STURGEON CONSULTING

No 5 Kleinmelkbos, George Mellet Crescent, Melkbosstrand, 7441
Postnet Suite #347, Private Bag x1, Melkbosstrand, 7437
t: 021 553 4167 f: 086 559 5327

TRANSPORT IMPACT ASSESSMENT FOR THE PROPOSED AGULHAS 400/132KV 2 X 500 MVA MAIN TRANSMISSION SUBSTATION

LOCATED SOUTHWEST OF SWELLENDAM, WESTERN CAPE

Project No. : STUR0166

SEPTEMBER 2016

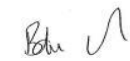
PREPARED BY:
STURGEON CONSULTING (PTY) LTD
Postnet Suite 347
P/Bag x1
Melkbosstrand
7437

CONTACT PERSON:
Mr Barend du Preez
Tel no: +27 (021) 553 4167

PREPARED FOR:
NSOVO ENVIRONMENTAL CONSULTING
Postnet Suite 69
P/Bag x29
Gallo Manor
2052

CONTACT PERSON:
Mr Khuliso Mudau
Tel no: +27 (011) 312 9984

STURGEON CONSULTING (PTY) LTD (Reg No. 2015/059313/07)
Directors: B du Preez (Pr Eng) & RS du Preez (Attn) Associate: SJ Larratt (Pr Tech Eng) Specialist Consultant: G Hitge (Pr Eng)

Project Title					**Project Number**
Ansovo Environmental Consulting – Proposed Agulhas 400/132kv 2 x 500 MVA Main Transmission Substation southwest of Swellendam					STUR0166
Document Title		Traffic Impact Assessment for the Proposed Agulhas 400/132kv MVA Main Transmission Substation Southwest of Swellendam			
Synopsis		This report assesses the key transportation issues pertaining to the proposed Agulhas Main Transmission Substation near Swellendam.			
Version	**Date (dd/mm/yy)**	**Filename**	Agulhas MTS_TIA		
Draft for comment	12/09/16	**Description**	Traffic Impact Assessment for the Proposed Agulhas 400/132kv MVA Main Transmission Substation Southwest of Swellendam – Draft		
			Prepared by	**Reviewed by**	**Approved**
		Name	S Larratt, Pr TechEng	B du Preez, Pr Eng	B du Preez, Pr Eng
		Signature			
Version	**Date (dd/mm/yy)**	**Filename**	Agulhas MTS_Final TIA		
Final	19/09/16	**Description**	Traffic Impact Assessment for the Proposed Agulhas 400/132kv MVA Main Transmission Substation Southwest of Swellendam – Final		
			Prepared by	**Reviewed by**	**Approved**
		Name	S Larratt, Pr TechEng	B du Preez, Pr Eng	B du Preez, Pr Eng
		Signature			
Version	**Date (dd/mm/yy)**	**Filename**			
		Description			
			Prepared by	**Reviewed by**	**Approved**
		Name			
		Signature			

DECLARATION OF INDEPENDANCE

This report was compiled by Mr Barend Du Preez and Mrs Sarah Larratt of Sturgeon Consulting, both who hereby declare that they acted as independent consultants and have no business, financial, personal or other interest in the proposed development project, application or appeal in respect of which we were appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of our performing such work. CVs of the applicable specialists that performed the core duties are contained in Appendix A at the back of this report.

Barend Du Preez, Pr Eng

Sarah Larratt, Pr TechEng

September 2016

TABLE OF CONTENTS

FIGURES

LIST OF ABBREVIATIONS

MTS – Main Transmission Substation
CLN – Customer Load Network
TIA – Transport Impact Assessment
TIS – Transport Impact Study
NLTA - National Land Transport Act 5 of 2009
COTO – South African Committee of Transport Officials
EIA – Environmental Impact Assessment
NEMA - National Environmental Management Act 107 of 1998
WCG – Western Cape Government
SANRAL – South African National Road Agency Limited
NMT – Non-Motorised Transport
vph – Vehicles per Hour
ADT – Average Daily Traffic
AADT – Annual Average Daily Traffic
MR – Proclaimed Main Road
DR – Proclaimed Divisional Road
OP – Proclaimed Minor Road

1. INTRODUCTION

1.1 BACKGROUND

Eskom Transmission Grid Planning and Eskom Distribution Western Cape Operating Unit initiated a study to investigate possible solutions to address the constraints on the sub-transmission network to the east of Bacchus 2x500 MVA 400/132kV substation. Bacchus substation forms part of the Outeniqua Customer Load Network (CLN) in the Western Cape Grid and it supplies Vryheid and Ashton sub-transmission substations in the east. Ashton substation is supplied via Boskloof 132kV switching station, whilst Vryheid substation is supplied directly from Bacchus substation. Vryehid and Ashton substations are both equipped with 2x40MVA 132/66kV transformers and are radially supplied.

In order to resolve the anticipated network constraints, the proposed Vryheid strengthening project is proposed and this entails the development of the new Agulhas 400/132kV 2x500 MVA Transmission Substation and associated loop in and out lines.

Four possible alternative sites have been proposed for the new substation and associated loop in and out lines on the following farms for investigation:

- Substation Site Alternative A: Farm 253
- Substation Site Alternative C: Farm 256 Portion 5
- Substation Site Alternative F: Farm 257
- Substation Site Alternative G: Farm 524

The proposed possible sites are situated in the Swellendam Local Municipality of the Overberg District Municipality. The substation project covers an area of approximately 360 000m^2 (600m x 600m).

Sturgeon Consulting (Pty) Ltd has been appointed by Nsovo Environmental Consulting to provide specialist input to the EIA application in terms of a Transport Impact Assessment (TIA) for the proposed Agulhas 400/132kV 2x500 MVA Transmission Substation. This study is undertaken as part of the Environmental Impact Assessment (EIA) process facilitated by Nsovo Environmental Consulting in terms of the National Environmental Management Act 107 of 1998 (NEMA). As part of the authorisation, several specialist studies have been identified to form part of the Environmental Impact Assessment (EIA).

The report aims to help inform the Environmental Impact Assessment (EIA) undertaken for the proposed development with the objective to facilitate informed decision-making as it relates to the desirability of the proposed substation in context of the statutory obligation to ensure long-term environmental sustainability with specific reference to the traffic impact.

1.2 METHODOLOGY

The broad methodology adopted for this specialist study is as follows:

1. Site visits of all 4 alternatives undertaken on 7 August 2016.
2. Literature review and internet research.
3. Traffic data collection (AADT, ADT etc. from SANRAL)
4. Data analysis
5. Liaison with client and/or project team
6. Fine tune analysis

7. Preparation of draft report and figures
8. Review comments on draft report
9. Amend report and finalise

1.3 LEGISLATIONS WITH REGARDS TO TRANSPORT IMPACT ASSESSMENTS

A Transport Impact Assessment (TIA) is required to determine what impact a new development's traffic will have on the existing road network and whether or not this development can be accommodated by the transport system. The purpose of a TIA is to support sustainable development by protecting the overall integrity of the transport system for the benefit of all users.

The South African Committee of Transport Officials (COTO), TMH 16 Manual, Volume 1, states that in terms of the manual, a TIS must be undertaken when "*An Application is submitted for a change in land use*".

The TMH16 also states that the National Land Transport Act 5 of 2009 requires the integration of land transport planning with the land development process and the preparation of integrated transport plans which constitutes the *transport component* of the integrated development plans of municipalities.

The NLTA (Act 5 of 2009) Section 38 does not set out any regulation as to what is required in a TIA. However, Section 38(2b) of the act states that "*developments on property within a transport area are subject to traffic impact assessments and public transport assessments as prescribed by the MEC*"

National Road Traffic Act 93 of 1996 provides for road traffic matters to be applied uniformly throughout the Republic and for matters connected therewith.

1.4 STUDY PURPOSE

The primary purpose of this report is to evaluate all four sites and the expected traffic impact of the proposed transmission substation with the main focus on access and traffic distribution during the construction phase and during the operational phase. In other words, the objective of the Transport Impact Assessment (TIA) is to assess the impact of the proposed transmission substation activities on the existing external road network surrounding the development. The report identifies the preferred site and access route to the site, comments on the condition of the existing roads in the site vicinity, identifies possible access points to the site and recommends road improvements to minimise the impact on the surrounding road network.

This TIA addresses the following traffic and transportation related implications of the proposed substation facility:

- Locality of the proposed sites for the substation
- Existing traffic volumes on the N2 and the provincial roads MR264 (R319), DR1251 and MR268 passing the site
- Acceptability from a traffic safety point of view of the location of the access/es to the proposed facility
- Risk posed by construction and operational vehicles
- Limitation of this Transport Impact Assessment
- Based on existing volumes of traffic, recommendations for mitigations measures for traffic impacts

It should be noted that this report does not address the internal traffic circulation for the substation.

As part of the EIA the TIS will be developed in line with the guidelines of the *Manual of Traffic Impact Studies (RR93/635)* published by the Department of Transport in 1995, *TMH16 Volume 1 & Volume 2, South African Traffic Impact and Site Assessment Manual, August 2012* published by the Committee of Transport Officials (COTO).

2. LOCATION OF THE PROPOSED SUBSTATION

The project includes the establishment of the Agulhas 400/132kV 2x500 MVA Main Transmission Substation (MTS) approximately 600m x 600m and development of associated loop in and loop out lines to connect the proposed Agulhas MTS to the existing 400kV line Bacchus – Proteus 1. This document deals with the specialist transport study relating to the proposed substation.

The proposed development will be located within Ward 3 of the Swellendam Local Municipality, which falls within the jurisdiction of the Overberg District Municipality in the Western Cape.

There are four alternative substation sites and loop in and loop out lines proposed. **Figure 1** and **Figure 2** provides a locality view of the location of the proposed sites.

The proposed site chosen for the substation will be approximately 600m x 600m and the loop in and loop out lines will be approximately 2km long, depending on the final location of the substation.

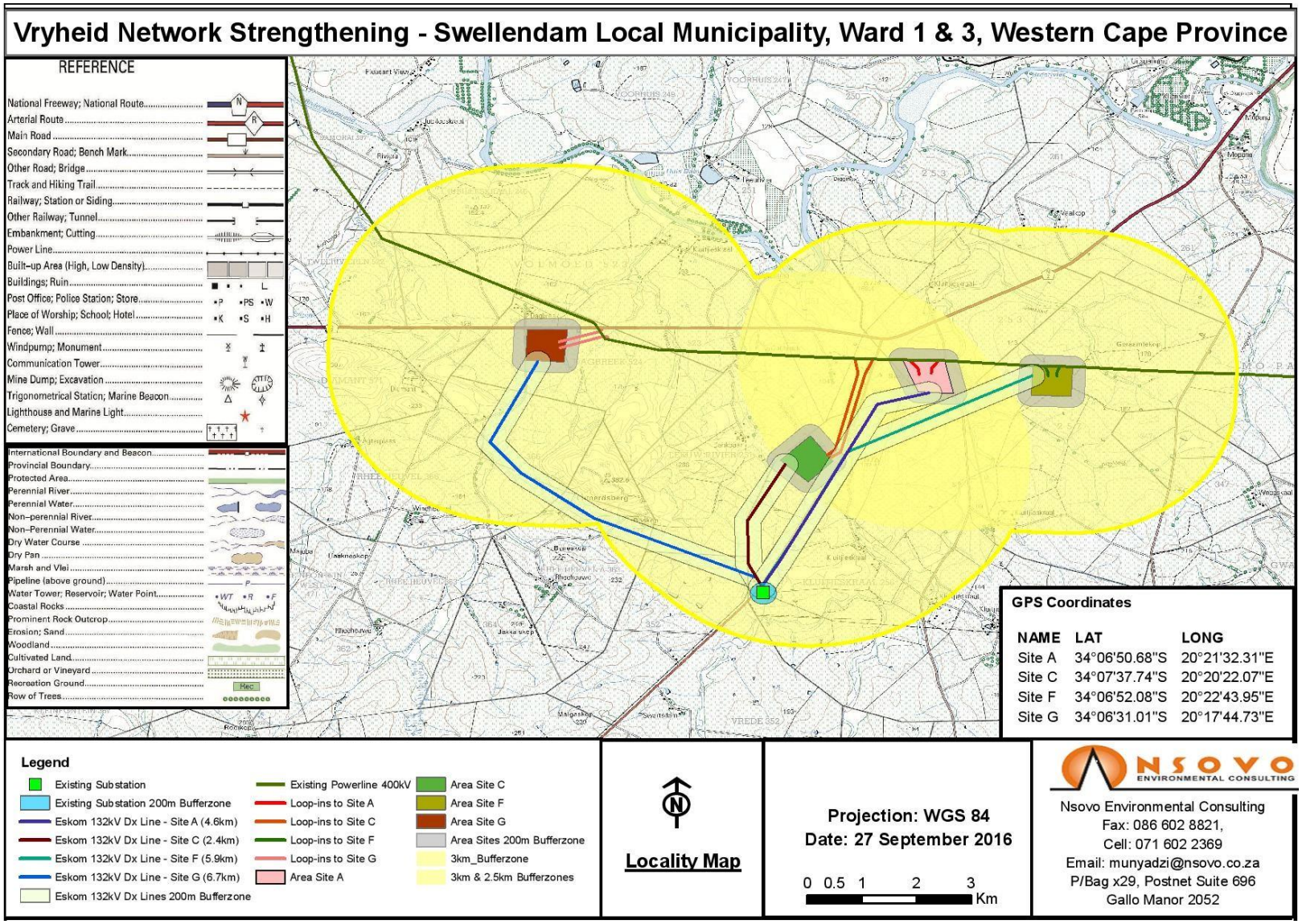


Figure 1: Locality Plan

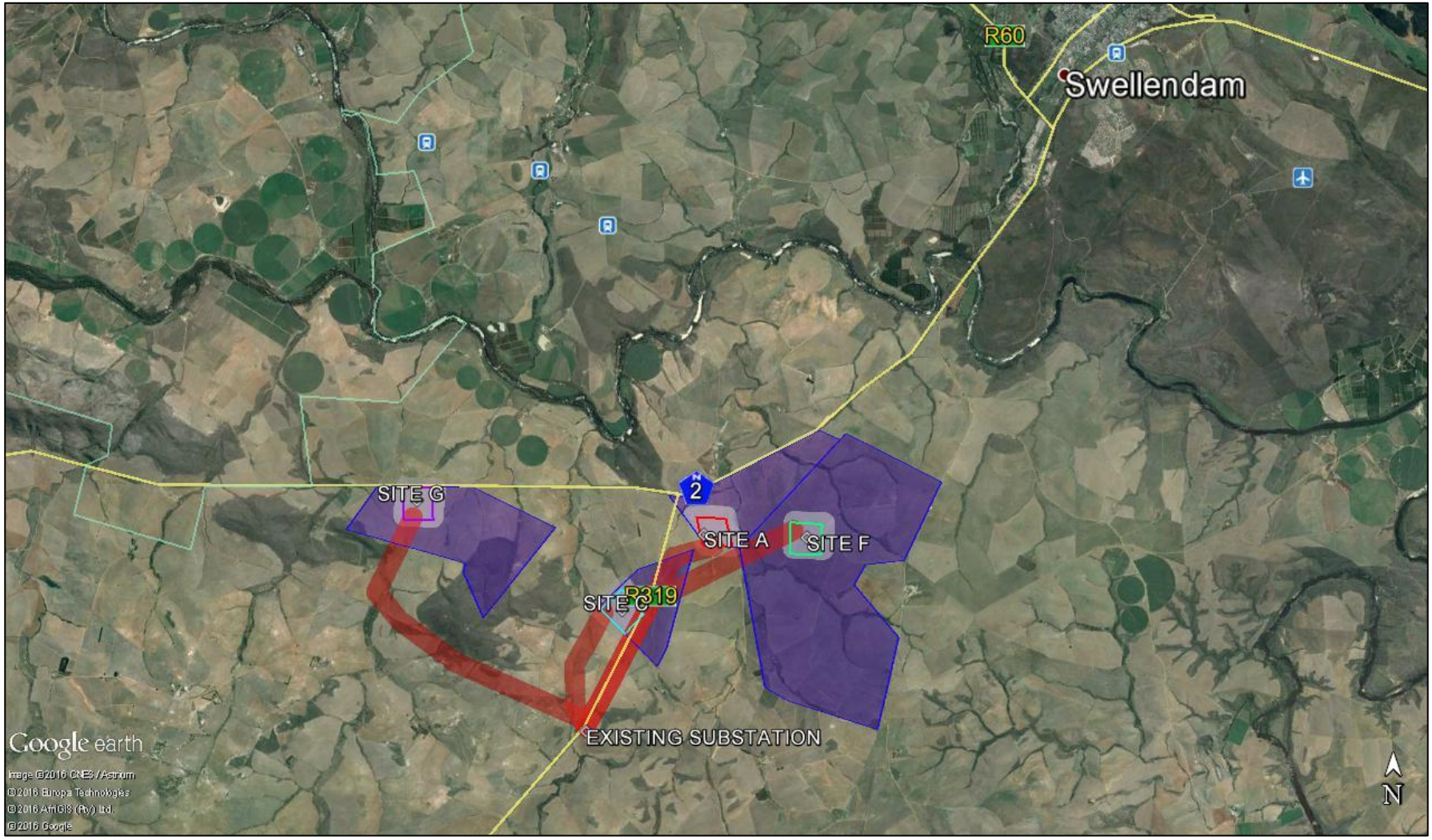


Figure 2: Locality Plan – Aerial View

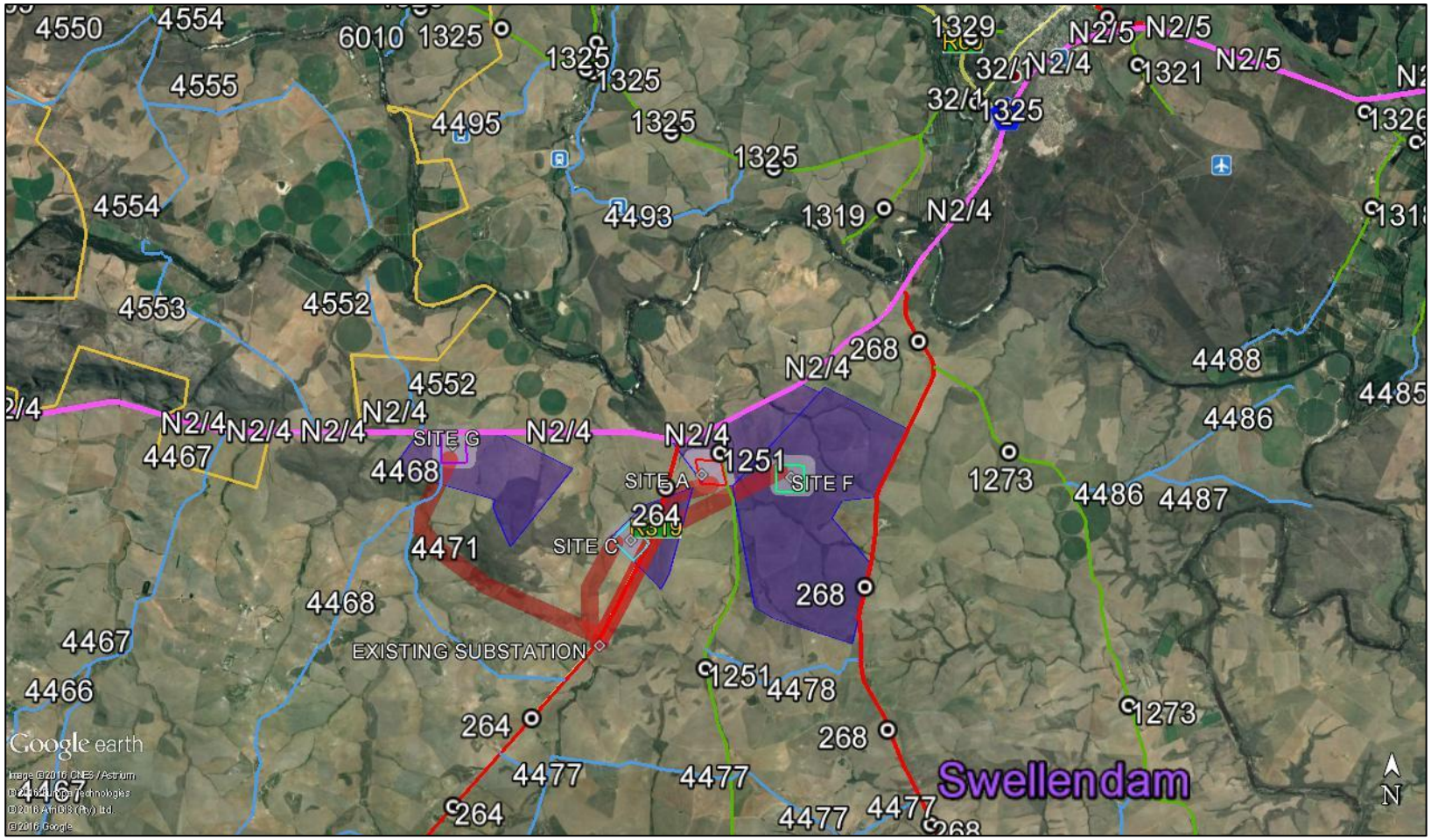


Figure 3: National and Provincial Road Network

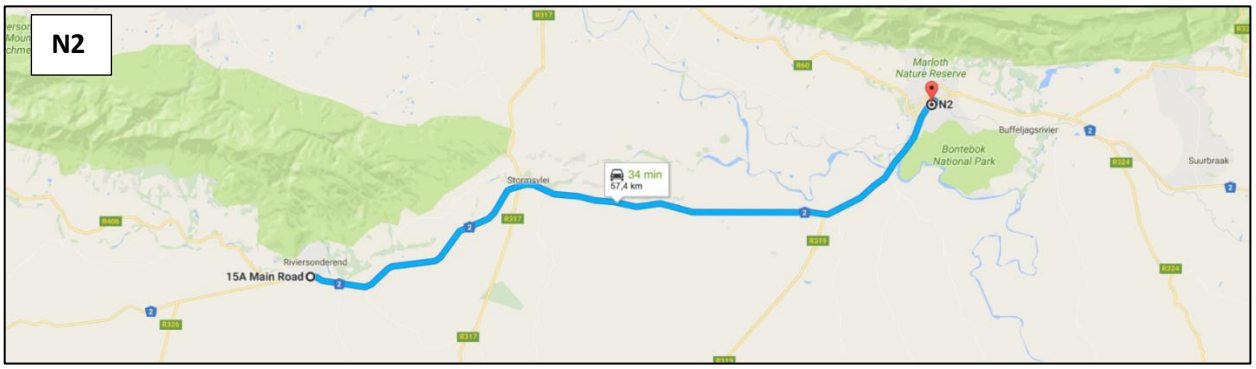
2.1 SITE ALTERNATIVES

In the Final Scoping Report seven (A to G) alternative sites were identified of which B, D and E were eliminated. The remain four (A, C, F and G) sites are evaluated from a traffic impact point of view. Each site will be discussed in more detail in Section 2.1.2, 3, 4 and 5 below.

Depending on the preferred site, the following roads may be directly affected by the construction and operational phase of the new substation:

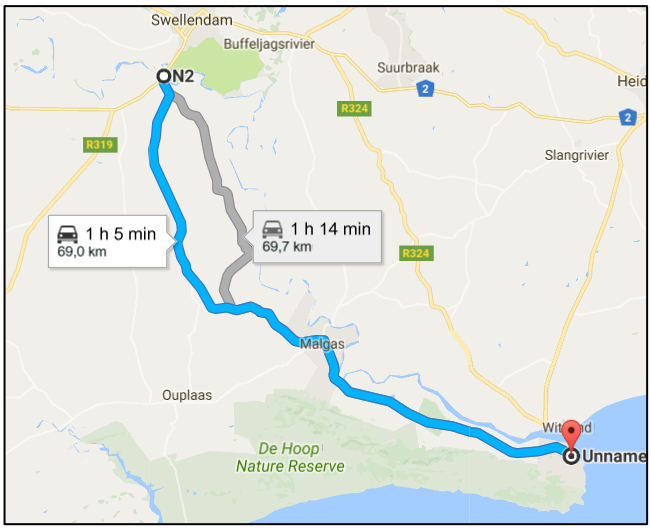
- **N2 National Road**

The N2 is a Class 1 Principal Arterial providing high mobility between provinces, regions and towns starting in Cape Town and ending in Ermelo while going through Port Elizabeth, East London and Durban. Section 4 of the N2 past the proposed alternative substation sites begins at Riviersonderend and ends at Swellendam. The N2/4 is a 2-lane road with paved shoulders, climbing lanes and turning lanes at major intersections. In many cases the shoulder is wide enough to allow yellow-line driving. The road is in a good condition. The speed limit on the road is 120km/h.



- **Main Road 268 (MR268)**

MR268 is a Class 3 Minor Arterial in a rural environment and connects the N2 with Infanta in the south. This is a 2-lane gravel road (8m wide) with no shoulders and a 25m road reserve. The road is in a poor condition. The speed limit on the road is 100km/h.

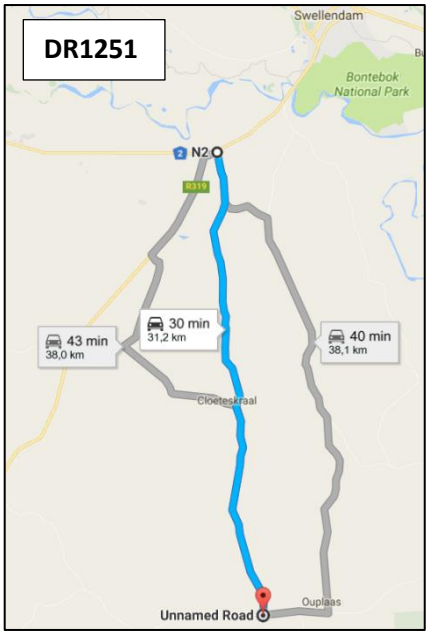


- **Main Road 264 (MR264)/R319**

MR264/R319 is a Class 3 Minor Arterial in a rural environment and it connects the N2 with Bredasdorp in the south. This is a 2-lane paved road with gravel shoulders and a 25m road reserve. The road is in a good condition. The speed limit on the road is 100km/h

- **Divisional Road 1251 (DR1251)**

DR1251 is a Class 4 Collector Street in a rural environment and it connects the N2 with DR1223 in the south. This is a 2-lane gravel road (6.0m) with no shoulders and a 20m road reserve width. The road is in a poor condition. The speed limit on the road is 100km/h.



- **Minor Road 4468 (OP4468)**

OP4468 is a Class 5 Local Access road in a rural environment connecting different farms with the N2. This is a 2-lane gravel road with no shoulders and a 20m proclaimed road reserve. The road is in a poor condition. The speed limit on the road is 100km/h.

- **Intersection Layouts on N2**

Depending on the preferred site the following intersections on the N2 may be affected by the construction of the new substation:

  - N2/MR268

  - N2/DR1251

- N2/MR264 (R319)

- N2/OP4468

2.1.1 Shoulder Site Distance (SSD)

At a stop-controlled intersection, the driver of the stationary vehicle must be able to see enough of the roadway to be able to cross before the approaching vehicle comes into view just as the stopped vehicle starts to cross. The proposed access to the preferred site will be stop controlled and will therefore have to comply with the shoulder site distance. As trucks will be using the access the worst case scenario will be where a SU+T (single unit plus trailer) will want to enter the main road from the stop-controlled side road. The N2 has a speed limit of 120km/h while all the other proclaimed roads have a speed limit of 100km/h. **Figure 4** provides a graph showing the required shoulder sight distances for different speeds and types of vehicles.

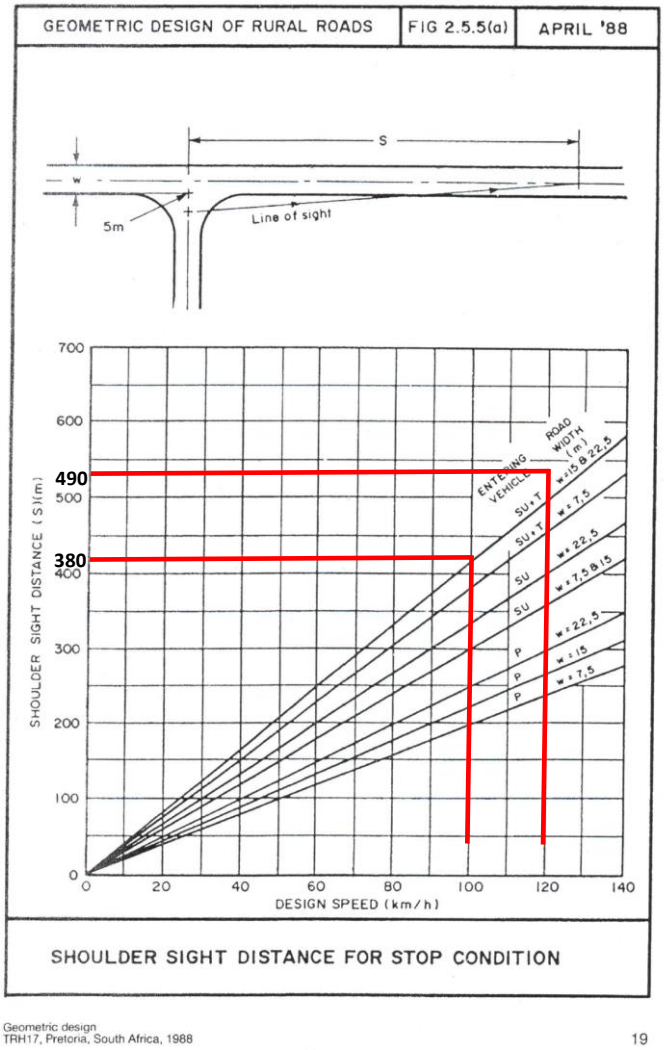
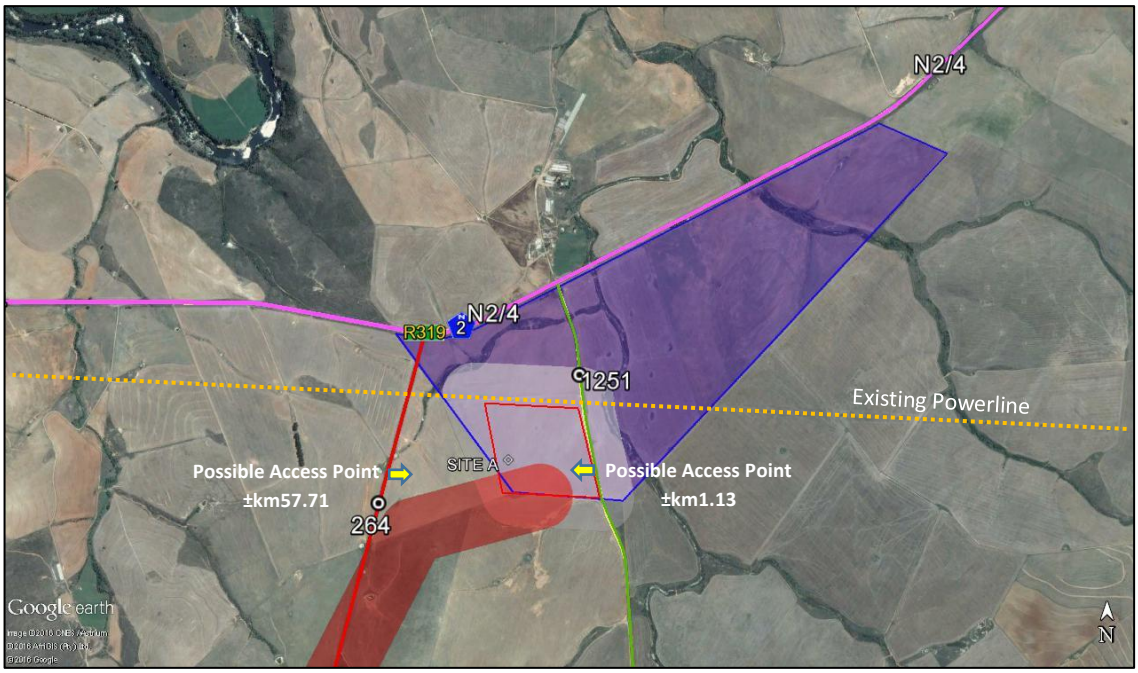


Figure 4: Shoulder Sight Distances

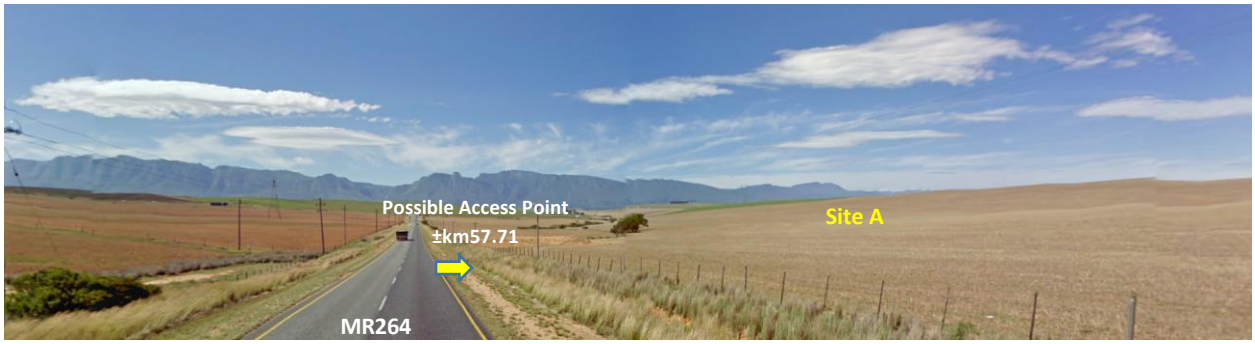
2.1.2 Substation Site Alternative A

Site A is located north of the existing substation and approximately 13km to the southwest of the town Swellendam along the N2 national road on the Remainder of Farm 253, Swellendam adjacent to the existing Eskom powerline. DR1251 runs north-south directly east of the site and intersects with the N2 national road to the north. MR264 (R319) runs west of the site and also intersects the N2 to the north.



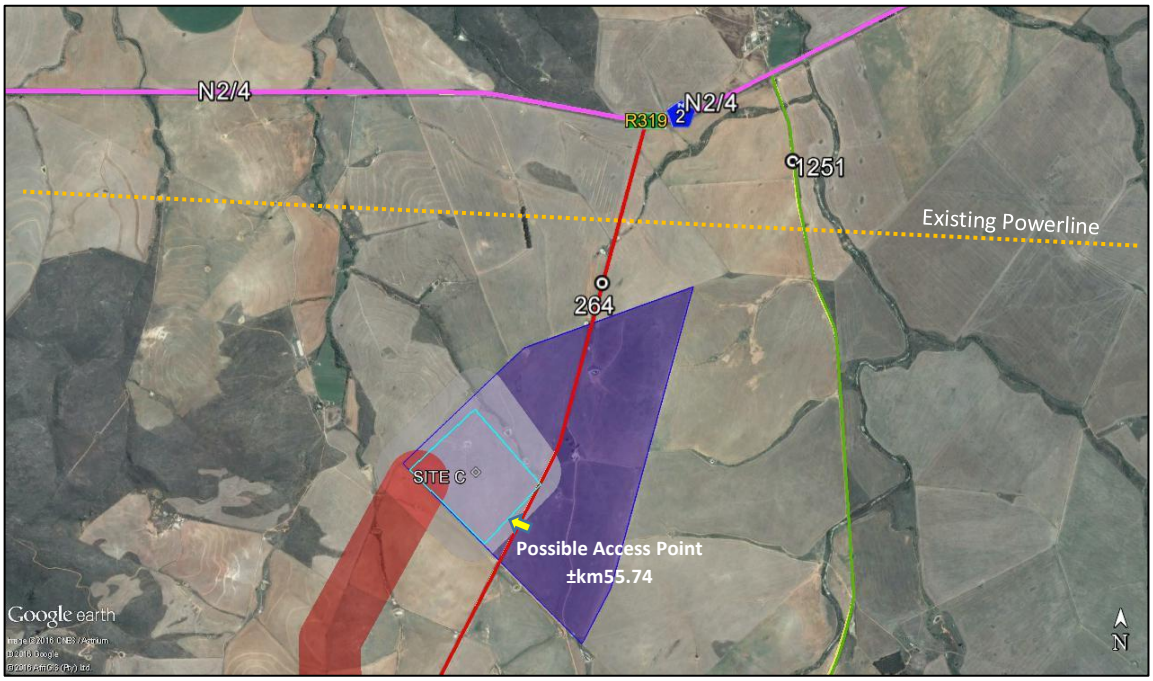
Access to Site A is possible off DR1251 at ±km1.13 and from MR264 at ±km57.71. The location of both these accesses allow for adequate shoulder sight distance (≥380m) in both directions. The proposed access off DR1251 provides direct access to Site A while the proposed access off MR264 will require a servitude right of way over the neighbouring farm (±700m).

DR1251 is a gravel road which is not in a good condition while MR264 is a paved road in a good condition. The Provincial Road Authority will require Eskom to maintain either DR1251 or MR264 and ensure that the road is in the same condition after construction has been completed as it was before construction started.



2.1.3 Substation Site Alternative C

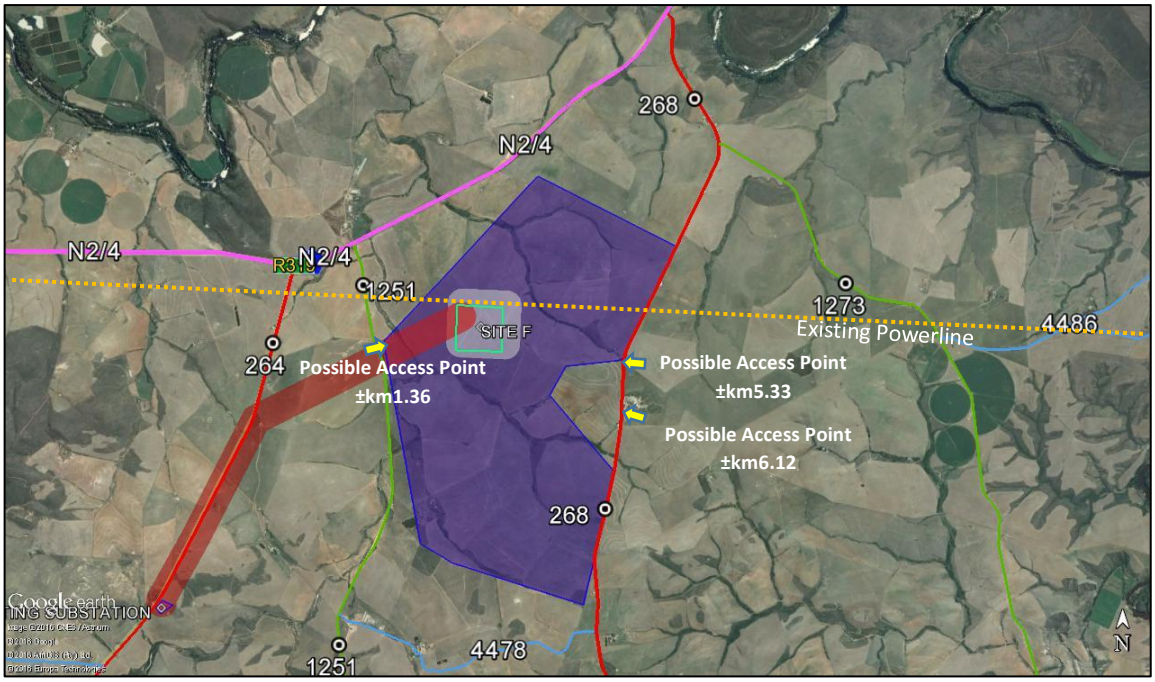
Site C is approximately 15km to the southwest of the town Swellendam along the N2 national road and the R319 (MR264) road to Bredasdorp, which will be the primary access. MR264 runs north-south to the east of the site and intersects with the N2 national road to the north of the site.



Access to Site C is proposed off MR264 at ±km55.74 (2.78km from N2) where adequate shoulder sight distances (≥380m) are achieved. MR264 is a paved road in a good condition. The site is approximately 2km south of the existing Eskom powerline.

2.1.4 Substation Site Alternative F

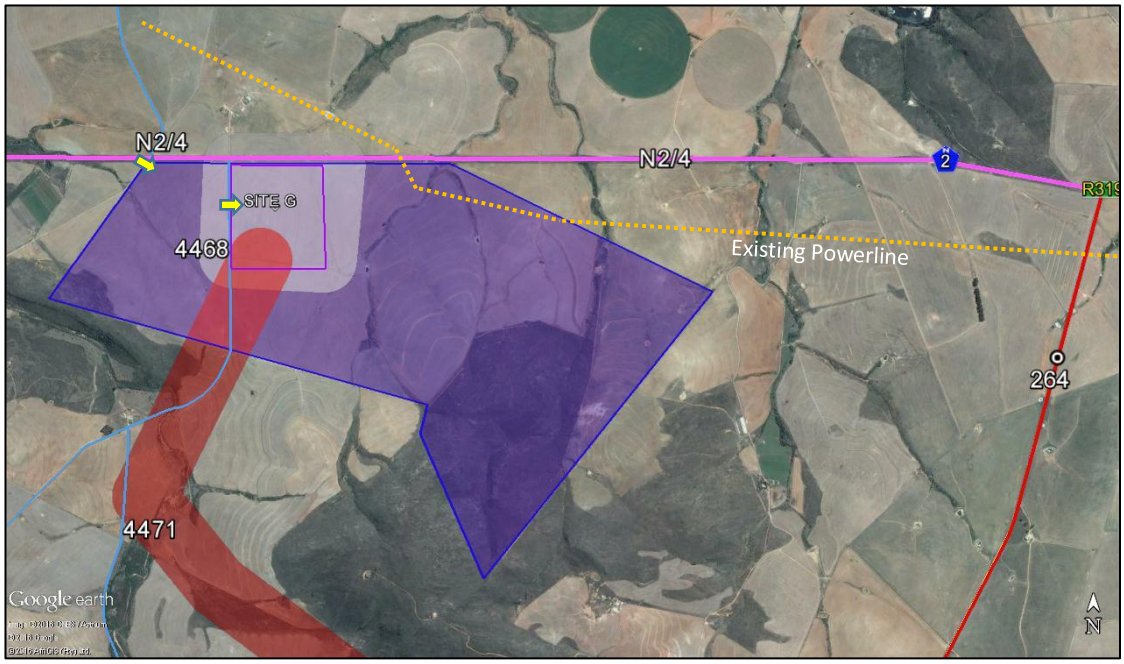
Site F is located to the east of Site A approximately 12km to the south west of Swellendam town. An existing Eskom powerline borders the site to the north and the N2 national road is located within close proximity. DR1251 is to the west and the MR268 to the east of the site.



Site F can be accessed from both MR268 and DR1251. An access road will have to be constructed over the farm land to access the site. Two possible access points off MR268 have been identified at ±km5.33 and ±km6.12 with adequate shoulder sight distance. The access roads from these two points will not require the crossing of a stream. The proposed access off DR1251 at ±km1.36 will require the construction of a bridge structure over a stream.

2.1.5 Substation Site Alternative G

Site G is located northwest of the existing substation, along the N2 approximately 18km southwest of the town Swellendam. The site is adjacent the N2 and OP4468. OP4468 runs north-south and intersects with the N2 to the north.



The OP4468/N2 intersection is very dangerous with inadequate shoulder sight distances (≥490m) and no turning lanes on the N2.

Access off the N2 directly onto Site G is not possible as there is no point where the shoulder sight distance (≥490m) is adequate. However, access is possible opposite OP4552 on the N2.

2.2 PREFERRED SUBSTATION SITE ALTERNATIVE

Taking into account the above it is recommended that **Site A** be chosen as the preferred site from a traffic impact point of view.

Site A is located close (±1.1km) to the N2 and access will be directly off DR1251. The site is also located directly adjacent to the existing Eskom powerline. DR1251 currently carries low traffic volumes.

Site C is ±2.8km from the N2 but access is off MR264, a paved road in a good condition. However, the site is approximately 1.8km from the existing Eskom Powerline.

Site F will require the construction of an access road and it can only be accessed from MR268 or DR1251 which are both gravel roads. The site is however located adjacent to the existing Eskom powerline.

Site G, although located next to the N2 an access road will have to be constructed to achieve a safe access off the N2. The site is located in close proximity of the existing Eskom powerline. Unfortunately, OP4468 cannot be used as an access road as the shoulder sight distance on the N2 is inadequate. SANRAL may require the construction of turning lanes on the N2 at the N2/OP4468 intersection to increase road safety.

3. EXISTING ROAD NETWORK AND TRAFFIC CONDITIONS

3.1 EXISTING ROAD NETWORK

Roads included in this study are the N2, MR264 (R319), MR268, DR1251 and OP4468. The N2 is a national route that runs from Cape Town through Port Elizabeth, East London and Durban to Ermelo. The road is currently in a good condition and is a two-lane undivided national road with hard shoulders managed by SANRAL. The road currently passes through or alongside important urban areas in the district including Caledon, Riviersonderend, Swellendam and Riversdale.

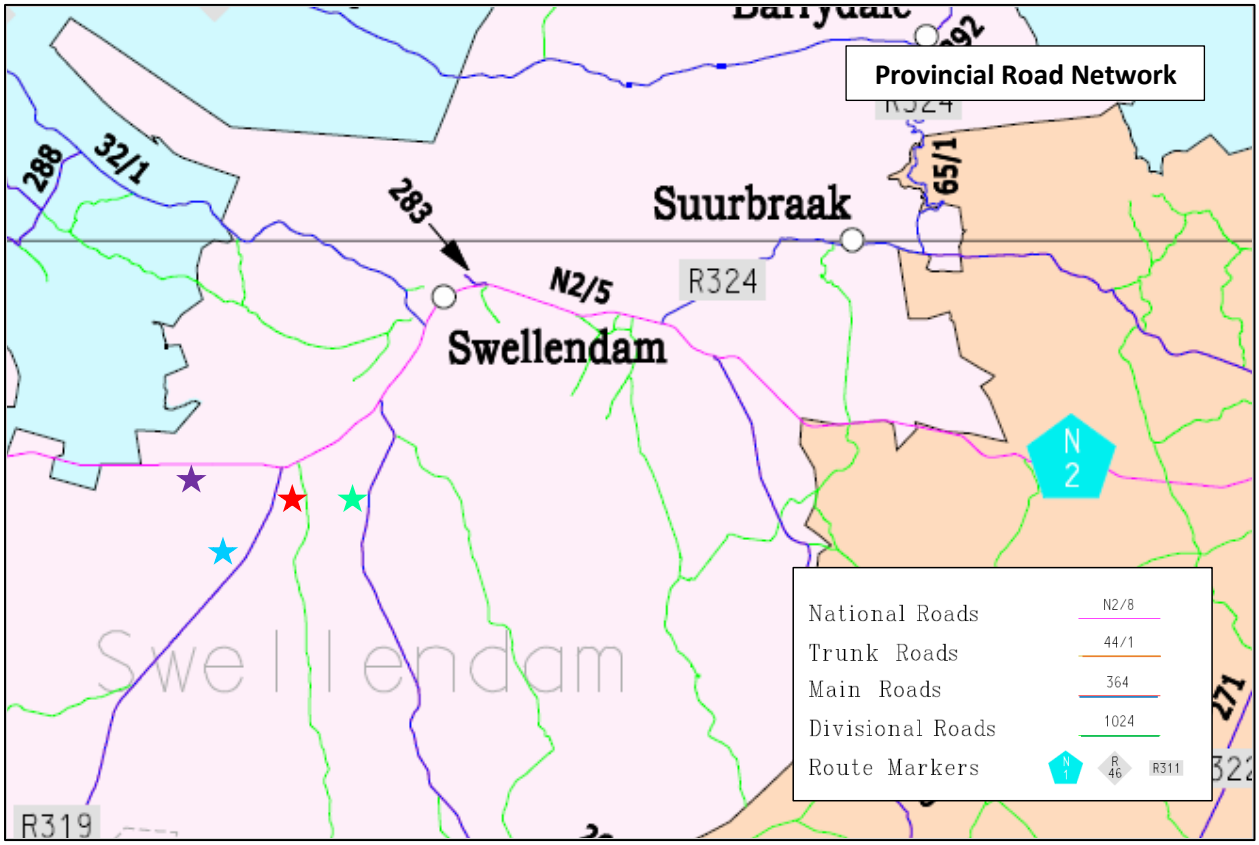
The R319 (MR264) is a Regional Route that connects Agulhas and Struisbaai in the south with the N2 near Swellendam and Bredasdorp and is a class 3 road.

The gravel DR1251 road is a class 3 and intersects with the N2 in the north and runs southwards towards Spitskop. MR268 runs in a north-south direction and connects to the N2 to the north and Infanta and Malgas to the south and is a class 4. The OP4468 is a class 5 gravel minor road and runs north-south and connects with the N2 in the north.

Existing road infrastructure is well developed in the area and thus well connected to surrounding major centres via regional routes. The combination of national roads and first and second order roads provides good inter- and intra- regional accessibility. The South African National Roads Agency (SANRAL) are responsible for the maintenance of the N2 which is in a good condition. Upgrades and extensions to the existing infrastructure will be implemented to accommodate the additional traffic volumes, if necessary. This means, possible upgrading of certain municipal, district and provincial routes, associated intersections and construction of new link roads, access roads and intersections where required.

The condition of the roads along the haulage routes must be left in a reasonable state following construction and any maintenance required will need to be undertaken by the developer. Any road upgrades/improvements will be the responsibility of the developer. The major impact on the road network will be during the construction phase. During the operational phase the impact will be much less.

The access routes to the proposed substation alternative sites will be discussed in more detail in **Section 4.2**.



3.2 FUTURE ROAD NETWORK

Future road upgrades within the study area present additional opportunities that could impact on the substation operations. In terms of the analysis of the available road network, it can be broken down into two sections, local and regional traffic. Local traffic will be traffic generated by the daily activities of Swellendam town, immediately surrounding towns and settlements and the substation.

Regional traffic will be generated outside the immediately surrounding road network, and will be related to the operations of the substation and the logistical needs required for the substation operations, and general business in Swellendam.

The road network affected by the substation is under the jurisdiction of SANRAL and the Western Cape Government. Any impact or proposed road upgrades on these roads may require consultation with the different authorities.

Future road upgrades may include the paving of MR268, re-gravelling of MR268 and/or DR1251, and local intersection improvements on the N2.

3.3 EXISTING TRAFFIC CONDITIONS

No traffic counts were conducted in the vicinity of the proposed site. However, the Western Cape Government's (WCG) Road Network Information System (RNIS) is a system that collects and analyses various types of data which includes, among others, a network inventory, traffic data (expressed as AADT), condition data, roughness data as well as structure and surface history. WCG does have a traffic counting programme for most of the Provincial, Trunk and District Roads as can be seen below (2011 data available only) in **Figure 5**.

SANRAL provided traffic count information for a counting station (No. 245) along the N2 located to the west of Swellendam. **Figure 6** provides a detailed analysis of the traffic count data received from SANRAL (2015) for station 245.

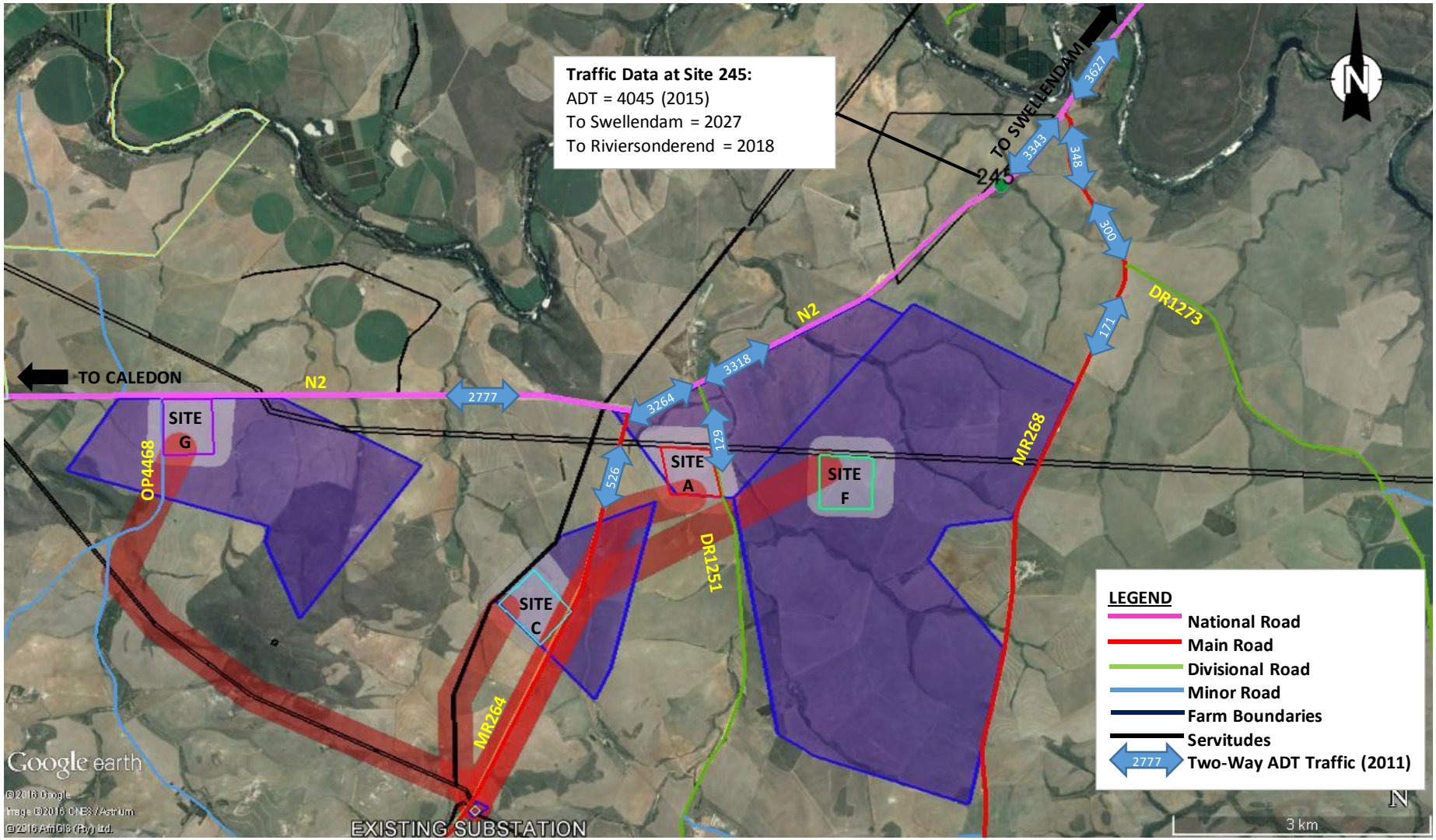


Figure 5: Existing Traffic Data

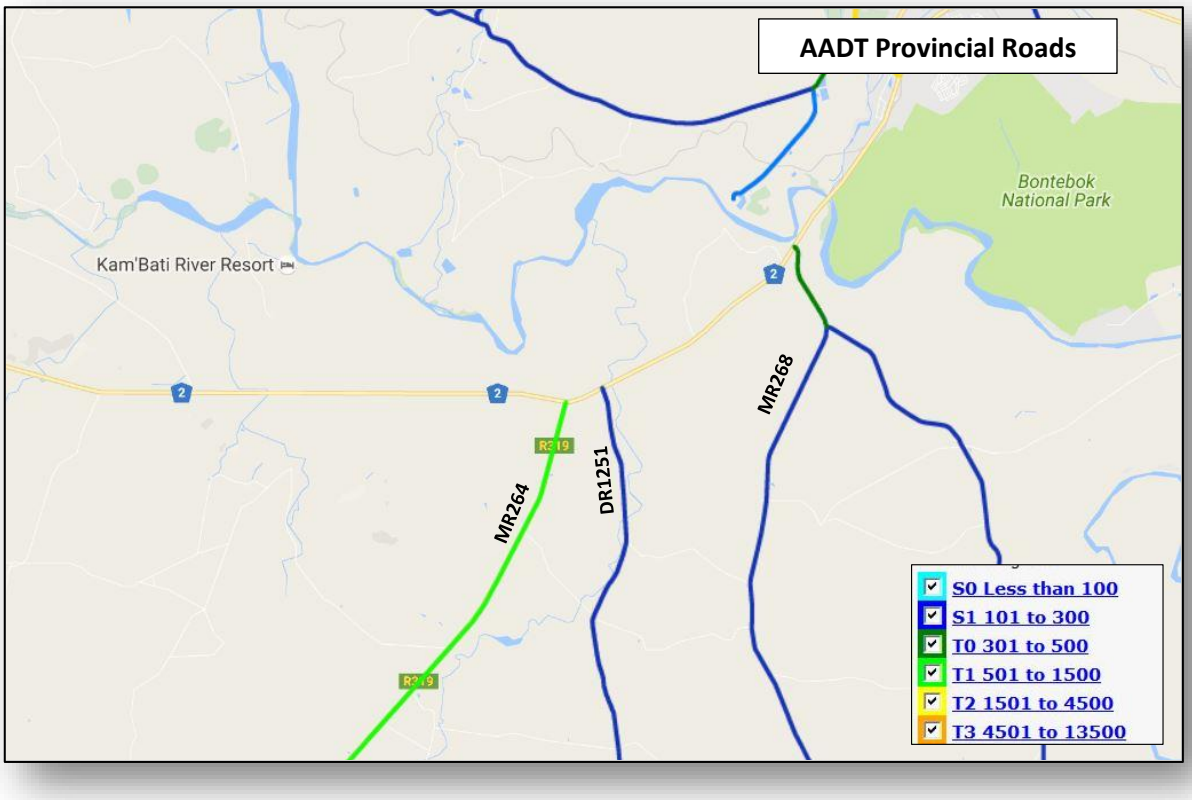
TRAFFIC HIGHLIGHTS OF SITE 245				
1.1	Site Identifier			245
1.2	Site Name			Swellendam
1.3	Site Description			Between Riviersonderend & Swellendam
1.4	Road Description	Route : N002	Road : N002 Section : 04	Distance : 49.2km
1.5	GPS Position			20 23 52.5E -34 05 03.1S
1.6	Number of Lanes			2
1.7	Station Type			Secondary
1.8	Requested Period			2015/01/01 - 2015/12/31
1.9	Length of record requested (hours)			8760
1.10	Actual First & Last Dates			2015/10/21 - 2015/11/11
1.11	Actual available good data (hours)			501
1.12	Percentage good data available for requested period			5.7
		To Swellendam	To Riviersonderend	Total
2.1a	Total number of vehicles (counted)	42358	42165	84523
2.1b	Total number of vehicles (projected for period)	739902	736531	1476433
2.2	Average daily traffic (ADT)	2027	2018	4045
2.3	Average daily truck traffic (ADTT)	314	317	631
2.4	Percentage of trucks	15.5	15.7	15.6
2.5	Truck split % (short:medium:long)	31 : 18 : 51	32 : 19 : 49	31 : 19 : 50
2.6	Percentage of night traffic (20:00 - 06:00)	13.5	11.5	12.5
3.1	Speed limit (km/hr)			120
3.2	Average speed (km/hr)	112.9	110.0	111.5
3.3	Average speed - light vehicles (km/hr)	116.4	113.9	115.2
3.4	Average speed - heavy vehicles (km/hr)	93.8	88.9	91.3
3.5	Average night speed (km/hr)	107.1	104.5	105.9
3.6	15th centile speed (km/hr)	94.9	89.9	92.9
3.7	85th centile speed (km/hr)	131.0	128.0	129.0
3.8	Percentage vehicles in excess of speed limit	36.2	30.3	33.3
4.1	Percentage vehicles in flows over 600 vehicles/hr	0.0	0.0	0.0
4.2	Highest volume on the road (vehicles/hr)		2015/11/06 14:00:00	506
4.3	Highest volume in the East (vehs/hr)		2015/11/06 17:00:00	280
4.4	Highest volume in the West (vehs/hr)		2015/11/01 15:00:00	300
4.5	Highest volume in a lane (vehicles/hr)		2015/11/01 15:00:00	300
4.6	15th highest volume on the road (vehicles/hr)		2015/11/06 12:00:00	431
4.7	15th highest volume in the East direction (vehs/hr)		2015/10/30 15:00:00	213
4.8	15th highest volume in the West direction (vehs/hr)		2015/11/06 13:00:00	240
4.9	30th highest volume on the road (vehicles/hr)		2015/10/23 17:00:00	394
4.10	30th highest volume in the East direction (vehs/hr)		2015/10/30 11:00:00	184
4.11	30th highest volume in the West direction (vehs/hr)		2015/10/25 17:00:00	206
5.1	Percentage of vehicles less than 2s behind vehicle ahead	12.0	12.5	12.2
6.1	Total number of heavy vehicles (projected for period)	114571	115847	230418
6.2	Estimated average number of axles per truck	5.1	5.0	5.1
6.3	Estimated truck mass (Ton/truck)	29.4	29.1	29.3
6.4	Estimated average E80/truck	1.7	1.7	1.7
6.5	Estimated daily E80 on the road			1080
6.6	Estimated daily E80 in the East direction			537
6.7	Estimated daily E80 in the West direction			542
6.8	Estimated daily E80 in the worst East lane			537
6.9	Estimated daily E80 in the worst West lane			542
6.10	ASSUMPTION on Axles/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
6.11	ASSUMPTION on Mass/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
6.12	ASSUMPTION on E80s/Truck (Short:Medium:Long)			(0.6 : 2.5 : 2.1)

Figure 6: Traffic Highlights from SANRAL's Permanent Counting Station 245 (2015) – N2

The traffic information for the N2 in the vicinity of the sites can be summarised as follows:

- The two-way ADT on the N2 at station 245 is more than 4 000 vpd.
- The heavy vehicles represent approximately 16% of the daily traffic.
- The highest two-way peak hour was approximately 500 vph (14:00-15:00).
- The highest peak hour volume (17:00-18:00) for vehicles travelling towards Swellendam (westbound) is 280 vph.
- The highest peak hour volume (13:00-14:00) for vehicles travelling towards Riviersonderend (eastbound) is 300 vph.
- The 30th highest hour is approximately 394 vph.
- The posted speed limit for the N2 is 120km/h.

The capacity of the road is approximately 1 600 vph/lane. The level of service for the N2 in the vicinity of the site from a link capacity point of view is acceptable at LOS C.



The AADT on MR268 and DR1251 in the vicinity of the site is low (>100 <500) and the AADT on MR264 (R319) is slightly higher with more than 500 vehicles per day but less than 1500 vehicles per day (Source: Western Cape RNIS).

4. PROPOSED MAIN TRANSMISSION SUBSTATION

4.1 DESCRIPTION OF THE PROJECT

The sub-transmission network constraints anticipated by 2018 are:

- Low voltages will be experienced at Ashton and Vryheid 132kV substations; and
- Boskloof-Ashton 132kV line will reach its thermal capacity.

The proposed Vryheid strengthening project is proposed and this entails the development of the new Agulhas 400/132kV 2x500 MVA Main Transmission Substation and associated loop in and loop out lines.

The required study area for the substation is approximately 600m x 600m (360 000m^2) to cater for the current and future needs. The proposed turn-in lines will be approximately 2 x 2km 400kV loop in and loop out lines, the final distance will be determined by the preferred substation location.

The proposed development entails the following:

- The Agulhas 400/132kV 2x500 MVA Main Transmission Substation (MTS);
- The loop in and loop out lines to connect the proposed Agulhas MTS to the existing 400kV line Bacchus – Proteus 1;
- Build a Double Circuit Kingbird line from Agulhas MTS Vryheid; and
- Extend Vryheid 132kV Busbar and build 2x132kV feeder bays.

The construction phase of the proposed project is likely to take approximately 3 years and the activities included are:

- Corridor Walk-Down
    - Access roads
    - Vegetation clearance
    - Substation and pylon construction
    - Steelworks structures
    - Stringing
    - Completion of construction work

Once the construction phase is completed, the site will be rehabilitated which includes:

- Removal of excess building materials
- Repairing any damage caused as part of the construction activities;
- Rehabilitating the area affected by temporary roads;
- Reinstating existing roads; and
- Replacing topsoil and planting indigenous grass where necessary.

Figure 7 shows the general substation plan layout. The proposed access location will be discussed in more details in **Section 4.3**.

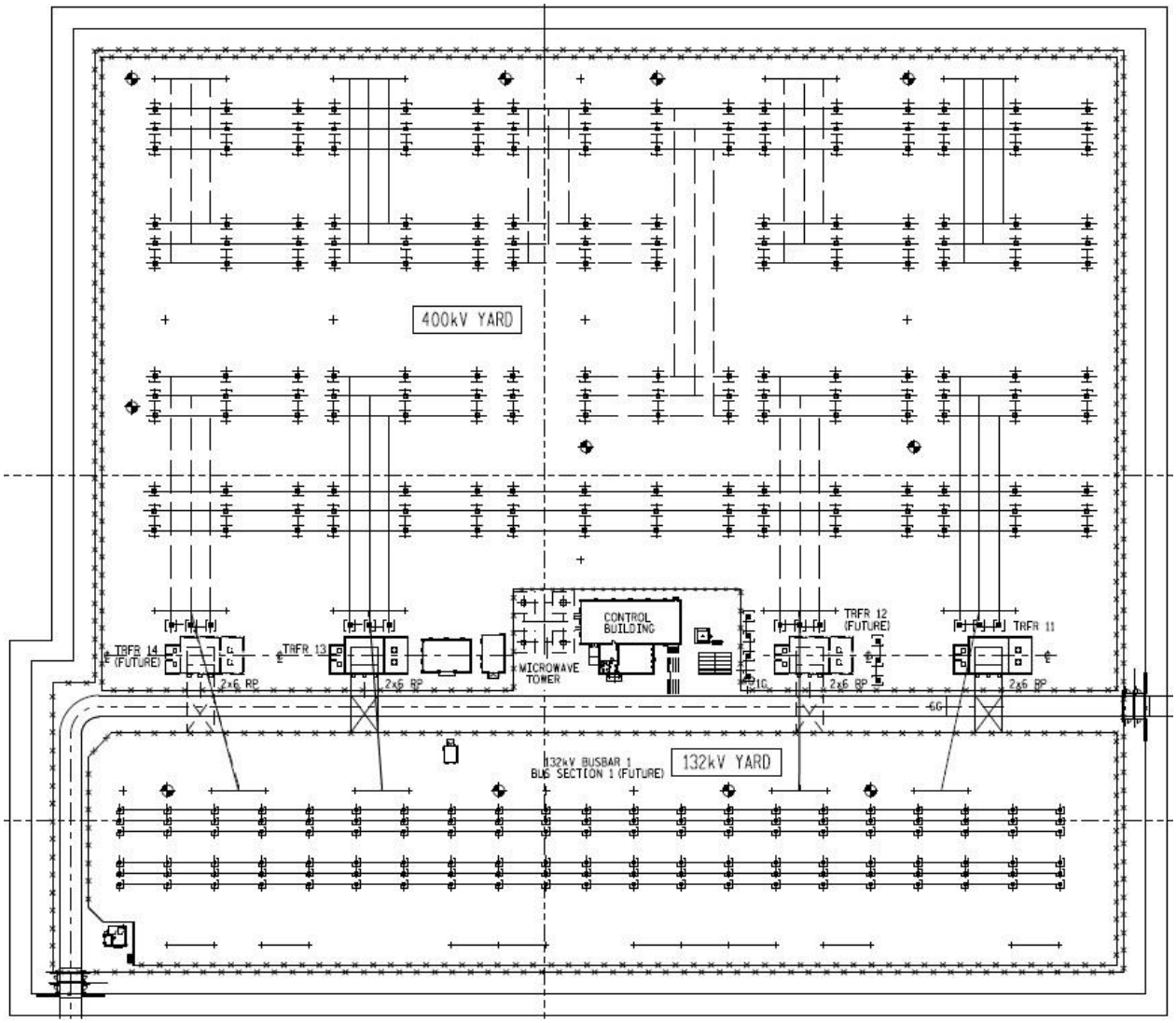


Figure 7: General Substation Layout

4.2 HOURS OF OPERATION

The facility will be operational 24 hours a day and will be unmanned during the operation stage, and during the construction stage the facility will only generate traffic during the 12 daylight hours.

4.3 ACCESS TO THE PROPOSED SUBSTATION

Access to the alternative sites has been discussed in **Section 2**.

Access to Site A, the preferred site, is off DR1251 at ±km1.13 as discussed in **Section 2.1.2** earlier.

An intersection will have to be constructed on DR1251 for which the design will have to be approved by the Provincial Road Authority. The alignment of the access road into Site A will depend on the final SDP of the substation.

5. TRAFFIC IMPACT OF THE PROPOSED SUBSTATION

The impact of the proposed development on the adjacent road network focuses on determining the vehicular trips generated per phase of development and investigating traffic engineering issues and concerns such as road safety, public transportation and non-motorised transport within the study area.

The traffic impact will be in accordance with the phased development of the substation. Currently the planning is for a 2 stage development. Stage 1 will include the initial construction of all the facilities required while Stage 2 will start once the substation starts operating (30 to 36 months after Stage 1). Each stage will generate its own traffic.

Generally speaking, traffic can be split between the following types:

- Employee/Commuter trips:
  - Private vehicles
  - Public transport vehicles (buses and minibus taxis)
- Freight trips:
  - Small delivery vehicles (<3 ton)
  - Heavy vehicles (>3 ton)
  - Abnormal loads
  - Freight via rail (if relevant)

The number of construction vehicles is unknown at this stage.

5.1 TRIP GENERATION

Trip Generation Rates do not exist for substation operations and associated activities based on the DoT's *South African Trip Generation Rates, 2nd Edition, 1995*. Therefore, the Trip Generation was calculated based on employee figures received from **Eskom** and based on typical traffic generation assumptions relating to similar operations. The trips generated as a result of employment activity are referred to as commuter trips, which are categorised as private vehicle trips and public transport trips. The transportation of commodities and products will generate freight movement on the transport network (road and rail if relevant).

Trip generation will differ during construction as well as during the operation of the substation. It is estimated that far more people will be employed during the construction of the substation, with many of the trips for delivering machinery, building materials and equipment to the site. During the operation stage (Stage 2) the substation will be unmanned and will generate minimal if not zero trips during the day.

Based on the numbers provided by Eskom, a maximum of ± 120 staff can be expected on site during the construction stage. The substation will be in operation 24 hours a day, 7 days per week but will be unmanned.

It was assumed that most of the workforce will be sourced from Swellendam and Buffelsjagrivier areas in the east.

5.1.1 Construction Workforce Traffic

The workforce required during the construction stage can be expected to reach 120 staff during the peak of the proposed construction.

It is assumed that approximately 20% (managerial, skilled and semi-skilled construction workers) which equates to 135 [24] workers are expected to use private vehicles to travel to and from work. Assuming a vehicle occupancy rate of 1.5 persons per vehicles, these categories of workers are expected to generate **16** private vehicles entering the facility during the AM peak hour and similarly **16** exiting the facility during the PM peak hour. This will generate an additional **32 two-way trips per day**. The remaining 80% of the workforce is expected to travel to the site by existing bus and minibus taxi services or by construction shuttle buses. The maximum traffic generation scenario assumes that all of these construction workers use minibuses or minibus taxis to travel to and from work. Therefore, using an occupancy rate of 15 persons per minibus or minibus taxi, the remaining 96 unskilled workers are expected to generate **12** additional minibus trips during the AM peak hour (6 vehicles arriving and 6 vehicles leaving). Similarly, **12** additional minibus taxi trips will be generated during the PM peak hour. Therefore, during this stage approximately **28 vehicles** will move to/from the construction site on a daily basis. The distribution of this construction traffic is expected to be approximately similar to the existing distribution of traffic using the surrounding road network. Currently, the DR1251 has an ADT of approximately 100 – 300 vehicles. The N2 has an ADT of more than 4 000 vehicles. Therefore, the additional construction workforce traffic is minimal proportion of the current daily traffic along the N2 and the DR1251.

Given the estimated low volume of construction traffic daily and during the peak periods, it is not expected that this additional traffic will have a detrimental impact on the surrounding road network.

5.1.2 Construction Vehicles

The construction activities at the proposed substation will generate additional heavy vehicle traffic on the surrounding road network as a result of the construction vehicles travelling to and from the site transporting equipment and construction materials. It is envisaged that the delivery vehicles will be deployed from their origins in the morning. The expected arrival times of these vehicles will fall outside of the traditional AM peak hour. Similarly, these vehicles will leave for their origins before the PM peak hour in order to be back in time. Therefore, the impact of the heavy construction vehicles on the external road network is expected to be negligible during the peak hours. In addition, heavy vehicles will be used to transport raw material and equipment within the construction site, in which case, these construction vehicles will remain on site overnight for lengthy periods of time and will also have no impact on the surrounding road network. Actual numbers of construction vehicles are unknown at this time but it is assumed that the expected maximum trips for the delivery of soil for the terrace could be in the order of 10 trips per day. The additional construction traffic will not be significant in comparison to the current daily traffic on the N2 and the DR1251.

5.1.3 Permanent Workforce (Operational Stage)

As mentioned above, during the operational stage of the substation there will be no staff on site therefore no additional trips will be generated.

5.1.4 Heavy Delivery Vehicles

The substation is expected generate a maximum of 10 heavy vehicle trips per day two-way, assuming that the transport operations occur every day of the week and for 10 hours a day (i.e. 30 days per month). This then calculates to a maximum of 1 vehicle two-way per hour which is considered to be very low.

By virtue of this low additional volume of daily traffic required for the delivery of the soil during the construction stage, the impact of these delivery vehicles will be negligible on the surrounding road network.

The operation stage will therefore generate no vehicles during the AM and PM peak hour due to the substation being unmanned. The volume of traffic during the construction stage is considered to be very low in traffic analysis terms.

5.2 ANALYSIS REQUIREMENTS FOR THE ADDITIONAL SUBSTATION GENERATED TRAFFIC VOLUMES

In accordance with the Department of Transport's Manual on Traffic Impact Studies (RR93/365), developments that generate over 150 vehicles per hour, in peak hours, require a full Traffic Impact Assessment (TIA), while those generating less than 150 vehicles per hour only require a Traffic Impact Statement (TIS). The difference between these two assessments is that the TIA must contain recent traffic counts and the analysis of both existing and future traffic flows, whereas in a TIS, little or no analysis is required, instead the Traffic Engineer's professional opinion is given more emphasis based on his or her observations and experience.

The construction stage and operational stage of the new proposed activities at the proposed substation generates significantly less than 150 vph in the peak hours, therefore a detailed analysis of these traffic volumes on the surrounding road network is not required for this study. The Traffic Engineer will instead provide his or her professional opinion based on a qualitative assessment of his or her observations and calculations.

Traffic data from SANRAL counting stations and the Western Cape Government Road Network Information System (RNIS) was utilised in order to obtain a baseline of the existing traffic conditions on the surrounding road network, and from which to base the impact assessment.

5.3 TRIP DISTRIBUTION

During the construction stage it is assumed that most of the workforce will stay close to Swellendam. All trips in the morning and afternoon peaks will be via the N2 to/ from the construction site.

Other trip purposes (deliveries, heavy vehicle loads and abnormal loads) will occur throughout the day and will mostly come from Swellendam (in the east) on the N2.

It is therefore expected that the majority of the trips during the construction stage will come from the east along the N2.

5.4 PEAK HOUR TRAFFIC GENERATION

The highest AM and PM peak hour traffic distribution are expected during the construction stage of the substation with far less trips during the operational stage of the substation (virtually zero). The number of trips will depend on the shifts that the employees/workforce will work during the construction stage of the project.

Currently, the highest peak hour volumes in the east for the N2 is between 17:00 and 18:00 and for the west between 15:00 and 16:00.

6. ROAD IMPROVEMENTS REQUIRED

6.1 TRAFFIC IMPLICATIONS OF THE PROPOSED DEVELOPMENT

During the construction stage of the development many heavy and abnormal vehicles will bring machinery, materials and equipment to the site. It is envisaged that these vehicles will all travel along the N2 and DR1251. This will add additional heavy vehicles that could have an impact on the existing pavement structure of these roads. SANRAL may require turning lanes to be constructed on the N2 at the intersection with DR1251.

After construction, the number of heavy vehicles accessing the site will decrease significantly. During the operational stage there will be no or very few trucks accessing the substation site. These trucks will more than likely be for maintenance.

6.2 ROAD AND INTERSECTION UPGRADES FOR ACCESS ROADS

Based on the expected number of employee trips generated by the proposed development as mentioned above in 5.1, it is our opinion that the existing road network has sufficient capacity to accommodate the additional trips during the construction and operational stages. A two-lane road such as the N2 in the vicinity of the site can accommodate approximately 36 000 vehicles per day (1 800 vph/lane x 10), depending on the type of vehicles. Once construction is completed, the day-to-day operation of the proposed substation will generate no to very little traffic which can easily be accommodated by the current road surface. The current daily traffic on the N2 is approximately 4 000 vehicles which is approximately 400 vph (approximately 10% of capacity of the road). The proposed substation will add an additional 28 vehicles a day (±3 vph) during the construction stage and 0 vehicles during the operational stage which is far less than the current capacity of the two-lane road (3 600 vph).

The operational phase of this project is not expected to generate any traffic volumes (substation will be unmanned). The number of staff on site is not expected to be more than 120 people during the construction stage only and therefore no additional upgrades are required to accommodate the construction site traffic.

The new access intersection to the site off the gravel DR1251 will be a two-lane cross section (one lane in, one lane out).

6.3 ABNORMAL LOADS

For the proposed substation development, it may be necessary for large equipment/machinery, materials to be delivered to the site during the construction stage. It is also expected that many abnormal load vehicles will be travelling from major centres via the National Roads, Provincial and District roads to access the site. Depending on the type, weight and length of the load an abnormal load permit may be required with a transport management plan indicating the route and possible limitations on travel.

6.4 IMPACT ON THE CONDITION OF THE ROAD NETWORK

The increase in traffic generated by the proposed substation development activities during construction will increase the percentage of heavy vehicles using this road network. Some sections of the road network have high percentage of heavy vehicles and others have a very low percentage. The N2 is in a good condition. The provincial roads especially the gravel roads (DR1251) are in a poor state.

The increase in heavy vehicles will accelerate the deterioration of these roads. With the exception of the N2 all other roads that the substation generated traffic is likely to use is under the jurisdiction of the Western Cape Government Department of Transport and Public Works. It is this department's responsibility to repair and rehabilitate these roads. The N2 is under SANRAL's jurisdiction and take responsibility for any maintenance requirements on this road.

6.5 RAIL INFRASTRUCTURE

There are no commuter rail services in the Swellendam Local Municipality. However, this rail infrastructure is of strategic importance to the area for future transport planning. Currently the rail transportation within the municipality is for goods only.

All material, equipment and machinery for the substation will be road-based.

6.6 LIAISON WITH ROAD AUTHORITIES

The following authorities will still need to be consulted with regards to the transport impact:

- SANRAL
- Western Cape Government Department of Transport & Public Works
- Swellendam Local Municipality
- Local Communities
- Other Interested and Affected Parties (IAPs)

7. PUBLIC TRANSPORT ASSESSMENT

7.1 BACKGROUND

In terms of the National Land Transport Act (NLTA) (Act No 5 of 2009) Section 35, it is a requirement that assessment of public transport be included in the traffic impact assessments. The following comments are relevant in respect to the public transport availability at the proposed development.

7.2 ROAD-BASED PUBLIC TRANSPORT

The public transport system in the Swellendam urban area is relatively well organised and established. In the rest of the municipality, in particular the rural areas, public transport is lacking and facilities are poor in areas where it does not exist.

Minibus taxi operation is the dominating mode of road-based public transport in the local municipality. Minibus taxi operators provide service from the town of Swellendam to Suurbraak, Buffelsjagrivier and Railton. The routes vary and most minibus taxis operate on an ad hoc basis. Swellendam Local Municipality has approximately 5 registered minibus taxis operating principally between Railton and the Swellendam CBD.

Two privately owned buses are reported to be transporting people from Swellendam to Buffelsjagrivier and Olivedale areas on Saturdays only.

Public transport is available on all the major roads surrounding the development, as per this applications' assumption a significant percentage of the employees/workforce will use buses and minibus taxis to the substation during the construction stage.

There are only two road-based public transport modes available in the district and the majority of passengers use unsubsidised minibus taxis. Buses are preferred for commuter movements with high patronage with the need for flexibility over medium distances. Buses are unsuitable for short distances.

Minibus taxis are preferred for lower passenger volumes over short distances. They are also preferred for lower passenger volumes over longer distances where volumes are too low to warrant the use of buses.

The N2 is a major public transport route since residents travel between Swellendam and Railton for work and/or services, or to gain access to the other national and provincial routes.

Communities mostly use non-motorised transport (NMT) and minibus taxis as a mode of transport. Minibus taxis mostly provide short distance trips to nearby towns and settlements. Public transport is limited to bus and minibus taxi operators.

7.3 NON-MOTORISED TRANSPORT ASSESSMENT

Non-Motorised transport (NMT) is an important pre-requisite in ensuring the livelihood of sustainable developments and communities. Whilst the nature of the area is urban, the presence of existing settlements is predominant in the area, non-motorised transport plays an important role in the local community.

Non-motorised transport in South Africa can be classified as all modes (non-mechanised) of transport excluding motorists. These include personal transport (walking and cycling) as well as passenger transport (wheelbarrow, carts, wheelchairs, rickshaws) to transport elderly or disabled people or goods (wheelbarrow, cars, rickshaws).

NMT is the most affordable means of travelling and it has the least impact on the environment. It also has positive health benefits and it is the most sustainable way of travelling particularly for people living in rural areas.

As is the case in most other towns and cities in South Africa, pedestrian trips make up the largest number of the total peak hour trips. Most commuters who make use of other modes of public transport such as bus or taxi make the first leg, and often also the last leg of their trip on foot.

Due to the low income level in the Swellendam local area, the community use non-motorised transport as their mode of choice. The NMT comprises of walking, cycling and a few animal drawn vehicles in the area. There is generally inadequate provision for pedestrian travel in the municipal areas and people mainly walk or cycle on the road shoulders. A proposal for the construction of a pedestrian bridge over the railway between Railton and Swellendam has been received.

8. CONCLUSIONS AND RECOMENDATIONS

Sturgeon Consulting prepared this transportation impact study for the proposed Agulhas Main Transmission Substation (MTS) in Swellendam in the Western Cape Province. This report summarises the existing transportation conditions within the site vicinity and provides an assessment of the transportation impacts of the proposed substation on the surrounding transportation system.

8.1 CONCLUSIONS

From the traffic impact investigation and discussions in the report the following conclusions can be made:

- The N2 and the Provincial paved roads are all in a good condition.
- The Provincial gravel roads are in a poor condition.
- Site A is best located from a traffic impact point of view.
- The expected increase in traffic due to the construction of the substation can be accommodated on the existing road network.
- The current demand on the existing road network in the vicinity of the site is low and the road network and intersections will operate at acceptable levels of service.
- The majority of the construction vehicles and abnormal loads (if any) will come from the east on N2.
- During the construction phase and as part of the contract, the contractor is required to monitor the condition of the roads used and repair the road where it becomes damaged due to construction traffic.
- It is expected that the construction phase of the proposed development will generate the most vehicular trips.
- During construction it is expected that the road surface of DR1251 may require maintenance at regular intervals. However, once construction is completed, the day to day operation of the proposed substation will generate no to very little traffic which can easily be accommodated by the existing road surface and must be in the same condition it was before construction started.
- The operational stage of this project is not expected to generate any or very little traffic due to the substation being unmanned.
- The number of staff on site during the construction stage is not expected to be more than 120 people and therefore no additional upgrades are required to accommodate the construction site staff.
- The substation will generate approximately 28 vehicle trips per day (16 private trips & 12 minibus taxis) during the construction stage. This is equivalent to approximately 3 vph. The current daily traffic along the N2 is approximately 4 000 vehicles (±400 vph) and along the DR1251 approximately between 100 – 300 vehicles (±10 - 30 vph).

8.2 RECOMMENDATIONS

It is recommended that:

- Site A be chosen as the preferred site for the new substation from a traffic impact point of view.
- The access to Site A is via the N2 off DR1251 at the proposed access location, approximately 1.3km from the N2 intersection.
- During construction the road surface of DR1251 be maintained at regular intervals. However, once construction is completed, the day to day operation of the proposed substation will generate no to very little traffic which can easily be accommodated by the existing road surface and must be in the same condition it was before construction started.
- The developer/client negotiate a chartered contract with existing minibus taxi or bus operators to transport the majority of the workers during the construction stage of the development.
- SANRAL and the Western Cape Government be informed of the preferred site for their comments and conditions.
- Provided that the above recommendations are adhered to, the proposed development of the Agulhas MTS facility can be supported from a traffic engineering perspective.

9. REFERENCES

1. Department of Transport, *Guidelines for Traffic Impact Studies, Report No. PR 93/645*, Pretoria, 1995.

2. Department of Transport, *South African Trip Generation Rates, Report No. RR 92/228*, Pretoria, 1995.

3. Department of Transport, Geometric Design of Rural Roads, TRH 17, Pretoria, 1988.

4. Committee of Transport Officials, *South African Trip Data Manual, TMH 17*, September 2013.

5. Committee of Transport Officials, *South African Traffic Impact and Site Traffic Assessment Manual*, *TMH 16 Volume 1*, August 2012.

6. Committee of Transport Officials, *South African Traffic Impact and Site Traffic Assessment Manual Standards and Requirements Manual, TMH 16 Volume 2*, August 2012.

7. Swellendam Local Municipality, *Integrated Development Plan. Final 2016-17 Review*, 2016.

8. Swellendam Local Municipality, *Swellendam Spatial Development Framework*, March 2015.

ANNEXURE A: CVS

GENERAL INFORMATION:

Name	:	**BAREND DU PREEZ**
Date of Birth	:	8 May 1962
Marital Status	:	Married
Home Language	:	Afrikaans
Profession/Specialisation	:	Professional Civil Engineer (950110) Transport Planning and Traffic Engineering
Years Self Employed	:	5 years
Nationality	:	South African
Years experience	:	26

KEY EXPERTISE:

As a Professional Civil Engineer (Prof. Reg. No. 950110), Barend du Preez has extensive experience in **transportation planning and traffic engineering**. He started his own Transport and Traffic Engineering Consultancy, called **Sturgeon Consulting** in October 2008. He has also been an office manager for more than 4 years in Cape Town while working for Arup. Over the last 27 years he has been involved in a wide range of projects in South Africa and worked on a Transport Master Plan in Mauritius, Stellenbosch Transport Model and Public Transport Operations Plan, as well as the Stellenbosch NMT Master Plan. He has recently completed working on the Stellenbosch Roads Master Plan and the was the project leader on the ITP Update of the Transport Register, Transport Needs Assessment, Transport Improvement Proposals and Implementation Budget & Programmes for the West Coast District Municipality and is currently the project leader on the full ITP Review for the West Coast District Municipality. He is currently part of the team that is preparing the Expansion of the NMT Network Plan for Stellenbosch and City of Cape Town "Awareness" Signage Plan for Cyclists as well as the role of transport in the evaluation of Informal Sector Trading Spaces for the WCG as a sub consultant to CK Rumboll & Partners. He has experience in the following transportation-related fields:

Transportation Planning:

- Transportation Policies and Institutional Issues
- Transportation Modelling (EMME/2 and Saturn)
- Non-Motorised Transport (NMT) Planning
- Integrated Transport Plans (ITPs) at all levels of government
- Integrated Development Plans (IDP's) transportation inputs
- Land Development Objectives (LDO's) transportation inputs
- Transportation Project Prioritisation (Planning and Implementation)
- Economic Evaluation of New Road Projects (CB-Roads and HDM3)
- Provincial Land Transport Framework (PLTF)
- Transport Corridor Feasibility Planning
- Road network classification

Public Transport:

- Public Transport Planning
- Public Transport Surveys (Operational as well as facilities management)
- Public Transport Data Collection and Surveys including Household Surveys
- Feasibility Studies for the Development of Public Transport Facilities
- Public Transport Facilities Management and Maintenance
- Supply and demand analysis for Public Transport Operations
- Public Transport Facilities Design

Traffic Engineering

- Transport Impact Assessments and Statements
- Land Use Application Evaluation – Traffic Impact
- Arterial Management Plans
- Travel Time Surveys
- Signal settings and signal design
- Various Transport and Traffic Surveys

EMPLOYMENT RECORD

Oct 2008 to date	Self Employed – Sturgeon Consulting
Jun 2007 - Sept 2008	Africon, Associate
Oct 2002 - May 2007	Arup (Office Manager Cape Town), Associate
Aug 1999 - Sept 2002	UWP Engineers, Associate
Aug 1997 - July 1999	GIBB Africa (African Consulting Engineers merger), Associate
April 1997 - July 1997	African Consulting Engineers, Director
April 1996 - Mar 1997	African Consulting Engineers, Associate
Jan 1995 - Mar 1996	African Consulting Engineers, Senior Transportation Engineer
April 1994 - Dec 1994	Stewart Scott, Transportation Engineer
Dec1993 - Mar 1994	Eastern Gauteng Services Council (EGSC), Transport Planning Analyst
Jan 1989 - Nov 1993	Scott and De Waal/Stewart Scott, Junior Transportation Engineer
Jan 1988 - Dec 1988	Johannesburg Consolidated Investments, Engineer in training
Jan 1986 - Dec 1987	South African Air Force, Quartermaster General

KEY QUALIFICATIONS/EDUCATION

1980	:	Standard 10 (Grade 12), Westonaria, South Africa
1985	:	BEng (Civil), University of Pretoria, South Africa
1990	:	BEng (Hons) (Transport), University of Pretoria, South Africa

PROFESSIONAL AFFILIATIONS

Professional Engineer, Engineering Council of South Africa (ECSA) – 950110 – 16 March 1995

LANGUAGES

Language	Reading	Writing	Speaking
Afrikaans	Excellent	Excellent	Excellent
English	Excellent	Good	Good

PUBLICATIONS

- Du Preez B and Gaigher R. - How Can Traffic Engineering Save Fuel? - Annual Transportation Convention, Pretoria, June 1992.
- Du Preez B. and Ho D. - GJMC Audit of Transport Related Studies: An insight into the Document Management System - Transport Conference, Pretoria, July 2000.

EXTRAMURAL ACTIVITIES

Long Distance Running – Completed 5 Comrades Marathons
Freshwater Angling – 7 times a Provincial Angler for Western Province since 2004
Kayak Fishing – Still a novice

EXPERIENCE RECORD – Since 2000

- *Various Traffic Impact Studies to date under Sturgeon Consultin– ±45 projects* (Cape Town): 10.2008 to date
- *Traffic Flow Analysis and Impact* (St Cyprians School, Cape Town): 05.2015 to date
- *Travel Demand Management Policy for the City of Cape town* (City of Cape Town): 04.2015 to date
- *City of Cape Town "Awareness" Signage Plan for Cyclists* (City of Cape Town): 01.2015 to date
- *West Coast ITP Review* (WCG): 09.2014 to date
- *Rhodes Drive NMT Study* (City of Cape Town): 08.2014 to date
- *WCG Informal Sector Trading Spaces – Transport Input* (CK Rumboll & Partners): 06.2014 to 09.2014
- *Expansion of Stellenbosch NMT Network* (Stellenbosch Municipality): 05.2014 to date
- *Thembalethu School George* (WCG): 03.2014 to date
- *Plantation Road NMT Study* (City of Cape Town): 04.2014-05.2014
- *Birdwood Street one-way and NMT Study* (City of Cape Town): 02.2014-03.2014
- *Vygekraal River Pedestrian Bridge in Kewtown* (City of Cape Town): 09.2013-11.2013
- *Phola Park Proposed Pedestrian Bridge over Railway, Gugulethu* (City of Cape Town): 09.2013-11.2013
- *West Coast ITP Update (WGC) 2013*: 09.2013 to 02.2014
- *Oostewal Street Transport Study in Langebaan* (Saldanha Bay Municipality): 07.2013 to date
- *Transport Impact Assessment Evaluations for Land Use Applications* (PGWC): 04.2009 to date
- *Somerset West Public Transport Interchange (City of Cape Town)*: 11.2012 to date
- *Kalkfontein Housing Project (City of Cape Town)*: 02.2013 to date
- *Upgrading of Ekanini Informal Settlement*: 02.2013 to date
- *West Coast ITP Update (WGC) 2012*: 08.2012 to 01.2013
- *Stellenbosch Roads Master Plan* (Stellenbosch Municipality): 05.2012 to 08.2012
- *George Airport Service Station and Hotel TIA:* (ACSA) 08.2011 to 03.2011
- *Erf 11910, Worcester, Road diversion impact on local business from a traffic point of view:* 07.2011 to 11.2011
- *Welbeloond Mix Use Development Traffic Impact Input:* 10.2008 on-going
- *Served on the following Project Management Teams (PMTs) on behalf of the PGWC Department of Transport and Public Transport: Barrydale Parking Study, Glentana MR348 AMP, R304 AMP, R44 AMP, Road Access Guideline Review, R44 Safety Assessment.*
- *Urban Renewal of the Paarl CBD*(Cape Winelands District Municipality, Stellenbosch): 11.2009 to 12.2009
- *CPTR Live Database Assessment* (Cape Winelands District Municipality, Stellenbosch): 04.2009 to 10.2009
- *Stellenbosch Transport Model and Public Transport Operations Plan* (Stellenbosch Municipality): 01.2009 to 06.2010
- *Stellenbosch NMT Network* (Stellenbosch Municipality): 10.2008 to 02.2010

- *Cape Winelands CPTR and OLS Review* (Cape Winelands District Municipality, Stellenbosch): 06.2008 – 10.2008
- *Medine Transport Master Plan* (Medine, Mauritius): 01.2008 – 12.2008
- *Various Traffic Impact Studies while with Africon – 15 Projects* (Cape Town): 06.2007 – 10.2008
- *R44 Arterial Access Management Plan* (PGWC): 05.2007 – 10.2008
- *Welbeloond TIA* (Private Client, Cape Town): 05.2007 – 10.2008
- *Transport Development Levy Review* (Nelson Mandela Bay/PE): 05.2007 – 10.2008
- *Drakenstein Transport Master Plan* (Drakenstein Municipality, Paarl): 05.2007 – 05.2008
- *Worcester Regional Hospital Independent Traffic Review* (PGWC): 01.2008 – 05.2008
- *Taxi Verification Project* (PGWC): 05.2006 – 04.2007
- *Klipfontein Corridor -Infrastructure Design Team: Traffic Impact* (PGWC): 06.2005 – 04.2007
- *Cape Winelands District Municipality Traffic Impact Support* (PGWC): 11.2004 – 03.2004
- *2004 CPTR Rail CD* (City of Cape Town): 08.2004 – 10.2004
- *Bergzicht Taxi Rank* (Stellenbosch Municipality): 07.2004 – 12.2004
- *Kayamandi Transport Plan* (Stellenbosch Municipality): 06.2004 – 08.2004
- *Mitchells Plain TMP* (City of Cape Town): 03.2004 – 07.2004
- *Provincial Non-Motorised Transport Strategy* (Western Cape): 03.2004 – 08.2004
- *2004 Household Surveys* (City of Cape Town): 02.2004 – 07.2004
- *2004 CPTR Facilities* (City of Cape Town): 02.2004 – 08.2004
- *Mamre Taxi Rank* (City of Cape Town): 01.2004 – 07.2004
- *SARS Container PPP Project* (SARS Pretoria): 10.2003 – 05.2004
- *Stellenbosch Transport Plan* (Stellenbosch Municipality): 02.2003 – 12.2003
- *Century City - Macro TIA Review* (Nedcor): 12.2002 – 08.2003Various Traffic Impact Studies while with Arup – 35 Projects (Cape Town): 10.2002 – 06.2006
- *Langeberg Transport Modelling* (Durbanville, Cape Town): 10.2002 – 03.2003
- *Stellenbosch Growth Management Strategy* (Stellenbosch Municipality): 10.2002 – 02.2003
- *Berg River Project -Traffic Management Plan* (DWAF, Franschhoek): 10.2002 – 11.2002
- *Water Sector Plans* (DWAF, KwaZulu Natal): 03.2002 – 08.2002
- *Eastern Cape Provincial Land Transport Framework (PLTF)* (PGEC, Eastern Cape): 02.2001 – 12.2001
- *Sandton Civic Taxi Rank* (City of Johannesburg): 01.2001 - 07.2001
- *Baragwanath Public Transport Node* (City of Johannesburg, Soweto): 08.2000 – 03.2001
- *Road Closures Orange Grove; Robindale; Darrenwood;* (Ratepayers, Randbrug): 06.2000 – 08.2002
- *Marabastad Road Network Assessment* (City of Pretoria): 06.2000 – 02.2001
- *Vom Hagen Road Network Assessment* (South Africa): 01.2000 – 12.2001
- *Main Road MR14* (Swaziland Government): 09.1999 – 01.2000
- *Inanda Club Office Development* (Private Client, Sandton): 09.1999 – 09.2000
- *Transport Audit Document Management System* (City of Johannesburg): 09.1999 – 05.2000

GENERAL INFORMATION:

Name	:	**SARAH LARRATT**
Date of Birth	:	3 February 1975
Marital Status	:	Married
Home Language	:	English
Profession	:	Civil Engineer
Specialism	:	Transport Planning and Traffic Engineering
Joined Sturgeon	:	2012
Nationality	:	South African
Years' Experience	:	19
Qualifications	:	BTech Eng (Civil)
Professional Associations	:	Professional Engineering Technologist (201070166) MSAICE (2011239) Member of Institute of Professional Engineering Technologists (IPET) Member of Institute of Civil Engineers (ICE) Member of Institute of Transportation Engineers (ITE)

KEY EXPERTISE:

Sarah is an Associate for **Sturgeon Consulting** and a Traffic Engineer with over 19 years of experience in South Africa and the UK. Much of her experience relates to public transport and planning and design of NMT facilities with responsibility for all aspects of traffic engineering. Sarah has experience gained in Project Management on a number of bus priority and traffic management projects in London including interim design, consultation and detailed design. Sarah has a technology degree in civil engineering and is a registered Professional Engineering Technologist with the Engineering Council of South Africa. She has a wide range of technical and professional skills, including corridor studies, public transport planning, non-motorised transport planning & design, traffic management studies, traffic impact assessment for redevelopment and urban regeneration, determining development impact for major residential, commercial and industrial projects and providing conceptual design for mitigation improvements. Sarah also has experience in geometric design and client management/ partnering and is familiar with the following software packages: SIDRA 6.1, AutoCAD, Microsoft Office Suite.

EMPLOYMENT RECORD:

August 2012 to date	Sturgeon Consulting, Associate
May 2007 – July 2012	Arup (Pty) Ltd, Senior Engineer
May 2000 - Dec 2006	Atkins Limited UK, Senior Consultant
Jan 1996 - March 2000	HHO Africa (Pty) Ltd, Graduate Engineering Technician
Jan 1994 – Dec 1994	Shell South Africa (Pty) Ltd, Student

KEY QUALIFICATIONS/EDUCATION:

1995	:	ND (Civil), Cape Peninsula University of Technology, Cape Town
1997	:	BTech Eng (Civil) (Urban Engineering), Cape Peninsula University of Technology, Cape Town

PROFESSIONAL AFFILIATIONS

Professional Engineering Technologist, Engineering Council of South Africa (ECSA) – 201070166 – 29 July 2010

PROJECT EXPERIENCE

Sturgeon Consulting, Cape Town, South Africa (2012 – Present)

Cape Town Film Studio Development Framework, South Africa

Transport Engineer responsible for the preparation of the Traffic Impact Assessment for the proposed draft Development Framework for the Cape Town Film Studios consisting of approximately 41 486m^2 Gross Leasable Area (GLA) for offices, light industrial, retail, storage, warehousing and residential land uses.

Planning Services for the Upgrading of Enkanini Informal Settlement, South Africa

Traffic engineer responsible to undertake the transport study component for the Provision of Professional Planning Services for the Upgrading of Enkanini Informal Settlement for the City of Cape Town for 3409 low-income residential units, community facilities and public open spaces, intended for the use of the immediate community as well as general business. This includes input into the scoping phase relating to transport impact scoping, input into designs, detailed traffic impact assessment and final transportation study report.

Kalkfontein Housing Project, South Africa

Part of the Bergstan project team appointed by the City of Cape Town: Informal Settlements project to undertake a Transport Impact Assessment (TIA) for the upgrading of the Kalkfontein Informal Settlement in Kuilsrivier consisting of 782 units (combination of single and double storey).

Eden District Municipality Integrated Transport Plan, South Africa

Part of the project team involved in the full review of the ITP of the Eden District Municipality, preparation of the DITP, LITP, Operating License Strategy (OLS) and Current Public Transport Record (CPTR).

Thembalethu Secondary School Transport Impact Assessment, George, South Africa

Traffic Engineer responsible for the preparation of the transport impact assessment for the proposed new Thembalethu Secondary School 2 in George for approximately 1480 learners and investigating the impact of the proposed development on the surrounding road network and proposed any necessary improvements.

City of Cape Town Route Assessment & "Awareness" Signage Plan for Cyclists, South Africa

Project Engineer responsible for the evaluation of the process and outcome of a study to propose bicycle awareness signage on routes frequently used by cyclists in the greater Cape Town region, as identified in the City's Bicycle Master Plan.

Stellenbosch Municipality 2015 Non-Motorised Transport (NMT) Network Plan, South Africa

The development of the NMT network in the satellite towns/nodes in the Stellenbosch Municipal Area as well as identifying additional NMT links for Phase 2 in Stellenbosch town for Stellenbosch Municipality. Proposals that provide infrastructure that supports walking and cycling, provides individuals with an alternative and sustainable choice of travel.

St Cyprian's School Traffic Study, South Africa

Traffic Engineer responsible for preparing a Traffic Impact Assessment (TIA) for the proposed redevelopment of St Cyprian's School in Gorge Road, Oranjezicht looking at current traffic and access issues and proposing mitigation measures.

West Coast District Municipality Review of Integrated Transport Plan, South Africa

Part of the project team involved in the full review of the ITP of the West Coast Municipality, preparation of the DITP, LITP, Operating License Strategy (OLS) and Current Public Transport Record (CPTR).

Update of Integrated Transport Plan for the West Coast District Municipality, South Africa

Transport planner involved in the update of the transport budgets & programmes and linkages with the PSO3 Outcomes, revision of the categorisation of planning authorities and institutional capacity building through information sessions for the West Coast District.

West Coast District Integrated Transport Plan Update (Transport Needs Assessment & Transport Register), South Africa

Transport planner assisting with the update of the transport needs assessment, transport register and the implementation budget and programme chapters of the Integrated Transport Plan for the West Coast District Municipality.

Rhodes Drive Non-Motorised Transport Feasibility Study, South Africa

Traffic study to investigate the current non-motorised transport (NMT) safety concerns along Rhodes Drive between Paradise Road and Constantia Nek and the feasibility of implementing NMT interventions to improve the safety for pedestrians (including runners) and cyclists for the City of Cape Town. Recommendation of appropriate improvements that will enable a safer NMT environment and achieve a balance in the competing needs of road user groups.

Various Non-Motorised Transport (NMT) Assessment Studies, South Africa

Traffic engineer responsible for the investigation of the current NMT safety issues in various areas in the Southern Region and the feasibility of grade-separated NMT interventions (pedestrian footbridge) to enable a safer pedestrian environment. Projects are part of the City of Cape Town's Non-Motorised Transport projects for the Southern Region.

Oostewal Road Upgrade Transport Study – Langebaan, South Africa

Traffic engineer responsible for the preparation of the transport impact assessment for the upgrade of Oostewal Road in Langebaan for the Saldanha Bay Municipality. Development of road cross sections, conceptual design of the Non-Motorised Transport (NMT) facilities, critical road / intersection upgrades as a result of the traffic impact of all existing, planned and future developments in the greater Langebaan area for the next 20 years.

Forensic Pathology Laboratory Traffic Impact Assessment, South Arica

Traffic engineer for proposed Forensic Pathology Laboratory on the existing Groote Schuur Hospital building in Observatory. Examined the traffic implications of the proposed development and its impact on the adjacent traffic regime.

Atlantic Hills Development, South Africa

Traffic engineer involved in the development of the Public Transport and Non-motorised Transport plan for the Atlantic Hills Development in the Annandale area and assistance with the transport and traffic highlights report.

Motor City Development Traffic Impact Assessment, South Africa

Traffic engineer for proposed Motor City development in Paarl for the mixed-use development consisting of 12 140m^2 of car showroom, 17 698m^2 of general office and 11 000m^2 shopping mall. Examined the traffic implications of the proposed development and its impact on the adjacent traffic regime.

Arup (Pty) Ltd, Cape Town, South Africa (2007 – 2012)

West Coast IRT Corridor: NMT Integration, South Africa

Project Leader responsible for the project planning and project management, co-ordinating activities of team members and ensuring project deliverables were met. Development of conceptual through to detailed design and tender preparation of the non-motorised transport components within a 500m radius from the proposed IRT stations.

Gaborone NMT Facilities, Botswana

Concept and detailed design of cycle and pedestrian facilities for the Gaborone City Council. Tasks included finalising detailed design drawings, contract documents and schedule of quantities.

Woodstock & Salt River Rail Stations Transport Study, South Africa

Traffic engineer involved in undertaking transport investigations as input to multi-disciplinary planning and design for potential developments at the Woodstock and Salt River rail station precincts. Critical analysis undertaken of the conditions of interchange and transport, to inform planning and design rationale.

Cape Town East City Design Initiative Transport Strategy, South Africa

Identifying and assessing transport strategies to support the vision of the East City Design Initiative by encouraging the establishment of a safe and attractive walking environment, while optimising the use of existing and planned infrastructure.

West Coast Mobility Strategy, South Africa

Part of the project team in the development of a mobility strategy as part of Integrated Public Transport Network (IPTN) plans for the purpose of implementing formal scheduled public transport services within the District Municipality of West Coast.

Klipfontein Public Transport Corridor, South Africa

Traffic Engineer for the traffic engineering aspects and conceptual to preliminary design with high priority on public transport and NMT facilities. Geometric design for new bus lanes and stations.

Atkins Limited, London, United Kingdom (2000 – 2006)

Sarah joined Atkins in London in 2000 as a Transport Engineer, and was appointed to be part of the senior management in the position of Team Leader and Senior Consultant in the Network Planning Team. Some of the major projects she was involved in are listed below:

International Convention Centre Parking & Access, Qatar

Assisted in the full demand, access and circulation assessment and design, development of design criteria for car park and drop-off & pick-up facilities and traffic assessment for the development of a 4,500 space car park to service the proposed Convention Centre in Doha for Qatar Foundation and Qatar Petroleum.

London Borough of Islington Framework Contract, UK

Client and Contract manager for the Street Management Consultancy Panel Contract for Lot 1: Traffic and Safety Engineering Services including area-wide traffic management, junction improvements, local safety schemes, bus priority measures, cycle and pedestrian improvement schemes.

Lambeth North/Waterloo Pedestrian Interchange Route Improvement Project, UK

Project managed the design and implementation of this safety and security project. Key tasks included resourcing of project, client liaison, development of provisional cost estimates, development of designs and monitoring progress.

Route 12 Articulated Bus Study, UK

Project Manager for the interim and detailed design to assess the traffic management measures necessary to permit the possible conversion of Bus Route 12 to operation by articulated buses within the London Borough of Southwark.

LANGUAGES

English	:	Very Good
Afrikaans	:	Average