defined by the "Outer West Corridor Study and Cato Ridge Local Area Plans". The following road proposals contained in the plan are relevant to the immediate road network:

- Upgrade Eddie Hagen Drive to four lanes;
- Provide new local access roads running parallel to Eddie Hagen Drive;
- New interchange on the N3 just to east of the Engen One-Stop;
- New link road R103 to N3;
- Upgrade R103 to four lanes;
- Signalise intersection of R103 and Eddie Hagen Drive;
- Signalisation of existing intersections(?) along Eddie Hagen Drive.

The proposed development has the potential to generate low levels of traffic and this, coupled with the modest traffic volumes and hence ample spare capacity on the existing road network, will not require any of these improvements to be implemented with the possible exception of the

signalisation of the R103 / Eddie Hagen Drive intersection. This is discussed in more detail hereunder.

None of these road proposals are compromised by the proposed development.

#### **4.2 Future Traffic**

Inspection of traffic count data dating back four years indicates that traffic in the peak periods has not changed significantly during this time. Normal traffic growth appears to have been minimal.

A number of new developments have been identified which would have an influence on the traffic levels and trends in the vicinity of the site in the short term.

As this area has long been recognised as an industrial node it is probable that tracts of vacant land in the surrounding area will gradually be developed. It is to be expected that, over time, infill development of this vacant land will take place but it is impossible to predict the extent and pace of this development. The following developments in close proximity to the proposed development have however been identified, the expected traffic generation for which will be taken cognisance of in the analysis which follows:

- i. Ellerines;
- ii. SRF Flexipak.

The proportional assignment of the Ellerines generated traffic is questioned in that almost the entire traffic volume is indicated as being distributed westwards along the R103. Any traffic between this distribution point and Durban is surely likely to use the R103 east and P245 via the Hammarsdale Interchange in accessing the N3. An adjustment will be made to these flows for the purposes of the analysis.

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## **5.0 DEVELOPMENT TRAFFIC GENERATION**

### **5.1 Traffic Generation**

The basis of the estimation of the traffic generation potential of the proposed development is usually the guidelines document, *South African Trip Generation Rates (Report RR92/228) 2<sup>nd</sup> Edition*, issued by the Department of Transport.

The rate for industrial development is 0.9 trip-ends per 100m<sup>2</sup> which translates to 113 trip-ends during the peak hour with a directional split of 70%:30%.

This equates to 79 trips inbound and 34 trips outbound during the morning peak hour and vice-versa during the afternoon peak hour.

In addition to the above it is necessary to undertake an estimate of the heavy transport associated with the manufacturing process of the development. Scrap metal is imported and billets are exported along with waste in the form of slag and other waste. In broad terms the Phase 1 transport will amount to some 300 tons per day in each direction. On average this will amount to approximately 20 inbound trucks per day and 12 outbound trucks per day. This is not significant and will easily be accommodated by the existing road network.

### **5.2 Trip Distribution**

The distribution of the peak hour generated trips to the surrounding areas is likely to be to the north (rural residential) via P423, the east (Mpumalanga, Outer West) via the R103/P245 and to the west (Cato Ridge, Camperdown, Pietermaritzburg) via the R103.

Heavy vehicle transport will mostly be to and from the east. Scrap metal is brought in (mostly from the east) and finished product is exported via Durban. There is also residual slag which will be transported off site probably mostly to Durban.

**Table 4: Development Trip Distribution**

<b>Vehicle Type</b>	<b>To/from North</b>	<b>To/from East</b>	<b>To/from West</b>
Light Vehicles	10%	40%	50%
Heavy Vehicles	0%	80%	20%

### 5.3 Traffic Assignment

The assignment of the generations in accordance with the distribution pattern above results in the following assigned volumes:

**Table 5: Traffic Assignment**

<b>Intersection / Approach</b>		<b>AM</b>	<b>PM</b>
<b>R103 / Eddie Hagen Drive</b>			
R103 East	Right Turn	32	14
R103 West	Left Turn	40	17
Eddie Hagen Dr	Left Turn	14	32
	Right Turn	17	40
<b>Eddie Hagen Drive / Site Access Intersection</b>			
Site Access	Left Turn	31	72
	Right Turn	8	3
Eddie Hagen Dr North	Left Turn	3	8
South	Right Turn	72	13

In reality the movements at the site access would be less because many of the blue collar workers would arrive on taxis which would be passing by on their normal commuter route. However, in the interests of conservatism the assigned volumes will be used in the analysis.

## 6.0 TRAFFIC ASSESSMENT

### 6.1 General

The following needs to be considered in the assessment of the ability of the existing road system in accommodating the generated traffic:

- Predicted traffic flows;
- Other developments;
- Intersection performance;
- Safety considerations;
- Existing road geometry;
- Traffic flow profile i.e. number of heavy vehicles and allowance for these vehicles;
- Access – location and performance;
- Ancillary facilities.

### 6.2 Traffic Operations

Traffic operational conditions are assessed for the actual roads impacted as well as the intersection of the R103 and Eddie Hagen Drive.

The assessment of the traffic impact is based on the quantification of the change in the traffic operational quality as a result of the additional traffic generated by the proposal. The procedure in assessing this change is to analyse the existing situation using accepted methods the results of which are depicted in Sub-section 3.2 above and to repeat the process with the addition of the generated traffic. The differences in the results of the two processes and the interpretation thereof, represent the traffic impact.

The analysis which follows addresses the following **three scenarios**:

- i. Development generated traffic added to existing traffic;**
- ii. Other new traffic (Ellerines and SRF Flexipak) added to existing traffic;**
- iii. Development traffic added to existing plus other new traffic.**

**Roads** – The table below provides an assessment of the capacity of the three roads affected by the proposed development in terms of the volume



to capacity (V/C) ratio for the morning and afternoon peak hours respectively.

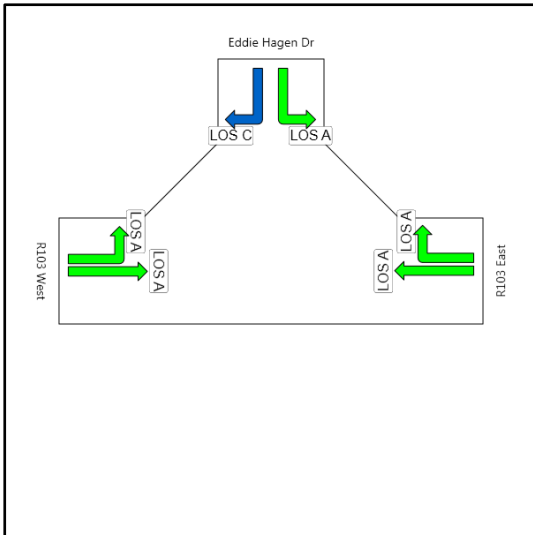
**Table 6: Peak Hour Road Capacities (V/C Ratio)**

Road	Ex Traffic		Ex + Gen Traffic		Ex + Other Traffic		Ex + Other + Gen Traf	
	AM	PM	AM	PM	AM	PM	AM	PM
R103 East	0.19	0.21	0.22	0.24	0.25	0.27	0.28	0.29
R103 West	0.22	0.17	0.25	0.20	0.29	0.24	0.32	0.27
P245	0.17	0.16	0.19	0.18	0.23	0.22	0.28	0.24
Eddie Hagen Dr	0.24	0.24	0.29	0.29	0.37	0.40	0.42	0.45

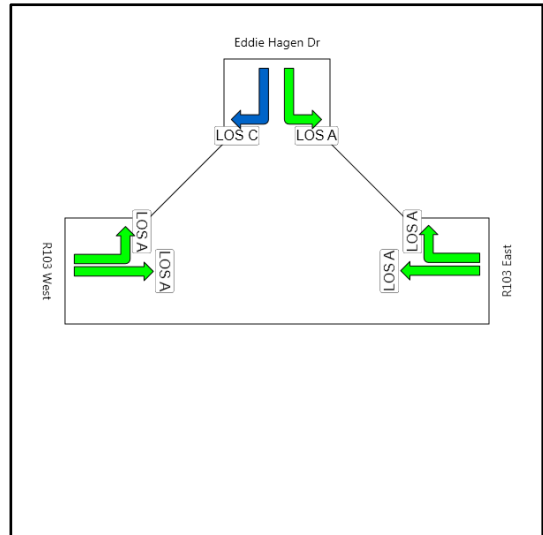
The values in the table show that there exists ample spare capacity on all of the roads affected with the highest trafficked road being Eddie Hagen Drive which is predicted to be at a V/C ratio approaching 0.5 during the peak periods with all of the expected traffic from other imminent developments included.

As stated in Sub-Section 4.2 background traffic growth has been minimal and therefore it is not considered necessary to undertake an analysis for a five year horizon. In any case there is significant spare capacity with generally good traffic operational conditions.

**Intersections** - The diagrams below depict the results of the analysis of the three scenarios. The discussion following the diagrams details any differences between these results and those for the existing situation.



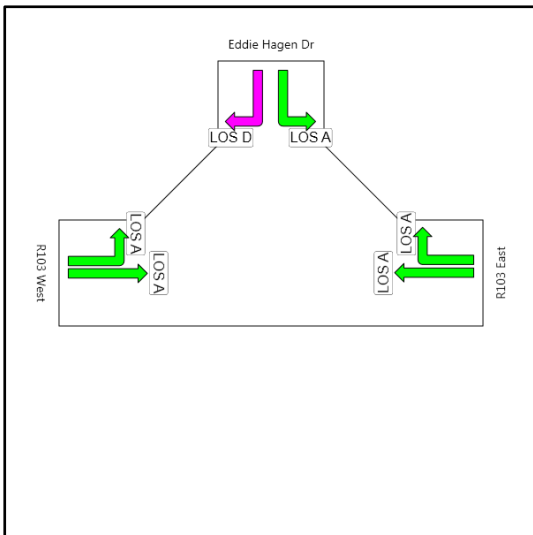
**AM**



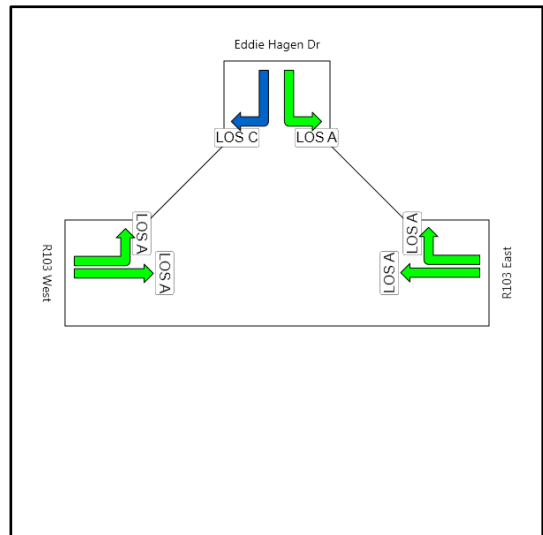
**PM**

**R103 / Eddie Hagen Drive Intersection**

**Existing Traffic + Generated Traffic**



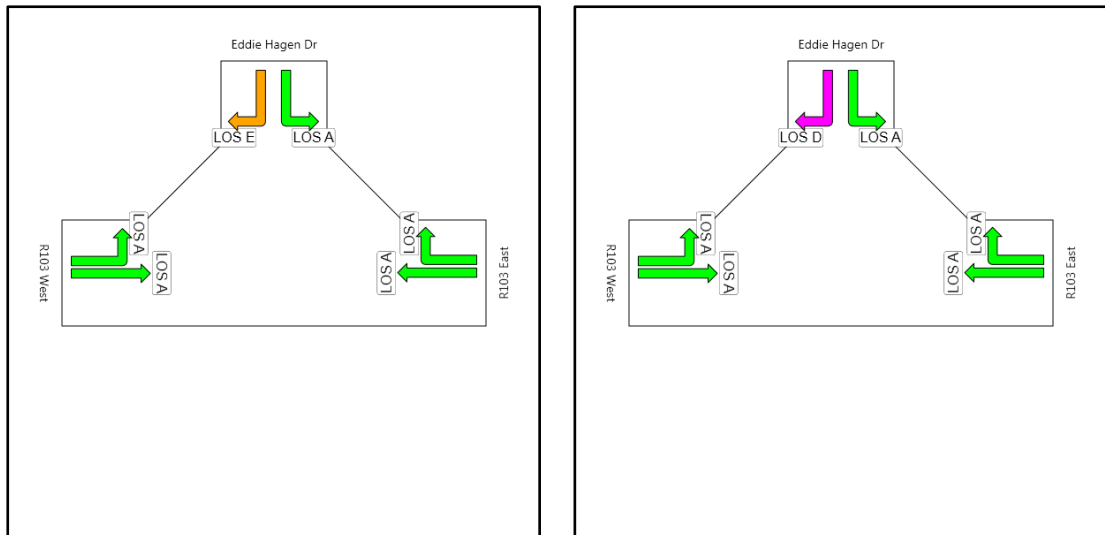
**AM**



**PM**

**R103 / Eddie Hagen Drive Intersection**

**Other New Traffic + Existing Traffic**



**AM**

**PM**

**R103 / Eddie Hagen Drive Intersection**

**Generated Traffic + Other New Traffic + Existing Traffic**

Comparison of the analysis results with the generated traffic added to the existing traffic with those of the existing conditions as detailed in Section 3 reveals the following results for the R103 / Eddie Hagen Drive intersection:

- i) Generated Traffic plus Existing Traffic.** A comparison of these results with those for the existing situation reveal that no discernible change in the level of service is detected with the addition of the generated traffic for both the morning and afternoon peak periods. This is to be expected given the modest volume of generated traffic.
  
- ii) Other New Traffic plus Existing Traffic.** The addition of both the Ellerines Warehouse traffic as well as the SRF Flexipak traffic to the existing traffic results in a drop in the level of service from LOS C to LOS D for the right turn movement from Eddie Hagen Drive. Given that this is a stop controlled movement and has to give priority to the traffic on the R103 the slight change in level of service is understandable. No other movements are affected.

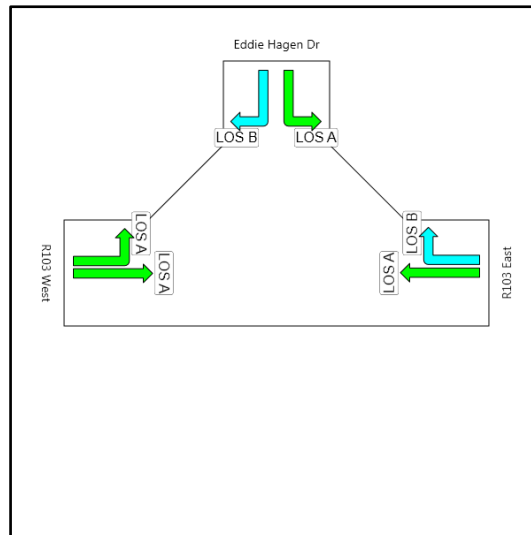
**iii)Generated Traffic plus Other New Traffic plus Existing**

**Traffic.** The addition of the development traffic to the existing traffic plus other new traffic scenario results in a further drop in the level of service for the right turn movement from Eddie Hagen Drive from LOS D to LOS E for the morning peak period and from LOS C to LOS D for the afternoon peak period. It is to be expected that the right turn out of the side road will experience additional average delay as a result of the increased traffic volume and the slightly higher opposing volume.

The movements on the R103 are unaffected in terms of level of service.

In summary therefore it can be said that the Eddie Hagen Drive approach movements, being the non-priority leg of the intersection, experience a slight reduction in the level of service. This reduction in the operational efficiency is not due solely to the proposed development being addressed in this report but is due to the collective impact of the identified new developments along Eddie Hagen Drive.

In order to afford the side road traffic safe and convenient passage through the intersection it is recommended that the intersection be converted to a signalised intersection. The results of an analysis of the morning peak for the total traffic scenario as a signalised intersection are depicted below.



**AM**

**R103 / Eddie Hagen Drive Intersection - Signalised  
Generated Traffic + Other New Traffic + Existing Traffic**

Assuming a short cycle length and the left turns as slip lanes (there is ample space to provide these) provides good serviceability as seen by the results depicted. The worst level of service is LOS B.

**6.3 Road Conditions**

The adequacy of the layout of the road system in terms of visibility, safety, physical dimensions/characteristics and ancillary facilities has been assessed.

**6.3.1. Visibility and Safety**

Normally the main item of concern for an un-signalised intersection is that of adequate **shoulder sight distance**. This is the distance along the road which the driver of a vehicle exiting an access or turning right needs to be able to see before pulling off from the stop line. The following table depicts the minimum shoulder sight distance requirements for light vehicles, a rigid truck and an articulated heavy vehicle for the three listed speeds below.

**Table 4: Shoulder Sight Distance Requirements (Metres)**

Vehicle Type	Through Road Speed		
	60 km/h	80 km/h	100 km/h
Light vehicle (car, LDV, taxi)	115	155	200
Rigid vehicle (refuse/delivery truck)	180	240	300
Articulated vehicle	230	305	380

It is important to maximise the sight distances in an attempt to achieve the minimum criteria for the type of vehicles using the intersection on a frequent basis. (Refer Sub-section 6.4 below)

### **6.3.2. Geometry**

All of the roads which will be used by the generated traffic have good geometry and no concerns are raised.

### **6.3.3. Traffic Flow Profile**

Heavy vehicle activity associated with a development of this nature would comprise both rigid chassis trucks and articulated heavy vehicles, mostly carrying high mass goods and, during construction, construction vehicles. The needs of these vehicles should be taken cognisance of in addressing all of the items mentioned above as well as in the design of the road infrastructure, with particular attention afforded the turning path requirements of the heavy vehicles. This is a crucial matter with regard to the design of an adequate and appropriate access.

## **6.4 Access**

### **6.4.1. Position and Layout**

The location of the access to the proposed development is such as to maximise and attain the required minimum sight distances for traffic turning into, and out of, the site access. The available shoulder sight distances are well in excess of the required minima as per Table 4.

#### **6.4.2. Intersection Performance**

The access intersection will operate satisfactorily given the low traffic volumes associated with the proposed development provided it is designed and constructed to an appropriate standard. As Eddie Hagen Drive is a provincial main road (P423) serving a large rural community it is suggested that, in the interests of safety and efficient traffic operations, the access intersection be constructed as a KZNDOT Type B2.

#### **6.4.3. Safety Considerations**

A review of all regulatory and warning signage should be undertaken. Appropriate signage and road marking should be installed on the impacted road network.

#### **6.4.4. Heavy Vehicle Needs**

The needs of these vehicles should be taken into consideration in the design and layout of the access with particular attention afforded the turning path requirements of the heavy vehicles as mentioned earlier in Sub-section 6.4.1.

#### **6.4.5. Entry Control**

Should the entrance to the site be security controlled this facility should be positioned a minimum of 60m from the edge of the fronting road.

### **6.5 Pedestrian Facilities and Public Transport**

Pedestrian traffic associated with the proposed development will be minimal and therefore no special requirements are identified.

Public transport facilities should be provided in the form of taxi lay-byes on Eddie Hagen Drive in close proximity to the site access.

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## 7.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the above investigations and analysis the following **conclusions** can be drawn from this assessment:

1. Existing road and traffic conditions on the major road network in the vicinity of the site are generally good.
2. Long term road proposals are not compromised by the proposed development.
3. The proposed development is typical of the existing land use in the area and is ideally suited to the site and its location within the local area.
4. The proposed development has the potential to generate modest levels of traffic in the peak periods.
5. Other imminent developments in close proximity to the site have been taken account of in the analysis.
6. The assessment of the traffic operational efficiency with the additional traffic likely to be generated by the proposed development added to the existing traffic reveals that it will have a minor impact on existing traffic operational conditions at the R103 Eddie Hagen Drive intersection.
7. The assessment of the traffic operational efficiency with the additional traffic likely to be generated by the proposed development added to the existing traffic as well as the other new development traffic will significantly impact the R103 / Eddie Hagen Drive intersection.
8. Consequently, the R103 / Eddie Hagen Drive intersection requires upgrading to a signalised intersection.
9. Suitable access to the proposed development is possible from the Eddie Hagen Drive fronting road. This access will require to be constructed to an appropriate standard in order to ensure traffic safety and be operationally efficient.



- 10.** The design of the access to the proposed development should be in accordance with the content of Sub-Sections 6.3 and 6.4.
- 11.** The heavy vehicle transport will be satisfactorily accommodated by the existing road infrastructure
- 12.** It is therefore **recommended** that;
- A single access be permitted off Eddie Hagen Drive;
  - This access be designed and constructed as a KZNDOT Type B2 access suitably modified to accommodate heavy vehicles, the design to be carried out by a registered professional and submitted to the KZNDOT for approval;
  - The R103/Eddie Hagen Drive intersection be upgraded by the installation of traffic signals;
  - The cost of this upgrade should be shared between the developers of this development, the developers of Ellerines and the developers of SRF Flexipak.
  - Taxi lay-byes are to be constructed at the site access;
- 



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