Basic Assessment for the Proposed Development of Electrical Grid Infrastructure to support the proposed nine 175 MW Solar Photovoltaic Facilities and associated Infrastructure (i.e. Witte Wall PV 1, Witte Wall PV 2, Grootfontein PV 1, Grootfontein PV 2, Grootfontein PV 3, Hoek Doornen PV 1, Hoek Doornen PV 2, Hoek Doornen PV 3, and Hoek Doornen PV 4), near Touws River, Western Cape

# APPENDIX J

Additional Information



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# TRAFFIC IMPACT STATEMENT FOR THE PROPOSED WITTE WALL PV 1 AND WITTE WALL PV 2 SOLAR PHOTOVOLTAIC PLANTS AND ASSOCIATED ELECTRICAL GRID INFRASTRUCTURE

TANQUA KAROO, WESTERN CAPE



Project No.: STUR0304

## FINAL REPORT NOVEMBER 2020

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This report assesses the key transportation issues pertaining to the proposed Witte Wall PV 1 and Witte Wall PV 2 PV plants and associated electrical grid infrastructure.

# **DECLARATION OF INDEPENDENCE**

This report was compiled by Mrs Annebet Krige and Mr Barend Du Preez 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. The CV of the lead author that performed the core duties are contained in Annexure A.

Annebet Krige, Pr Eng

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November 2020

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# ACRONYMS

TIS – Traffic Impact Study
WCG – Western Cape Government
RNIS – Road Network Information System
vph – Vehicles per Hour
COTO – Committee of Transport Officials
AMP – Access Management Plan
RCAM - Road Classification and Access Management Manual
LOS – Level of Service
AM – Morning
PM – Afternoon
EIA – Environmental Impact Assessment
BAR – Basic Assessment Report
PV – Photovoltaic
MW – Megawatt
REDZ – Renewable Energy Development Zone

SEF – Solar Energy Facility

# 1 INTRODUCTION

## 1.1 APPOINTMENT AND BACKGROUND

Sturgeon Consulting (Pty) Ltd was appointed by Element Consulting Engineers on behalf of Veroniva (Pty) Ltd to conduct a Traffic Impact Statement (TIS) for the proposed construction and operation of the Witte Wall PV 1, and Witte Wall PV 2 photovoltaic (PV) solar energy facilities (SEF) and the associated electrical grid infrastructure. Each of these PV energy facilities will have a generating capacity of 175MW.

The proposed development of the Witte Wall solar cluster (Witte Wall PV1 and Witte Wall PV2) forms part of a larger solar energy project, which includes the Grootfontein and Hoek Doornen solar PV clusters. The Grootfontein solar cluster includes the Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 SEFs and the Hoek Doornen solar cluster includes the Hoek Doornen PV 1, Hoek Doornen PV 2, Hoek Doornen PV 3 and Hoek Doornen PV 4 SEFs. Each of these PV energy facilities will also have a generating capacity of 175MW. These fall within the Komsberg Renewable Energy Development Zone (REDZ) and will form part of a larger group of proposed and existing renewable energy facilities, which will connect to the ESKOM Kappa substation to the south.

## 1.2 LOCALITY

Witte Wall PV 1 and Witte Wall PV 2 will be located on the Farm 171 Witte Wall in the Tanqua Karoo region, also known as Ceres-Karoo. This farm is located approximately 60km from the towns of Ceres to the southwest and Touws River to the south with access from Main Road 319 (MR319), also known as the R356. The farm is located in the Witzenberg Local Municipality, within the Cape Winelands District Municipality in the Western Cape Province. Please refer to **Figure 1** below for the Locality Plan.



Figure 1: Locality Plan

## **1.3 SCOPE OF WORKS**

This TIS will investigate the transportation implications associated with the abnormal load vehicles transporting components to the site and the transportation of construction materials, equipment and workers to the site during the construction and operational phases.

This TIS strictly serves as technical input to inform the Basic Assessment Processes currently being undertaken in terms of the National Environmental Management Act (Act 107 of 1998, as amended).

## 1.4 METHODOLOGY

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

- Site visit 28 October 2020
- Literature review and internet research
- Traffic data collection (Annual Average Daily Traffic, ADTT etc. from the Road Network Information System)
- Data analysis
- Evaluation of initial proposed access configurations
- Liaison with client and/or project team
- Fine tune analysis
- Preparation of report and figures

## 1.5 LEGISLATION WITH REGARDS TO TRAFFIC STUDIES

A TIS 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 existing transport system. The purpose of a TIS 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), TMH16 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 National Land Transport Act 5 of 2008 (NLTA) Section 38 does not set out any regulation as to what is required in a TIS. 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 (NRTA)* provides for road traffic matters to be applied uniformly throughout the Republic and for matters connected therewith.

### 1.6 STUDY PURPOSE

The primary purpose of this report is to evaluate the expected traffic impact of the proposed Witte Wall PV 1 and Witte Wall PV2 solar PV plants and the associated electrical grid infrastructure with the main focus on access and traffic distribution during the Construction and Operational phases of the project. In other words, the objective of the TIS is to assess the impact of the activities of the proposed PV Plants on the existing external road network surrounding the development during both phases. The report identifies

the preferred access route to the site, comments on the condition of the existing roads in the vicinity of the site, identifies possible access points to the site and recommends road improvements to minimise the impact on the surrounding road network where necessary.

This TIS addresses the following traffic and transportation related implications of the proposed PV Plants:

- Locality of proposed site for the PV Plants
- Existing traffic volumes on Main Road 319 (R356)
- Acceptability from a traffic safety point of view of the location of the access route(s) to the proposed facilities
- Risk posed by construction and operational vehicles
- Based on existing volumes of traffic, recommendations for mitigations measures for traffic impacts where relevant

In terms of limitation of this TIS, it should be noted that this report does not address the internal traffic circulation for the PV Plants.

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 and *TMH16 Volume 1 & Volume 2, South African Traffic Impact and Site Assessment Manual, August 2012* published by the Committee of Transport Officials (COTO).

## 2 **PROJECT DESCRIPTION**

## 2.1 PROJECT PHASING

The project can be divided into the following three main phases:

- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

## 2.1.1 Construction Phase

The construction phase for each of the proposed PV projects is expected to extend 12 to 24 months.

The main activities that will form part of the construction phase are:

- Removal of vegetation for the proposed infrastructure;
- Excavations for infrastructure and associated infrastructure;
- Establishment of a laydown area for equipment;
- Stockpiling of topsoil and cleared vegetation;
- Creation of employment opportunities and associated transport of employees to and from site;
- Transportation of material and equipment to site, and personnel to and from site; and
- Construction of the solar field, 132 kV power line and additional infrastructure.

#### 2.1.2 Operational Phase

The following activities will occur during the operational phase:

- The generation of electricity from the proposed solar facility and supply of electricity to the Kappa substation (note: the Electrical Grid Infrastructure component of the project is not expected to generate any significant traffic during operations); and
- Cleaning of panels and maintenance of the solar field and infrastructure.
- During the life span of the project (approximately 20 years), on-going cleaning and maintenance will be required on a scheduled basis.

#### 2.1.3 Decommissioning Phase

The main aim of decommissioning is to return the land to its original, pre-construction condition. Should the unlikely need for decommissioning arise (i.e. if the actual solar facility becomes outdated or the land needs to be used for other purposes), the decommissioning procedures will be undertaken and the site will be rehabilitated and returned to its pre-construction state.

## 2.2 TRANSPORTATION REQUIREMENTS

During the project cycle, it is anticipated that the following vehicles will need to access the site:

- Building materials are to be transported by single-unit trucks within the road freight limitations of South Africa.
- Solar panels, frames and inverters are to be transported in 40 foot long containers (which have exterior dimensions of 12.19m long x 2.44m wide x 2.59m high) on double axle trucks within the road freight limitations of South Africa.
- Workers from the surrounding area will be transported by taxi/bus/shuttle or private car.
- Transformers will be transported by abnormal load trucks for which a permit will need to be applied for in terms of Section 81 of the National Road Traffic Act and authorisation needs to be obtained from the relevant road authorities to modify the road reserve to accommodate turning movements at intersections.

## **3** EXISTING ROAD NETWORK

## 3.1 POSSIBLE ROUTE ALTERNATIVES

It is anticipated that the imported components required for the solar plants will arrive at the Port of Saldanha Bay or Cape Town Harbour. From Google Maps, the distances and travelling times from the Port of Saldanha and Cape Town Harbour are very similar. This is shown in **Figure 2** and **Figure 3** below.

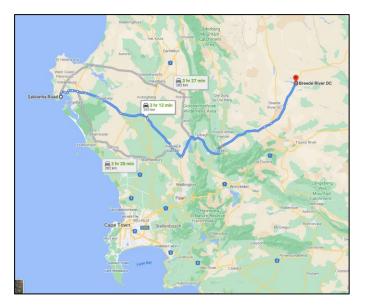


Figure 2: Possible Route Alternatives – Port of Saldanha Bay

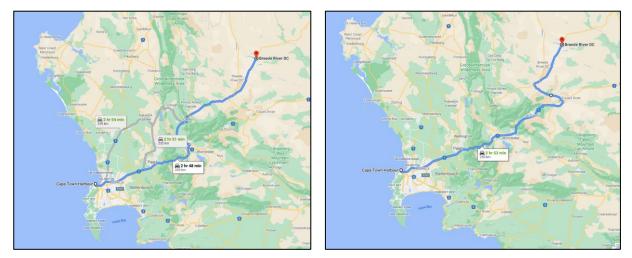


Figure 3: Possible Route Alternatives: Cape Town Harbour

## 3.2 ROAD CONDITION

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) is responsible for the maintenance of the national roads which are in a reasonable condition, however heavy traffic contribute significantly to the deterioration of the road surfaces.

According to the Western Cape Government Road Network Information System (RNIS), the paved main roads in the vicinity of the proposed PV Plants are in a fair to poor condition. Road freight, transport, specifically heavy vehicle transport, significantly contributes to the deterioration of main road surfaces



and maintenance of these roads is not always adequate. The main gravel roads are good to fair condition. This is illustrated below.

**Figure 4: Paved Road Conditions** 

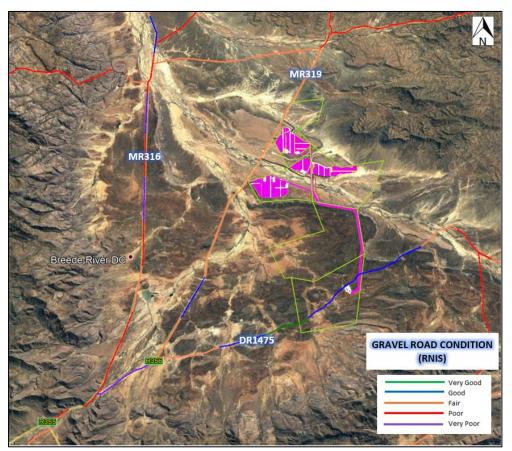


Figure 5: Gravel Road Conditions

## 3.3 EXTERNAL ACCESS ROAD

The main access road that will be directly affected by the proposed construction and operation of the solar plants is Main Road 319 (R356). MR319 is a 6.0m gravel road within a 25.0m road reserve and connects with the R355 (Main Road 316) to the south-west and traverses the Northern Cape Provincial boundary in the east to connect with the R354. The distance of gravel road from the connection with the R355 to the entrance to the Witte Wall site is approximately 32 km.



Figure 6: Main Road 319

MR319 can be classified as a Rural Class 3 Minor Arterial for which the Western Cape Government is the controlling authority.

# 4 SITE ACCESS CONSIDERATIONS

## 4.1 PROPOSED ACCESS LOCATION

Access to the Witte Wall PV 1, and Witte Wall PV 2 solar PV plants are proposed from the existing access to Farm 171 Witte Wall at Km 74.84 along MR319. This is shown Figure 7 below.

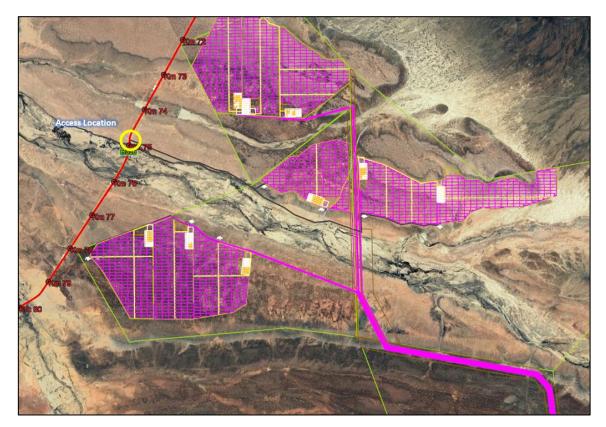


Figure 7: Witte Wall Access Location

The existing access road to Farm 171 Witte Wall is a private gravel road, approximately 7km in length, which will be used as an internal access road to access the Witte Wall PV 1, and Witte Wall PV 2 solar PV facilities. Refer to **Figure 8**.



Figure 8: Internal Access Road

#### 4.2 SIGHT DISTANCE

According to the TRH17 Geometric Design of Rural Roads, a shoulder sight distance of 300m is required for a Single-Unit Truck and Trailer SU+T) design vehicle for a design speed of 80 km/h. The site visit and photos taken at the proposed access location indicate that shoulder sight distance will be sufficient. Refer to Figure 9.



Sight Distance to the Left

Sight Distance to the Right

Figure 9: Sight Distance at Existing Access at Km 74.84 along MR319

## **5** EXISTING TRAFFIC CONDITIONS

No manual traffic counts were conducted in the vicinity of the proposed solar plants due to the low volume (<100vpd) of traffic on the directly affected roads in the area.

The Western Cape Government's (WCG) RNIS has a traffic count database for which traffic counts are conducted regularly. The Western Cape proclaimed road network is categorised into Trunk Roads, Main Roads, Divisional Roads and Minor Roads. A count station (Station 4994) is located at the MR319(R356)/OP8014 intersection (km59.74) approximately 15 km north of the gravel access to Farm (Station station 4474) 171 Witte Wall. А count is also located at the MR319(R356)/DR1475(Matjiesfontein) intersection (km99.84) approximately 25 km south of the gravel access to Farm 171 Witte Wall. Both these stations were counted in August 2018 which provides recent traffic information.



Figure 10: Location of Count Stations

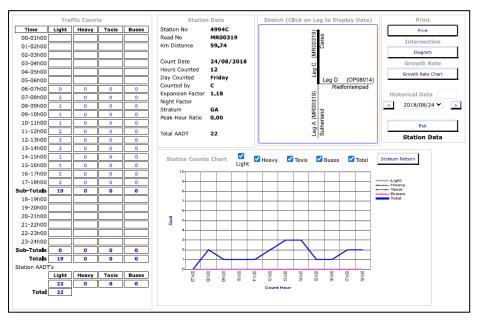


Figure 11: Station 4994 Count Information



Figure 12: Station 4474 Count Information

The Annual Average Daily Traffic (AADT) of gravel road MR319 (R356) in the vicinity of the site is extremely low with approximately 22 vehicles per day (Source: RNIS) at Station 4994 and 33 vehicles per day at Station 4474. The posted speed limit along MR319 is 80km/h. No heavy vehicles were observed along this road during the count.

## 6 TRIP GENERATION RATES

The trip generation estimates discussed below are based on similar studies that have been undertaken for SEFs and the associated electrical infrastructure (collector substation and transmission line). The trip generation rates discussed below relates to the anticipated trip generation rates associated with a 175 MW SEF.

## 6.1 CONSTRUCTION PHASE

It is expected that the Construction Phase for each of the proposed PV Plants will extend between 12 and 24 months (more likely 24 months due to the magnitude of the proposed plants). During the construction of each 175MW PV Plant, solar panels will be transported in 40ft containers by double-axle trucks. It is expected that approximately 2500 containers will be transported (two containers per truck), which will result in 1250 double-axle truck trips. Based on a 24 month construction period (i.e. 104 weeks), and a 6 day work week (104 x 6 = 624 work days), this could result in approximately **2 daily double-axle trips**.

It is also expected that approximately 15 single unit trucks carrying construction materials will visit the site on a daily basis, resulting in **15 daily single unit truck trips**.

Furthermore, it is expected that 460 unskilled labourers and 150 skilled labourers will be transported to the site daily. Experience has shown that during the construction period, approximately **20 daily bakkie trips** are expected to come to / from the site. A vehicle occupancy of 1.5 persons/vehicle (bakkie) is assumed, which relates to 30 labourers coming to/from the site by bakkie. The remaining 580 labourers will be transported to/from the site by eighty-seater buses and taxis from the surrounding areas resulting in approximately **8 daily bus trips**.

Water will also be delivered to the site from a municipal water supply by a 12-kilolitre water truck on a daily basis during the construction phase. Water demand will be in the order of 355 000 litres per month for construction purposes and potable water. This relates to approximately 1 x 12 kilolitre water truck trip per day. This will result in **1 daily water truck trip**.

## 6.2 OPERATIONAL PHASE

It is expected that the Operational Phase will take place during the life span of the project (approximately 20 years). During this time, it is anticipated that 6 light load trucks will visit the site on a daily basis, transporting staff and equipment. This will equate to **6 daily light load truck trips**.

It is also anticipated that 1-2 small single-axle trucks will visit the site on a weekly basis. This equates to (conservative) **1** daily single axle truck trip.

It is estimated that between 5 million and 8 million litres of water will be required for cleaning the solar panels and for potable water requirements per year. This will relate to approximately 2 daily 12 kilolitre water truck trips for cleaning of the solar panels and for potable water requirements. In total, there will therefore be **2 daily water truck trips**.

#### 6.3 DECOMMISSIONING PHASE

The Decommissioning Phase will generate similar trips as the Construction Phase over a similar time period (12 to 24 months). This includes **2 daily double-axle trips** for the transportation of the solar panels, **15 daily light load trips**, for the transportation of construction materials, **8 daily bus trips** and **20 daily bakkie trips** for the workforce and **1 daily water truck trip**.

## 7 TRAFFIC IMPACT ASSESSMENT

From the trip generation information gathered in **Section 6** the following traffic impacts should be considered:

- Potential congestion and delays on the surrounding road network
- Potential impact on traffic safety and increase in accidents with other vehicles or animals
- Potential change in the quality of the surface condition of the roads
- Potential noise and dust pollution.

The number of additional daily trips per 175 MW solar photovoltaic plant and associated electrical grid infrastructure are summarised below:

#### Construction Phase – 46 Daily Trips

- 2 daily double-axle trips
- 15 daily light load trips
- 8 daily bus trips
- 20 daily bakkie trips
- 1 daily water truck trips.

#### **Operational Phase – 9 Daily Trips**

- 6 daily light load truck trips
- 1 daily single axle truck trips (conservative assumption as 1-2 small single-axle trucks will visit the site on a **weekly** basis)
- 2 daily water truck trips

#### Decommissioning Phase – 46 Daily Trips

- 2 daily double-axle trips
- 15 daily light load trips
- 8 daily bus trips
- 20 daily bakkie trips
- 1 daily water truck trips.

It is anticipated that each 175MW plant will have a 24-month construction period. In a rural environment, the peak hour trips constitute approximately 20%-40% of the daily traffic. This relates to approximately 9 to 18 additional daily peak hour trips on the road network during the construction and decommissioning phase and 2 to 4 additional daily peak hour trips on the road network during the operational phase, which will have an insignificant traffic impact on the surrounding road network.

Should construction of the two PV plants (Witte Wall PV 1 and Witte Wall PV 2) commence at exactly the same time, the cumulative daily trips that can be anticipated are summarised below. The total cumulative daily trips relating to all the nine SEFs are discussed in **Section 9**.

#### Construction Phase – 92 Daily Trips

- 4 daily double-axle trips
- 30 daily light load trips
- 16 daily bus trips
- 40 daily bakkie trips
- 2 daily water truck trips

#### **Operational Phase – 18 Daily Trips**

- 12 daily light load truck trips
- 2 daily single axle truck trips
- 4 daily water truck trips

#### Decommissioning Phase – 92 Daily Trips

- 4 daily double-axle trips
- 30 daily light load trips
- 16 daily bus trips
- 40 daily bakkie trips
- 2 daily water truck trips

The above daily trip generation rates will relate to approximately 18 to 37 additional daily peak hour trips on the road network during the construction and decommissioning phase and 4 to 7 additional daily peak hour trips on the road network during the operational phase. The trips during the construction and decommissioning phases will have a traffic impact on the surrounding road network and to further limit the impact, it is proposed that these trips be scheduled outside of peak traffic periods. The trips during the operational phase will have an insignificant traffic impact during the peak hours.

The mitigation measures to address the traffic impact are listed below:

- Stagger delivery trips and schedule deliveries outside of the peak traffic periods
- Staff trips should also occur outside of the peak hours where possible
- Dust control of the gravel roads
- Regular maintenance of the gravel external access roads by the contractor during the construction period and the operator during the operational phase.
- Upgrading of the internal farm access road to suitable standards as specified by the civil engineer and regular maintenance of the access road during all phases of the project, especially during the construction and decommissioning phases.
- The route to the site should be further investigated to ensure that the abnormal loads are not obstructed at any point by geometric, height and width limitations along the route.
- The applicable permits to transport the abnormal loads should be obtained.

## 8 TRAFFIC IMPACT ASSESSMENT SUMMARY

The impacts associated with the traffic generation of the proposed Witte Wall PV 1 and Witte Wall PV 2 SEF are summarised in **Table 1** below:

CONSTRUCTION AND DECOMMISECongestion and delays on road networkSpatial Exter DurationnetworkDurationPotential impact on traffic safety and increase in accidents with other vehicles and animalsSpatial Exter Spatial Exter DurationPotential impact and increase in accidents with other vehicles and surfaceConsequence Reversibility IrreplaceabilCondition of road surfaceStatusSpatial Exter DurationDurationCondition of road surfaceStatusDuration consequence ProbabilityIrreplaceabil ReversibilityDuration surfaceConsequence ProbabilityDuration consequence ProbabilityConsequence ProbabilityDuration consequence ProbabilityConsequence ProbabilityDust PollutionStatus Spatial Exter DurationDust PollutionStatus Spatial Exter DurationNoise PollutionStatusNoise PollutionStatus	ct Criteria	Significance and Ranking (Pre- Mitigation)	Potential mitigation measures	Significance and Ranking (Post- Mitigation)	Confidence Level
delays on road network Duration Consequence Probability Reversibility Irreplaceabil Potential impact on traffic safety and increase in accidents with other vehicles and animals Probability Reversibility Irreplaceabil Condition of road surface Spatial Exter Duration Consequence Spatial Exter Duration Consequence Probability Reversibility Irreplaceabil Dust Pollution Spatial Exter Duration Consequence Probability Reversibility Irreplaceabil Consequence Probability Reversibility Irreplaceabil Consequence Probability Reversibility Irreplaceabil Consequence Probability Reversibility Irreplaceabil Consequence Probability Reversibility	ONING PHASE				
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surface Spatial Exter Duration Consequence Probability Reversibility Irreplaceabi Dust Pollution Status Spatial Exter Duration Consequence Probability Reversibility Irreplaceabi	Neutral Local Medium Term e Moderate Likely High	Low Risk / Impact (4)	Speed control by means of stop and go system and speed limit road signage.	Low (4)	High
Spatial Exter Duration Consequenc Probability Reversibility Irreplaceabi	Neutral Nedium Term e Slight Likely High	Very Low Risk / Impact (5)	Regular maintenance of access roads by the contractor. Ensure access roads are restored to original pre- construction road condition.	Very Low (5)	High
Noise Pollution Status	Medium Term e Moderate Likely High	Low Risk / Impact (4)	Dust control of gravel roads. Speed control by means of stop and go system and speed limit road signage.	Low (4)	High
Spatial Exter Duration Consequence Probability Reversibility Irreplaceabi	Neutral Local Medium Term e Moderate Likely High	Low Risk / Impact (4)	Stagger delivery trips.	Low (4)	High

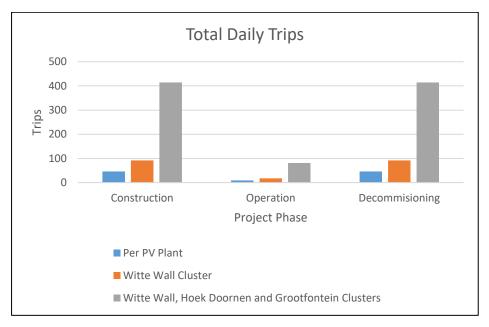
#### Table 1: Rating of Traffic Related Impacts

# 9 CUMULATIVE IMPACTS

The cumulative impacts of all the proposed nine SEFs in the vicinity were considered and assessed. It is however very unlikely that all nine projects will occur at the same time, as all these projects will be subject to a highly competitive bidding process and only a few projects would be allowed to enter into a power purchase agreement with Eskom at a time. Construction will most likely be staggered based on project and site-specific issues.

The biggest traffic impact associated with SEFs is during the construction phase (and similarly during the decommissioning phase). During the operational phase, the trips added to the road network is expected to be insignificant. It should be noted that all the applications for abnormal load transport are considered by the applicable authorities and they will ensure that the trips are staggered on the road network to limit possible delays.

However, for the purpose of determining the cumulative impacts, **Figure 13** and **Figure 14** below illustrates the cumulative impacts of the nine SEFs for the daily and peak periods.



#### Figure 13: Total Cumulative Daily Trips

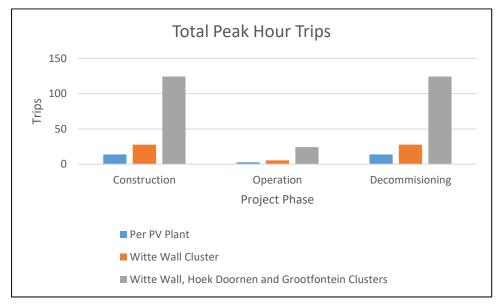


Figure 14: Total Cumulative Average Peak Hour Trips

The impacts associated with the cumulative traffic generation of the proposed Witte Wall, Grootfontein and Hoek Doornen solar clusters are summarised in **Table 2** below:

Impact	Impact C	riteria	Significance and Ranking (Pre- Mitigation)	Potential mitigation measures	Significance and Ranking (Post- Mitigation)	Confidence Level
CONSTRUCTION AN	D DECOMMISION	NG PHASE				
Congestion and	Status	Neutral	Low Risk /	Stagger delivery trips	Very Low (5)	High
Delays on road	Spatial Extent	Local	Impact	and schedule trips		
network	Duration	Medium	(4)	outside of peak hours.		
		Term				
	Consequence	Substantial				
	Probability	Very				
		Unlikely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Potential impact	Status	Neutral	Low Risk /	Speed control by means	Low (4)	High
on traffic safety	Spatial Extent	Local	Impact (4)	of stop and go system		
and increase in	Duration	Medium		and speed limit road		
accidents with		Term		signage.		
other vehicles and animals	Consequence	Moderate				
driimdis	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Condition of road	Status	Neutral	Low Risk /	Regular maintenance of	Very Low (5)	High
surface	Spatial Extent	Local	Impact (4)	access roads by the		
	Duration	Medium 		contractor. Ensure		
		Term		access roads are		
	Consequence	Substantial		restored to original pre- construction road		
	Probability	Very		condition.		
	<b>D</b>	Unlikely		condition.		
	Reversibility	High				
Dust Pollution	Irreplaceability	Replaceable	Law Diels /	Dust sentral of survel	1 (4)	Llink
Dust Pollution	Status	Neutral	Low Risk /	Dust control of gravel roads. Speed control by	Low (4)	High
	Spatial Extent	Local	Impact (4)	means of stop and go		
	Duration	Medium Term		system and speed limit		
	Consequence	Severe		road signage.		
	Probability	Very		Tour Signage.		
	Probability	Unlikely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Noise Pollution	Status	Neutral	Low Risk /	Stagger delivery trips.	Low (4)	High
	Spatial Extent	Local	Impact (4)			
	Duration	Medium	P ( )			
		Term				
	Consequence	Severe	1			
	Probability	Very	1			
		Unlikely				
	Reversibility	High	1			
	Irreplaceability	Replaceable	1			
OPERATIONAL PHAS						
				ificant impact on the surrou		

Table 2:	Cumulative	Rating of	Traffic	Related	Impacts

## **10 CONCLUSIONS AND RECOMMENDATIONS**

Sturgeon Consulting (Pty) Ltd prepared this TIS for the proposed construction and operation of the Witte Wall PV 1 and Witte Wall PV 2 SEFs near Touws Rivier in the Western Cape. Each of these PV energy facilities will have a generating capacity of 175MW. This report summarises the existing transportation conditions within the site vicinity and provides an assessment of the transportation impacts of the proposed development on the surrounding transport system.

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

- The main gravel roads in the vicinity of the proposed development are in a good to fair condition
- The main surfaced roads in the vicinity of the proposed development is in a fair to poor condition
- Access to the proposed development will be taken off Main Road 319 at an existing access at Km 74.84
- This access complies with the sight distance requirements
- Existing traffic information indicates that MR319 carries very little traffic with an AADT of <50 vehicles per day
- Traffic will be generated during the Construction, Operational and Decommissioning phases of the project.
- During the Construction and Decommissioning phases, 46 daily trips and 9 to 18 peak hour trips will be generated per 175MW facility.
- The following traffic impacts are related to the trips generated during the Construction and Decommissioning phases:
  - Potential congestion and delays on the surrounding road network
  - Potential impact on traffic safety and increase in accidents with other vehicles or animals
  - Potential change in the quality of the surface condition of the roads
  - Potential noise and dust pollution.
- Traffic generated during the Operational phase will have an insignificant traffic impact on the surrounding road network

The mitigation measures to address the traffic impact are recommended:

- Stagger delivery trips and schedule deliveries outside of the peak traffic periods
- Staff trips should also occur outside of the peak hours where possible
- Dust control of the gravel roads
- Speed limits and stop and go facilities to be implemented to ensure reduced speeds along the roads
- Regular maintenance of the gravel external access roads by the contractor during the construction period and the operator during the operational phase.
- Upgrading of the internal farm access road to suitable standards as specified by the civil engineer and regular maintenance of the access road during all phases of the project, especially during the construction and decommissioning phases.
- The route to the site should be further investigated to ensure that the abnormal loads are not obstructed at any point by geometric, height and width limitations along the route.
- The applicable permits to transport the abnormal loads should be obtained.

No other remedial or mitigation measures will be required to accommodate the additional traffic generated by the proposed SEFs.

Provided that the above recommendations are adhered to, the proposed development of the Witte Wall PV 1 and Witte Wall PV 2 SEFs can be supported from a traffic engineering perspective.

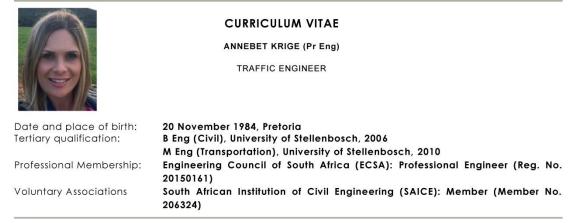
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- 2. Department of Transport, Guidelines for Traffic Impact Studies, Report No. PR93/645, Pretoria, 1995.
- 3. Department of Transport, South African Trip Generation Rates, Report No. RR92/228, Pretoria, 1995.
- 4. Committee of Transport Officials (COTO), South African Trip Data Manual, Draft 2.1, June 2020.
- 5. Committee of Transport Officials (COTO), South African Traffic Impact and Site Traffic Assessment Manual Standards and Requirements Manual, Volume 2 TMH 16, September 2012.
- 6. Committee of Transport Officials (COTO), South African Traffic Impact and Site Traffic Assessment Manual, Volume 1 TMH 16, September 2012.
- 7. SANRAL Geometric Design Guide
- 8. Department of Transport, TRH17, Geometric Design of Rural Roads, 1988

# APPENDIX A: CV OF ANNEBET KRIGE



t: 021 553 4167 f: 086 559 5327



#### INTRODUCTION

AnneBet Krige is registered as a Professional Civil Engineer with the Engineering Council of South Africa (ECSA). Over the past 12 years, she has gained extensive knowledge in the Civil Engineering field and currently works as a Traffic Engineer for Sturgeon Consulting. She obtained her Masters' Degree in Transportation Engineering from the University of Stellenbosch in 2010 and specialises in this field.

#### Expertise & Specialised Skills:

AnneBet has gained extensive experience in the following fields:

- Traffic Studies and Transportation Planning (Statements, Assessments, Parking Studies);
- Design of Non-Motorised Transport Facilities;
- Design and Upgrading of Traffic Signals;
- Traffic Accommodation Plans;
- Design of Civil Engineering Infrastructure for various developments (Water, Sewerage, Stormwater, Roads);
- Rehabilitation and Reseal of existing National and Provincial Roads;
- Construction of new Roads;
- Tender Documentation.
- Contract Administration

#### SUMMARY OF EMPLOYMENT

2018 – Present	Associate, Sturgeon Consulting
2011 - 2018	Traffic Engineer, Element Consulting Engineers
2006 - 2011	Engineer in Training, EFG Engineers

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Oshakati		Element Namibio
	e proposed Oshakati Mall Development	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: Current	Study Value: R48 900	
Bergriver Housing Tender		Bergriver Municipality
	e proposed Bergriver Housing Developments	, , , , , , , , , , , , , , , , , , ,
Role & Responsibilities:	Traffic Engineer	
Completed/Current: Current	Study Value: R217 500	
Van Kervel Special School		Uhambiso Consul
	e Upgrading and Extension of the Van Kervel	
Role & Responsibilities:	Traffic Engineer	special school, Geolge
Completed/Current: Current	Study Value: R33 220	
completed/content. Content	Slody value. R33 220	
Nonwabisi Park		City of Cape Towr
Fraffic Impact Assessment for th	e Monwabisi Park Informal Settlement	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: Current		
Loop Street Signs		Wide Open Platform
Iraffic Opinion for the proposed	LED Screen for 97 and 220 Loop Street, Cape	Town
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2019	Study Value: R42 900	
Sunningdale Saint Square		amalus Developments (Pty) Ltd:
	Proposed Apartments on Erf 38099, Sunningd	Idle
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2019	Study Value: R27 900	
Mamre Service Station		Plan Africa Consulting
	e proposed Rezoning of Erf 615, Mamre	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2019	Study Value: R34 700	
Erf 13811, Wellington		De Villiers Consulting Engineers
	e proposed Provence Development, Wellingto	on
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2019	Study Value: R54 400	
Allesverloren Lifestyle Village		Latitude Property Solutions
	e proposed Allesverloren Lifestyle Estate Deve	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2019	Study Value: R71 900	
Langebaanweg Truck Stop		West Coast Petroleum (Pty) Ltd
Access Investigation / Traffic Im	pact Assessment for the proposed Langebaar	nweg Truck Stop
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2020	Study Value: R89 800	
Erf 11919, Paarl		Van der Sluve Preiset
	e proposed Retail Development on Erf 11919,	Van der Sluys Projects
Role & Responsibilities:		Fuuli
Completed/Current: 2020	Traffic Engineer Study Value: R136 900	
	stody value. Krob /00	
Erf 838, Milnerton		Headland Planners (Pty) LLto
	e Proposed Fruit and Veg Retail Development	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2019	Study Value: R60 500	
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Abbotsdale	CK Rumboll and Partn
	Industrial Development on Portion A of Erf 373, Abbotsdale
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2019	Study Value: R60 100
Grootfontein – Tsumkwe Feasibili	y Study Pregon Consulting Enginee
Feasibility Study for the Upgrade	to Bitumen Standard of M0074: Grootfontein - Tsumkwe
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Study Value: R163 600
	The second All seconds
Eros Traffic Study, Windhoek	Element Namibi
Traffic Impact Study for the dens	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2019	Study Value: R37 900
Paarl East Housing Development	Aureco
Traffic Impact Study for the deve	lopment of 650 housing opportunities
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2018	Study Value: R61 750
Bella Riva Lifestyle Development	
	a Lifestyle Development (5875 unit)
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Study Value: R172 000
completed/content. content	<b>Slody Value.</b> R172 000
Mahama Infill Housing Developm	
Traffic Impact Study for the Mahe	ama Infill Housing Project
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2018	Study Value: R157 500
Blueberry Hill Housing Developm	ent Nadeson Consultin
	lopment of 3500 housing opportunities
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2019	Study Value: R182 000
Design of Jip de Jager Road	
Traffic Impact Study for the Desig	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2018	Study Value: R175 000
Brentwood Park	
Traffic Impact Study for the Brent	wood Park GAP Housing Development
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2017	Study Value: R75 000
Curro Windhoek	
Traffic Impact Study for Curro Wi	adhaek
Role & Responsibilities:	
	Traffic Engineer
Completed/Current: 2017	Study Value: R75 000
Schaapkraal	
	apkraal GAP Housing Development, Mitchells Plain
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2017	Study Value: R75 000
Trekoskraal	
Traffic Impact Study for the Trekc	skraal Development. West Coast
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2017	Study Value: R70 000
eepierea, eerrein. 2017	

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not of the Sleeper Site East London	
Sludy Value. R255 000	
Project Value: R537 000	
Study Value: R38 500	
oment	
Study Value: R49 000	
	<b>-</b> · - · ·
	Tip Trans Logis
Sludy Value. R24 500	
	City of uMhlathu
	tion of Traffic Signals
Study Value: R 167 500	
	Asla Devo
oosed Storage and Office Facilities in Strand	
Study Value: R33 500	
	Dube Tradepo
adeport. Durban	
	Milprops 3
Mall Langebaan	Milprops 5
Study Value: R28 000	
Orrig	Walky Colomon & Associat
	Welby-Solomon & Associat
element of a Curro Castle in Ultright	Curro Holdin
stuay value: R35 000	
Ca	ipe Town Community Housi
	-
elopment of 650 residential units on Erf 2435, N	Nitchells Plain
Traffic Engineer	litchells Plain
	pment         gedaan Residential Development, Saldanha         Traffic Engineer         Study Value: R49 000         Gand Mine, Malmesbury         Traffic Engineer         Study Value: R24 500         Itant to conduct a study to warrant the installa         Traffic Engineer         Study Value: R167 500         posed Storage and Office Facilities in Strand         Traffic Engineer         Study Value: R33 500         adeport, Durban         Traffic Engineer         Study Value: R80 000         Mall, Langebaan         Traffic Engineer         Study Value: R28 000         Orrie,         Primary School         Traffic Engineer         Study Value: R38 000         Orrie,         Study Value: R38 000

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Curro Burgundy	Curro Holding
	elopment of a Curro Castle in Burgundy Estate
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2016	Study Value: R48 000
Paarl Development	Baobab Propertie
	elopment of Farm 851 Portion 9, Paarl
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2016	Study Value: R48 000
•	
Erf 68, Kylemore	Jomar Service
	Development of Erf 68, Kylemore
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2015	Study Value: R30 000
Curro Benoni	Curro Holding
	elopment of a Curro Academy on Erf 7940, Benoni
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2015	Study Value: R65 000
Curro Constantia	Curre Heldine
	Curro Holding
	elopment of a Curro Castle in Constantia
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2015	Study Value: R30 000
Hout Bay International School, H	lout Bay Hout Bay International Schoo
Parking Study for the Hout Bay I	
Role & Responsibilities:	
Completed/Current: 2014	Study Value: R55 000
District 6, Cape Town	Department of Rural Development and Land Reform
Traffic Impact Study for District	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2013	Contract Value: Unknown
PPC Mine, Vanrhynsdorp	CK Rumboll & Partner
	Access to the Proposed PPC Mine, Vanrhynsdorp
Role & Responsibilities:	
Completed/Current: 2013	Contract Value: Unknown
IDZ, Saldanha Bay	Saldanha Bay ID
Traffic Impact Study for the Salo	
Role & Responsibilities:	in anno Erigino or
Completed/Current: 2012	Contract Value: R500 million
Sawmill, Wemmershoek	Owne
Traffic Impact Study for the Wei	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2012	Contract Value: Unknown
Sandown Centre, Parklands	Leon Smith Architect
Parking Study for the Sandown	
Role & Responsibilities:	Traffic Engineer Contract Value: Unknown
Completed/Current: 2011	

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Pick n Pay, Brackenfell		Pick & Pay Brackenfel
Parking and Circulation Study for	or Pick n Pay, Brackenfell	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2011	Contract Value: Unknown	
Hoek van de Berg, Hawston		
	elopment of an Eco-Estate on Farm Hoek v	an de Berg, Hawston
Role & Responsibilities:	Assistant Traffic Engineer	<b>.</b>
Completed/Current: 2011	Study Value: R125 000	
•		
Tygervalley Extensions, Bellville		
Traffic Impact Study for the Tyge		
Role & Responsibilities:	Assistant Traffic Engineer	
Completed/Current: 2009	Study Value: R165 000	
	-	
Upgrading of MR168, Stellenbos		ial Administration: Western Cap
Traffic Impact Study for the upg		
Role & Responsibilities:	Assistant Traffic Engineer	
Completed/Current: 2009	Contract Value: R360 million	
Blue Downs Development		MSP Development
Traffic Impact Study for the Blue	Downs Development	
Role & Responsibilities:	Assistant Traffic Engineer	
Completed/Current: 2009	Contract Value: R12 million	
Buhrein, Kraaifontein		MSP Development
Traffic Impact Study for the Buh	rein Development	
Role & Responsibilities:	Assistant Traffic Engineer	

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Brackengate Industrial Developm	nent Redefine Properties / VDVM
Design and installation of Traffic	Signals along Cilmor Road, Stikland
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Contract Value: R 2 000 000
Medway Road Upgrade, Richard	s Bay Richards Bay ID
Upgrading of Traffic Signals at th	e John Ross Highway / Medway Road intersection, Richards Bay
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Contract Value: R500 000
Cape Town CBD	City of Cape Town: TC
Upgrading of Traffic Signal Layou	uts in Cape Town
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Contract Value: Unknown
Erf 16161, Paarl	Asl
Design and Installation of Traffic	Signals for Erf 16161, Paarl
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2013	Contract Value: Unknown
Buhrein, Kraaifontein	
Design and Installation of Traffic	Signals for Buhrein, Kraaifontein
Role & Responsibilities:	Assistant Traffic Engineer
Completed/Current: 2011	Contract Value: R700 000
Shoprite, Mossel Bay	
Design and Installation of Traffic	Signals for Shoprite, Kwanonqaba, Mossel Bay
Role & Responsibilities:	Assistant Traffic Engineer
Completed/Current: 2011	Contract Value: R600 000
Shoprite DC, Brackenfell	
Design and Installation of Traffic	Signals for Shoprite DC, Brackenfell
Role & Responsibilities:	Assistant Traffic Engineer
Completed/Current: 2010	Contract Value: R800 000

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Road Safety Audit	Namibia Roads Authority
Road Safety Audit for T0602: Gob	abis to Buitepos
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Contract Value:
Non-Motorised Transport, City of	Cape Town City of Cape Town
Implementation of the Non-Moto	rised Transport programme to the City of Cape Town
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Contract Value: R50m
Westbury Pedestrian Bridge, Johc	
	the construction of the Westbury Pedestrian Bridge, Johannesburg
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Contract Value: Unknown
Erven 13259 and 13585, Brackenf	ell Group 5 Property Developmen
Traffic Accommodation Plan for	the development of Erven 13259 and 13585, Brackenfell
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Contract Value: R550 000
Lakeview and Klipspruit BRT Statio	ons, Soweto Johannesburg Roads Authority
Non-motorised Transport for Lake	view and Klipspruit BRT Stations, Soweto
Role & Responsibilities:	Traffic Engineer / Design Engineer
Completed/Current: Current	Contract Value: R35 million
Traffic Calming, Stellenbosch	Stellenbosch Municipality
Stellenbosch Traffic Calming Plar	nning
Role & Responsibilities:	Assistant Traffic Engineer
Completed/Current: 2013	Contract Value: Unknown
Traffic Accommodation, Cape To	Group S
	the upgrading of intersections in Cape Town CBD
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2013	Contract Value: Unknown

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Upgrading of Medway Road, Rich	nards Bay
Upgrading of Medway Road	
Role & Responsibilities:	Assistant Engineer
Completed/Current: Current	Contract Value: R50 million
Trunk Road 32 between N2 and H	erbertsdale Provincial Government Western Cape
The Reseal / Rehabilitation of a se	ection of Main Road 342 between km 7.72 and Herbertsdale
Role & Responsibilities:	Assistant Engineer
Completed/Current: Current	Contract Value: Unknown
National Route 7, Garies	SANRAL
	ute 7 Section 7 between Garies and km 60
Role & Responsibilities:	Assistant Engineer
Completed/Current: Current	Contract Value: R101.4 million
completed/content. Content	Comaci value. RT01.4 miniori
National Route 7, Okiep	SANRAL
Repair and Reseal of National Ro	ute 7 Section 7 to 8 between km 60 and Okiep
Role & Responsibilities:	Assistant Engineer
Completed/Current: Current	Contract Value: R95.5 million
De ede 0100/1 0040/1 020/1 004	
Roads P122/1, P249/1, P39/1, P24	1/1(D405) and K111, Muldersdrift
Rehabilitation of Roads P122/1, P	1/1(D405) and K111, Muldersdrift 249/1, P39/1, P241/1(D405) and K111, Muldersdrift
Rehabilitation of Roads P122/1, P Role & Responsibilities:	1/1(D405) and K111, Muldersdrift 249/1, P39/1, P241/1(D405) and K111, Muldersdrift Assistant Engineer
Rehabilitation of Roads P122/1, P	1/1(D405) and K111, Muldersdrift 249/1, P39/1, P241/1(D405) and K111, Muldersdrift Assistant Engineer
Rehabilitation of Roads P122/1, P Role & Responsibilities:	1/1(D405) and K111, Muldersdrift 249/1, P39/1, P241/1(D405) and K111, Muldersdrift Assistant Engineer Contract Value: Unknown
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton a	1/1(D405) and K111, Muldersdrift 249/1, P39/1, P241/1(D405) and K111, Muldersdrift Assistant Engineer Contract Value: Unknown
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton a The Reseal of Trunk Road 32 Secti Road 1329	1/1(D405) and K111, Muldersdrift         249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Provincial Government Western Cape
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton a The Reseal of Trunk Road 32 Secti	1/1(D405) and K111, Muldersdrift         249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         nd Swellendam       Provincial Government Western Cape         ion 1 between Ashton and Swellendam, Main Road 283 and Divisional
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton an The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014	1/1(D405) and K111, Muldersdrift         249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Ind Swellendam         Provincial Government Western Cape         ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton an The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities:	1/1(D405) and K111, Muldersdrift         249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Ind Swellendam         Provincial Government Western Cape         ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton an The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014 National Route 14 Section 1 betw	1/1(D405) and K111, Muldersdrift         249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Ind Swellendam       Provincial Government Western Cape         Ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million         SANRAL
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton a The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014 National Route 14 Section 1 betw Pofadder	1/1(D405) and K111, Muldersdrift         249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Ind Swellendam       Provincial Government Western Cape         Ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million         SANRAL
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton an The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014 National Route 14 Section 1 betw Pofadder Repair and reseal N14 between V Role & Responsibilities:	1/1(D405) and K111, Muldersdrift         249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         nd Swellendam       Provincial Government Western Cape         ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million         een Witputs and       SANRAL         Witputs and Pofadder
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton an The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014 National Route 14 Section 1 betw Pofadder Repair and reseal N14 between W Role & Responsibilities: Completed/Current: 2013	1/1(D405) and K111, Muldersdrift         249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Ind Swellendam         Provincial Government Western Cape         ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million         SANRAL         Witputs and Pofadder         Assistant Engineer         Contract Value: R70.3 million
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton an The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014 National Route 14 Section 1 betw Poladder Repair and reseal N14 between V Role & Responsibilities: Completed/Current: 2013 National Route 14 Section 2 betw	1/1(D405) and K111, Muldersdrift         249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         and Swellendam       Provincial Government Western Cape         ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million         een Witputs and Pofadder         Assistant Engineer         Contract Value: R70.3 million
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton an The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014 National Route 14 Section 1 betw Poladder Repair and reseal N14 between V Role & Responsibilities: Completed/Current: 2013 National Route 14 Section 2 betw	1/1(D405) and K111, Muldersdrift         249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Ind Swellendam         Provincial Government Western Cape         ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million         SANRAL         Witputs and Pofadder         Assistant Engineer         Contract Value: R70.3 million

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Sitari, Somerset West	
Civil Engineering Services for Site	ari Fields. Somerset West
Role & Responsibilities:	Assistant Resident Engineer
Completed/Current: Current	Contract Value: R350m
Van der Stel, Stellenbosch	
Upgrading of the Van der Stel S	port Complex parking area
Role & Responsibilities:	Resident Engineer
Completed/Current: 2012	Contract Value: R700 000
CSP Plant, Upington	
Access to the proposed CSP Pla	
Role & Responsibilities:	Design Engineer
Completed/Current: 2012	Contract Value: Unknown
Droogfontein, Kimberley	
	s to the proposed PV Farm, Droogfontein, Kimberley
Role & Responsibilities:	Design Engineer
Completed/Current: 2012	Contract Value: Unknown
completed/content. 2012	
Robben Island	
	and Sewerage works on Robben Island
Role & Responsibilities:	Assistant Resident Engineer
Completed/Current: 2011	Contract Value: R12 million
KFC Observatory	
Civil Engineering Services for KFG	
Role & Responsibilities:	Assistant Resident Engineer
Completed/Current: 2010	Contract Value: R300 000
Blue Downs Development	
Role & Responsibilities:	tes for the Blue Downs Development
	Assistant Design Engineer Contract Value: R12 million
Completed/Current: 2010	Contract value: R12 million
Shoprite, Strand	
Construction of Broadway Shop	ite Access Road, Strand
Role & Responsibilities:	Resident Engineer
Completed/Current: 2010	9
Checkers, Burgundy	
Civil Infrastructure for Checkers,	Burgundy Estate
Role & Responsibilities:	Assistant Design Engineer, Assistant Resident Engineer
Completed/Current: 2009	Contract Value: R44 million

#### CONTINUOUS PROFESSIONAL DEVELOPMENT

- Non-Motorised Transport Planning and Design (SARF, 2015)
- AutoTrack Training Level One (Point A CAD Solutions, 2012)
- Environmental Engineering (University of Stellenbosch, 2010)
- Intelligent Transport Systems (University of Stellenbosch, 2010)
- 2010 Highway Capacity Manual (University of Stellenbosch, 2010)
- Contract Administration (SAICE, 2010)
- Water Network Analysis (Water Institute of South Africa, 2010)
- Traffic Signal Design (SARF, 2007)
- Sidra & Traffix Workshop (SAICE, 2007)

Sturgeon Consulting

AnneBet Krige

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# TRAFFIC IMPACT STATEMENT FOR THE PROPOSED GROOTFONTEIN PV 1, GROOTFONTEIN PV 2 AND GROOTFONTEIN PV 3 SOLAR PHOTOVOLTAIC PLANTS AND ASSOCIATED ELECTRICAL GRID INFRASTRUCTURE

#### TANQUA KAROO, WESTERN CAPE



Project No.: STUR0304

FINAL REPORT NOVEMBER 2020

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TRANSPORT PLANNING AND TRAFFIC ENGINEERING

# DOCUMENT CONTROL SHEET

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		NAME		NAME
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SYNOPSIS:				
This report assesses the				
Grootfontein PV 2 and G	irootfontein PV 3 PV	plants and associa	ated electrical gri	id infrastructure.

# **DECLARATION OF INDEPENDANCE**

This report was compiled by Mrs Annebet Krige and Mr Barend Du Preez 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. The CV of the lead author that performed the core duties are contained in Annexure A.

Annebet Krige, Pr Eng

Barend Du Preez, Pr Eng

November 2020

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# ACRONYMS

TIS – Traffic Impact Study
WCG – Western Cape Government
RNIS – Road Network Information System
vph – Vehicles per Hour
COTO – Committee of Transport Officials
AMP – Access Management Plan
RCAM - Road Classification and Access Management Manual
LOS – Level of Service
AM – Morning
PM – Afternoon
EIA – Environmental Impact Assessment
BAR – Basic Assessment Report
PV – Photovoltaic
MW – Megawatt
REDZ – Renewable Energy Development Zone
SEF – Solar Energy Facility

## **1** INTRODUCTION

## 1.1 APPOINTMENT AND BACKGROUND

Sturgeon Consulting (Pty) Ltd was appointed by Element Consulting Engineers on behalf of Veroniva (Pty) Ltd to conduct a Traffic Impact Statement (TIS) for the proposed construction and operation of the Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 photovoltaic (PV) solar energy facilities (SEF) and the associated electrical grid infrastructure. Each of these PV energy facilities will have a generating capacity of 175MW.

The proposed development of the Grootfontein solar cluster (Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3) forms part of a larger solar energy project, which includes the Witte Wall and Hoek Doornen solar PV clusters. The Witte Wall solar cluster will include the Witte Wall PV 1 and Witte Wall PV2 solar energy facilities and the Hoek Doornen solar cluster includes the Hoek Doornen PV 1, Hoek Doornen PV 2, Hoek Doornen PV 3 and Hoek Doornen PV 4 SEFs. Each of these PV energy facilities will also have a generating capacity of 175MW. These fall within the Komsberg Renewable Energy Development Zone (REDZ) and will form part of a larger group of proposed and existing renewable energy facilities, which will connect to the ESKOM Kappa substation to the south.

## 1.2 LOCALITY

Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 will be located on Portion 5 of Farm Grootfontein 149 and the Remainder of Farm Grootfontein 149 in the Tanqua Karoo region, also known as Ceres-Karoo. These farms are located approximately 60km from the towns of Ceres to the southwest and Touws River to the south with access from Main Road 319 (MR319), also known as the R356. The Farms are located in the Witzenberg Local Municipality, within the Cape Winelands District Municipality in the Western Cape Province. Please refer to **Figure 1** below for the Locality Plan.



Figure 1: Locality Plan

## **1.3 SCOPE OF WORKS**

This TIS will investigate the transportation implications associated with the abnormal load vehicles transporting components to the site and the transportation of construction materials, equipment and workers to the site during the construction and operational phases.

This TIS strictly serves as technical input to inform the Basic Assessment Processes currently being undertaken in terms of the National Environmental Management Act (Act 107 of 1998, as amended).

#### 1.4 METHODOLODY

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

- Site visit 28 October 2020
- Literature review and internet research
- Traffic data collection (Annual Average Daily Traffic, ADTT etc. from the Road Network Information System)
- Data analysis
- Evaluation of initial proposed access configurations
- Liaison with client and/or project team
- Fine tune analysis
- Preparation of report and figures

#### 1.5 LEGISLATION WITH REGARDS TO TRAFFIC STUDIES

A TIS 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 existing transport system. The purpose of a TIS 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), TMH16 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 National Land Transport Act 5 of 2008 (NLTA) Section 38 does not set out any regulation as to what is required in a TIS. 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 (NRTA)* provides for road traffic matters to be applied uniformly throughout the Republic and for matters connected therewith.

#### 1.6 STUDY PURPOSE

The primary purpose of this report is to evaluate the expected traffic impact of the proposed Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 solar PV plants and associated electrical grid infrastructure with the main focus on access and traffic distribution during the Construction and Operational phases of the project. In other words, the objective of the TIS is to assess the impact of the activities of the proposed PV Plants on the existing external road network surrounding the development during both

phases. The report identifies the preferred access route to the site, comments on the condition of the existing roads in the vicinity of the site, identifies possible access points to the site and recommends road improvements to minimise the impact on the surrounding road network where necessary.

This TIS addresses the following traffic and transportation related implications of the proposed PV Plants:

- Locality of proposed site for the PV Plants
- Existing traffic volumes on Main Road 319 (R356)
- Acceptability from a traffic safety point of view of the location of the access route(s) to the proposed facilities
- Risk posed by construction and operational vehicles
- Based on existing volumes of traffic, recommendations for mitigations measures for traffic impacts where relevant

In terms of limitation of this TIS, it should be noted that this report does not address the internal traffic circulation for the PV Plants.

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 and *TMH16 Volume 1 & Volume 2, South African Traffic Impact and Site Assessment Manual, August 2012* published by the Committee of Transport Officials (COTO).

## 2 **PROJECT DESCRIPTION**

## 2.1 PROJECT PHASING

The project can be divided into the following three main phases:

- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

#### 2.1.1 <u>Construction Phase</u>

The construction phase for each of the proposed PV projects is expected to extend 12 to 24 months.

The main activities that will form part of the construction phase are:

- Removal of vegetation for the proposed infrastructure;
- Excavations for infrastructure and associated infrastructure;
- Establishment of a laydown area for equipment;
- Stockpiling of topsoil and cleared vegetation;
- Creation of employment opportunities and associated transport of employees to and from site;
- Transportation of material and equipment to site, and personnel to and from site; and
- Construction of the solar field, 132 kV power line and additional infrastructure.

#### 2.1.2 Operational Phase

The following activities will occur during the operational phase:

- The generation of electricity from the proposed solar facility and supply of electricity to the Kappa substation (note: the Electrical Grid Infrastructure component of the project is not expected to generate any significant traffic during operations); and
- Cleaning of panels and maintenance of the solar field and infrastructure.
- During the life span of the project (approximately 20 years), on-going cleaning and maintenance will be required on a scheduled basis.

#### 2.1.3 Decommissioning Phase

The main aim of decommissioning is to return the land to its original, pre-construction condition. Should the unlikely need for decommissioning arise (i.e. if the actual solar facility becomes outdated or the land needs to be used for other purposes), the decommissioning procedures will be undertaken and the site will be rehabilitated and returned to its pre-construction state.

## 2.2 TRANSPORTATION REQUIREMENTS

During the project cycle, it is anticipated that the following vehicles will need to access the site:

- Building materials are to be transported by single-unit trucks within the road freight limitations of South Africa.
- Solar panels, frames and inverters are to be transported in 40 foot long containers (which have exterior dimensions of 12.19m long x 2.44m wide x 2.59m high) on double axle trucks within the road freight limitations of South Africa.
- Workers from the surrounding area will be transported by taxi/bus/shuttle or private car.
- Transformers will be transported by abnormal load trucks for which a permit will need to be applied for in terms of Section 81 of the National Road Traffic Act and authorisation needs to be obtained from the relevant road authorities to modify the road reserve to accommodate turning movements at intersections.

## **3** EXISTING ROAD NETWORK

#### 3.1 POSSIBLE ROUTE ALTERNATIVES

It is anticipated that the imported components required for the solar plants will arrive at the Port of Saldanha Bay or Cape Town Harbour. From Google Maps, the distances and travelling times from the Port of Saldanha and Cape Town Harbour are very similar. This is shown in **Figure 2** and **Figure 3** below.

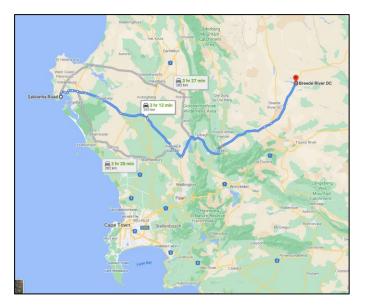


Figure 2: Possible Route Alternatives – Port of Saldanha Bay

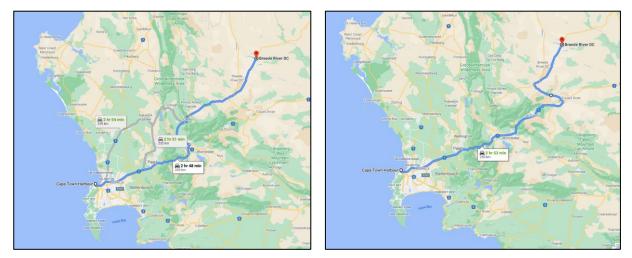


Figure 3: Possible Route Alternatives: Cape Town Harbour

## 3.2 ROAD CONDITION

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) is responsible for the maintenance of the national roads which are in a reasonable condition, however heavy traffic contribute significantly to the deterioration of the road surfaces.

According to the Western Cape Government Road Network Information System (RNIS), the paved main roads in the vicinity of the proposed PV Plants are in a fair to poor condition. Road freight, transport, specifically heavy vehicle transport, significantly contributes to the deterioration of main road surfaces

and maintenance of these roads is not always adequate. The main gravel roads are good to fair condition. This is illustrated below.



**Figure 4: Paved Road Conditions** 

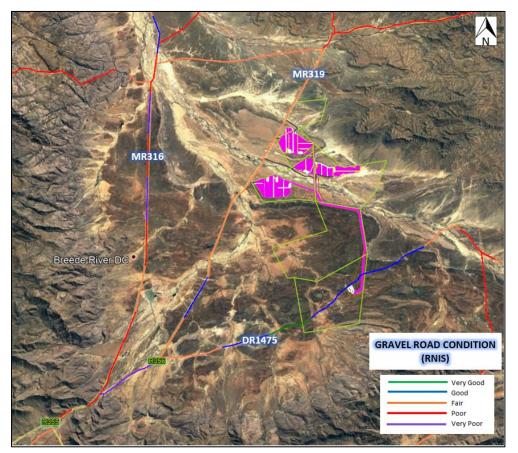


Figure 5: Gravel Road Conditions

## 3.3 EXTERNAL ACCESS ROAD

The main access road that will be directly affected by the proposed construction and operation of the solar plants is Main Road 319 (R356). MR319 is a 6.0m gravel road within a 25.0m road reserve and connects with the R355 (Main Road 316) to the south-west and traverses the Northern Cape Provincial boundary in the east to connect with the R354. The distance of gravel road from the connection with the R355 to the entrance to the Grootfontein site is approximately 37 km.



Figure 6: Main Road 319

MR319 can be classified as a Rural Class 3 Minor Arterial for which the Western Cape Government is the controlling authority. Minor Road 8013 (OP8013) intersects with MR319 at km67.73 and traverses Portion 5 of Farm Grootfontein 149. Refer to **Figure 7**.



Figure 7: External Access Road MR319

## 4 SITE ACCESS CONSIDERATIONS

## 4.1 PROPOSED ACCESS LOCATION

Two access options are proposed to gain access to the Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 solar PV plants:

- Option 1 from the existing access to Farm Grootfontein at Km 69.65 along MR319
- Option 2 from a new access at Km 72.15 along MR319

This is shown Figure 8 below.



Figure 8: Grootfontein Access Locations

## 4.1.1 Access Spacing

According to the Western Cape Government's *Access Management Guidelines, 2020*, a minimum access spacing of **820m** between public roads and/or driveways are recommended along Class 3 roads in Rural Roadside Development Environments (RDE). The access spacing measured from the proposed access road at Km 72.15 to the adjacent registered roads (according to the RNIS database) are measured as approximately 2.50km to the north-east existing access location (Grootfontein) and 1.28km to the southwest existing farm access location. Refer to **Figure 9**. The proposed access location at Km 72.15 therefore conforms to the minimum spacing requirements, should this access option be considered as the preferred option.

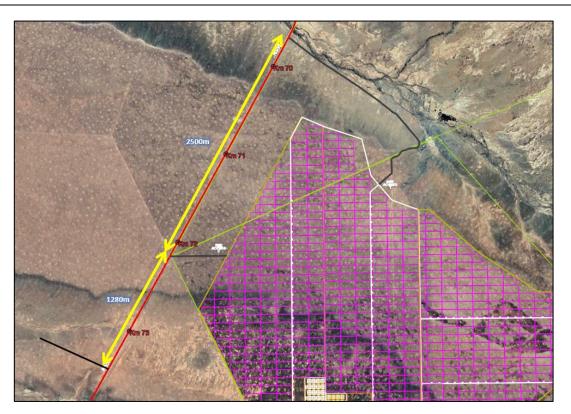


Figure 9: Access Spacing

## 4.1.2 Sight Distance

According to the TRH17 Geometric Design of Rural Roads, a shoulder sight distance of 300m is required for a Single-Unit Truck and Trailer SU+T) design vehicle for a design speed of 80 km/h. The site visit and photos taken at the proposed access location alternatives indicate that shoulder sight distance will be sufficient at both the proposed access locations. Refer to **Figure 10** and **Figure 11**.

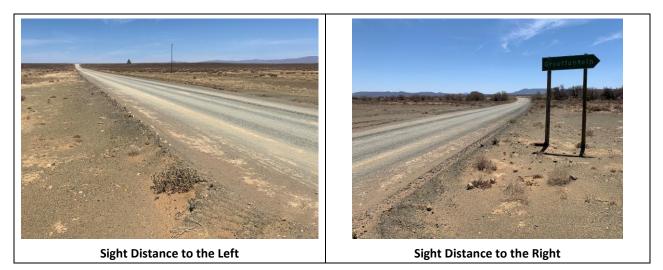


Figure 10: Sight Distance at Existing Access Option 1 at km 69.95 along MR319



Sight Distance to the Left

Sight Distance to the Right

Figure 11: Sight Distance at Proposed Access Option 2 at km 72.15 along MR319

## **5** EXISTING TRAFFIC CONDITIONS

No manual traffic counts were conducted in the vicinity of the proposed solar plants due to the low volume (<100vpd) of traffic on the directly affected roads in the area.

The Western Cape Government's (WCG) RNIS has a traffic count database for which traffic counts are conducted regularly. The Western Cape proclaimed road network is categorised into Trunk Roads, Main Roads, Divisional Roads and Minor Roads. A count station (Station 4994) is located at the MR319(R356)/OP8014 intersection (km59.74) approximately 9km north of the gravel access to Portion 5 of Farm Grootfontein 149. A count station (Station 4474) is also located at the MR319(R356)/DR1475(Matjiesfontein) intersection (km99.84) approximately 30km south of the gravel access to Portion 5 of Farm Grootfontein 149. Both these stations were counted in August 2018 which provides recent traffic information.



Figure 12: Location of Count Stations

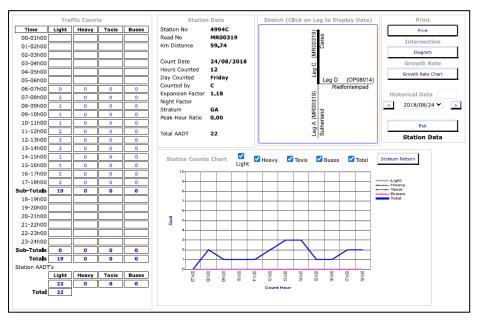


Figure 13: Station 4994 Count Information



Figure 14: Station 4474 Count Information

The Annual Average Daily Traffic (AADT) of gravel road MR319 (R356) in the vicinity of the site is extremely low with approximately 22 vehicles per day (Source: RNIS) at Station 4994 and 33 vehicles per day at Station 4474. The posted speed limit along MR319 is 80km/h. No heavy vehicles were observed along this road during the count.

## 6 TRIP GENERATION RATES

The trip generation estimates discussed below are based on similar studies that have been undertaken for SEFs and the associated electrical infrastructure (collector substation and transmission line). The trip generation rates discussed below relates to the anticipated trip generation rates associated with a 175 MW SEF.

#### 6.1 CONSTRUCTION PHASE

It is expected that the Construction Phase for each of the proposed PV Plants will extend between 12 and 24 months (more likely 24 months due to the magnitude of the proposed plants). During the construction of each 175MW PV Plant, solar panels will be transported in 40ft containers by double-axle trucks. It is expected that approximately 2500 containers will be transported (two containers per truck), which will result in 1250 double-axle truck trips. Based on a 24 month construction period (i.e. 104 weeks), and a 6 day work week (104 x 6 = 624 work days), this could result in approximately **2 daily double-axle trips**.

It is also expected that approximately 15 single unit trucks carrying construction materials will visit the site on a daily basis, resulting in **15 daily single unit truck trips**.

Furthermore, it is expected that 460 unskilled labourers and 150 skilled labourers will be transported to the site daily. Experience has shown that during the construction period, approximately **20 daily bakkie trips** are expected to come to / from the site. A vehicle occupancy of 1.5 persons/vehicle (bakkie) is assumed, which relates to 30 labourers coming to/from the site by bakkie. The remaining 580 labourers will be transported to/from the site by eighty-seater buses and taxis from the surrounding areas resulting in approximately **8 daily bus trips**.

Water will also be delivered to the site from a municipal water supply by a 12-kilolitre water truck on a daily basis during the construction phase. Water demand will be in the order of 355 000 litres per month for construction purposes and potable water. This relates to approximately 1 x 12 kilolitre water truck trip per day. This will result in **1 daily water truck trip**.

## 6.2 OPERATIONAL PHASE

It is expected that the Operational Phase will take place during the life span of the project (approximately 20 years). During this time, it is anticipated that 6 light load trucks will visit the site on a daily basis, transporting staff and equipment. This will equate to **6 daily light load truck trips**.

It is also anticipated that 1-2 small single-axle trucks will visit the site on a weekly basis. This equates to (conservative) **1** daily single axle truck trip.

It is estimated that between 5 million and 8 million litres of water will be required for cleaning the solar panels and for potable water requirements per year. This will relate to approximately 2 daily 12 kilolitre water truck trips for cleaning of the solar panels and for potable water requirements. In total, there will therefore be **2 daily water truck trips**.

#### 6.3 DECOMMISSIONING PHASE

The Decommissioning Phase will generate similar trips as the Construction Phase over a similar time period (12 to 24 months). This includes **2 daily double-axle trips** for the transportation of the solar panels, **15 daily light load trips**, for the transportation of construction materials, **8 daily bus trips** and **20 daily bakkie trips** for the workforce and **1 daily water truck trip**.

## 7 TRAFFIC IMPACT ASSESSMENT

From the trip generation information gathered in **Section 6** the following traffic impacts should be considered:

- Potential congestion and delays on the surrounding road network
- Potential impact on traffic safety and increase in accidents with other vehicles or animals
- Potential change in the quality of the surface condition of the roads
- Potential noise and dust pollution.

The number of additional daily trips per 175 MW solar photovoltaic plant and associated electrical grid infrastructure are summarised below:

#### Construction Phase – 46 Daily Trips

- 2 daily double-axle trips
- 15 daily light load trips
- 8 daily bus trips
- 20 daily bakkie trips
- 1 daily water truck trips.

#### **Operational Phase – 9 Daily Trips**

- 6 daily light load truck trips
- 1 daily single axle truck trips (conservative assumption as 1-2 small single-axle trucks will visit the site on a **weekly** basis)
- 2 daily water truck trips

#### Decommissioning Phase – 46 Daily Trips

- 2 daily double-axle trips
- 15 daily light load trips
- 8 daily bus trips
- 20 daily bakkie trips
- 1 daily water truck trips.

It is anticipated that each 175MW plant will have a 24-month construction period. In a rural environment, the peak hour trips constitute approximately 20%-40% of the daily traffic. This relates to approximately 9 to 18 additional daily peak hour trips on the road network during the construction and decommissioning phase and 2 to 4 additional daily peak hour trips on the road network during the operational phase, which will have an insignificant traffic impact on the surrounding road network.

Should construction of all three PV plants (Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3) commence at exactly the same time, the cumulative daily trips that can be anticipated are summarised below. The total cumulative daily trips relating to all the nine SEFs are discussed in **Section 9**.

#### Construction Phase – 138 Daily Trips

- 6 daily double-axle trips
- 45 daily light load trips
- 24 daily bus trips
- 60 daily bakkie trips
- 3 daily water truck trips.

#### **Operational Phase – 27 Daily Trips**

- 18 daily light load truck trips
- 3 daily single axle truck trips
- 6 daily water truck trips

#### Decommissioning Phase – 138 Daily Trips

- 6 daily double-axle trips
- 45 daily light load trips
- 24 daily bus trips
- 60 daily bakkie trips
- 3 daily water truck trips.

The above daily trip generation rates will relate to approximately 28 to 55 additional daily peak hour trips on the road network during the construction and decommissioning phase and 5 to 11 additional daily peak hour trips on the road network during the operational phase. The trips during the construction and decommissioning phases will have a traffic impact on the surrounding road network and to further limit the impact, it is proposed that these trips be scheduled outside of peak traffic periods. The trips during the operational phase will have an insignificant traffic impact during the peak hours.

The mitigation measures to address the traffic impact are listed below:

- Stagger delivery trips and schedule deliveries outside of the peak traffic periods
- Staff trips should also occur outside of the peak hours where possible
- Dust control of the gravel roads
- Regular maintenance of the gravel external access roads by the contractor during the construction period and the operator during the operational phase.
- Upgrading of the internal farm access road to suitable standards as specified by the civil engineer and regular maintenance of the access road during all phases of the project, especially during the construction and decommissioning phases.
- The route to the site should be further investigated to ensure that the abnormal loads are not obstructed at any point by geometric, height and width limitations along the route.
- The applicable permits to transport the abnormal loads should be obtained.

## 8 TRAFFIC IMPACT ASSESSMENT SUMMARY

The impacts associated with the traffic generation of the proposed Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 SEF are summarised in **Table 1** below:

Impact	Impact C	riteria	Significance and Ranking (Pre- Mitigation)	Potential mitigation measures	Significance and Ranking (Post- Mitigation)	Confidence Level
CONSTRUCTION AN	D DECOMMISION	NG PHASE				
Congestion and delays on road network	Status Spatial Extent Duration Consequence Probability Reversibility Irreplaceability	Neutral Local Medium Term Slight Likely High Replaceable	Very Low Risk / Impact (5)	Stagger delivery trips and schedule trips outside of peak hours.	Very Low (5)	High
Potential impact on traffic safety and increase in accidents with other vehicles and animals	Status Spatial Extent Duration Consequence Probability Reversibility Irreplaceability	Neutral Local Medium Term Moderate Likely High Replaceable	Low Risk / Impact (4)	Speed control by means of stop and go system and speed limit road signage.	Low (4)	High
Condition of road surface	Status Spatial Extent Duration Consequence Probability Reversibility Irreplaceability	Neutral Local Medium Term Slight Likely High Replaceable	Very Low Risk / Impact (5)	Regular maintenance of access roads by the contractor. Ensure access roads are restored to original pre- construction road condition.	Very Low (5)	High
Dust Pollution	Status Spatial Extent Duration Consequence Probability Reversibility Irreplaceability	Neutral Local Medium Term Moderate Likely High Replaceable	Low Risk / Impact (4)	Dust control of gravel roads. Speed control by means of stop and go system and speed limit road signage.	Low (4)	High
Noise Pollution	Status Spatial Extent Duration Consequence Probability Reversibility	Neutral Local Medium Term Moderate Likely High Replaceable	Low Risk / Impact (4)	Stagger delivery trips.	Low (4)	High

#### Table 1: Rating of Traffic Related Impacts

# 9 CUMULATIVE IMPACTS

The cumulative impacts of all the proposed nine SEFs in the vicinity were considered and assessed. It is however very unlikely that all nine projects will occur at the same time, as all these projects will be subject to a highly competitive bidding process and only a few projects would be allowed to enter into a power purchase agreement with Eskom at a time. Construction will most likely be staggered based on project and site-specific issues.

The biggest traffic impact associated with SEFs is during the construction phase (and similarly during the decommissioning phase). During the operational phase, the trips added to the road network is expected to be insignificant. It should be noted that all the applications for abnormal load transport are considered by the applicable authorities and they will ensure that the trips are staggered on the road network to limit possible delays.

However, for the purpose of determining the cumulative impacts, **Figure 15** and **Figure 16** below illustrates the cumulative impacts of the nine SEFs for the daily and peak periods.

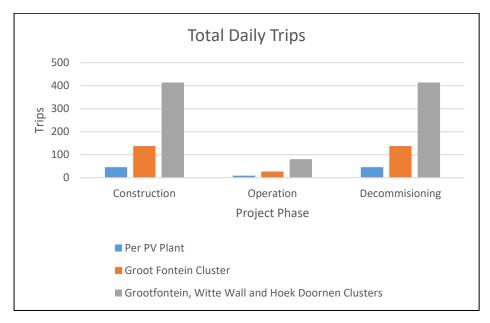


Figure 15: Total Cumulative Daily Trips

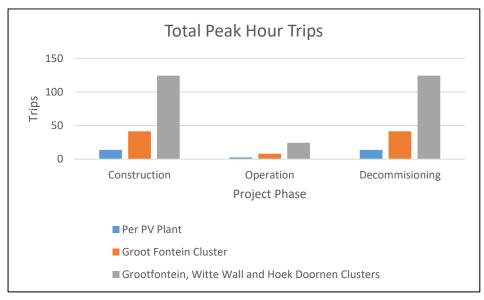


Figure 16: Total Cumulative Average Peak Hour Trips

The impacts associated with the cumulative traffic generation of the proposed Grootfontein, Witte Wall and Hoek Doornen solar clusters are summarised in **Table 2** below:

Impact	Impact C	riteria	Significance and Ranking (Pre- Mitigation)	Potential mitigation measures	Significance and Ranking (Post- Mitigation)	Confidence Level
CONSTRUCTION AN	D DECOMMISION	NG PHASE				
Congestion and	Status	Neutral	Low Risk /	Stagger delivery trips	Very Low (5)	High
Delays on road	Spatial Extent	Local	Impact	and schedule trips		
network	Duration	Medium Term	(4)	outside of peak hours.		
	Consequence	Substantial				
	Probability	Very Unlikely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Potential impact	Status	Neutral	Low Risk /	Speed control by means	Low (4)	High
on traffic safety	Spatial Extent	Local	Impact (4)	of stop and go system		
and increase in	Duration	Medium		and speed limit road		
accidents with		Term		signage.		
other vehicles and	Consequence	Moderate				
animals	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Condition of road	Status	Neutral	Low Risk /	Regular maintenance of	Very Low (5)	High
surface	Spatial Extent	Local	Impact (4)	access roads by the		
	Duration	Medium		contractor. Ensure		
		Term		access roads are		
	Consequence	Substantial		restored to original pre-		
	Probability	Very		construction road		
		Unlikely		condition.		
	Reversibility	High				
	Irreplaceability	Replaceable				
Dust Pollution	Status	Neutral	Low Risk /	Dust control of gravel	Low (4)	High
	Spatial Extent	Local	Impact (4)	roads. Speed control by		
	Duration	Medium Term		means of stop and go system and speed limit		
	Consequence	Severe		road signage.		
	Probability	Very Unlikely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Noise Pollution	Status	Neutral	Low Risk /	Stagger delivery trips.	Low (4)	High
	Spatial Extent	Local	Impact (4)			
	Duration	Medium				
		Term				
	Consequence	Severe				
	Probability	Very				
		Unlikely				
	Reversibility	High				
	Irreplaceability	Replaceable				
OPERATIONAL PHAS						

Table 2: Cumulative Rating of Traffic Related Impacts
Table 2. Cumulative Nating of Tranic Related impacts

## **10 CONCLUSIONS AND RECOMMENDATIONS**

Sturgeon Consulting (Pty) Ltd prepared this Transport Impact Study (TIS) for the proposed construction and operation of the Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 photovoltaic (PV) solar energy facilities (SEF) near Touws Rivier in the Western Cape. Each of these PV energy facilities will have a generating capacity of 175MW. This report summarises the existing transportation conditions within the site vicinity and provides an assessment of the transportation impacts of the proposed development on the surrounding transport system.

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

- The main gravel roads in the vicinity of the proposed development is in a good to fair condition
- The main surfaced roads in the vicinity of the proposed development is in a fair to poor condition
- Access to the proposed development will be taken off Main Road 319 at an existing access at Km 69.65 (Option 1) or a new proposed access at Km 72.15 (Option 2)
- Both accesses comply with the access spacing and sight distance requirements
- Existing traffic information indicates that MR319 carries very little traffic with an AADT of <50 vehicles per day</li>
- Traffic will be generated during the Construction, Operational and Decommissioning phases of the project.
- During the Construction and Decommissioning phases, 46 daily trips and 9 to 18 peak hour trips will be generated per 175MW facility.
- The following traffic impacts are related to the trips generated during the Construction and Decommissioning phases:
  - Potential congestion and delays on the surrounding road network
  - $\circ$   $\,$  Potential impact on traffic safety and increase in accidents with other vehicles or animals
  - Potential change in the quality of the surface condition of the roads
  - Potential noise and dust pollution.
- Traffic generated during the Operational phase will have an insignificant traffic impact on the surrounding road network

The mitigation measures to address the traffic impact are recommended:

- Stagger delivery trips and schedule deliveries outside of the peak traffic periods
- Staff trips should also occur outside of the peak hours where possible
- Dust control of the gravel roads
- Speed limits and stop and go facilities to be implemented to ensure reduced speeds along the roads
- Regular maintenance of the gravel external access roads by the contractor during the construction period and the operator during the operational phase.
- Upgrading of the internal farm access road to suitable standards as specified by the civil engineer and regular maintenance of the access road during all phases of the project, especially during the construction and decommissioning phases.
- The route to the site should be further investigated to ensure that the abnormal loads are not obstructed at any point by geometric, height and width limitations along the route.
- The applicable permits to transport the abnormal loads should be obtained.

No other remedial or mitigation measures will be required to accommodate the additional traffic generated by the proposed SEFs.

Provided that the above recommendations are adhered to, the proposed development of the Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 SEFs can be supported from a traffic engineering perspective.

## REFERENCES

- 1. Western Cape Government: Access Management Guidelines 2020 (AGM 2020), Second Edition 2020.
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- 3. Department of Transport, South African Trip Generation Rates, Report No. RR92/228, Pretoria, 1995.
- 4. Committee of Transport Officials (COTO), South African Trip Data Manual, Draft 2.1, June 2020.
- 5. Committee of Transport Officials (COTO), South African Traffic Impact and Site Traffic Assessment Manual Standards and Requirements Manual, Volume 2 TMH 16, September 2012.
- 6. Committee of Transport Officials (COTO), South African Traffic Impact and Site Traffic Assessment Manual, Volume 1 TMH 16, September 2012.
- 7. SANRAL Geometric Design Guide
- 8. Department of Transport, TRH17, Geometric Design of Rural Roads, 1988

# APPENDIX A: CV OF ANNEBET KRIGE



t: 021 553 4167 f: 086 559 5327

	CURRICULUM VITAE ANNEBET KRIGE (Pr Eng) TRAFFIC ENGINEER
Date and place of birth: Tertiary qualification:	20 November 1984, Pretoria B Eng (Civil), University of Stellenbosch, 2006
Professional Membership:	M Eng (Transportation), University of Stellenbosch, 2010 Engineering Council of South Africa (ECSA): Professional Engineer (Reg. No. 20150161)
Voluntary Associations	South African Institution of Civil Engineering (SAICE): Member (Member No. 206324)

#### INTRODUCTION

AnneBet Krige is registered as a Professional Civil Engineer with the Engineering Council of South Africa (ECSA). Over the past 12 years, she has gained extensive knowledge in the Civil Engineering field and currently works as a Traffic Engineer for Sturgeon Consulting. She obtained her Masters' Degree in Transportation Engineering from the University of Stellenbosch in 2010 and specialises in this field.

#### Expertise & Specialised Skills:

AnneBet has gained extensive experience in the following fields:

- Traffic Studies and Transportation Planning (Statements, Assessments, Parking Studies);
- Design of Non-Motorised Transport Facilities;
- Design and Upgrading of Traffic Signals;
- Traffic Accommodation Plans;
- Design of Civil Engineering Infrastructure for various developments (Water, Sewerage, Stormwater, Roads);
- Rehabilitation and Reseal of existing National and Provincial Roads;
- Construction of new Roads;
- Tender Documentation.
- Contract Administration

#### SUMMARY OF EMPLOYMENT

2018 – Present	Associate, Sturgeon Consulting
2011 - 2018	Traffic Engineer, Element Consulting Engineers
2006 - 2011	Engineer in Training, EFG Engineers

Sturgeon Consulting

AnneBet Krige

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t: 021 553 4167 f: 086 559 5327

Oshakati	Element Namibio
	e proposed Oshakati Mall Development
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Study Value: R48 900
Bergriver Housing Tender	Bergriver Housing Developments
	proposed Bergriver Housing Developments
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Study Value: R217 500
Van Kervel Special School	Uhambiso Consu
Traffic Impact Assessment for the	Upgrading and Extension of the Van Kervel Special School, George
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Study Value: R33 220
	City of Cores Town
Monwabisi Park	City of Cape Tow
	Monwabisi Park Informal Settlement
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Study Value: R180 550
Loop Street Signs	Wide Open Platforn
Traffic Opinion for the proposed	LED Screen for 97 and 220 Loop Street, Cape Town
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2019	Study Value: R42 900
Sunningdale Saint Square	Camalus Developments (Pty) Ltd Proposed Apartments on Erf 38099, Sunningdale
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2019	Study Value: R27 900
Completed/Current: 2019	Study Value: R27 900
Completed/Current: 2019 Mamre Service Station	Study Value: R27 900
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Abbotsdale	CK Rumboll and Partn
	Industrial Development on Portion A of Erf 373, Abbotsdale
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2019	Study Value: R60 100
Creationtain Taumkuus Eassibili	by Study
Grootfontein – Tsumkwe Feasibili	ty Study Pregon Consulting Engineer to Bitumen Standard of M0074: Grootfontein - Tsumkwe
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Study Value: R163 600
completed/content. Content	310dy Value. K163 800
Eros Traffic Study, Windhoek	Element Namibi
Traffic Impact Study for the densi	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2019	Study Value: R37 900
Pagel East Housing Dovelopment	Aureco
Paarl East Housing Development	lopment of 650 housing opportunities
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2018	Study Value: R61 750
completed/content: 2016	Siday Yalue. Kol / Su
Bella Riva Lifestyle Development	
	a Lifestyle Development (5875 unit)
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Study Value: R172 000
Mahama Infill Housing Developm	
Traffic Impact Study for the Maha	
Role & Responsibilities: Completed/Current: 2018	Traffic Engineer Study Value: R157 500
Blueberry Hill Housing Developme Traffic Impact Study for the deve Role & Responsibilities:	ent Nadeson Consultin lopment of 3500 housing opportunities Traffic Engineer
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Traffic Impact Study for the deve Role & Responsibilities: Completed/Current: 2019 Design of Jip de Jager Road Traffic Impact Study for the Desig Role & Responsibilities: Completed/Current: 2018 Brentwood Park Traffic Impact Study for the Brent Role & Responsibilities: Completed/Current: 2017 Curro Windhoek Traffic Impact Study for Curro Win Role & Responsibilities: Completed/Current: 2017 Schaapkraal Traffic Impact Study for the Scha Role & Responsibilities: Completed/Current: 2017 Schaapkraal Traffic Impact Study for the Scha Role & Responsibilities: Completed/Current: 2017 Trefic Impact Study for the Scha	Iopment of 3500 housing opportunities Traffic Engineer Study Value: R182 000 gn of Jip de Jager Road Traffic Engineer Study Value: R175 000 wood Park GAP Housing Development Traffic Engineer Study Value: R75 000 Andhoek Traffic Engineer Study Value: R75 000 Andhoek Traffic Engineer Study Value: R75 000

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Sleeper Site, East London		
	net of the Sleeper Site, East London	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2017	Study Value: R255 000	
	· · ·	
Vorcester Traffic Study raffic Study at Pre-Determined i	ntersections in Worcester	
ole & Responsibilities:	Traffic Engineer	
completed/Current: 2017	Project Value: R537 000	
•	· · · · · · · · · · · · · · · · · · ·	
V Farm Hanover	Proposed Solar PV Farm, Hanover	
ole & Responsibilities:	Traffic Engineer	
completed/Current: 2017	Study Value: R38 500	
ompleted/content. 2017	3100y Value. Koo 500	
Velgedaan Residential Developr		
	gedaan Residential Development, Saldanha	
ole & Responsibilities:	Traffic Engineer	
Completed/Current: 2017	Study Value: R49 000	
Aalmesbury Sand Mine		Tip Trans Logis
raffic Impact Statement for a Sc	and Mine, Malmesbury	
ole & Responsibilities:	Traffic Engineer	
Completed/Current: 2017	Study Value: R24 500	
lichards Bay Traffic Signals		City of uMhlathu
	ant to conduct a study to warrant the installat	ion of Traffic Signals
ole & Responsibilities:	Traffic Engineer	
Completed/Current: 2017	Study Value: R 167 500	
itrand Storage Facilities		Asla Dev
	osed Storage and Office Facilities in Strand	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2017	Study Value: R33 500	
Dube Tradeport		Dube Tradep
raffic Impact Study for Dube Tro		
Role & Responsibilities:	Traffic Engineer	
Completed/Current: Current	Study Value: R80 000	
aguna Mall		Milprops
raffic Impact Study for Laguna I	Mall, Langebaan	
	Traffic Engineer	
lole & Responsibilities:		
	Study Value: R28 000	
Completed/Current: Current	Study Value: R28 000	Welby-Solomon & Associa
Role & Responsibilities: Completed/Current: Current Curfhall Primary School	Study Value: R28 000 Orrie, N	Welby-Solomon & Associa
Completed/Current: Current urfhall Primary School raffic Impact Study for Turfhall P	Study Value: R28 000 Orrie, N Primary School	Welby-Solomon & Associa
Completed/Current: Current urfhall Primary School raffic Impact Study for Turfhall P Role & Responsibilities:	Study Value: R28 000 Orrie, N Primary School Traffic Engineer	Welby-Solomon & Associa
Completed/Current: Current urfhall Primary School raffic Impact Study for Turfhall P cole & Responsibilities:	Study Value: R28 000 Orrie, N Primary School	Welby-Solomon & Associa
Completed/Current: Current urfhall Primary School raffic Impact Study for Turfhall P tole & Responsibilities: Completed/Current: 2016 Curro Uitzicht	Study Value: R28 000 Orrie, N Primary School Traffic Engineer Study Value: R38 000	
Completed/Current: Current urfhall Primary School raffic Impact Study for Turfhall P cole & Responsibilities: Completed/Current: 2016 Curro Uitzicht raffic Impact Study for the deve	Study Value: R28 000 Orrie, N Primary School Traffic Engineer Study Value: R38 000 elopment of a Curro Castle in Uitzicht	
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Completed/Current: Current urfhall Primary School raffic Impact Study for Turfhall P cole & Responsibilities: Completed/Current: 2016 Curro Uitzicht raffic Impact Study for the deve cole & Responsibilities:	Study Value: R28 000 Orrie, N Primary School Traffic Engineer Study Value: R38 000 elopment of a Curro Castle in Uitzicht	
Completed/Current: Current urfhall Primary School raffic Impact Study for Turfhall P Role & Responsibilities: Completed/Current: 2016 Curro Uitzicht raffic Impact Study for the deve Role & Responsibilities: Completed/Current: 2016	Study Value: R28 000         Orrie, N         Primary School         Traffic Engineer         Study Value: R38 000         elopment of a Curro Castle in Uitzicht         Traffic Engineer         Study Value: R35 000	Curro Holdir
Completed/Current: Current urfhall Primary School raffic Impact Study for Turfhall P tole & Responsibilities: Completed/Current: 2016 Curro Uitzicht raffic Impact Study for the deve tole & Responsibilities: Completed/Current: 2016 Morgen's Village	Study Value: R28 000 Orrie, N Primary School Traffic Engineer Study Value: R38 000 elopment of a Curro Castle in Uitzicht Traffic Engineer Study Value: R35 000 Caj	Curro Holdir pe Town Community Housi
Completed/Current: Current urfhall Primary School raffic Impact Study for Turfhall P Role & Responsibilities: Completed/Current: 2016 Curro Uitzicht raffic Impact Study for the deve Role & Responsibilities: Completed/Current: 2016 Morgen's Village raffic Impact Study for the deve	Study Value: R28 000         Orrie, N         Primary School         Traffic Engineer         Study Value: R38 000         elopment of a Curro Castle in Uitzicht         Traffic Engineer         Study Value: R35 000         Caj         elopment of 650 residential units on Erf 2435, Mit	Welby-Solomon & Associa Curro Holdir pe Town Community Housi itchells Plain
Completed/Current: Current urfhall Primary School raffic Impact Study for Turfhall P Role & Responsibilities: Completed/Current: 2016 Curro Uitzicht raffic Impact Study for the deve Role & Responsibilities: Completed/Current: 2016 Morgen's Village	Study Value: R28 000 Orrie, N Primary School Traffic Engineer Study Value: R38 000 elopment of a Curro Castle in Uitzicht Traffic Engineer Study Value: R35 000 Caj	Curro Holdir pe Town Community Housi

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Curro Burgundy	alan mant of a Course Coulds in Duranus du Estate	Curro Holding
	elopment of a Curro Castle in Burgundy Estate	
Role & Responsibilities:		
Completed/Current: 2016	Study Value: R48 000	
Paarl Development		Baobab Propertie
	elopment of Farm 851 Portion 9, Paarl	Puebab riepenie
Role & Responsibilities:		
Completed/Current: 2016	Study Value: R48 000	
•		
Erf 68, Kylemore		Jomar Service
	Development of Erf 68, Kylemore	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2015	Study Value: R30 000	
Curro Benoni		Curro Holding
	elopment of a Curro Academy on Erf 7940, Benoni	Conto Holding
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2015	Study Value: R65 000	
Curro Constantia		Curro Holding
Traffic Impact Study for the devi	elopment of a Curro Castle in Constantia	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2015	Study Value: R30 000	
Hout Bay International School, H Parking Study for the Hout Bay Ir		Bay International Schoo
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2014	Study Value: R55 000	
District 6, Cape Town	Department of Rural Develo	pment and Land Reforn
Traffic Impact Study for District &		•
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2013	Contract Value: Unknown	
PPC Mine Vanrhunsdorn		CK Rumboll & Partner
PPC Mine, Vanrhynsdorp		
Traffic Impact Statement for the	Access to the Proposed PPC Mine, Vanrhynsdorp	
Traffic Impact Statement for the Role & Responsibilities:	Traffic Engineer	
Traffic Impact Statement for the		
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013	Traffic Engineer	Saldanha Bay ID
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay	Traffic Engineer Contract Value: Unknown	Saldanha Bay ID
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay Traffic Impact Study for the Sald	Traffic Engineer Contract Value: Unknown Ianha Bay IDZ Development	Saldanha Bay ID
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay Traffic Impact Study for the Sald Role & Responsibilities:	Traffic Engineer Contract Value: Unknown Ianha Bay IDZ Development Traffic Engineer	Saldanha Bay IDi
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay Traffic Impact Study for the Sald	Traffic Engineer Contract Value: Unknown Ianha Bay IDZ Development	Saldanha Bay IDi
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay Traffic Impact Study for the Sald Role & Responsibilities:	Traffic Engineer Contract Value: Unknown Ianha Bay IDZ Development Traffic Engineer	Saldanha Bay ID Owne
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay Traffic Impact Study for the Sald Role & Responsibilities: Completed/Current: 2012	Traffic Engineer Contract Value: Unknown Ianha Bay IDZ Development Traffic Engineer Contract Value: R500 million	
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay Traffic Impact Study for the Sald Role & Responsibilities: Completed/Current: 2012 Sawmill, Wemmershoek	Traffic Engineer Contract Value: Unknown Ianha Bay IDZ Development Traffic Engineer Contract Value: R500 million	
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay Traffic Impact Study for the Sald Role & Responsibilities: Completed/Current: 2012 Sawmill, Wemmershoek Traffic Impact Study for the Wen	Traffic Engineer Contract Value: Unknown Ianha Bay IDZ Development Traffic Engineer Contract Value: R500 million	
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay Traffic Impact Study for the Sald Role & Responsibilities: Completed/Current: 2012 Sawmill, Wemmershoek Traffic Impact Study for the Wen Role & Responsibilities: Completed/Current: 2012	Traffic Engineer Contract Value: Unknown Ianha Bay IDZ Development Traffic Engineer Contract Value: R500 million Inmershoek Sawmill Traffic Engineer	Owne
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay Traffic Impact Study for the Sald Role & Responsibilities: Completed/Current: 2012 Sawmill, Wenmershoek Traffic Impact Study for the Wen Role & Responsibilities: Completed/Current: 2012 Sandown Centre, Parklands	Traffic Engineer         Contract Value: Unknown         Ianha Bay IDZ Development         Traffic Engineer         Contract Value: R500 million         Inmershoek Sawmill         Traffic Engineer         Contract Value: Unknown	Owne
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay Traffic Impact Study for the Sald Role & Responsibilities: Completed/Current: 2012 Sawmill, Wemmershoek Traffic Impact Study for the Wen Role & Responsibilities: Completed/Current: 2012	Traffic Engineer         Contract Value: Unknown         Ianha Bay IDZ Development         Traffic Engineer         Contract Value: R500 million         Inmershoek Sawmill         Traffic Engineer         Contract Value: Unknown	

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Pick n Pay, Brackenfell		Pick & Pay Brackenfell
Parking and Circulation Study for	or Pick n Pay, Brackenfell	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2011	Contract Value: Unknown	
Hoek van de Berg, Hawston		
Traffic Impact Study for the Dev	elopment of an Eco-Estate on Farm Hoek v	an de Berg, Hawston
Role & Responsibilities:	Assistant Traffic Engineer	
Completed/Current: 2011	Study Value: R125 000	
Tygervalley Extensions, Bellville		
Traffic Impact Study for the Tyge	ervalley Extensions, Bellville	
Role & Responsibilities:	Assistant Traffic Engineer	
Completed/Current: 2009	Study Value: R165 000	
Upgrading of MR168, Stellenbos	ch Provinc	ial Administration: Western Cape
Traffic Impact Study for the upg	rading of MR168	
Role & Responsibilities:	Assistant Traffic Engineer	
Completed/Current: 2009	Contract Value: R360 million	
Blue Downs Development		MSP Developments
Traffic Impact Study for the Blue	e Downs Development	
Role & Responsibilities:	Assistant Traffic Engineer	
Completed/Current: 2009	Contract Value: R12 million	
Buhrein, Kraaifontein		MSP Developments
Traffic Impact Study for the Buh	rein Development	
Role & Responsibilities:	Assistant Traffic Engineer	

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Brackengate Industrial Developr	nent Redefine Properties / VDVM
	Signals along Cilmor Road, Stikland
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Contract Value: R 2 000 000
Medway Road Upgrade, Richard	s Bay Richards Bay IDi
Upgrading of Traffic Signals at th	e John Ross Highway / Medway Road intersection, Richards Bay
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Contract Value: R500 000
Cape Town CBD	City of Cape Town: TCI
Upgrading of Traffic Signal Layo	uts in Cape Town
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Contract Value: Unknown
Erf 16161, Paarl	Asic
Design and Installation of Traffic	Signals for Erf 16161, Paarl
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2013	Contract Value: Unknown
Buhrein, Kraaifontein	
Design and Installation of Traffic	Signals for Buhrein, Kraaifontein
Role & Responsibilities:	Assistant Traffic Engineer
Completed/Current: 2011	Contract Value: R700 000
Shoprite, Mossel Bay	
Design and Installation of Traffic	Signals for Shoprite, Kwanongaba, Mossel Bay
Role & Responsibilities:	Assistant Traffic Engineer
Completed/Current: 2011	Contract Value: R600 000
Shoprite DC, Brackenfell	
Design and Installation of Traffic	Signals for Shoprite DC, Brackenfell
Role & Responsibilities:	Assistant Traffic Engineer
Completed/Current: 2010	Contract Value: R800 000

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Road Safety Audit		Namibia Roads Authority
Road Safety Audit for T0602: Gob	abis to Buitepos	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: Current	Contract Value:	
Non-Motorised Transport, City of	Cape Town	City of Cape Towr
Implementation of the Non-Moto	rised Transport programme to the	City of Cape Town
Role & Responsibilities:	Traffic Engineer	
Completed/Current: Current	Contract Value: R50m	
Westbury Pedestrian Bridge, Johc	nnesburg	Johannesburg Development Agency
Traffic Accommodation Plan for t	he construction of the Westbury P	edestrian Bridge, Johannesburg
Role & Responsibilities:	Traffic Engineer	
Completed/Current: Current	Contract Value: Unknown	
Erven 13259 and 13585, Brackenf	ell	Group 5 Property Developmen
Traffic Accommodation Plan for	he development of Erven 13259 a	nd 13585, Brackenfell
Role & Responsibilities:	Traffic Engineer	
Completed/Current: Current	Contract Value: R550 000	
Lakeview and Klipspruit BRT Statio	ons, Soweto	Johannesburg Roads Authority
Non-motorised Transport for Lake	view and Klipspruit BRT Stations, So	oweto
Role & Responsibilities:	Traffic Engineer / Design Eng	ineer
Completed/Current: Current	Contract Value: R35 million	
Traffic Calming, Stellenbosch		Stellenbosch Municipality
Stellenbosch Traffic Calming Plar	ning	
Role & Responsibilities:	Assistant Traffic Engineer	
Completed/Current: 2013	Contract Value: Unknown	
Traffic Accommodation, Cape To	wn	Group
Traffic Accommodation plan for	he upgrading of intersections in C	Cape Town CBD
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2013	Contract Value: Unknown	

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Upgrading of Medway Road, Rich	ards Bay
Upgrading of Medway Road	
Role & Responsibilities:	Assistant Engineer
Completed/Current: Current	Contract Value: R50 million
Trunk Road 32 between N2 and H	erbertsdale Provincial Government Western Cape
	ection of Main Road 342 between km 7.72 and Herbertsdale
Role & Responsibilities:	Assistant Engineer
Completed/Current: Current	Contract Value: Unknown
National Route 7, Garies	SANRAL
	ute 7 Section 7 between Garies and km 60
Role & Responsibilities:	Assistant Engineer
	Contract Value: R101.4 million
Completed/Current: Current	Contract Value: RT01.4 million
National Route 7, Okiep	SANRAL
Repair and Reseal of National Ro	ute 7 Section 7 to 8 between km 60 and Okiep
Role & Responsibilities:	Assistant Engineer
Completed/Current: Current	Contract Value: R95.5 million
	1/1/DAOS) and K111 Muldorsdrift
	1/1(D405) and K111, Muldersdrift 249/1 P39/1 P241/1/D405) and K111 Muldersdrift
Rehabilitation of Roads P122/1, P	249/1, P39/1, P241/1(D405) and K111, Muldersdrift
Rehabilitation of Roads P122/1, P Role & Responsibilities:	249/1, P39/1, P241/1(D405) and K111, Muldersdrift Assistant Engineer
Rehabilitation of Roads P122/1, P	249/1, P39/1, P241/1(D405) and K111, Muldersdrift Assistant Engineer
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton a	249/1, P39/1, P241/1(D405) and K111, Muldersdrift Assistant Engineer Contract Value: Unknown Md Swellendam Provincial Government Western Cape
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton a	249/1, P39/1, P241/1(D405) and K111, Muldersdrift Assistant Engineer Contract Value: Unknown
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton a The Reseal of Trunk Road 32 Secti Road 1329	249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Ind Swellendam         Provincial Government Western Cape         ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton a The Reseal of Trunk Road 32 Secti	249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Md Swellendam       Provincial Government Western Cape         ion 1 between Ashton and Swellendam, Main Road 283 and Divisional
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton an The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014	249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Ind Swellendam       Provincial Government Western Cape         Ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton an The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014	249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Ind Swellendam       Provincial Government Western Cape         Ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton a The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014 National Route 14 Section 1 betw	249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Assistant Engineer         Ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million         SANRAL
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton a The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014 National Route 14 Section 1 betw Pofadder	249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Assistant Engineer         Ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million         SANRAL
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton an The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014 National Route 14 Section 1 betw Pofadder Repair and reseal N14 between V Role & Responsibilities:	249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Assistant Engineer         Ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million         SANRAL         Witputs and Pofadder
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton an The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014 National Route 14 Section 1 betw Pofadder Repair and reseal N14 between V Role & Responsibilities: Completed/Current: 2013	249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Assistant Engineer         Ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million         SANRAL         Vitputs and Pofadder         Assistant Engineer         Contract Value: R70.3 million
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t: 021 553 4167 f: 086 559 5327

Sitari, Somerset West		
Civil Engineering Services for Sita	ri Fields, Somerset West	
Role & Responsibilities:	Assistant Resident Engineer	
Completed/Current: Current	Contract Value: R350m	
Van der Stel, Stellenbosch		
Upgrading of the Van der Stel Sp		
Role & Responsibilities:	Resident Engineer	
Completed/Current: 2012	Contract Value: R700 000	
CSP Plant, Upington		
Access to the proposed CSP Plan	t	
Role & Responsibilities:	Design Engineer	
Completed/Current: 2012	Contract Value: Unknown	
Droogfontein, Kimberley		
Upgrading of the existing access	to the proposed PV Farm, Droogfontein, Kimberley	
Role & Responsibilities:	Design Engineer	
Completed/Current: 2012	Contract Value: Unknown	
Robben Island		
Repair & Maintenance of Water of	and Sewerage works on Robben Island	
Role & Responsibilities:	Assistant Resident Engineer	
Completed/Current: 2011	Contract Value: R12 million	
KFC Observatory		
Civil Engineering Services for KFC	, Observatory	
Role & Responsibilities:	Assistant Resident Engineer	
Completed/Current: 2010	Contract Value: R300 000	
Blue Downs Development		
Upgrading of Roads and Accesse	es for the Blue Downs Development	
Role & Responsibilities:	Assistant Design Engineer	
Completed/Current: 2010	Contract Value: R12 million	
Shoprite, Strand		
Construction of Broadway Shopri	te Access Road, Strand	
Role & Responsibilities:	Resident Engineer	
Completed/Current: 2010	Contract Value: R950 000	
Checkers, Burgundy		
Civil Infrastructure for Checkers, E		
Role & Responsibilities:	Assistant Design Engineer, Assistant Resident Engineer	
Completed/Current: 2009	Contract Value: R44 million	

#### CONTINUOUS PROFESSIONAL DEVELOPMENT

- Non-Motorised Transport Planning and Design (SARF, 2015)
- AutoTrack Training Level One (Point A CAD Solutions, 2012)
- Environmental Engineering (University of Stellenbosch, 2010)
- Intelligent Transport Systems (University of Stellenbosch, 2010)
- 2010 Highway Capacity Manual (University of Stellenbosch, 2010)
- Contract Administration (SAICE, 2010)
- Water Network Analysis (Water Institute of South Africa, 2010)
- Traffic Signal Design (SARF, 2007)
- Sidra & Traffix Workshop (SAICE, 2007)

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# TRAFFIC IMPACT STATEMENT FOR THE PROPOSED HOEK DOORNEN PV 1, HOEK DOORNEN PV 2, HOEK DOORNEN PV 3, AND HOEK DOORNEN PV 4 SOLAR PHOTOVOLTAIC PLANTS AND ASSOCIATED ELECTRICAL GRID INFRASTRUCTURE

TANQUA KAROO, WESTERN CAPE



Project No.: STUR0304

FINAL REPORT NOVEMBER 2020

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TRANSPORT PLANNING AND TRAFFIC ENGINEERING

# DOCUMENT CONTROL SHEET

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SYNOPSIS:					
This report assesses th	e key transportatio	n issues pertainir	ng to the propo	sed Hoek Doornen PV 1, Hoek	

Doornen PV 2, Hoek Doornen PV 3 and Hoek Doornen PV 4 PV plants and associated electrical grid infrastructure.

# **DECLARATION OF INDEPENDANCE**

This report was compiled by Mrs Annebet Krige and Mr Barend Du Preez 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. The CV of the lead author that performed the core duties are contained in Annexure A.

Annebet Krige, Pr Eng

Barend Du Preez, Pr Eng

November 2020

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# ACRONYMS

TIS – Traffic Impact Study
WCG – Western Cape Government
RNIS – Road Network Information System
vph – Vehicles per Hour
COTO – Committee of Transport Officials
AMP – Access Management Plan
RCAM - Road Classification and Access Management Manual
LOS – Level of Service
AM – Morning
PM – Afternoon
EIA – Environmental Impact Assessment
BAR – Basic Assessment Report
PV – Photovoltaic
MW – Megawatt
REDZ – Renewable Energy Development Zone
SEF – Solar Energy Facility

# **1** INTRODUCTION

#### 1.1 APPOINTMENT AND BACKGROUND

Sturgeon Consulting (Pty) Ltd was appointed by Element Consulting Engineers on behalf of Veroniva (Pty) Ltd to conduct a Traffic Impact Statement (TIS) for the proposed construction and operation of the Hoek Doornen PV 1, Hoek Doornen PV 2, Hoek Doornen PV 3, and Hoek Doornen PV 4 photovoltaic (PV) solar energy facilities (SEF) and the associated electrical grid infrastructure. Each of these PV energy facilities will have a generating capacity of 175MW.

The proposed development of the Hoek Doornen solar cluster (Hoek Doornen PV 1, Hoek Doornen PV2, Hoek Doornen PV3 and Hoek Doornen PV4) forms part of a larger solar energy project, which includes the Grootfontein and Witte Wall solar PV clusters. The Grootfontein solar cluster includes the Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 SEFs and the Witte Wall solar cluster includes the Witte Wall PV 1 and Witte Wall PV 2 SEFs. Each of these PV energy facilities will also have a generating capacity of 175MW. These fall within the Komsberg Renewable Energy Development Zone (REDZ) and will form part of a larger group of proposed and existing renewable energy facilities, which will connect to the ESKOM Kappa substation to the south.

### 1.2 LOCALITY

Hoek Doornen PV 1, Hoek Doornen PV 2, Hoek Doornen PV 3, and Hoek Doornen PV 4 will be located on Portion 1 of Farm 172 Hoek Doornen in the Tanqua Karoo region, also known as Ceres-Karoo. This farm is located approximately 60km from the towns of Ceres to the southwest and Touws River to the south with access from Main Road 319 (MR319), also known as the R356. The farm is located in the Witzenberg Local Municipality, within the Cape Winelands District Municipality in the Western Cape Province. Please refer to **Figure 1** below for the Locality Plan.



Figure 1: Locality Plan

#### **1.3 SCOPE OF WORKS**

This TIS will investigate the transportation implications associated with the abnormal load vehicles transporting components to the site and the transportation of construction materials, equipment and workers to the site during the construction and operational phases.

This TIS strictly serves as technical input to inform the Basic Assessment Processes currently being undertaken in terms of the National Environmental Management Act (Act 107 of 1998, as amended).

#### 1.4 METHODOLODY

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

- Site visit 28 October 2020
- Literature review and internet research
- Traffic data collection (Annual Average Daily Traffic, ADTT etc. from the Road Network Information System)
- Data analysis
- Evaluation of initial proposed access configurations
- Liaison with client and/or project team
- Fine tune analysis
- Preparation of report and figures

#### 1.5 LEGISLATION WITH REGARDS TO TRAFFIC STUDIES

A TIS 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 existing transport system. The purpose of a TIS 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), TMH16 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 National Land Transport Act 5 of 2008 (NLTA) Section 38 does not set out any regulation as to what is required in a TIS. 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 (NRTA)* provides for road traffic matters to be applied uniformly throughout the Republic and for matters connected therewith.

#### 1.6 STUDY PURPOSE

The primary purpose of this report is to evaluate the expected traffic impact of the proposed Hoek Doornen PV 1, Hoek Doornen PV 2, Hoek Doornen PV 3, and Hoek Doornen PV 4 solar PV plants and the associated electrical grid infrastructure with the main focus on access and traffic distribution during the Construction and Operational phases of the project. In other words, the objective of the TIS is to assess the impact of the activities of the proposed PV Plants on the existing external road network surrounding

the development during both phases. The report identifies the preferred access route to the site, comments on the condition of the existing roads in the vicinity of the site, identifies possible access points to the site and recommends road improvements to minimise the impact on the surrounding road network where necessary.

This TIS addresses the following traffic and transportation related implications of the proposed PV Plants:

- Locality of proposed site for the PV Plants
- Existing traffic volumes on Main Road 319 (R356)
- Acceptability from a traffic safety point of view of the location of the access route(s) to the proposed facilities
- Risk posed by construction and operational vehicles
- Based on existing volumes of traffic, recommendations for mitigations measures for traffic impacts where relevant

In terms of limitation of this TIS, it should be noted that this report does not address the internal traffic circulation for the PV Plants.

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 and *TMH16 Volume 1 & Volume 2, South African Traffic Impact and Site Assessment Manual, August 2012* published by the Committee of Transport Officials (COTO).

# 2 **PROJECT DESCRIPTION**

#### 2.1 PROJECT PHASING

The project can be divided into the following three main phases:

- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

#### 2.1.1 Construction Phase

The construction phase for each of the proposed PV projects is expected to extend 12 to 24 months.

The main activities that will form part of the construction phase are:

- Removal of vegetation for the proposed infrastructure;
- Excavations for infrastructure and associated infrastructure;
- Establishment of a laydown area for equipment;
- Stockpiling of topsoil and cleared vegetation;
- Creation of employment opportunities and associated transport of employees to and from site;
- Transportation of material and equipment to site, and personnel to and from site; and
- Construction of the solar field, 132 kV power line and additional infrastructure.

#### 2.1.2 Operational Phase

The following activities will occur during the operational phase:

- The generation of electricity from the proposed solar facility and supply of electricity to the Kappa substation (note: the Electrical Grid Infrastructure component of the project is not expected to generate any significant traffic during operations); and
- Cleaning of panels and maintenance of the solar field and infrastructure.
- During the life span of the project (approximately 20 years), on-going cleaning and maintenance will be required on a scheduled basis.

#### 2.1.3 Decommissioning Phase

The main aim of decommissioning is to return the land to its original, pre-construction condition. Should the unlikely need for decommissioning arise (i.e. if the actual solar facility becomes outdated or the land needs to be used for other purposes), the decommissioning procedures will be undertaken and the site will be rehabilitated and returned to its pre-construction state.

#### 2.2 TRANSPORTATION REQUIREMENTS

During the project cycle, it is anticipated that the following vehicles will need to access the site:

- Building materials are to be transported by single-unit trucks within the road freight limitations of South Africa.
- Solar panels, frames and inverters are to be transported in 40 foot long containers (which have exterior dimensions of 12.19m long x 2.44m wide x 2.59m high) on double axle trucks within the road freight limitations of South Africa.
- Workers from the surrounding area will be transported by taxi/bus/shuttle or private car.
- Transformers will be transported by abnormal load trucks for which a permit will need to be applied for in terms of Section 81 of the National Road Traffic Act and authorisation needs to be obtained from the relevant road authorities to modify the road reserve to accommodate turning movements at intersections.

## **3** EXISTING ROAD NETWORK

#### 3.1 POSSIBLE ROUTE ALTERNATIVES

It is anticipated that the imported components required for the solar plants will arrive at the Port of Saldanha Bay or Cape Town Harbour. From Google Maps, the distances and travelling times from the Port of Saldanha and Cape Town Harbour are very similar. This is shown in **Figure 2** and **Figure 3** below.

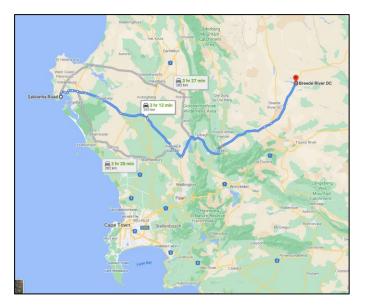


Figure 2: Possible Route Alternatives – Port of Saldanha Bay

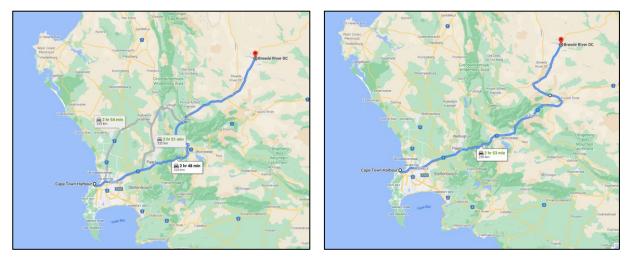


Figure 3: Possible Route Alternatives: Cape Town Harbour

#### 3.2 ROAD CONDITION

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) is responsible for the maintenance of the national roads which are in a reasonable condition, however heavy traffic contribute significantly to the deterioration of the road surfaces.

According to the Western Cape Government Road Network Information System (RNIS), the paved main roads in the vicinity of the proposed PV Plants are in a fair to poor condition. Road freight, transport, specifically heavy vehicle transport, significantly contributes to the deterioration of main road surfaces

and maintenance of these roads is not always adequate. The main gravel roads are good to fair condition. This is illustrated below.



**Figure 4: Paved Road Conditions** 

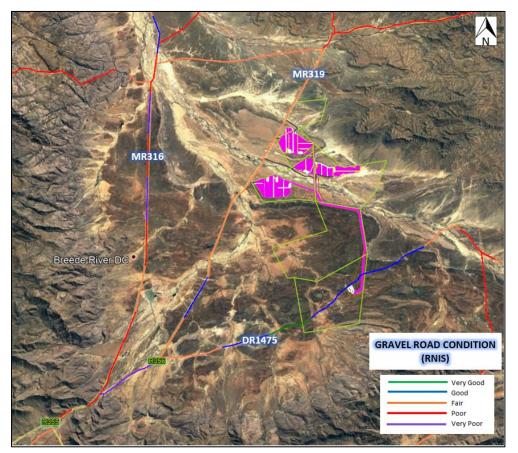


Figure 5: Gravel Road Conditions

#### 3.3 EXTERNAL ACCESS ROAD

The main access road that will be directly affected by the proposed construction and operation of the solar plants is Main Road 319 (R356). MR319 is a 6.0m gravel road within a 25.0m road reserve and connects with the R355 (Main Road 316) to the south-west and traverses the Northern Cape Provincial boundary in the east to connect with the R354. The distance of gravel road from the connection with the R355 to the entrance to the Hoek Doornen PV 1, Hoek Doornen PV 2 and Hoek Doornen PV 3 site is approximately 29 km. The distance of gravel road from the connection with the R355 to the entrance to the Hoek Doornen PV 4 site is approximately 32 km.



Figure 6: Main Road 319

MR319 can be classified as a Rural Class 3 Minor Arterial for which the Western Cape Government is the controlling authority.

# 4 SITE ACCESS CONSIDERATIONS

#### 4.1 PROPOSED ACCESS LOCATION

Access to the Hoek Doornen PV 1, Hoek Doornen PV 2 and Hoek Doornen PV 3 solar PV plants are proposed from an existing access at Km 78.00 to Portion 1 of Farm 174 Karre Kolk. This access will need to be taken via a registered servitude across Portion 1 of Farm 174 Karre Kolk. This is shown **Figure 7** and **Figure 8**.

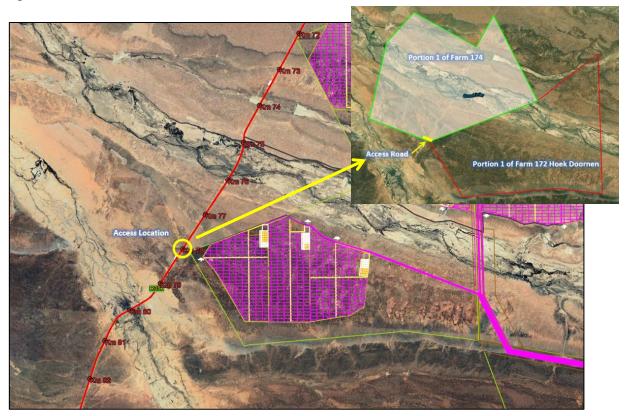


Figure 7: Hoek Doornen PV1, Hoek Doornen PV2 and Hoek Doornen PV3 Access Location



Figure 8: Existing Access Road at Km 78.00 along MR319

Access to the Hoek Doornen PV 4 solar PV plant is proposed from the existing access to Farm 171 Witte Wall at Km 74.84 along MR319. This is shown **Figure 9** below.

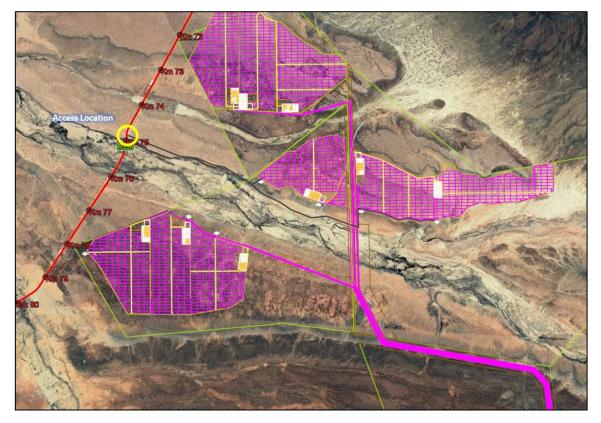


Figure 9: Hoek Doornen PV 4 Access Location

The existing access road to Farm 171 Witte Wall is a private gravel road, approximately 7km in length, which will be used as an internal access road to access the Hoek Doornen PV 4 solar PV facilities. Refer to **Figure 10**.



Figure 10: Internal Access Road

### 4.2 ACCESS SPACING

According to the Western Cape Government's *Access Management Guidelines, 2020*, a minimum access spacing of **820m** between public roads and/or driveways are recommended along Class 3 roads in Rural Roadside Development Environments (RDE).

An existing access to the north-western Portion 1 of Farm 174 Karre Kolk is located at Km 77.93, approximately 70 north-east of the proposed access to the Hoek Doornen PV 1, Hoek Doornen PV 2 and Hoek Doornen PV 3 solar cluster at Km 78.00. Although these accesses create a staggered intersection, it is proposed that these access locations be retained based on the following:

- MR 319 carries very little traffic (AADT < 50 vpd)
- There will be no crossing of the road from the access at Km 78.00 to the access at Km 77.93
- There is more than enough sight distance at both accesses
- There is an existing road at both these access locations

The access spacing measured from the gravel road at Km 77.93 and access location at Km 78.00 to the adjacent registered roads (according to the RNIS database) are measured as approximately 1.85km to the north-east existing farm access location and 1.39km to the south-west existing farm access location. Refer to **Figure 11**.

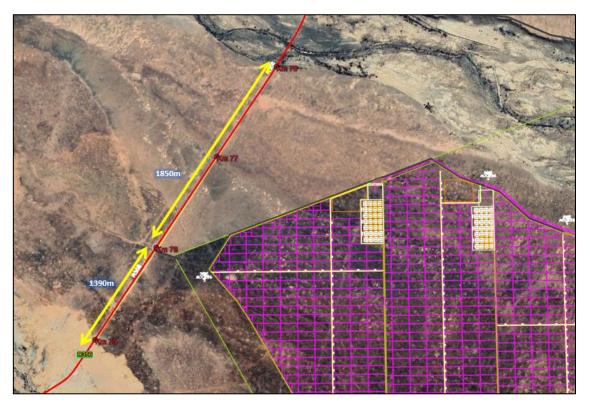


Figure 11: Access Spacing

#### 4.3 SIGHT DISTANCE

According to the TRH17 Geometric Design of Rural Roads, a shoulder sight distance of 300m is required for a Single-Unit Truck and Trailer SU+T) design vehicle for a design speed of 80 km/h. The site visit and photos taken at the proposed access location alternatives indicate that shoulder sight distance will be sufficient. Refer to **Figure 12** for access to the Hoek Doornen PV 1, PV 2 and PV 3 solar PV plants and **Figure 13** for access to the Hoek Doornen PV 4 solar PV plant.

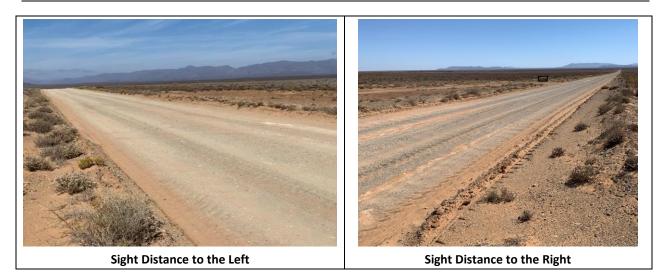


Figure 12: Sight Distance at Proposed Access at Km 78.00 along MR319

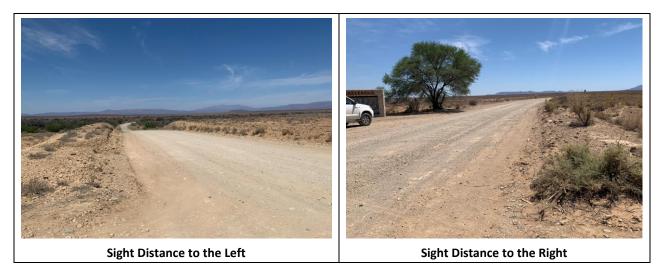


Figure 13: Sight Distance at Existing Access at Km 74.84 along MR319

## **5** EXISTING TRAFFIC CONDITIONS

No manual traffic counts were conducted in the vicinity of the proposed solar plants due to the low volume (<100vpd) of traffic on the directly affected roads in the area.

The Western Cape Government's (WCG) RNIS has a traffic count database for which traffic counts are conducted regularly. The Western Cape proclaimed road network is categorised into Trunk Roads, Main Roads, Divisional Roads and Minor Roads. A count station (Station 4994) is located at the MR319(R356)/OP8014 intersection (km59.74) approximately 18 km north of the proposed access to Portion 1 of Farm 172 Hoek Doornen. A count station (Station 4474) is also located at the MR319(R356)/DR1475(Matjiesfontein) intersection (km99.84) approximately 22 km south of the proposed access to Portion 1 of Farm 172 Hoek Doornen. Both these stations were counted in August 2018 which provides recent traffic information.



Figure 14: Location of Count Stations



Figure 15: Station 4994 Count Information



Figure 16: Station 4474 Count Information

The Annual Average Daily Traffic (AADT) of gravel road MR319 (R356) in the vicinity of the site is extremely low with approximately 22 vehicles per day (Source: RNIS) at Station 4994 and 33 vehicles per day at Station 4474. The posted speed limit along MR319 is 80km/h. No heavy vehicles were observed along this road during the count.

## 6 TRIP GENERATION RATES

The trip generation estimates discussed below are based on similar studies that have been undertaken for SEFs and the associated electrical infrastructure (collector substation and transmission line). The trip generation rates discussed below relates to the anticipated trip generation rates associated with a 175 MW SEF.

#### 6.1 CONSTRUCTION PHASE

It is expected that the Construction Phase for each of the proposed PV Plants will extend between 12 and 24 months (more likely 24 months due to the magnitude of the proposed plants). During the construction of each 175MW PV Plant, solar panels will be transported in 40ft containers by double-axle trucks. It is expected that approximately 2500 containers will be transported (two containers per truck), which will result in 1250 double-axle truck trips. Based on a 24 month construction period (i.e. 104 weeks), and a 6 day work week (104 x 6 = 624 work days), this could result in approximately **2 daily double-axle trips**.

It is also expected that approximately 15 single unit trucks carrying construction materials will visit the site on a daily basis, resulting in **15 daily single unit truck trips**.

Furthermore, it is expected that 460 unskilled labourers and 150 skilled labourers will be transported to the site daily. Experience has shown that during the construction period, approximately **20 daily bakkie trips** are expected to come to / from the site. A vehicle occupancy of 1.5 persons/vehicle (bakkie) is assumed, which relates to 30 labourers coming to/from the site by bakkie. The remaining 580 labourers will be transported to/from the site by eighty-seater buses and taxis from the surrounding areas resulting in approximately **8 daily bus trips**.

Water will also be delivered to the site from a municipal water supply by a 12-kilolitre water truck on a daily basis during the construction phase. Water demand will be in the order of 355 000 litres per month for construction purposes and potable water. This relates to approximately 1 x 12 kilolitre water truck trip per day. This will result in **1 daily water truck trip**.

#### 6.2 OPERATIONAL PHASE

It is expected that the Operational Phase will take place during the life span of the project (approximately 20 years). During this time, it is anticipated that 6 light load trucks will visit the site on a daily basis, transporting staff and equipment. This will equate to **6 daily light load truck trips**.

It is also anticipated that 1-2 small single-axle trucks will visit the site on a weekly basis. This equates to (conservative) **1** daily single axle truck trip.

It is estimated that between 5 million and 8 million litres of water will be required for cleaning the solar panels and for potable water requirements per year. This will relate to approximately 2 daily 12 kilolitre water truck trips for cleaning of the solar panels and for potable water requirements. In total, there will therefore be **2 daily water truck trips**.

#### 6.3 DECOMMISSIONING PHASE

The Decommissioning Phase will generate similar trips as the Construction Phase over a similar time period (12 to 24 months). This includes **2 daily double-axle trips** for the transportation of the solar panels, **15 daily light load trips**, for the transportation of construction materials, **8 daily bus trips** and **20 daily bakkie trips** for the workforce and **1 daily water truck trip**.

## 7 TRAFFIC IMPACT ASSESSMENT

From the trip generation information gathered in **Section 6** the following traffic impacts should be considered:

- Potential congestion and delays on the surrounding road network
- Potential impact on traffic safety and increase in accidents with other vehicles or animals
- Potential change in the quality of the surface condition of the roads
- Potential noise and dust pollution.

The number of additional daily trips per 175 MW solar photovoltaic plant and associated electrical grid infrastructure are summarised below:

#### Construction Phase – 46 Daily Trips

- 2 daily double-axle trips
- 15 daily light load trips
- 8 daily bus trips
- 20 daily bakkie trips
- 1 daily water truck trips.

#### **Operational Phase – 9 Daily Trips**

- 6 daily light load truck trips
- 1 daily single axle truck trips (conservative assumption as 1-2 small single-axle trucks will visit the site on a **weekly** basis)
- 2 daily water truck trips

#### Decommissioning Phase – 46 Daily Trips

- 2 daily double-axle trips
- 15 daily light load trips
- 8 daily bus trips
- 20 daily bakkie trips
- 1 daily water truck trips.

It is anticipated that each 175MW plant will have a 24-month construction period. In a rural environment, the peak hour trips constitute approximately 20%-40% of the daily traffic. This relates to approximately 9 to 18 additional daily peak hour trips on the road network during the construction and decommissioning phase and 2 to 4 additional daily peak hour trips on the road network during the operational phase, which will have an insignificant traffic impact on the surrounding road network.

Should construction of all four PV plants (Hoek Doornen PV 1, Hoek Doornen PV 2, Hoek Doornen PV 3 and Hoek Doornen PV 4) commence at exactly the same time, the cumulative daily trips that can be anticipated are summarised below. The total cumulative daily trips relating to all the nine SEFs are discussed in **Section 9**.

#### Construction Phase – 184 Daily Trips

- 8 daily double-axle trips
- 60 daily light load trips
- 32 daily bus trips
- 80 daily bakkie trips
- 4 daily water truck trips

#### **Operational Phase – 36 Daily Trips**

- 24 daily light load truck trips
- 4 daily single axle truck trips
- 8 daily water truck trips

#### Decommissioning Phase – 184 Daily Trips

- 8 daily double-axle trips
- 60 daily light load trips
- 32 daily bus trips
- 80 daily bakkie trips
- 4 daily water truck trips

The above daily trip generation rates will relate to approximately 37 to 74 additional daily peak hour trips on the road network during the construction and decommissioning phase and 7 to 14 additional daily peak hour trips on the road network during the operational phase. The trips during the construction and decommissioning phases will have a traffic impact on the surrounding road network and to further limit the impact, it is proposed that these trips be scheduled outside of peak traffic periods. The trips during the operational phase will have an insignificant traffic impact during the peak hours.

The mitigation measures to address the traffic impact are listed below:

- Stagger delivery trips and schedule deliveries outside of the peak traffic periods
- Staff trips should also occur outside of the peak hours where possible
- Dust control of the gravel roads
- Regular maintenance of the gravel external access roads by the contractor during the construction period and the operator during the operational phase.
- Upgrading of the internal farm access road to suitable standards as specified by the civil engineer and regular maintenance of the access road during all phases of the project, especially during the construction and decommissioning phases.
- The route to the site should be further investigated to ensure that the abnormal loads are not obstructed at any point by geometric, height and width limitations along the route.
- The applicable permits to transport the abnormal loads should be obtained.

## 8 TRAFFIC IMPACT ASSESSMENT SUMMARY

The impacts associated with the traffic generation of the proposed Hoek Doornen PV 1, Hoek Doornen PV2, Hoek Doornen PV3 and Hoek Doornen PV4 SEF are summarised in **Table 1** below:

Impact	Impact C	riteria	Significance and Ranking (Pre- Mitigation)	Potential mitigation measures	Significance and Ranking (Post- Mitigation)	Confidence Level
CONSTRUCTION AN	D DECOMMISION	NG PHASE				
Congestion and delays on road network	Status Spatial Extent Duration Consequence Probability Reversibility	Neutral Local Medium Term Slight Likely High Doclassible	Very Low Risk / Impact (5)	Stagger delivery trips and schedule trips outside of peak hours.	Very Low (5)	High
Potential impact on traffic safety and increase in accidents with other vehicles and animals	Irreplaceability Status Spatial Extent Duration Consequence Probability Reversibility Irreplaceability	Replaceable Neutral Local Medium Term Moderate Likely High Replaceable	Low Risk / Impact (4)	Speed control by means of stop and go system and speed limit road signage.	Low (4)	High
Condition of road surface	Status Spatial Extent Duration Consequence Probability Reversibility Irreplaceability	Neutral Local Medium Term Slight Likely High Replaceable	Very Low Risk / Impact (5)	Regular maintenance of access roads by the contractor. Ensure access roads are restored to original pre- construction road condition.	Very Low (5)	High
Dust Pollution	Status Spatial Extent Duration Consequence Probability Reversibility Irreplaceability	Neutral Local Medium Term Moderate Likely High Replaceable	Low Risk / Impact (4)	Dust control of gravel roads. Speed control by means of stop and go system and speed limit road signage.	Low (4)	High
Noise Pollution	Status Spatial Extent Duration Consequence Probability Reversibility	Neutral Local Medium Term Moderate Likely High	Low Risk / Impact (4)	Stagger delivery trips.	Low (4)	High

#### **Table 1: Rating of Traffic Related Impacts**

# 9 CUMULATIVE IMPACTS

The cumulative impacts of all the proposed nine SEFs in the vicinity were considered and assessed. It is however very unlikely that all nine projects will occur at the same time, as all these projects will be subject to a highly competitive bidding process and only a few projects would be allowed to enter into a power purchase agreement with Eskom at a time. Construction will most likely be staggered based on project and site-specific issues.

The biggest traffic impact associated with SEFs is during the construction phase (and similarly during the decommissioning phase). During the operational phase, the trips added to the road network is expected to be insignificant. It should be noted that all the applications for abnormal load transport are considered by the applicable authorities and they will ensure that the trips are staggered on the road network to limit possible delays.

However, for the purpose of determining the cumulative impacts, **Figure 17** and **Figure 18** below illustrates the cumulative impacts of the nine SEFs for the daily and peak periods.

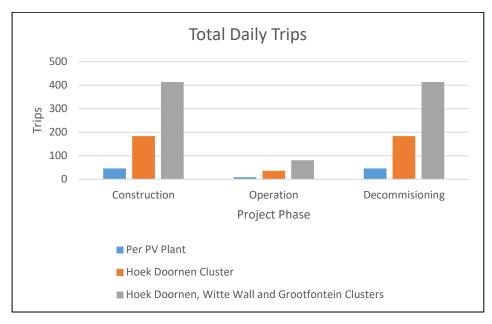
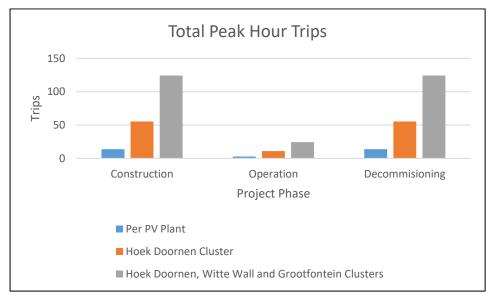
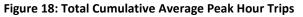


Figure 17: Total Cumulative Daily Trips





The impacts associated with the cumulative traffic generation of the proposed Hoek Doornen, Grootfontein and Witte Wall solar clusters are summarised in **Table 2** below:

Delays on road Spa network Dur Con Pro- Potential impact Sta on traffic safety Spa and increase in Dur accidents with other vehicles and Cor animals Pro- Rev Irree Condition of road Sta surface Spa Surface Spa Dur Dur Dust Pollution Sta	atus patial Extent uration onsequence obability eversibility replaceability atus patial Extent uration onsequence obability eversibility replaceability	NG PHASE Neutral Local Medium Term Substantial Very Unlikely High Replaceable Neutral Local Medium Term Moderate Likely	Low Risk / Impact (4) Low Risk / Impact (4)	Stagger delivery trips and schedule trips outside of peak hours. Speed control by means of stop and go system and speed limit road	Very Low (5)	High
Delays on road network Dur Con Pro- Potential impact Sta on traffic safety Spa and increase in Dur accidents with Other vehicles and Other other vehicles and Con animals Pro- Rev Irre Condition of road Sta surface Spa Dur Dur Dust Pollution Sta	oatial Extent uration onsequence obability eversibility replaceability atus oatial Extent uration onsequence obability eversibility replaceability	Local Medium Term Substantial Very Unlikely High Replaceable Neutral Local Medium Term Moderate	Impact (4) Low Risk /	and schedule trips outside of peak hours. Speed control by means of stop and go system		
network Dur Con Protential impact Sta on traffic safety Spa and increase in Dur accidents with Other vehicles and Cor animals Pro Condition of road Sta surface Spa Uur Con Entre Condition of road Sta surface Spa Dur Dur Cor Proc Rev Dur Cor Proc Rev Dur Sta Sta Sta Sta Sta Sta Sta Sta	uration onsequence obability eversibility replaceability atus oatial Extent uration onsequence obability eversibility replaceability	Medium Term Substantial Very Unlikely High Replaceable Neutral Local Medium Term Moderate	(4) Low Risk /	outside of peak hours. Speed control by means of stop and go system	Low (4)	High
Potential impact Potential impact on traffic safety and increase in accidents with other vehicles and other vehicles and animals Pro Rev Irre Condition of road surface Dua Pro Rev Irre Condition of road Sta Spa Dua Con Pro Rev Irre Dua Con Pro Rev Irre Dua Sta Spa Spa Dua Sta Spa Dua Sta Spa Dua Sta Spa Spa Dua Sta Spa Spa Spa Spa Spa Spa Spa Sp	onsequence obability eversibility atus obatial Extent uration onsequence obability eversibility replaceability	Term Substantial Very Unlikely High Replaceable Neutral Local Medium Term Moderate	Low Risk /	Speed control by means of stop and go system	Low (4)	High
Provide the second seco	obability eversibility replaceability atus patial Extent uration onsequence obability eversibility replaceability	Substantial Very Unlikely High Replaceable Neutral Local Medium Term Moderate		of stop and go system	Low (4)	High
Provember of the second	obability eversibility replaceability atus patial Extent uration onsequence obability eversibility replaceability	Very Unlikely High Replaceable Neutral Local Medium Term Moderate		of stop and go system	Low (4)	High
Rev         Potential impact       Sta         on traffic safety       Spa         and increase in       Dui         accidents with       Other vehicles and         other vehicles and       Con         animals       Pro         Condition of road       Sta         surface       Spa         Quarticle       Spa         Dur       Con         Pro       Dur         Dur       Con         Pro       Dur         Dur       Con         Surface       Spa         Dust Pollution       Sta	eversibility replaceability atus patial Extent uration onsequence obability eversibility replaceability	Unlikely High Replaceable Neutral Local Medium Term Moderate		of stop and go system	Low (4)	High
Potential impact Sta on traffic safety Spa and increase in Dui accidents with other vehicles and Con animals Pro Rev Irre Condition of road Sta surface Spa Dui Pro Rev Irre Dust Pollution Sta	replaceability atus patial Extent uration onsequence robability eversibility replaceability	High Replaceable Neutral Local Medium Term Moderate		of stop and go system	Low (4)	High
Potential impact Sta on traffic safety Spa and increase in Dui accidents with other vehicles and Con animals Pro Rev Irre Condition of road Sta surface Spa Dui Pro Rev Irre Dust Pollution Sta	replaceability atus patial Extent uration onsequence robability eversibility replaceability	Replaceable Neutral Local Medium Term Moderate		of stop and go system	Low (4)	High
Potential impact Sta on traffic safety Spa and increase in Du accidents with other vehicles and Con animals Pro Condition of road Sta surface Spa Du Rev Dust Pollution Sta	atus patial Extent uration onsequence obability eversibility replaceability	Neutral Local Medium Term Moderate		of stop and go system	Low (4)	High
on traffic safety Spa and increase in Dur accidents with other vehicles and Cor animals Pro Rev Condition of road Sta surface Spa Dur Cor Pro Rev Dust Pollution Sta	oatial Extent uration onsequence obability eversibility replaceability	Local Medium Term Moderate		of stop and go system	Low (4)	High
and increase in Duraccidents with other vehicles and Correlated animals Proceed of the second state of the	uration onsequence obability eversibility replaceability	Medium Term Moderate	Impact (4)			1
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surface Spa Dui Con Pro Rev Irre Dust Pollution Sta	atus	Replaceable	Leve Diele /	Developmentation	) ( ( ( (	112-1-
Con Pro Rev Irre Dust Pollution Sta		Neutral	Low Risk /	Regular maintenance of	Very Low (5)	High
Con Pro Rev Irre Dust Pollution Sta	atial Extent	Local	Impact (4)	access roads by the contractor. Ensure		
Pro Rev Irre Dust Pollution Sta	uration	Medium Term		access roads are		
Pro Rev Irre Dust Pollution Sta	onsequence	Substantial	-	restored to original pre-		
Rev Irre Dust Pollution Sta	obability	Very		construction road		
Irre Dust Pollution Sta	obability	Unlikely		condition.		
Irre Dust Pollution Sta	eversibility	High	-			
Dust Pollution Sta	replaceability	Replaceable				
	atus	Neutral	Low Risk /	Dust control of gravel	Low (4)	High
Spa	atial Extent	Local	Impact (4)	roads. Speed control by		
· · ·	uration	Medium		means of stop and go		
		Term		system and speed limit		
Cor	onsequence	Severe		road signage.		
	obability	Very				
		Unlikely				
Rev	eversibility	High				
Irre	replaceability	Replaceable				
Noise Pollution Sta	atus	Neutral	Low Risk /	Stagger delivery trips.	Low (4)	High
Spa	atial Extent	Local	Impact (4)			
Du	uration	Medium				
		Term	-			
	onsequence	Severe				
Pro	obability	Very				
		Unlikely	4			
	eversibility	High	4			
OPERATIONAL PHASE	replaceability	Replaceable				

## **10 CONCLUSIONS AND RECOMMENDATIONS**

Sturgeon Consulting (Pty) Ltd prepared this TIS for the proposed construction and operation of the Hoek Doornen PV 1, Hoek Doornen PV 2, Hoek Doornen PV 3 and Hoek Doornen PV 4 SEFs near Touws Rivier in the Western Cape. Each of these PV energy facilities will have a generating capacity of 175MW. This report summarises the existing transportation conditions within the site vicinity and provides an assessment of the transportation impacts of the proposed development on the surrounding transport system.

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

- The main gravel roads in the vicinity of the proposed development is in a good to fair condition
- The main surfaced roads in the vicinity of the proposed development is in a fair to poor condition
- Access to the proposed development will be taken off Main Road 319 at Km 78.00 (Hoek Doornen PV 1, Hoek Doornen PV 2 and Hoek Doornen PV 3) and Km 74.82 (Hoek Doornen PV 4)
- This access complies with the access spacing and sight distance requirements
- Existing traffic information indicates that MR319 carries very little traffic with an AADT of <50 vehicles per day</li>
- Traffic will be generated during the Construction, Operational and Decommissioning phases of the project.
- During the Construction and Decommissioning phases, 46 daily trips and 9 to 18 peak hour trips will be generated per 175MW facility.
- The following traffic impacts are related to the trips generated during the Construction and Decommissioning phases:
  - Potential congestion and delays on the surrounding road network
  - Potential impact on traffic safety and increase in accidents with other vehicles or animals
  - Potential change in the quality of the surface condition of the roads
  - Potential noise and dust pollution.
- Traffic generated during the Operational phase will have an insignificant traffic impact on the surrounding road network

The mitigation measures to address the traffic impact are recommended:

- Stagger delivery trips and schedule deliveries outside of the peak traffic periods
- Staff trips should also occur outside of the peak hours where possible
- Dust control of the gravel roads
- Speed limits and stop and go facilities to be implemented to ensure reduced speeds along the roads
- Regular maintenance of the gravel external access roads by the contractor during the construction period and the operator during the operational phase.
- Upgrading of the internal farm access road to suitable standards as specified by the civil engineer and regular maintenance of the access road during all phases of the project, especially during the construction and decommissioning phases.
- The route to the site should be further investigated to ensure that the abnormal loads are not obstructed at any point by geometric, height and width limitations along the route.
- The applicable permits to transport the abnormal loads should be obtained.

No other remedial or mitigation measures will be required to accommodate the additional traffic generated by the proposed SEFs.

Provided that the above recommendations are adhered to, the proposed development of the Hoek Doornen PV 1, Hoek Doornen PV 2, Hoek Doornen PV 3 and Hoek Doornen PV 4 SEFs can be supported from a traffic engineering perspective.

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- 4. Committee of Transport Officials (COTO), South African Trip Data Manual, Draft 2.1, June 2020.
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- 6. Committee of Transport Officials (COTO), South African Traffic Impact and Site Traffic Assessment Manual, Volume 1 TMH 16, September 2012.
- 7. SANRAL Geometric Design Guide
- 8. Department of Transport, TRH17, Geometric Design of Rural Roads, 1988

# APPENDIX A: CV OF ANNEBET KRIGE



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	CURRICULUM VITAE ANNEBET KRIGE (Pr Eng) TRAFFIC ENGINEER
Date and place of birth: Tertiary qualification:	20 November 1984, Pretoria B Eng (Civil), University of Stellenbosch, 2006 M Eng (Transportation), University of Stellenbosch, 2010
Professional Membership:	Engineering Council of South Africa (ECSA): Professional Engineer (Reg. No. 20150161)
Voluntary Associations	South African Institution of Civil Engineering (SAICE): Member (Member No. 206324)

#### INTRODUCTION

AnneBet Krige is registered as a Professional Civil Engineer with the Engineering Council of South Africa (ECSA). Over the past 12 years, she has gained extensive knowledge in the Civil Engineering field and currently works as a Traffic Engineer for Sturgeon Consulting. She obtained her Masters' Degree in Transportation Engineering from the University of Stellenbosch in 2010 and specialises in this field.

#### Expertise & Specialised Skills:

AnneBet has gained extensive experience in the following fields:

- Traffic Studies and Transportation Planning (Statements, Assessments, Parking Studies);
- Design of Non-Motorised Transport Facilities;
- Design and Upgrading of Traffic Signals;
- Traffic Accommodation Plans;
- Design of Civil Engineering Infrastructure for various developments (Water, Sewerage, Stormwater, Roads);
- Rehabilitation and Reseal of existing National and Provincial Roads;
- Construction of new Roads;
- Tender Documentation.
- Contract Administration

#### SUMMARY OF EMPLOYMENT

2018 – Present	Associate, Sturgeon Consulting
2011 - 2018	Traffic Engineer, Element Consulting Engineers
2006 - 2011	Engineer in Training, EFG Engineers

Sturgeon Consulting

AnneBet Krige

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t: 021 553 4167 f: 086 559 5327

Oshakati	Element Namibio
	e proposed Oshakati Mall Development
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Study Value: R48 900
Bergriver Housing Tender	Bergriver Housing Developments
	proposed Bergriver Housing Developments
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Study Value: R217 500
Van Kervel Special School	Uhambiso Consu
Traffic Impact Assessment for the	Upgrading and Extension of the Van Kervel Special School, George
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Study Value: R33 220
	City of Cores Town
Monwabisi Park	City of Cape Tow
	Monwabisi Park Informal Settlement
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Study Value: R180 550
Loop Street Signs	Wide Open Platforn
Traffic Opinion for the proposed	LED Screen for 97 and 220 Loop Street, Cape Town
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2019	Study Value: R42 900
Sunningdale Saint Square	Camalus Developments (Pty) Ltd Proposed Apartments on Erf 38099, Sunningdale
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2019	Study Value: R27 900
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Completed/Current: 2019 Mamre Service Station Traffic Impact Assessment for the Role & Responsibilities: Completed/Current: 2019 Erf 13811, Wellington Traffic Impact Assessment for the Role & Responsibilities: Completed/Current: 2019 Allesverloren Lifestyle Village Traffic Impact Assessment for the Role & Responsibilities: Completed/Current: 2019 Langebaanweg Truck Stop Access Investigation / Traffic Imp Role & Responsibilities: Completed/Current: 2020 Erf 11919, Paarl Traffic Impact Assessment for the Role & Responsibilities: Completed/Current: 2020 Erf 11919, Paarl Traffic Impact Assessment for the Role & Responsibilities: Completed/Current: 2020 Erf 838, Milnerton	Study Value: R27 900 Plan Africa Consulting proposed Rezoning of Erf 615, Mamre Traffic Engineer proposed Rezone Development, Wellington Traffic Engineer Study Value: R54 400 Latitude Property Solution proposed Allesverloren Lifestyle Estate Development, Riebeeck Wes Traffic Engineer Study Value: R71 900 West Coast Petroleum (Pty) Lto poct Assessment for the proposed Langebaanweg Truck Stop Traffic Engineer Study Value: R89 800 Van der Sluys Project proposed Retail Development on Erf 11919, Paarl Traffic Engineer Study Value: R136 900
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Completed/Current: 2019 Mamre Service Station Traffic Impact Assessment for the Role & Responsibilities: Completed/Current: 2019 Erf 13811, Wellington Traffic Impact Assessment for the Role & Responsibilities: Completed/Current: 2019 Allesverloren Lifestyle Village Traffic Impact Assessment for the Role & Responsibilities: Completed/Current: 2019 Langebaanweg Truck Stop Access Investigation / Traffic Imp Role & Responsibilities: Completed/Current: 2020 Erf 11919, Paarl Traffic Impact Assessment for the Role & Responsibilities: Completed/Current: 2020 Erf 11919, Paarl Traffic Impact Assessment for the Role & Responsibilities: Completed/Current: 2020 Erf 838, Milnerton	Study Value: R27 900         Plan Africa Consulting         Proposed Rezoning of Erf 615, Mamre         Traffic Engineer         Study Value: R34 700         Nortje & De Villiers Consulting Engineer         Proposed Provence Development, Wellington         Traffic Engineer         Study Value: R54 400         Latitude Property Solution         Proposed Allesverioren Lifestyle Estate Development, Riebeeck Wes         Traffic Engineer         Study Value: R71 900         West Coast Petroleum (Pty) Lto         Doct Assessment for the proposed Langebaanweg Truck Stop         Traffic Engineer         Study Value: R89 800         Van der Sluys Project         e proposed Retail Development on Erf 11919, Paarl         Traffic Engineer         Study Value: R136 900



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Abbotsdale	CK Rumboll and Partne
	Industrial Development on Portion A of Erf 373, Abbotsdale
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2019	Study Value: R60 100
Grootfontein – Tsumkwe Feasibili	ly Study Pregon Consulting Engineers
	to Bitumen Standard of M0074: Grootfontein - Tsumkwe
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Study Value: R163 600
Eros Traffic Study, Windhoek	Element Namibio
Traffic Impact Study for the dens	ification of Eros, Windhoek
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2019	Study Value: R37 900
	En anne ne 🦉 Enderson Addit (official Energiese)
Paarl East Housing Development	Aureco
	lopment of 650 housing opportunities
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2018	Study Value: R61 750
Rella Riva Lifestyle Development	
Bella Riva Lifestyle Development Traffic Impact Study for Bella Rive	a Lifestyle Development (5875 unit)
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Study Value: R172 000
Mahama Infill Housing Developm	ent ACE Consulting
Traffic Impact Study for the Mah	ama Infill Housing Project
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2018	Study Value: R157 500
Blueberry Hill Housing Developm	
	lopment of 3500 housing opportunities
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2019	Study Value: R182 000
Design of Jip de Jager Road	
Traffic Impact Study for the Desig	an of Jip de Jager Road
Role & Responsibilities:	Traffic Engineer
	Study Value: R175 000
	Study Value: R175 000
Completed/Current: 2018 Brentwood Park	
Completed/Current: 2018 Brentwood Park Traffic Impact Study for the Brent	wood Park GAP Housing Development
Completed/Current: 2018 Brentwood Park Traffic Impact Study for the Brent Role & Responsibilities:	wood Park GAP Housing Development Traffic Engineer
Completed/Current: 2018 Brentwood Park Traffic Impact Study for the Brent Role & Responsibilities:	wood Park GAP Housing Development
Completed/Current: 2018 Brentwood Park Traffic Impact Study for the Brent Role & Responsibilities: Completed/Current: 2017	wood Park GAP Housing Development Traffic Engineer
Completed/Current: 2018 Brentwood Park Traffic Impact Study for the Brent Role & Responsibilities: Completed/Current: 2017 Curro Windhoek	wood Park GAP Housing Development Traffic Engineer Study Value: R75 000
Completed/Current: 2018 Brentwood Park Traffic Impact Study for the Brent Role & Responsibilities: Completed/Current: 2017 Curro Windhoek Traffic Impact Study for Curro WI	wood Park GAP Housing Development Traffic Engineer Study Value: R75 000
Completed/Current: 2018 Brentwood Park Traffic Impact Study for the Bren Role & Responsibilities: Completed/Current: 2017 Curro Windhoek Traffic Impact Study for Curro WI Role & Responsibilities:	wood Park GAP Housing Development Traffic Engineer Study Value: R75 000 ndhoek Traffic Engineer
Completed/Current: 2018 Brentwood Park Traffic Impact Study for the Bren Role & Responsibilities: Completed/Current: 2017 Curro Windhoek Traffic Impact Study for Curro WI Role & Responsibilities:	wood Park GAP Housing Development Traffic Engineer Study Value: R75 000
Completed/Current: 2018 Brentwood Park	wood Park GAP Housing Development Traffic Engineer Study Value: R75 000 ndhoek Traffic Engineer
Completed/Current: 2018 Brentwood Park Traffic Impact Study for the Brent Role & Responsibilities: Completed/Current: 2017 Curro Windhoek Traffic Impact Study for Curro WI Role & Responsibilities: Completed/Current: 2017 Schaapkraal	wood Park GAP Housing Development Traffic Engineer Study Value: R75 000 ndhoek Traffic Engineer
Completed/Current: 2018 Brentwood Park Traffic Impact Study for the Brent Role & Responsibilities: Completed/Current: 2017 Curro Windhoek Traffic Impact Study for Curro WI Role & Responsibilities: Completed/Current: 2017 Schaapkraal Traffic Impact Study for the Scha	wood Park GAP Housing Development Traffic Engineer Study Value: R75 000 ndhoek Traffic Engineer Study Value: R75 000 apkraal GAP Housing Development, Mitchells Plain
Completed/Current: 2018 Brentwood Park Traffic Impact Study for the Brent Role & Responsibilities: Completed/Current: 2017 Curro Windhoek Traffic Impact Study for Curro WI Role & Responsibilities: Completed/Current: 2017 Schaapkraal	wood Park GAP Housing Development Traffic Engineer Study Value: R75 000 ndhoek Traffic Engineer Study Value: R75 000
Completed/Current: 2018 Brentwood Park Traffic Impact Study for the Brent Role & Responsibilities: Completed/Current: 2017 Curro Windhoek Traffic Impact Study for Curro WI Role & Responsibilities: Completed/Current: 2017 Schaapkraal Traffic Impact Study for the Scha Role & Responsibilities: Completed/Current: 2017	wood Park GAP Housing Development Traffic Engineer Study Value: R75 000 Indhoek Traffic Engineer Study Value: R75 000 apkraal GAP Housing Development, Mitchells Plain Traffic Engineer
Completed/Current: 2018 Brentwood Park Traffic Impact Study for the Bren Role & Responsibilities: Completed/Current: 2017 Curro Windhoek Traffic Impact Study for Curro WI Role & Responsibilities: Completed/Current: 2017 Schaapkraal Traffic Impact Study for the Scha Role & Responsibilities: Completed/Current: 2017 Trekoskraal	wood Park GAP Housing Development Traffic Engineer Study Value: R75 000 Andhoek Traffic Engineer Study Value: R75 000 apkraal GAP Housing Development, Mitchells Plain Traffic Engineer Study Value: R75 000
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Sleeper Site, East London		
	et of the Sleeper Site, East London	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2017	Study Value: R255 000	
Worcester Traffic Study		
Traffic Study at Pre-Determined in		
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2017	Project Value: R537 000	
PV Farm Hanover		
Traffic Impact Statement for the	Proposed Solar PV Farm, Hanover	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2017	Study Value: R38 500	
Welgedaan Residential Developr	nent	
	edaan Residential Development, Saldanha	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2017	Study Value: R49 000	
	There are a second seco	
Malmesbury Sand Mine		Tip Trans Logisti
Traffic Impact Statement for a Sc		
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2017	Study Value: R24 500	
Richards Bay Traffic Signals		City of uMhlathuz
	ant to conduct a study to warrant the installat	
Role & Responsibilities:	Traffic Engineer	non of frame signals
Completed/Current: 2017	Study Value: R 167 500	
Strand Storage Facilities		Asla Devce
	osed Storage and Office Facilities in Strand	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2017	Study Value: R33 500	
Dube Tradeport		Dube Tradepo
Traffic Impact Study for Dube Tra	deport. Durban	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: Current	Study Value: R80 000	
<b>Laguna Mall</b> Traffic Impact Study for Laguna <i>I</i>	Anii Janachaan	Milprops 36
Role & Responsibilities:	Traffic Engineer	
Completed/Current: Current		
Turfhall Primary School		Welby-Solomon & Associate
Traffic Impact Study for Turfhall P		
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2016	Study Value: R38 000	
Curro Uitzicht		Curro Holding
	lopment of a Curro Castle in Uitzicht	
Role & Responsibilities:	Traffic Engineer	
	Study Value: R35 000	
· · · · · · · · · · · · · · · · · · ·		
Completed/Current: 2016 Morgen's Village		
Completed/Current: 2016 Morgen's Village Traffic Impact Study for the deve	lopment of 650 residential units on Erf 2435, M	
Completed/Current: 2016 Morgen's Village		<b>pe Town Community Housin</b> itchells Plain

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Curro Burgundy	alan mant of a Course Coulds in Duranus du Estate	Curro Holding
	elopment of a Curro Castle in Burgundy Estate	
Role & Responsibilities:		
Completed/Current: 2016	Study Value: R48 000	
Paarl Development		Baobab Propertie
	elopment of Farm 851 Portion 9, Paarl	Puebab riepenie
Role & Responsibilities:		
Completed/Current: 2016	Study Value: R48 000	
•		
Erf 68, Kylemore		Jomar Service
	Development of Erf 68, Kylemore	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2015	Study Value: R30 000	
Curro Benoni		Curro Holding
	elopment of a Curro Academy on Erf 7940, Benoni	Conto Holding
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2015	Study Value: R65 000	
Curro Constantia		Curro Holding
Traffic Impact Study for the devi	elopment of a Curro Castle in Constantia	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2015	Study Value: R30 000	
Hout Bay International School, H Parking Study for the Hout Bay Ir		Bay International Schoo
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2014	Study Value: R55 000	
District 6, Cape Town	Department of Rural Develo	pment and Land Reforn
Traffic Impact Study for District &		•
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2013	Contract Value: Unknown	
PPC Mine Vanrhunsdorn		CK Rumboll & Partner
PPC Mine, Vanrhynsdorp		
Traffic Impact Statement for the	Access to the Proposed PPC Mine, Vanrhynsdorp	
Traffic Impact Statement for the Role & Responsibilities:	Traffic Engineer	
Traffic Impact Statement for the		
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013	Traffic Engineer	Saldanha Bay ID
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay	Traffic Engineer Contract Value: Unknown	Saldanha Bay ID
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay Traffic Impact Study for the Sald	Traffic Engineer Contract Value: Unknown Ianha Bay IDZ Development	Saldanha Bay ID
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay Traffic Impact Study for the Sald Role & Responsibilities:	Traffic Engineer Contract Value: Unknown Ianha Bay IDZ Development Traffic Engineer	Saldanha Bay IDi
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay Traffic Impact Study for the Sald	Traffic Engineer Contract Value: Unknown Ianha Bay IDZ Development	Saldanha Bay IDi
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay Traffic Impact Study for the Sald Role & Responsibilities:	Traffic Engineer Contract Value: Unknown Ianha Bay IDZ Development Traffic Engineer	Saldanha Bay ID Owne
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay Traffic Impact Study for the Sald Role & Responsibilities: Completed/Current: 2012	Traffic Engineer Contract Value: Unknown Ianha Bay IDZ Development Traffic Engineer Contract Value: R500 million	
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay Traffic Impact Study for the Sald Role & Responsibilities: Completed/Current: 2012 Sawmill, Wemmershoek	Traffic Engineer Contract Value: Unknown Ianha Bay IDZ Development Traffic Engineer Contract Value: R500 million	
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay Traffic Impact Study for the Sald Role & Responsibilities: Completed/Current: 2012 Sawmill, Wemmershoek Traffic Impact Study for the Wen	Traffic Engineer Contract Value: Unknown Ianha Bay IDZ Development Traffic Engineer Contract Value: R500 million	
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay Traffic Impact Study for the Sald Role & Responsibilities: Completed/Current: 2012 Sawmill, Wemmershoek Traffic Impact Study for the Wen Role & Responsibilities: Completed/Current: 2012	Traffic Engineer Contract Value: Unknown Ianha Bay IDZ Development Traffic Engineer Contract Value: R500 million Inmershoek Sawmill Traffic Engineer	Owne
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay Traffic Impact Study for the Sald Role & Responsibilities: Completed/Current: 2012 Sawmill, Wenmershoek Traffic Impact Study for the Wen Role & Responsibilities: Completed/Current: 2012 Sandown Centre, Parklands	Traffic Engineer         Contract Value: Unknown         Ianha Bay IDZ Development         Traffic Engineer         Contract Value: R500 million         Inmershoek Sawmill         Traffic Engineer         Contract Value: Unknown	Owne
Traffic Impact Statement for the Role & Responsibilities: Completed/Current: 2013 IDZ, Saldanha Bay Traffic Impact Study for the Sald Role & Responsibilities: Completed/Current: 2012 Sawmill, Wemmershoek Traffic Impact Study for the Wen Role & Responsibilities: Completed/Current: 2012	Traffic Engineer         Contract Value: Unknown         Ianha Bay IDZ Development         Traffic Engineer         Contract Value: R500 million         Inmershoek Sawmill         Traffic Engineer         Contract Value: Unknown	

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Pick n Pay, Brackenfell		Pick & Pay Brackenfell
Parking and Circulation Study for	or Pick n Pay, Brackenfell	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2011	Contract Value: Unknown	
Hoek van de Berg, Hawston		
Traffic Impact Study for the Dev	elopment of an Eco-Estate on Farm Hoek v	an de Berg, Hawston
Role & Responsibilities:	Assistant Traffic Engineer	
Completed/Current: 2011	Study Value: R125 000	
Tygervalley Extensions, Bellville		
Traffic Impact Study for the Tyge	ervalley Extensions, Bellville	
Role & Responsibilities:	Assistant Traffic Engineer	
Completed/Current: 2009	Study Value: R165 000	
Upgrading of MR168, Stellenbos	ch Provinc	ial Administration: Western Cape
Traffic Impact Study for the upg	rading of MR168	
Role & Responsibilities:	Assistant Traffic Engineer	
Completed/Current: 2009	Contract Value: R360 million	
Blue Downs Development		MSP Developments
Traffic Impact Study for the Blue	e Downs Development	
Role & Responsibilities:	Assistant Traffic Engineer	
Completed/Current: 2009	Contract Value: R12 million	
Buhrein, Kraaifontein		MSP Developments
Traffic Impact Study for the Buh	rein Development	
Role & Responsibilities:	Assistant Traffic Engineer	

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Brackengate Industrial Developr	nent Redefine Properties / VDVM
	Signals along Cilmor Road, Stikland
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Contract Value: R 2 000 000
Medway Road Upgrade, Richard	s Bay Richards Bay IDi
Upgrading of Traffic Signals at th	e John Ross Highway / Medway Road intersection, Richards Bay
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Contract Value: R500 000
Cape Town CBD	City of Cape Town: TCI
Upgrading of Traffic Signal Layo	uts in Cape Town
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	Contract Value: Unknown
Erf 16161, Paarl	Asic
Design and Installation of Traffic	Signals for Erf 16161, Paarl
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2013	Contract Value: Unknown
Buhrein, Kraaifontein	
Design and Installation of Traffic	Signals for Buhrein, Kraaifontein
Role & Responsibilities:	Assistant Traffic Engineer
Completed/Current: 2011	Contract Value: R700 000
Shoprite, Mossel Bay	
Design and Installation of Traffic	Signals for Shoprite, Kwanongaba, Mossel Bay
Role & Responsibilities:	Assistant Traffic Engineer
Completed/Current: 2011	Contract Value: R600 000
Shoprite DC, Brackenfell	
Design and Installation of Traffic	Signals for Shoprite DC, Brackenfell
Role & Responsibilities:	Assistant Traffic Engineer
Completed/Current: 2010	Contract Value: R800 000

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Road Safety Audit		Namibia Roads Authority
Road Safety Audit for T0602: Gob	abis to Buitepos	
Role & Responsibilities:	Traffic Engineer	
Completed/Current: Current	Contract Value:	
Non-Motorised Transport, City of	Cape Town	City of Cape Towr
Implementation of the Non-Moto	rised Transport programme to the	City of Cape Town
Role & Responsibilities:	Traffic Engineer	
Completed/Current: Current	Contract Value: R50m	
Westbury Pedestrian Bridge, Johc	nnesburg	Johannesburg Development Agency
Traffic Accommodation Plan for t	he construction of the Westbury P	edestrian Bridge, Johannesburg
Role & Responsibilities:	Traffic Engineer	
Completed/Current: Current	Contract Value: Unknown	
Erven 13259 and 13585, Brackenf	ell	Group 5 Property Developmen
Traffic Accommodation Plan for	he development of Erven 13259 a	nd 13585, Brackenfell
Role & Responsibilities:	Traffic Engineer	
Completed/Current: Current	Contract Value: R550 000	
Lakeview and Klipspruit BRT Statio	ons, Soweto	Johannesburg Roads Authority
Non-motorised Transport for Lake	view and Klipspruit BRT Stations, So	oweto
Role & Responsibilities:	Traffic Engineer / Design Eng	ineer
Completed/Current: Current	Contract Value: R35 million	
Traffic Calming, Stellenbosch		Stellenbosch Municipality
Stellenbosch Traffic Calming Plar	ning	
Role & Responsibilities:	Assistant Traffic Engineer	
Completed/Current: 2013	Contract Value: Unknown	
Traffic Accommodation, Cape To	wn	Group
Traffic Accommodation plan for	he upgrading of intersections in C	Cape Town CBD
Role & Responsibilities:	Traffic Engineer	
Completed/Current: 2013	Contract Value: Unknown	

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Upgrading of Medway Road, Rich	ards Bay
Upgrading of Medway Road	
Role & Responsibilities:	Assistant Engineer
Completed/Current: Current	Contract Value: R50 million
Trunk Road 32 between N2 and H	erbertsdale Provincial Government Western Cape
	ection of Main Road 342 between km 7.72 and Herbertsdale
Role & Responsibilities:	Assistant Engineer
Completed/Current: Current	Contract Value: Unknown
National Route 7, Garies	SANRAL
	ute 7 Section 7 between Garies and km 60
Role & Responsibilities:	Assistant Engineer
	Contract Value: R101.4 million
Completed/Current: Current	Contract Value: RT01.4 million
National Route 7, Okiep	SANRAL
Repair and Reseal of National Ro	ute 7 Section 7 to 8 between km 60 and Okiep
Role & Responsibilities:	Assistant Engineer
Completed/Current: Current	Contract Value: R95.5 million
	1/1/DAOS) and K111 Muldorsdrift
	1/1(D405) and K111, Muldersdrift 249/1 P39/1 P241/1/D405) and K111 Muldersdrift
Rehabilitation of Roads P122/1, P	249/1, P39/1, P241/1(D405) and K111, Muldersdrift
Rehabilitation of Roads P122/1, P Role & Responsibilities:	249/1, P39/1, P241/1(D405) and K111, Muldersdrift Assistant Engineer
Rehabilitation of Roads P122/1, P	249/1, P39/1, P241/1(D405) and K111, Muldersdrift Assistant Engineer
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton a	249/1, P39/1, P241/1(D405) and K111, Muldersdrift Assistant Engineer Contract Value: Unknown Md Swellendam Provincial Government Western Cape
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton a	249/1, P39/1, P241/1(D405) and K111, Muldersdrift Assistant Engineer Contract Value: Unknown
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton a The Reseal of Trunk Road 32 Secti Road 1329	249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Ind Swellendam         Provincial Government Western Cape         ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton a The Reseal of Trunk Road 32 Secti	249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Md Swellendam       Provincial Government Western Cape         ion 1 between Ashton and Swellendam, Main Road 283 and Divisional
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton an The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014	249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Ind Swellendam       Provincial Government Western Cape         Ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton an The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014	249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Ind Swellendam       Provincial Government Western Cape         Ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton a The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014 National Route 14 Section 1 betw	249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Assistant Engineer         Ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million         SANRAL
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton a The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014 National Route 14 Section 1 betw Pofadder	249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Assistant Engineer         Ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million         SANRAL
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton an The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014 National Route 14 Section 1 betw Pofadder Repair and reseal N14 between V Role & Responsibilities:	249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Assistant Engineer         Ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million         SANRAL         Witputs and Pofadder
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton an The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014 National Route 14 Section 1 betw Pofadder Repair and reseal N14 between V Role & Responsibilities: Completed/Current: 2013	249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Assistant Engineer         Ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million         SANRAL         Vitputs and Pofadder         Assistant Engineer         Contract Value: R70.3 million
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton an The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014 National Route 14 Section 1 betw Pofadder Repair and reseal N14 between V Role & Responsibilities: Completed/Current: 2013 National Route 14 Section 2 betw	249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Assistant Engineer         ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million         SANRAL         Vitputs and Pofadder         Assistant Engineer         Contract Value: R70.3 million
Rehabilitation of Roads P122/1, P Role & Responsibilities: Completed/Current: Current Trunk Road 32 between Ashton an The Reseal of Trunk Road 32 Secti Road 1329 Role & Responsibilities: Completed/Current: 2014 National Route 14 Section 1 betw Pofadder Repair and reseal N14 between V Role & Responsibilities: Completed/Current: 2013 National Route 14 Section 2 betw	249/1, P39/1, P241/1(D405) and K111, Muldersdrift         Assistant Engineer         Contract Value: Unknown         Assistant Engineer         Ion 1 between Ashton and Swellendam, Main Road 283 and Divisional         Assistant Engineer         Contract Value: R60.8 million         SANRAL         Witputs and Pofadder         Assistant Engineer         Contract Value: R70.3 million

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t: 021 553 4167 f: 086 559 5327

Sitari, Somerset West	
Civil Engineering Services for Sita	ri Fields, Somerset West
Role & Responsibilities:	Assistant Resident Engineer
Completed/Current: Current	Contract Value: R350m
Van der Stel, Stellenbosch	
Upgrading of the Van der Stel Sp	ort Complex parking area
Role & Responsibilities:	Resident Engineer
Completed/Current: 2012	Contract Value: R700 000
CSP Plant, Upington	
Access to the proposed CSP Plan	t
Role & Responsibilities:	Design Engineer
Completed/Current: 2012	Contract Value: Unknown
Droogfontein, Kimberley	
	to the proposed PV Farm, Droogfontein, Kimberley
Role & Responsibilities:	Design Engineer
Completed/Current: 2012	Contract Value: Unknown
Robben Island	
	and Sewerage works on Robben Island
Role & Responsibilities:	Assistant Resident Engineer
Completed/Current: 2011	Contract Value: R12 million
KFC Observatory	
Civil Engineering Services for KFC	Observatory
Role & Responsibilities:	Assistant Resident Engineer
Completed/Current: 2010	Contract Value: R300 000
Blue Downs Development	
	es for the Blue Downs Development
Role & Responsibilities:	Assistant Design Engineer
Completed/Current: 2010	Contract Value: R12 million
Shoprite, Strand	
Construction of Broadway Shopri	te Access Road, Strand
Role & Responsibilities:	Resident Engineer
Completed/Current: 2010	
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Checkers, Burgundy	
Civil Infrastructure for Checkers, I	
Role & Responsibilities:	Assistant Design Engineer, Assistant Resident Engineer
Completed/Current: 2009	Contract Value: R44 million

#### CONTINUOUS PROFESSIONAL DEVELOPMENT

- Non-Motorised Transport Planning and Design (SARF, 2015)
- AutoTrack Training Level One (Point A CAD Solutions, 2012)
- Environmental Engineering (University of Stellenbosch, 2010)
- Intelligent Transport Systems (University of Stellenbosch, 2010)
- 2010 Highway Capacity Manual (University of Stellenbosch, 2010)
- Contract Administration (SAICE, 2010)
- Water Network Analysis (Water Institute of South Africa, 2010)
- Traffic Signal Design (SARF, 2007)
- Sidra & Traffix Workshop (SAICE, 2007)

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