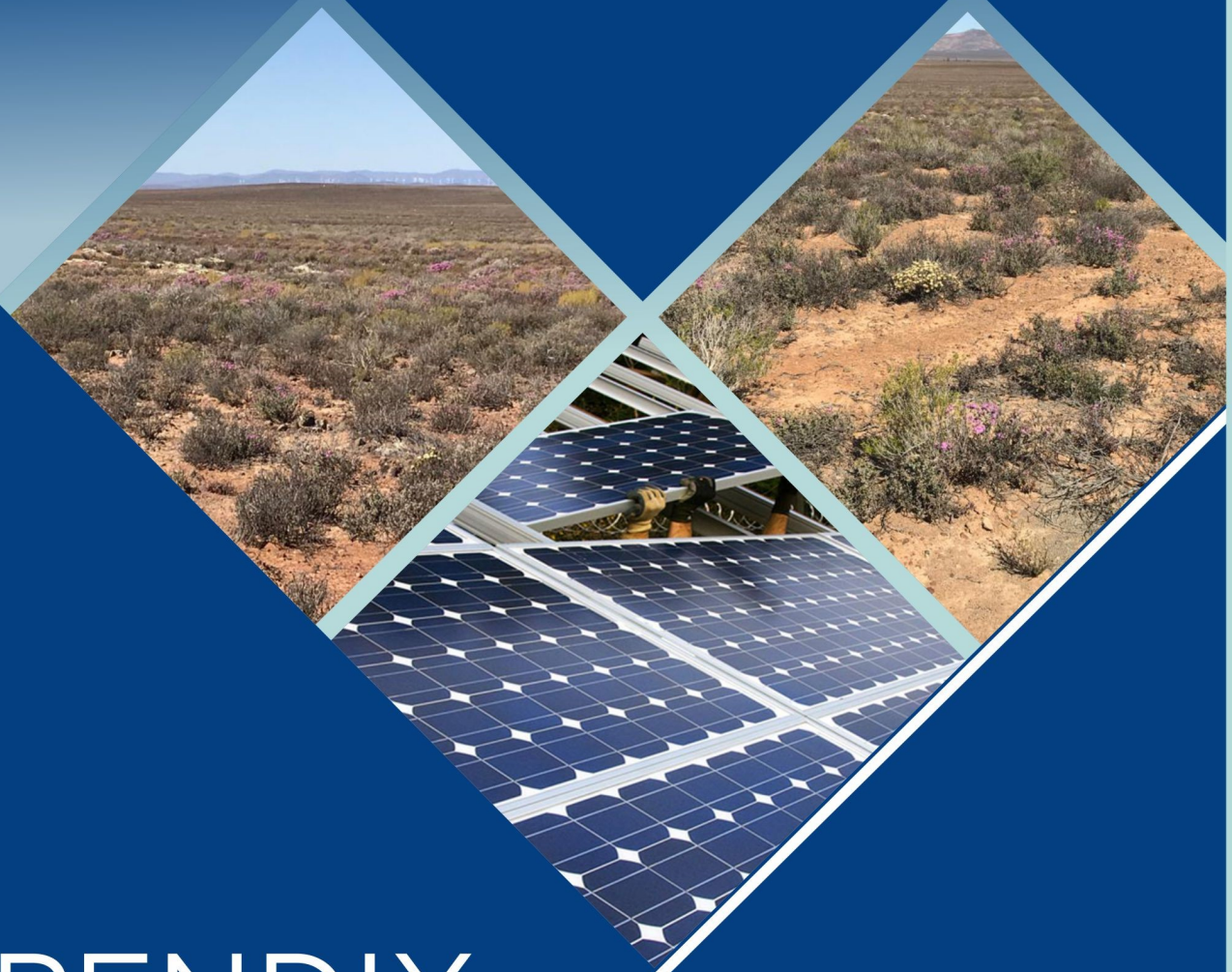
Basic Assessment for the Proposed Development of three 175 MW Solar Photovoltaic Facilities and associated Infrastructure (i.e. Grootfontein PV 1, Grootfontein PV 2, and Grootfontein PV 3), near Touws River, Western Cape



APPENDIX I

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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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TRAFFIC IMPACT STATEMENT FOR THE PROPOSED GROOTFONTEIN PV 1, GROOTFONTEIN PV 2 AND GROOTFONTEIN PV 3 PV PLANTS AND ASSOCIATED ELECTRICAL GRID INFRASTRUCTURE NEAR TOUWS RIVER, WESTERN CAPE.

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SYNOPSIS:
This report assesses the key transportation issues pertaining to the proposed Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 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

TABLE OF CONTENTS

Figures

TABLES

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 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.

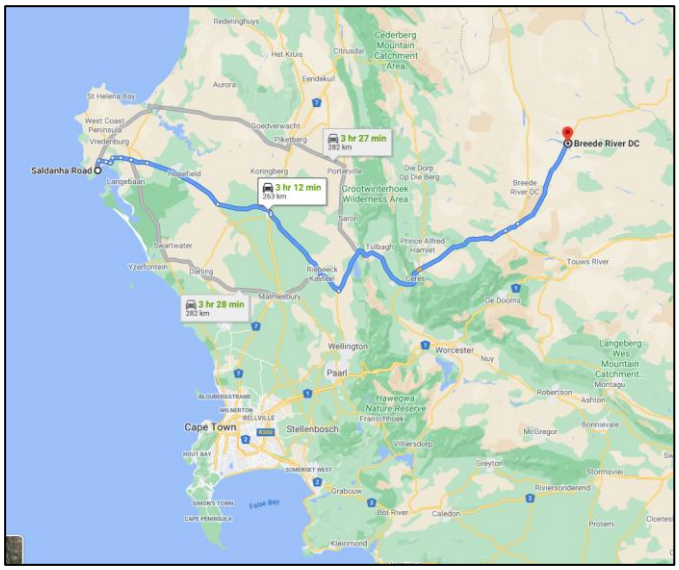


Figure 2: Possible Route Alternatives – Port of Saldanha Bay

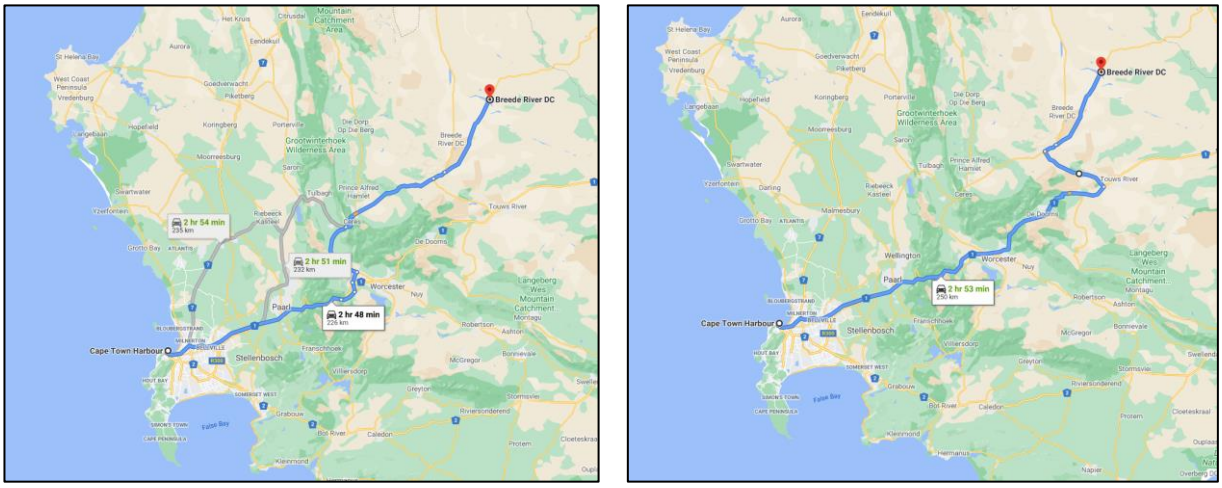


Figure 3: Possible Route Alternatives: Cape Town Harbour

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.

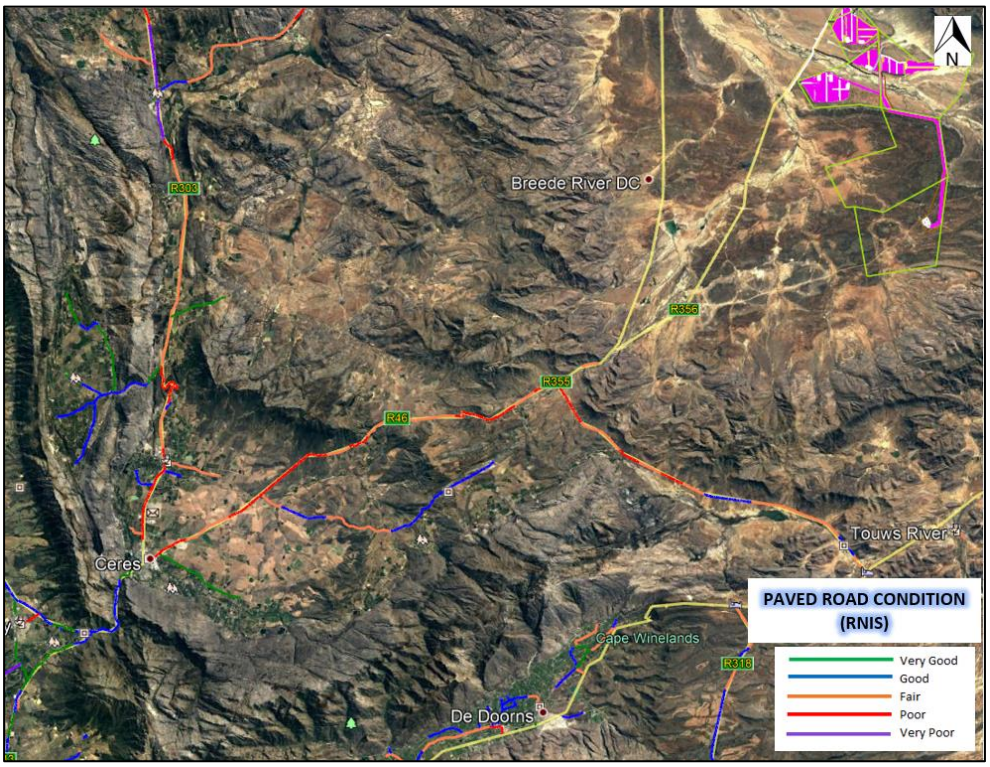


Figure 4: Paved Road Conditions

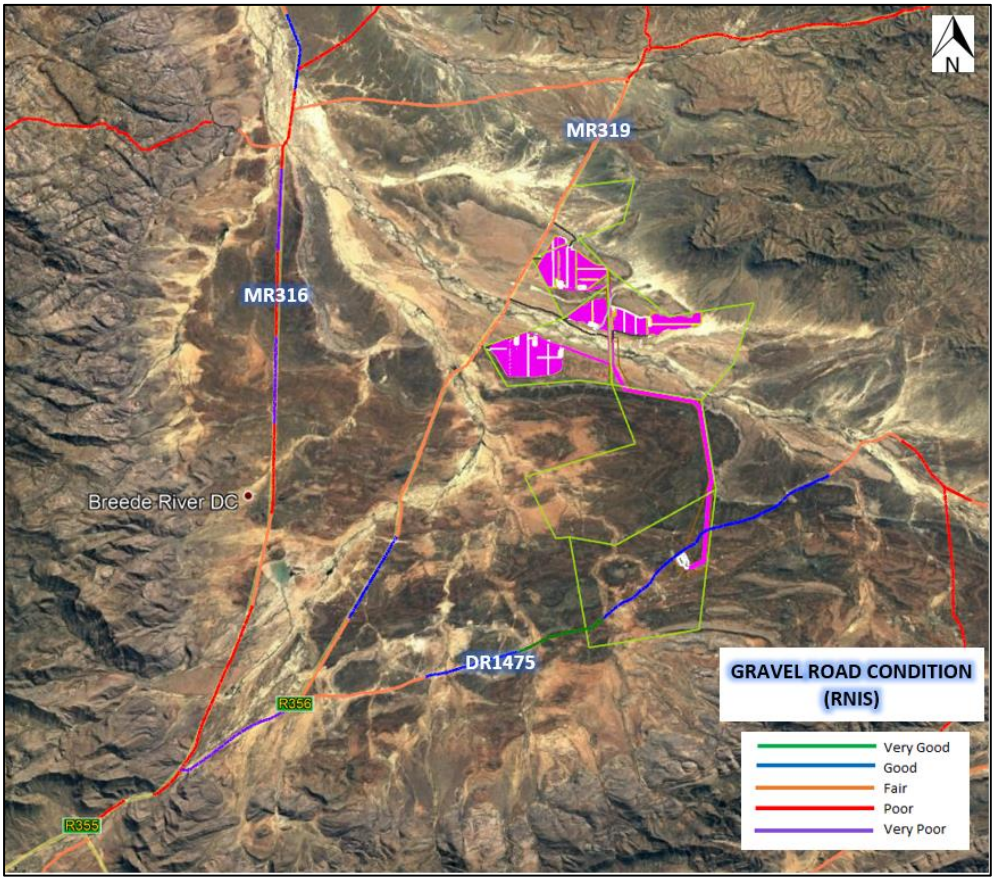


Figure 5: Gravel Road Conditions

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 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.

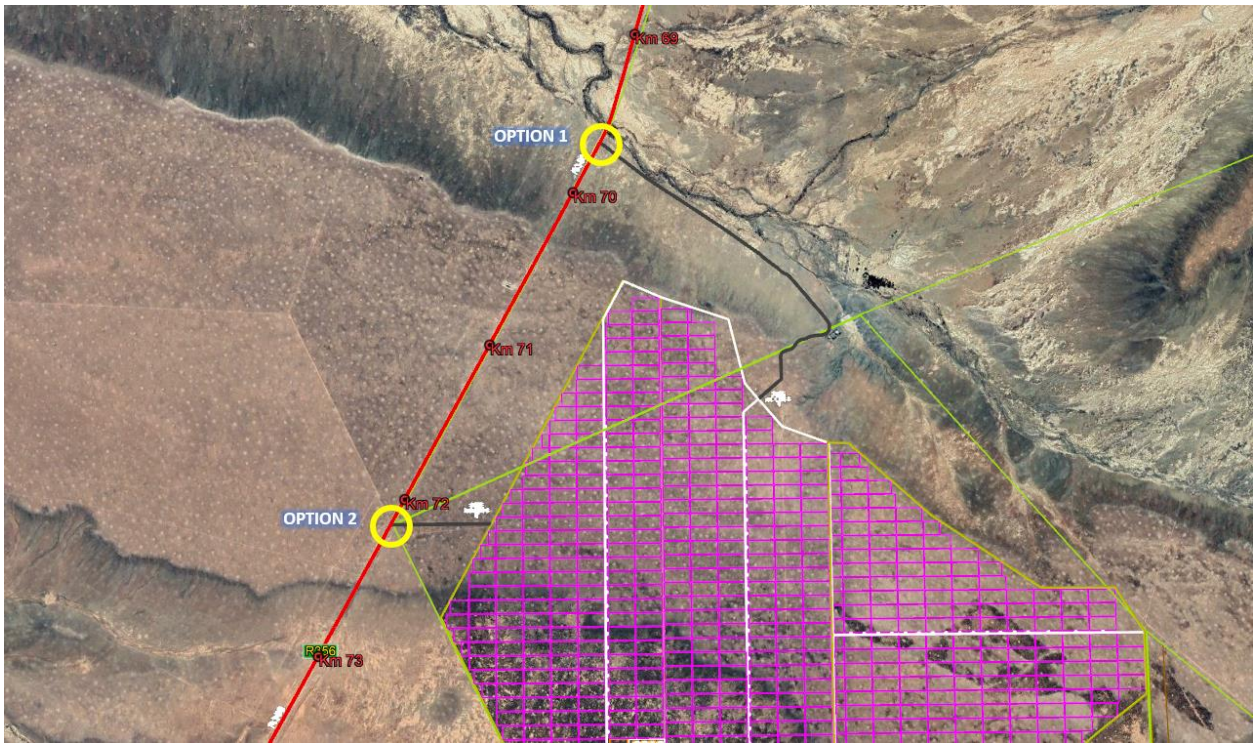


Figure 8: Grootfontein Access Locations

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 south-west 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.

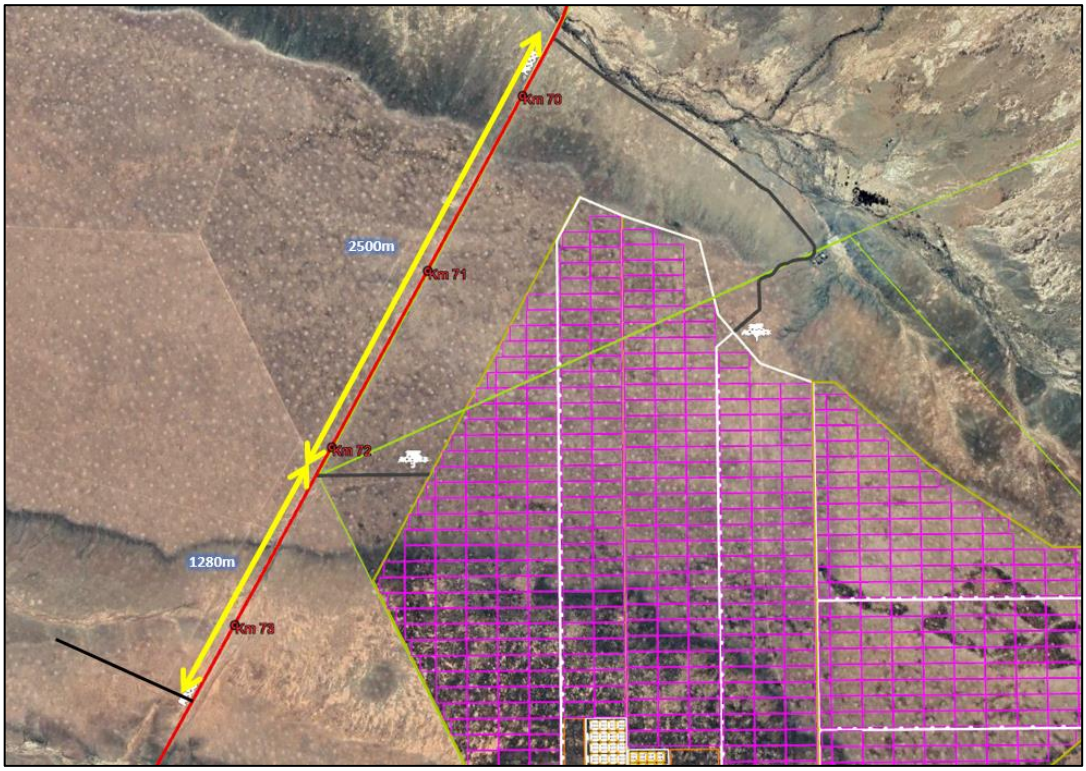


Figure 9: Access Spacing

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**.

Sight Distance to the Left

Sight Distance to the Right

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.

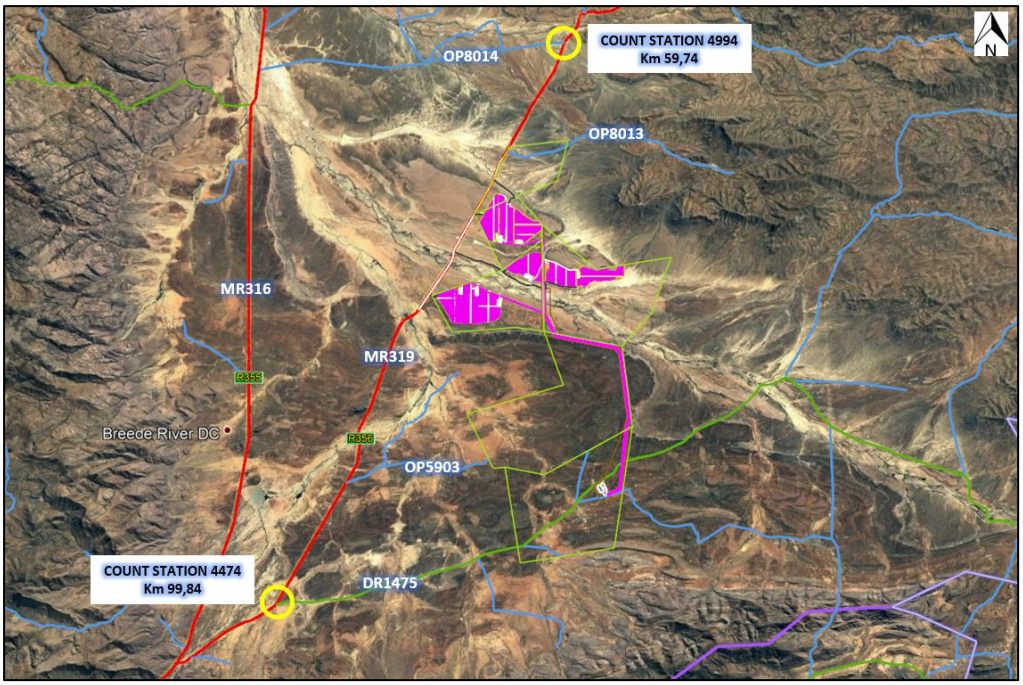


Figure 12: Location of Count Stations

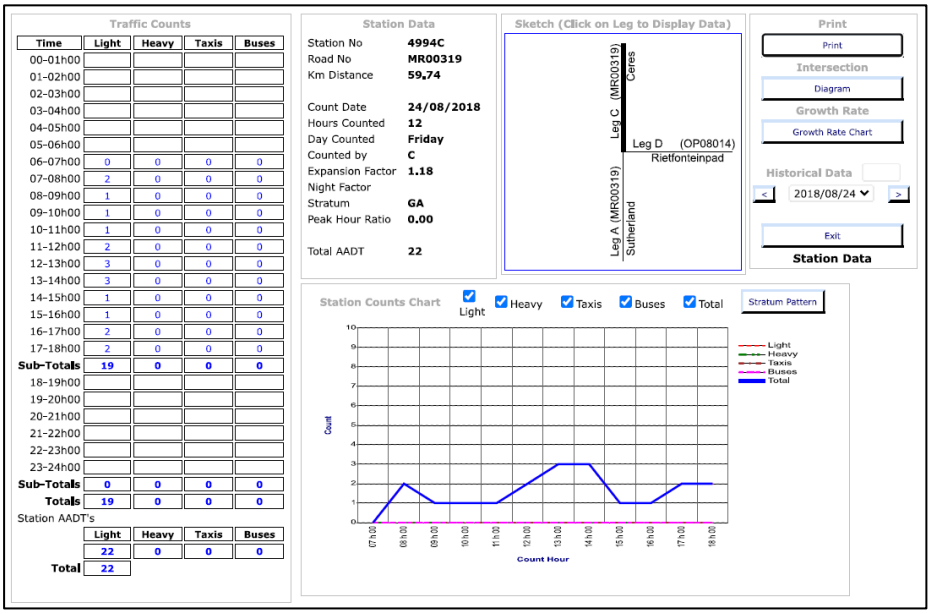
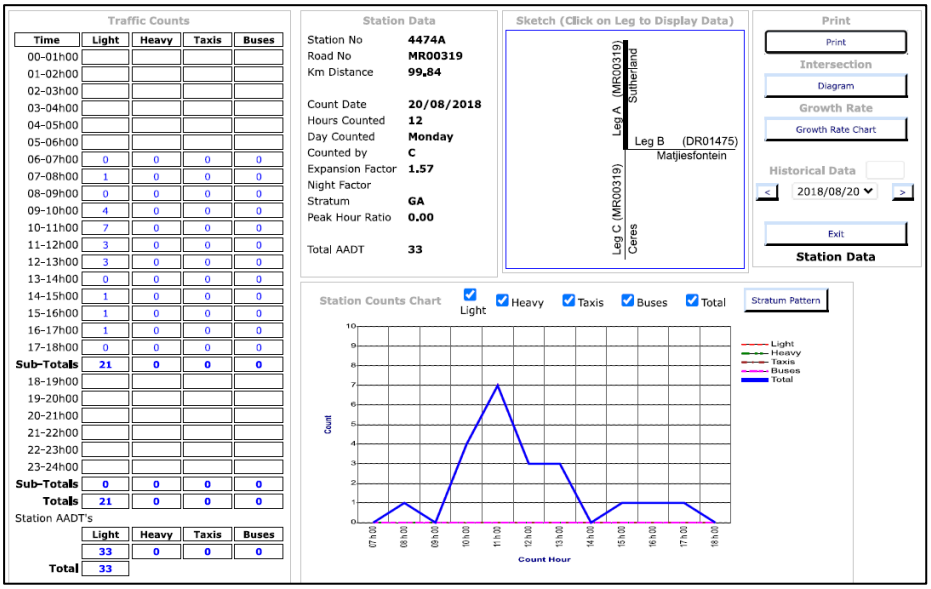


Figure 13: Station 4994 Count Information



Time	Light	Heavy	Taxis	Buses
00-01h00				
01-02h00				
02-03h00				
03-04h00				
04-05h00				
05-06h00				
06-07h00	0	0	0	0
07-08h00	1	0	0	0
08-09h00	0	0	0	0
09-10h00	4	0	0	0
10-11h00	7	0	0	0
11-12h00	3	0	0	0
12-13h00	3	0	0	0
13-14h00	0	0	0	0
14-15h00	1	0	0	0
15-16h00	1	0	0	0
16-17h00	1	0	0	0
17-18h00	0	0	0	0
Sub-Totals	**21**	**0**	**0**	**0**
18-19h00				
19-20h00				
20-21h00				
21-22h00				
22-23h00				
23-24h00				
Sub-Totals	**0**	**0**	**0**	**0**
Totals	**21**	**0**	**0**	**0**

Light	Heavy	Taxis	Buses
33	0	0	0

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:

Table 1: Rating of Traffic Related Impacts

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
CONSTRUCTION AND DECOMMISIONING PHASE						
Congestion and delays on road network	Status	Neutral	Very Low Risk / Impact (5)	Stagger delivery trips and schedule trips outside of peak hours.	Very Low (5)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Slight				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Potential impact on traffic safety and increase in accidents with other vehicles and animals	Status	Neutral	Low Risk / Impact (4)	Speed control by means of stop and go system and speed limit road signage.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Condition of road surface	Status	Neutral	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
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Slight				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Dust Pollution	Status	Neutral	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 Extent	Local				
	Duration	Medium Term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Noise Pollution	Status	Neutral	Low Risk / Impact (4)	Stagger delivery trips.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				
OPERATIONAL PHASE						
The traffic generated during the operational phase will not have a significant impact on the surrounding road network.						

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.

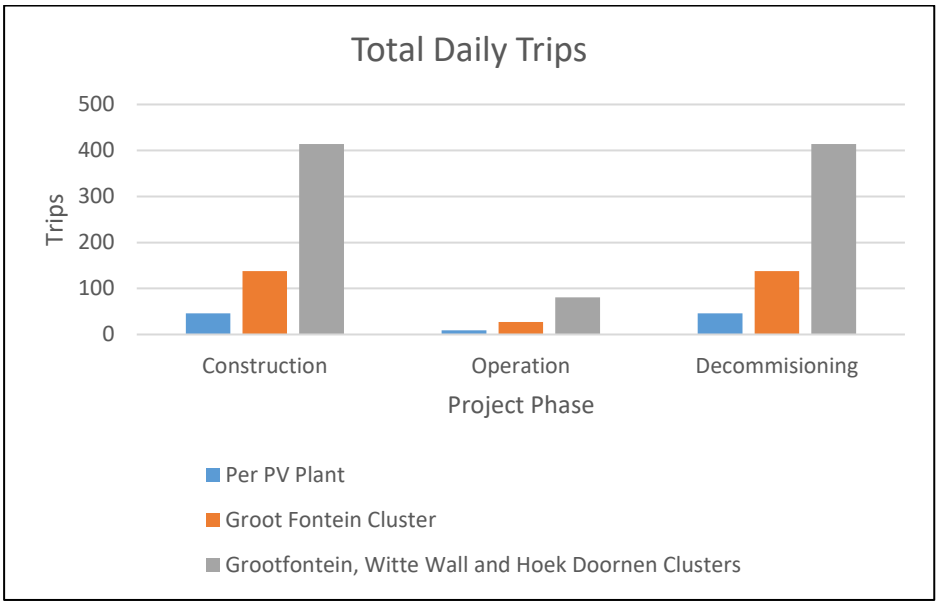


Figure 15: Total Cumulative Daily Trips

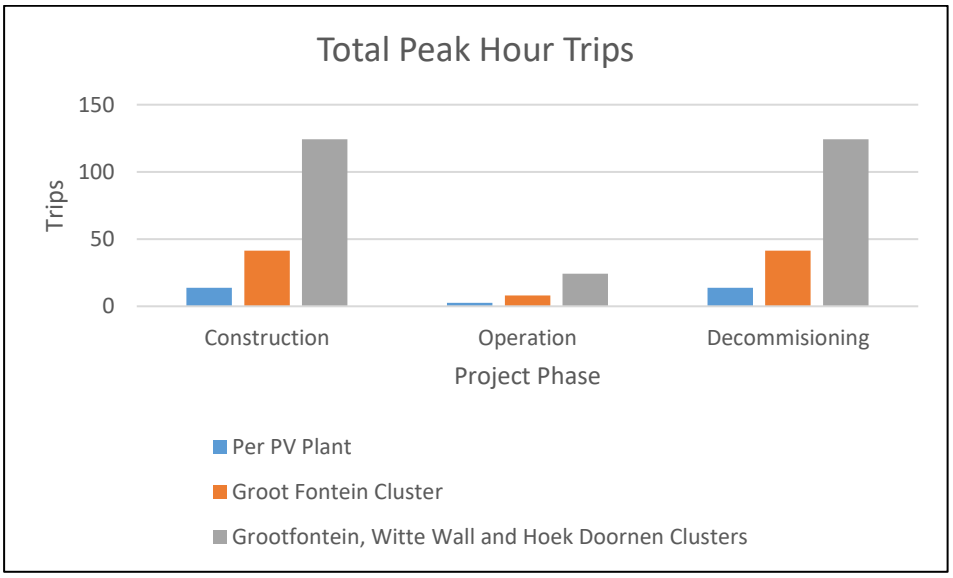


Figure 16: Total Cumulative Average Peak Hour Trips

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:

Table 2: Cumulative Rating of Traffic Related Impacts

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
CONSTRUCTION AND DECOMMISIONING PHASE						
Congestion and Delays on road network	Status	Neutral	Low Risk / Impact (4)	Stagger delivery trips and schedule trips outside of peak hours.	Very Low (5)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Substantial				
	Probability	Very Unlikely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Potential impact on traffic safety and increase in accidents with other vehicles and animals	Status	Neutral	Low Risk / Impact (4)	Speed control by means of stop and go system and speed limit road signage.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Condition of road surface	Status	Neutral	Low Risk / Impact (4)	Regular maintenance of access roads by the contractor. Ensure access roads are restored to original pre-construction road condition.	Very Low (5)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Substantial				
	Probability	Very Unlikely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Dust Pollution	Status	Neutral	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 Extent	Local				
	Duration	Medium Term				
	Consequence	Severe				
	Probability	Very Unlikely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Noise Pollution	Status	Neutral	Low Risk / Impact (4)	Stagger delivery trips.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Severe				
	Probability	Very Unlikely				
	Reversibility	High				
	Irreplaceability	Replaceable				
OPERATIONAL PHASE						
The traffic generated during the operational phase will not have a significant impact on the surrounding road network.						

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
- 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 Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 SEFs can be supported from a traffic engineering perspective.

REFERENCES

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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

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CURRICULUM VITAE

ANNEBET KRIGE (Pr Eng)

TRAFFIC ENGINEER

Date and place of birth:	**20 November 1984, Pretoria**
Tertiary qualification:	**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

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PROJECT EXPERIENCE: TRANSPORTATION ENGINEERING – TRAFFIC STUDIES

Oshakati	**Element Namibia**
Traffic Impact Assessment for the proposed Oshakati Mall Development	
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	**Study Value:** R48 900

Bergriver Housing Tender	**Bergriver Municipality**
Traffic Impact Assessment for the proposed Bergriver Housing Developments	
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	**Study Value:** R217 500

Van Kervel Special School	**Uhambiso Consult**
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

Monwabisi Park	**City of Cape Town**
Traffic Impact Assessment for the Monwabisi Park Informal Settlement	
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	**Study Value:** R180 550

Loop Street Signs	**Wide Open Platform**
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) Ltds**
Traffic Impact Statement for the Proposed Apartments on Erf 38099, Sunningdale	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2019	**Study Value:** R27 900

Mamre Service Station	**Plan Africa Consulting**
Traffic Impact Assessment for the proposed Rezoning of Erf 615, Mamre	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2019	**Study Value:** R34 700

Erf 13811, Wellington	**Nortje & De Villiers Consulting Engineers**
Traffic Impact Assessment for the proposed Provence Development, Wellington	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2019	**Study Value:** R54 400

Allesverloren Lifestyle Village	**Latitude Property Solutions**
Traffic Impact Assessment for the proposed Allesverloren Lifestyle Estate Development, Riebeeck Wes	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2019	**Study Value:** R71 900

Langebaanweg Truck Stop	**West Coast Petroleum (Pty) Ltd**
Access Investigation / Traffic Impact Assessment for the proposed Langebaanweg Truck Stop	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2020	**Study Value:** R89 800

Erf 11919, Paarl	**Van der Sluys Projects**
Traffic Impact Assessment for the proposed Retail Development on Erf 11919, Paarl	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2020	**Study Value:** R136 900

Erf 838, Milnerton	**Headland Planners (Pty) LLtd**
Traffic Impact Assessment for the Proposed Fruit and Veg Retail Development	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2019	**Study Value:** R60 500

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PROJECT EXPERIENCE: TRANSPORTATION ENGINEERING – TRAFFIC STUDIES...continued

Abbotsdale	**CK Rumboll and Partners**
Traffic Impact Assessment for the Industrial Development on Portion A of Erf 373, Abbotsdale	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2019	**Study Value:** R60 100

Grootfontein – Tsumkwe Feasibility Study	**Pregon Consulting Engineers**
Feasibility Study for the Upgrade to Bitumen Standard of M0074: Grootfontein - Tsumkwe	
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	**Study Value:** R163 600

Eros Traffic Study, Windhoek	**Element Namibia**
Traffic Impact Study for the densification of Eros, Windhoek	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2019	**Study Value:** R37 900

Paarl East Housing Development	**Aurecon**
Traffic Impact Study for the development of 650 housing opportunities	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2018	**Study Value:** R61 750

Bella Riva Lifestyle Development	
Traffic Impact Study for Bella Riva Lifestyle Development (5875 unit)	
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	**Study Value:** R172 000

Mahama Infill Housing Development	**ACE Consulting**
Traffic Impact Study for the Mahama Infill Housing Project	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2018	**Study Value:** R157 500

Blueberry Hill Housing Development	**Nadeson Consulting**
Traffic Impact Study for the development 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 Design of Jip de Jager Road	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2018	**Study Value:** R175 000

Brentwood Park	
Traffic Impact Study for the Brentwood Park GAP Housing Development	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2017	**Study Value:** R75 000

Curro Windhoek	
Traffic Impact Study for Curro WIndhoek	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2017	**Study Value:** R75 000

Schaapkraal	
Traffic Impact Study for the Schaapkraal GAP Housing Development, Mitchells Plain	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2017	**Study Value:** R75 000

Trekoskraal	
Traffic Impact Study for the Trekoskraal Development, West Coast	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2017	**Study Value:** R70 000

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PROJECT EXPERIENCE: TRANSPORTATION ENGINEERING – TRAFFIC STUDIES...continued

Sleeper Site, East London	
Traffic Study for the Developmenet 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 intersections in Worcester	
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 Development	
Traffic Impact Study for the Welgedaan Residential Development, Saldanha	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2017	**Study Value:** R49 000

Malmesbury Sand Mine	**Tip Trans Logistix**
Traffic Impact Statement for a Sand Mine, Malmesbury	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2017	**Study Value:** R24 500

Richards Bay Traffic Signals	**City of uMhlathuze**
Appointment of a Traffic Consultant to conduct a study to warrant the installation of Traffic Signals	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2017	**Study Value:** R 167 500

Strand Storage Facilities	**Asla Devco**
Traffic Impact Study for the proposed Storage and Office Facilities in Strand	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2017	**Study Value:** R33 500

Dube Tradeport	**Dube Tradeport**
Traffic Impact Study for Dube Tradeport, Durban	
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	**Study Value:** R80 000

Laguna Mall	**Milprops 365**
Traffic Impact Study for Laguna Mall, Langebaan	
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	**Study Value:** R28 000

Turfhall Primary School	**Orrie, Welby-Solomon & Associates**
Traffic Impact Study for Turfhall Primary School	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2016	**Study Value:** R38 000

Curro Uitzicht	**Curro Holdings**
Traffic Impact Study for the development of a Curro Castle in Uitzicht	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2016	**Study Value:** R35 000

Morgen's Village	**Cape Town Community Housing**
Traffic Impact Study for the development of 650 residential units on Erf 2435, Mitchells Plain	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2016	**Study Value:** R68 000

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PROJECT EXPERIENCE: TRANSPORTATION ENGINEERING – TRAFFIC STUDIES...continued

Curro Burgundy	**Curro Holdings**
Traffic Impact Study for the development of a Curro Castle in Burgundy Estate	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2016	**Study Value:** R48 000

Paarl Development	**Baobab Properties**
Traffic Impact Study for the Development of Farm 851 Portion 9, Paarl	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2016	**Study Value:** R48 000

Erf 68, Kylemore	**Jomar Services**
Traffic Impact Statement for the Development of Erf 68, Kylemore	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2015	**Study Value:** R30 000

Curro Benoni	**Curro Holdings**
Traffic Impact Study for the Development of a Curro Academy on Erf 7940, Benoni	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2015	**Study Value:** R65 000

Curro Constantia	**Curro Holdings**
Traffic Impact Study for the development of a Curro Castle in Constantia	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2015	**Study Value:** R30 000

Hout Bay International School, Hout Bay	**Hout Bay International School**
Parking Study for the Hout Bay International School	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2014	**Study Value:** R55 000

District 6, Cape Town	**Department of Rural Development and Land Reform**
Traffic Impact Study for District 6, Cape Town	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2013	**Contract Value:** Unknown

PPC Mine, Vanrhynsdorp	**CK Rumboll & Partners**
Traffic Impact Statement for the Access to the Proposed PPC Mine, Vanrhynsdorp	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2013	**Contract Value:** Unknown

IDZ, Saldanha Bay	**Saldanha Bay IDZ**
Traffic Impact Study for the Saldanha Bay IDZ Development	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2012	**Contract Value:** R500 million

Sawmill, Wemmershoek	**Owner**
Traffic Impact Study for the Wemmershoek Sawmill	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2012	**Contract Value:** Unknown

Sandown Centre, Parklands	**Leon Smith Architects**
Parking Study for the Sandown Shopping Centre in Parklands	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2011	**Contract Value:** Unknown

PROJECT EXPERIENCE: TRANSPORTATION ENGINEERING – TRAFFIC STUDIES...continued

Pick n Pay, Brackenfell	**Pick & Pay Brackenfell**
Parking and Circulation Study for Pick n Pay, Brackenfell	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2011	**Contract Value:** Unknown

Hoek van de Berg, Hawston	
Traffic Impact Study for the Development of an Eco-Estate on Farm Hoek van de Berg, Hawston	
Role & Responsibilities:	Assistant Traffic Engineer
Completed/Current: 2011	**Study Value:** R125 000

Tygervalley Extensions, Bellville	
Traffic Impact Study for the Tygervalley Extensions, Bellville	
Role & Responsibilities:	Assistant Traffic Engineer
Completed/Current: 2009	**Study Value:** R165 000

Upgrading of MR168, Stellenbosch	**Provincial Administration: Western Cape**
Traffic Impact Study for the upgrading 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 Downs Development	
Role & Responsibilities:	Assistant Traffic Engineer
Completed/Current: 2009	**Contract Value:** R12 million

Buhrein, Kraaifontein	**MSP Developments**
Traffic Impact Study for the Buhrein Development	
Role & Responsibilities:	Assistant Traffic Engineer
Completed/Current: 2008	**Contract Value:** R45 million

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PROJECT EXPERIENCE: TRANSPORTATION ENGINEERING – TRAFFIC SIGNAL DESIGN

Brackengate Industrial Development	**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, Richards Bay	**Richards Bay IDZ**
Upgrading of Traffic Signals at the 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: TCT**
Upgrading of Traffic Signal Layouts in Cape Town	
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	**Contract Value:** Unknown

Erf 16161, Paarl	**Asla**
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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PROJECT EXPERIENCE: TRANSPORTATION ENGINEERING – GENERAL TRAFFIC ENGINEERING

Road Safety Audit	**Namibia Roads Authority**
Road Safety Audit for T0602: Gobabis 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-Motorised Transport programme to the City of Cape Town	
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	**Contract Value:** R50m

Westbury Pedestrian Bridge, Johannesburg	**Johannesburg Development Agency**
Traffic Accommodation Plan for the construction of the Westbury Pedestrian Bridge, Johannesburg	
Role & Responsibilities:	Traffic Engineer
Completed/Current: Current	**Contract Value:** Unknown

Erven 13259 and 13585, Brackenfell	**Group 5 Property Development**
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 Stations, Soweto	**Johannesburg Roads Authority**
Non-motorised Transport for Lakeview 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 Planning	
Role & Responsibilities:	Assistant Traffic Engineer
Completed/Current: 2013	**Contract Value:** Unknown

Traffic Accommodation, Cape Town	**Group 5**
Traffic Accommodation plan for the upgrading of intersections in Cape Town CBD	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2013	**Contract Value:** Unknown

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PROJECT EXPERIENCE: REHABILITATION / RESEAL / NEW ROAD CONSTRUCTION

Upgrading of Medway Road, Richards Bay	
Upgrading of Medway Road	
Role & Responsibilities:	Assistant Engineer
Completed/Current: Current	**Contract Value:** R50 million

Trunk Road 32 between N2 and Herbertsdale	**Provincial Government Western Cape**
The Reseal / Rehabilitation of a section 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**
Repair and Reseal of National Route 7 Section 7 between Garies and km 60	
Role & Responsibilities:	Assistant Engineer
Completed/Current: Current	**Contract Value:** R101.4 million

National Route 7, Okiep	**SANRAL**
Repair and Reseal of National Route 7 Section 7 to 8 between km 60 and Okiep	
Role & Responsibilities:	Assistant Engineer
Completed/Current: Current	**Contract Value:** R95.5 million

Roads P122/1, P249/1, P39/1, P241/1(D405) and K111, Muldersdrift	
Rehabilitation of Roads P122/1, P249/1, P39/1, P241/1(D405) and K111, Muldersdrift	
Role & Responsibilities:	Assistant Engineer
Completed/Current: Current	**Contract Value:** Unknown

Trunk Road 32 between Ashton and Swellendam	**Provincial Government Western Cape**
The Reseal of Trunk Road 32 Section 1 between Ashton and Swellendam, Main Road 283 and Divisional Road 1329	
Role & Responsibilities:	Assistant Engineer
Completed/Current: 2014	**Contract Value:** R60.8 million

National Route 14 Section 1 between Witputs and Pofadder	**SANRAL**
Repair and reseal N14 between Witputs and Pofadder	
Role & Responsibilities:	Assistant Engineer
Completed/Current: 2013	**Contract Value:** R70.3 million

National Route 14 Section 2 between Bladgrond and Kakamas	**SANRAL**
Repair and reseal: National route 14 Section 2 between Bladgrond (Km 59.00) and Kakamas 9Km 131.00)	
Role & Responsibilities:	Assistant Engineer
Completed/Current: 2014	**Contract Value:** R89.1 million

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PROJECT EXPERIENCE: CIVIL INFRASTRUCTURE

Sitari, Somerset West	
Civil Engineering Services for Sitari Fields, Somerset West	
Role & Responsibilities:	Assistant Resident Engineer
Completed/Current: Current	**Contract Value:** R350m

Van der Stel, Stellenbosch	
Upgrading of the Van der Stel Sport Complex parking area	
Role & Responsibilities:	Resident Engineer
Completed/Current: 2012	**Contract Value:** R700 000

CSP Plant, Upington	
Access to the proposed CSP Plant	
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 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 Accesses for the Blue Downs Development	
Role & Responsibilities:	Assistant Design Engineer
Completed/Current: 2010	**Contract Value:** R12 million

Shoprite, Strand	
Construction of Broadway Shoprite Access Road, Strand	
Role & Responsibilities:	Resident Engineer
Completed/Current: 2010	**Contract Value:** R950 000

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)