TRAFFIC ENGINEERING SPECIALIST SCOPING REPORT INPUTS:

Scoping and Environmental Impact Assessment (EIA) Process for the Proposed Development of a Solar Photovoltaic Facility and associated infrastructure on the Remained of Farm 167, Portion 2 of Farm 167, Portion 1 of Farm 166, Portion 2 of Farm 166 and Farm 315, near Hopefield, Western Cape Province

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List of Abbreviations

ADT	Average Daily Traffic
EIA	Environmental Impact Assessment
BA	Basic Assessment
DEA	Department of Environmental Affairs
PV	Photovoltaic
TIS	Traffic Impact Study
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
SEF	Solar Energy Facility

This report serves as the Traffic Engineering Scoping Report input that was prepared as part of the Scoping and Environmental Impact Assessment (EIA) Process for the proposed development of a Solar Photovoltaic (PV) Facility and associated infrastructure on the Remainder of Farm 167, Portion 2 of Farm 167, Portion 1 of Farm 166, Portion 2 of Farm 166 and Farm 315, near Hopefield, Western Cape Province.

1. Introduction

1.1 Scope, Purpose and Objectives of this Specialist Input to the Scoping Report

Solar Capital is intending to develop a Solar PV facility, located to the north-east of Hopefield in the Western Cape Province, as shown in Figure 1. The project will entail the proposed development of a Solar PV facility and associated electrical infrastructure that will be constructed in 13 phases. Each phase of the PV facility will have an estimated capacity ranging from up to 25 MWac to 170 MWac.

Figure 1: Locality Plan

The scope of the Traffic Engineering Impact Assessment is to 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. The report identifies the preferred access route to the site, comments on the condition of the existing roads in the vicinity of the site and identifies possible access points to the site.

The primary purpose of this Traffic Engineering Impact Assessment is therefore to provide inputs to the Draft Scoping Report for projects as required by the 2014 National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) EIA Regulations (as amended).

Separate reports have not been compiled for each phase of the proposed PV facility. This report covers the entire proposed Solar Facility and associated infrastructure.

1.2 Details of Specialist

This specialist assessment has been undertaken by Annebet Krige of Sturgeon Consulting (Pty) Ltd, Traffic Engineering and Transport Planning Specialists. Annebet Krige is registered with the Engineering Council of South Africa with Registration Number 20150161 in the field of Traffic Engineering. A curriculum vitae is included in Appendix A of this specialist input report.

In addition, a signed specialist statement of independence is included in Appendix B of this specialist input report.

1.3 Terms of Reference

The Terms of Reference for the Traffic Impact Study that will be completed during the EIA Phase of the project include:

- Extent of the traffic study and study area;
- Site Observations;
- Proposed development description in relation to traffic related impacts;
- Existing and Future Road Planning;
- Existing traffic volumes on external road network;
- Access Assessment;
- Acceptability from a traffic safety point of view of the location of the access route(s) to the proposed facility;
- Trip generation of the proposed development during Construction, Operation and Decommissioning;
- Risk posed by construction and operational vehicles;
- Impact assessment;
- Based on existing volumes of traffic, recommendations for mitigations measures for traffic impacts where relevant

This specialist input to scoping incorporates the relevant inputs to be provided by the specialist in the scoping phase from the full set of Terms of Reference above.

2. Approach and Methodology

The report assesses possible access routes for the haulage of imported materials, the road network surrounding the proposed facility, possible access options and the traffic impact of the proposed facility on the surrounding road network in the vicinity of the site during the Construction, Operational and Decommissioning phases of the project.

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

- Site visit:
    - To be undertaken in 2024
    - Review of project background information.
    - Literature review and internet research.
- Access Routes and Access Point Assessment:
    - Evaluation of initial proposed access configurations.
    - Assessment of potential access roads.
- Traffic Impact:
    - Assessment of typical trip generation during the Construction, Operation and Decommissioning phases of the project.
    - Assessment of potential traffic impacts.

- Liaison with Applicant and/or project team.
- Preparation of report and figures.

2.1 Information Sources

The main information sources used for this Traffic Engineering Impact Assessment are listed below:

Data / Information	Source	Date	Type	Description
TMH 16 Volume 1 South African Traffic Impact and Site Traffic Assessment Manual	Committee of Transport Officials	August 2012	Manual	Requirements for Traffic Impact Studies in South Africa.
National Road Traffic Act, 1996 (Act No. 93 of 1996)	Department of Transport	1996	Government Gazette	To provide for road traffic matters which shall apply uniformly throughout the Republic and for matters connected therewith.
Amendment of the National Road Traffic Regulations	Department of Transport	2014	Government Notice	Regulations to the National Road Traffic Act, 1996 (Act No. 93 of 1996)
TRH 11: Dimensional and Mass Limitations and Other Requirements for Abnormal Load Vehicles	Department of Transport	August 2009	Government Notice	Description of abnormal loads and vehicle configurations and methods to determine road pavement damage
TRH 11: Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other events on Public Roads	Committee of State Road Authorities	March 2000	Report	Rules and Conditions which apply to the transport of abnormal loads and vehicles on public roads.

In addition to the above, the following Information was also used:

- Project Information provided by the EAP and Applicant;
- Google Earth files provided by the EAP and Applicant;
- Google Earth Satellite Imagery;
- Information gathered during the site visit; and
- Project research of all available information.

2.2 Assumptions, Knowledge Gaps and Limitations

The following assumptions, knowledge gaps and limitations will apply:

- The study is based on information supplied by the Applicant (Solar Capital) and the Environmental Consultants;

- Haulage and access will be limited to existing surfaced national and provincial and gravel roads;
- The internal farm roads within the boundary of the PV Facility will not be included in this study;
- Construction materials to be sourced and transported from local manufacturers where possible;
- All imported materials to be transported from the nearest, most viable port of entry;
- Maximum vertical height clearance along the haulage route is 5.2m for abnormal loads.

3. Description of Project Aspects relevant to Traffic Engineering Assessment

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

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

3.1 Construction Phase

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 and additional infrastructure.

3.2 Operational Phase

The following activities will occur during the operational phase:

- The generation of electricity from the proposed solar facility and supply of electricity;
- 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.

3.3 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.

3.4 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 12.19 m long x 2.44 m wide x 2.59 m 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.

4. Baseline Description

4.1 Study Area Definition

The study area for all the proposed Solar Facility is the full extent of the affected farm properties on which the proposed PV Facility will be constructed. The full extent of these properties has been assessed in this study. The total **study area** for all the proposed Solar Facilities is approximately 3 337.60 hectares (ha).

4.2 General Description – Existing Road Network

The proposed Solar PV facility will be located to the north-east of Hopefield in the Western Cape as shown in Figure 2.

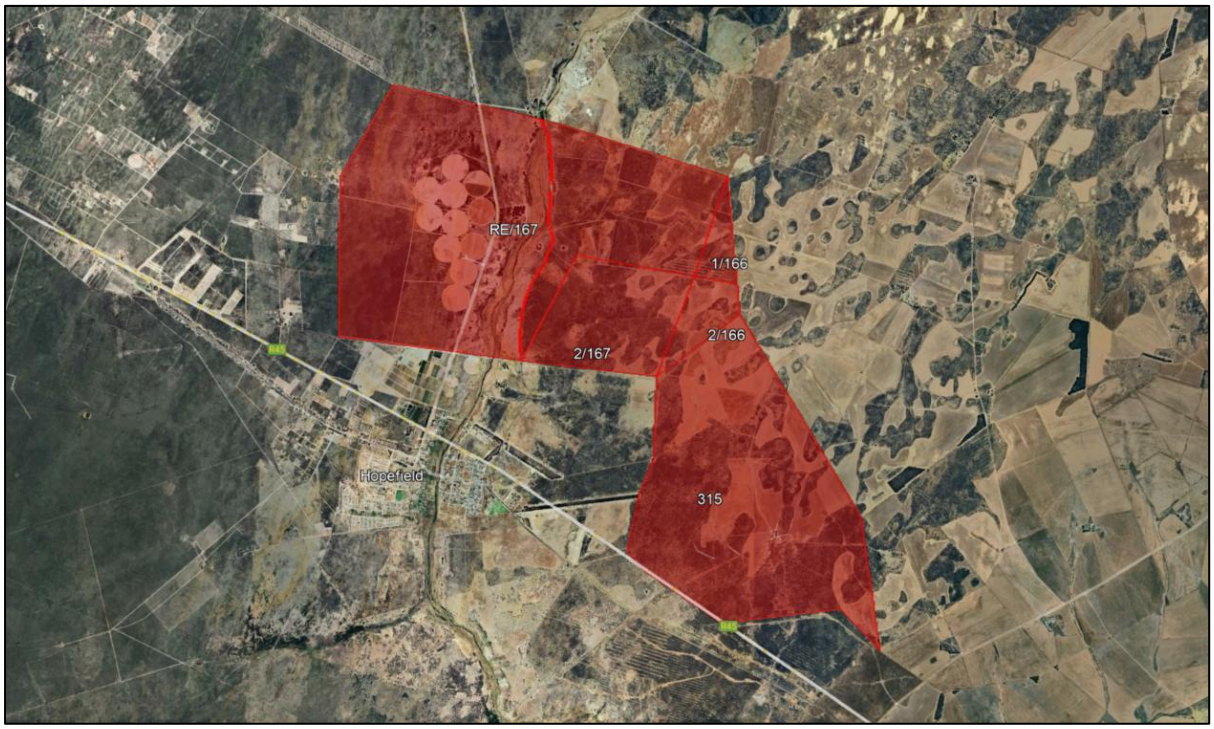


Figure 2: Proposed Solar PV Facility

Please note that trip generation rates and existing traffic conditions (based on available traffic counts) will be discussed during the EIA Phase, in the Traffic Impact Assessment report. It will however be discussed briefly in paragraph **Error! Reference source not found.**.

4.2.1 Haulage of Imported Materials

There are two options for the haulage of imported materials to the proposed PV facility as shown in the figures below. The preferred option will be the route from the Port of Saldanha as shown in Figure 3. The route is approximately 50km and follows the R399 from the Port and then turns east onto the R45 to Hopefield. From Hopefield the subject property can be accessed by the R45 or MR234.

Figure 3: Preferred Route

The first alternative option will be the route from the Port of Cape Town as shown in Figure 4 by the blue line. This route is approximately 126km and follows the N1 from the Cape Town Harbour towards Milnerton and then turns north onto the N7 to Malmesbury and then turns west onto the R45 towards Hopefield. From Hopefield the subject property can be accessed by the R45 or MR234.

Figure 4: Proposed Route: Alternative 1

It should be noted that the above-mentioned route alternatives will all need to navigate through intersections, over and underneath bridges and other road structures, across railway lines and also along mountain passes. It is critical that the abnormal load vehicles can move safely and without obstruction along these routes. It is however anticipated that this is achievable, considering other solar facilities in the vicinity of the proposed site.

4.2.2 Main Roads in the Vicinity of the Site

The main roads in the vicinity of the PV facility are shown in Table 1 and Figure 5. Table 1 also provides details with regards to the controlling and maintaining road authority, width of the road and whether the road is a gravel or surfaced (tarred) road.

Table 1: Main Roads in the Vicinity of the Site

Road Name	Road Authority	Road Width	Gravel / Surfaced
Trunk Road 21/1 (TR2101) (R45)	Western Cape Provincial Government	±11.7m blacktop and ±2.2m and more gravel shoulders along both sides of the road	Surfaced
Trunk Road 21/2 (TR2102) (R45)	Western Cape Provincial Government	±11.7m blacktop and ±2.2m and more gravel shoulders along both sides of the road	Surfaced
Main Road 234 (MR234)	Western Cape Provincial Government	Between ±8.6m and ±9.0m	Surfaced
Divisional Road 1173 (DR1173)	Western Cape Provincial Government	Between ±11.0m and ±12.5m	Gravel
Minor Road 5560 (OP5560)	Western Cape Provincial Government	Between ±5.7m and ±8.0m	Gravel
Minor Road 7626 (OP7626)	Western Cape Provincial Government	Between ±3.6m and ±4.0m	Gravel
Minor Road 5562 (OP5562)	Western Cape Provincial Government	Between ±7.3m and ±11.9m	Gravel
Minor Road 5561 (OP5561)	Western Cape Provincial Government	Between ±3.5m and ±8.9m	Gravel

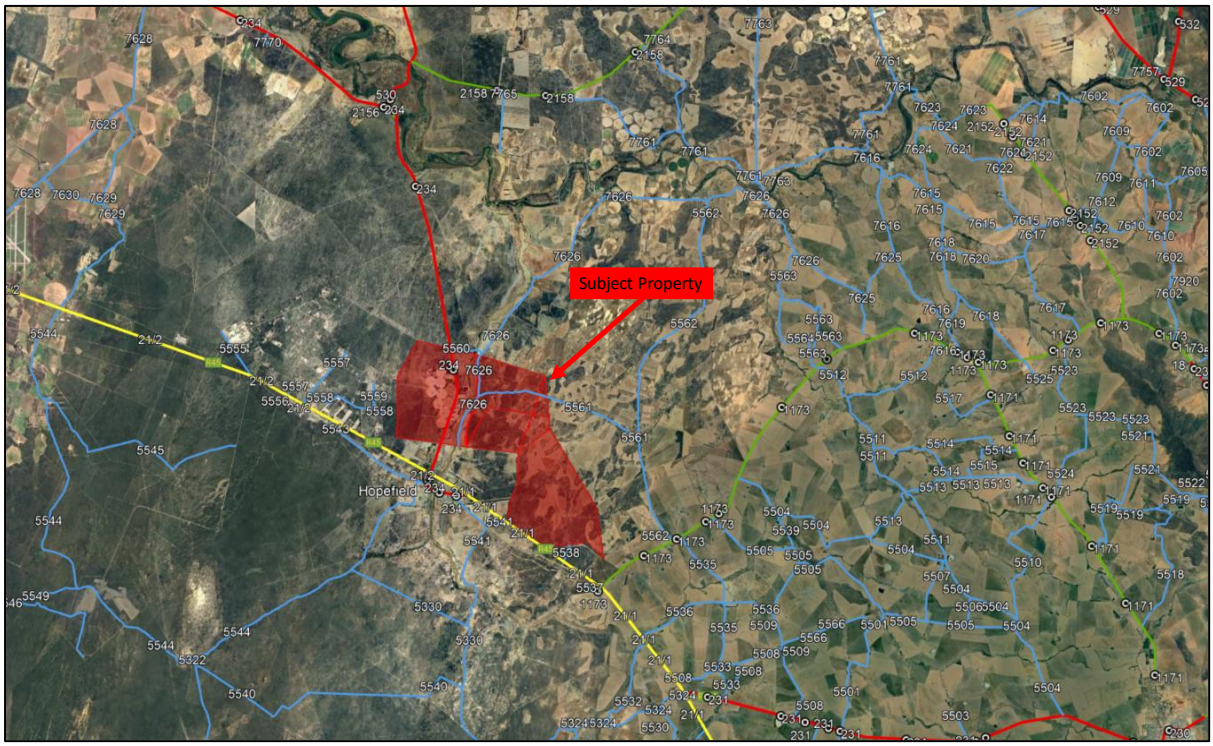


Figure 5: Main Roads in the Vicinity of the Site

4.2.3 Main Access Considerations

As indicated in the previous paragraph, various existing provincial gravel roads from the R45 (Trunk Road 21/1 and Trunk Road 21/2) or MR234 (Main Road 234) can provide access to the site. This can be seen in Figure 6 below.

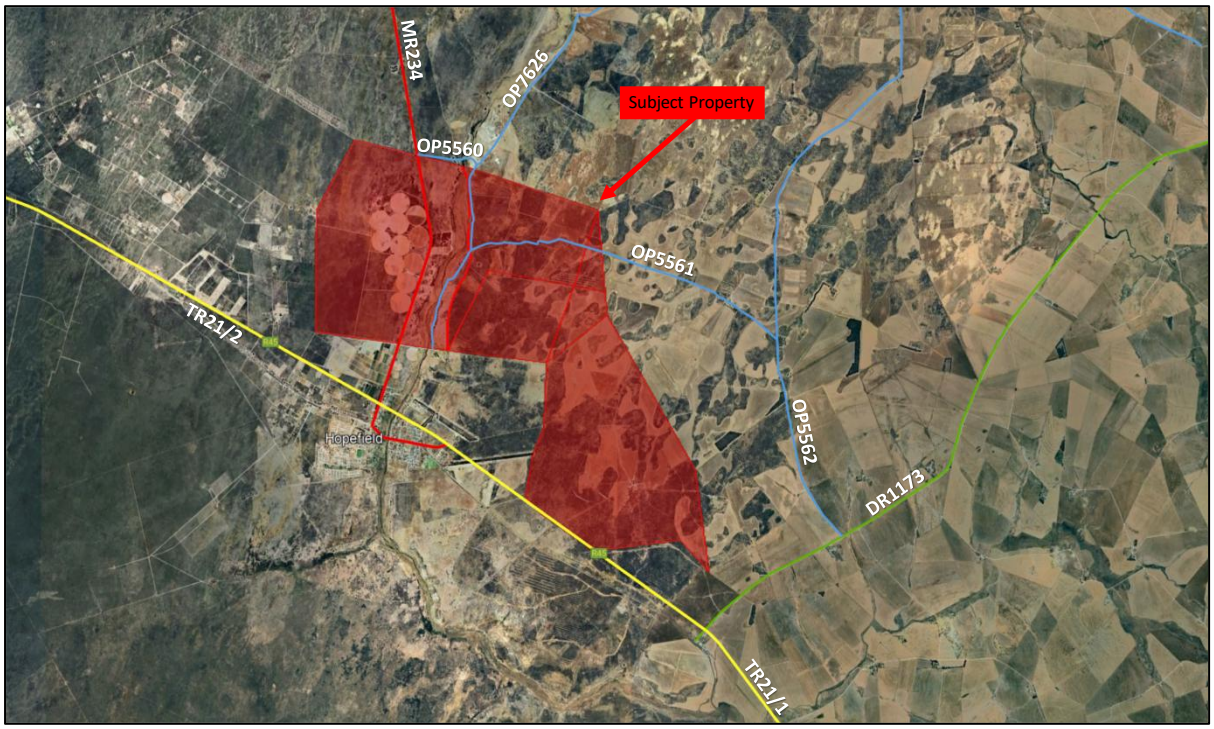


Figure 6: Proposed Solar PV Facility Gravel Roads

The potential main access roads to the proposed facility as shown in Figure 6 and Figure 7 are:

- Access Route Option 1:
  - Along TR21/2, MR234, OP5560 and OP7626
- Access Route Option 2:
  - Along TR21/2 and TR21/1
- Access Route Option 3:
  - Along TR21/2, TR21/1 DR1173, OP5562 and OP5561

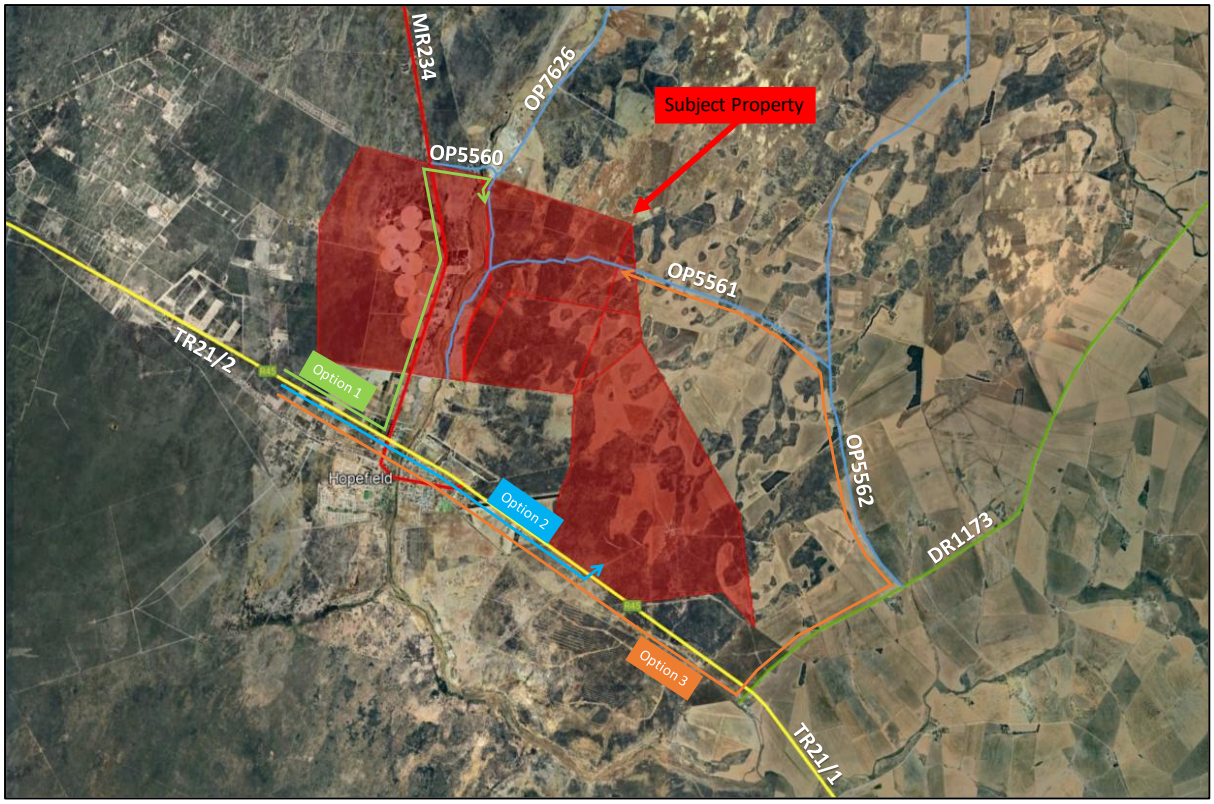


Figure 7: Proposed Access Roads

4.2.3.1 *Access Route Option 1*

The main access point for Access Route Option 1 from a surfaced road is from Main Road 234 (MR234), located along the R45 (TR21/2) in Hopefield. Main Road 234 (MR234) provides access to Minor Road 5560 approximately ±5.3km north of Hopefield. Minor Road 5560 (OP5560) is a gravel road and crosses a railway line to gain access to Minor Road 7626 (OP7626). Figure 8 indicates the sight distance to the left and right along Main Road 234 (MR234) and a photo of Minor Road 5560 (OP5560) taken from Main Road 234 (MR234).

Sight Distance to the left at OP5560 along MR234

Sight Distance to the right at OP5560 along MR234

Minor Road 5560

Figure 8: Minor Road 5560

4.2.3.2 Access Route Option 2

The main access point for Access Route Option 2, from a surfaced road is from the R45 (TR21/1), located approximately ±4.6km east of Hopefield. This access will provide the most direct access from a surfaced road. This access road is considered the preferred option. Figure 9 indicates the sight distances to the left and right along the R45 and a photo of the existing access taken from the R45.

Sight Distance to the left at the Existing Access along the R45

Sight Distance to the right at the Existing Access along the R45

Existing Access

Figure 9: Existing Access

4.2.3.3 Access Route Option 3

The main access point for Access Route Option 3, from a surfaced road is from the R45 approximately ±8.4km east of Hopefield. The R45 provides access to Divisional Road 1173 (DR1173). Divisional Road 1173 (DR1173) is a gravel road that provides access to Minor Road 5562 (OP5562) and then Minor Road 5561 (OP5561). Both Minor Road 5562 (OP5562) and then Minor Road 5561 (OP5561) are also gravel roads. There will also be a large portion of travel distance on gravel roads along this access. This is the least favourable option. Figure 10 indicates the sight distance to the left and right along the R45 and a photo of Divisional Road 1173 taken from the R45.

Sight Distance to the left at DR1173 along the R45

Sight Distance to the right at DR1173 along the R45

Divisional Road 1173

Figure 10: Divisional Road 1173

All routes to the site should however 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 also be obtained. It should also be ensured that all the gravel haulage roads should be maintained during the construction phase and reinstated after the construction phase is completed, this is applicable for both provincial roads and also the private internal farm roads to an extent as agreed with the landowners.

4.3 Project Specific Description

4.3.1 All Phases of the Solar Facility and associated infrastructure

The 13 proposed phases of the proposed Solar Facility are shown in Figure 11. The preferred access route will be from the R45 (TR21/1) towards the existing accesses.

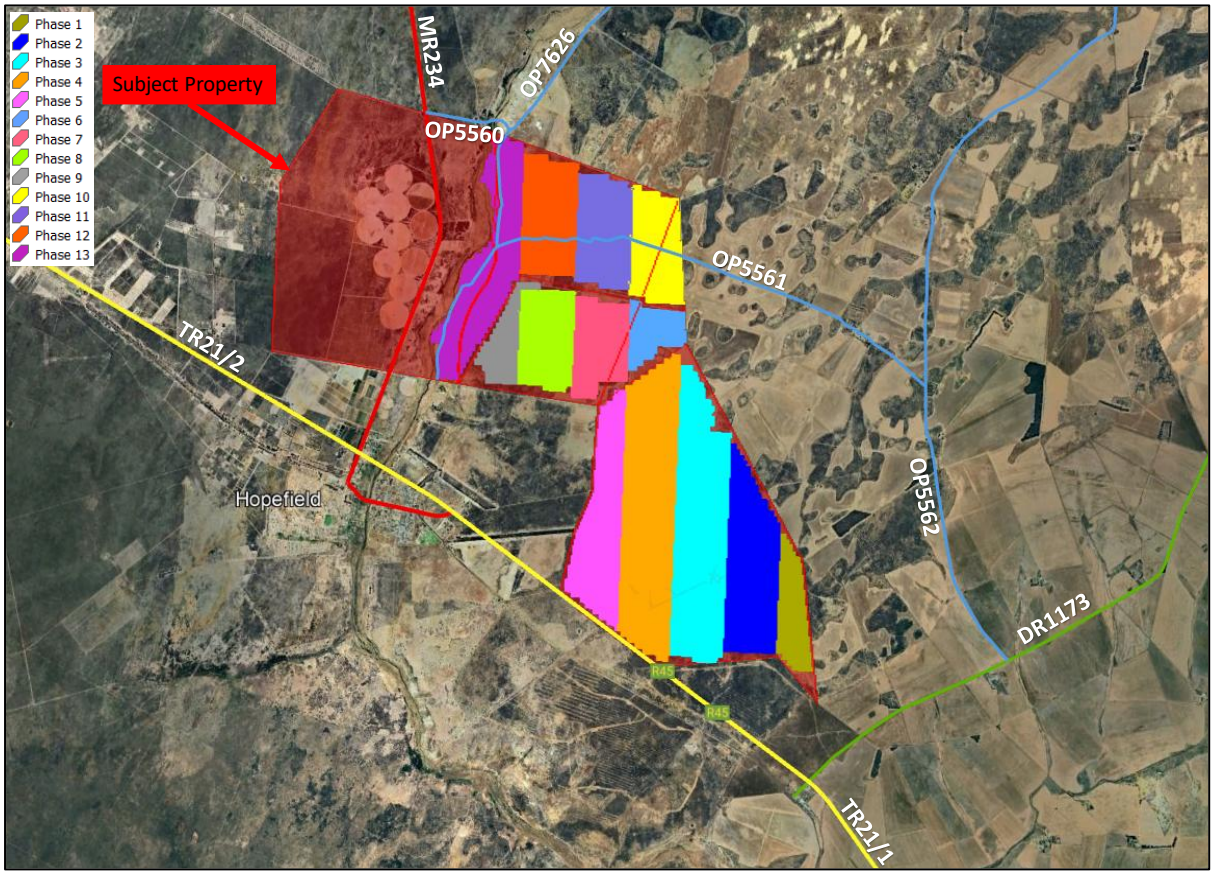


Figure 11: Phases of the Proposed Solar Facility

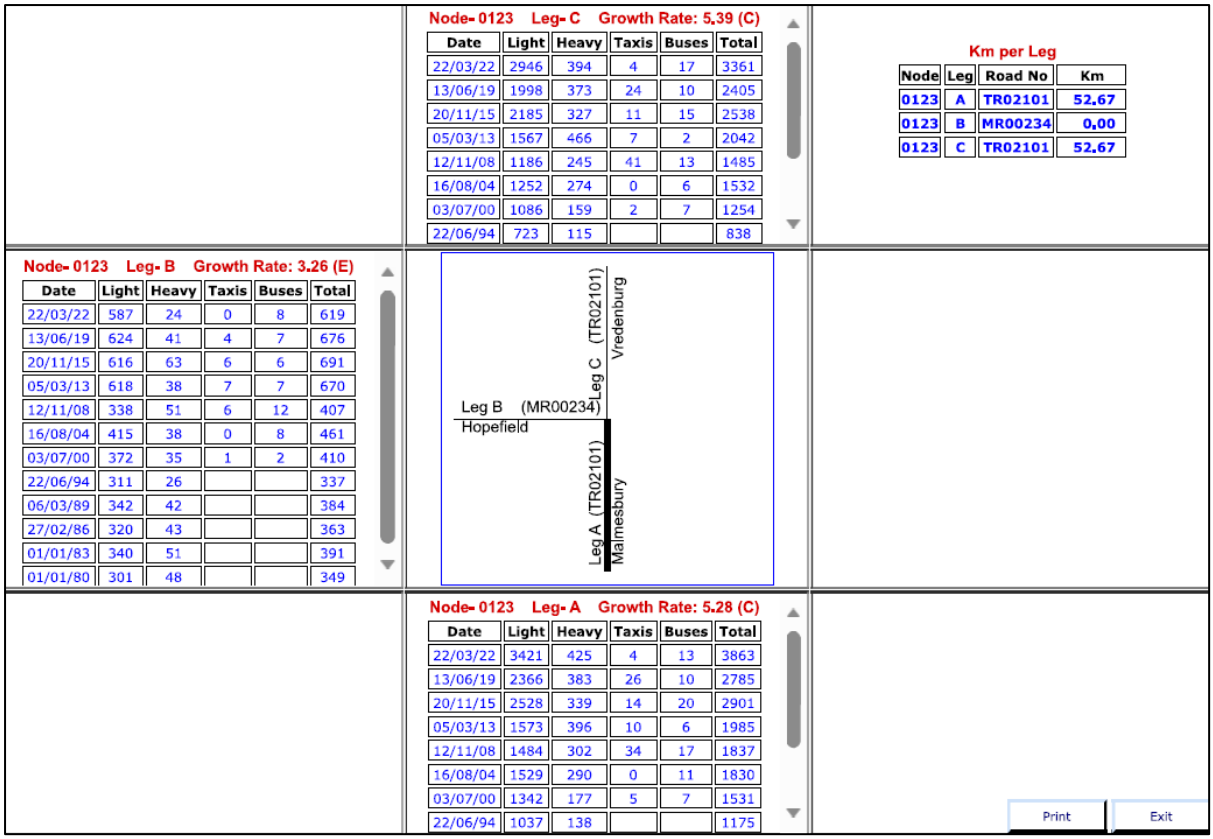
4.4 Identification of Environmental Sensitivities

Part of the terms of reference was to identify sensitivities by the National Web-Based Environmental Screening Tool (Screening Tool). However, it is important to note that there are no dedicated traffic or transport related themes on the Screening Tool, therefore the environmental sensitivity of the proposed project area as identified by the Screening Tool is not applicable. Therefore, no site sensitivity verification report is required (as indicated in Appendix C). Furthermore, there is no dedicated assessment protocol prescribed for Traffic. Therefore, the specialist assessment has been undertaken in compliance with Appendix 6 of the NEMA EIA Regulations of 2014.

5. Existing Traffic Conditions

5.1 The R45 (TR21/1 and TR21/2)

Traffic count information was obtained from the Provincial Road Network Information System (RNIS) for the count station nearest to the development located along the R45 (TR21/1). The latest traffic counts were conducted in 2022. The nearest counting station that would provide realistic counts is at Station 0123C at km 52.67 on the R45 (TR21/1) at the R45 (TR21/1) / MR234 intersection:



Node- 0123 Leg- C Growth Rate: 5.39 (C)

Date	Light	Heavy	Taxis	Buses	Total
22/03/22	2946	394	4	17	3361
13/06/19	1998	373	24	10	2405
20/11/15	2185	327	11	15	2538
05/03/13	1567	466	7	2	2042
12/11/08	1186	245	41	13	1485
16/08/04	1252	274	0	6	1532
03/07/00	1086	159	2	7	1254
22/06/94	723	115			838

Km per Leg

Node	Leg	Road No	Km
0123	A	TR02101	52.67
0123	B	MR00234	0.00
0123	C	TR02101	52.67

Node- 0123 Leg- B Growth Rate: 3.26 (E)

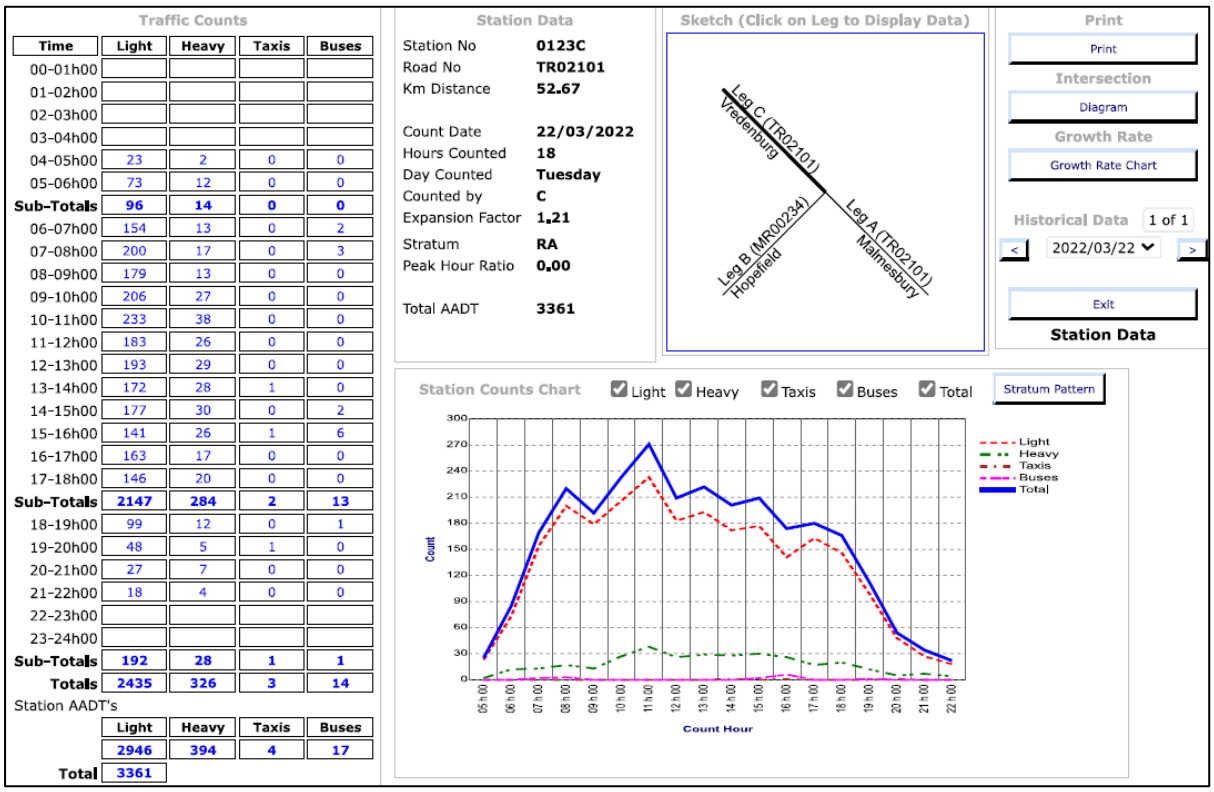
Date	Light	Heavy	Taxis	Buses	Total
22/03/22	587	24	0	8	619
13/06/19	624	41	4	7	676
20/11/15	616	63	6	6	691
05/03/13	618	38	7	7	670
12/11/08	338	51	6	12	407
16/08/04	415	38	0	8	461
03/07/00	372	35	1	2	410
22/06/94	311	26			337
06/03/89	342	42			384
27/02/86	320	43			363
01/01/83	340	51			391
01/01/80	301	48			349

Node- 0123 Leg- A Growth Rate: 5.28 (C)

Date	Light	Heavy	Taxis	Buses	Total
22/03/22	3421	425	4	13	3863
13/06/19	2366	383	26	10	2785
20/11/15	2528	339	14	20	2901
05/03/13	1573	396	10	6	1985
12/11/08	1484	302	34	17	1837
16/08/04	1529	290	0	11	1830
03/07/00	1342	177	5	7	1531
22/06/94	1037	138			1175

Print Exit

Figure 12: Total Traffic Data for Station No. 0123 on the R45 (TR21/1)



Traffic Counts

Time	Light	Heavy	Taxis	Buses
00-01h00				
01-02h00				
02-03h00				
03-04h00				
04-05h00	23	2	0	0
05-06h00	73	12	0	0
Sub-Totals	**96**	**14**	**0**	**0**
06-07h00	154	13	0	2
07-08h00	200	17	0	3
08-09h00	179	13	0	0
09-10h00	206	27	0	0
10-11h00	233	38	0	0
11-12h00	183	26	0	0
12-13h00	193	29	0	0
13-14h00	172	28	1	0
14-15h00	177	30	0	2
15-16h00	141	26	1	6
16-17h00	163	17	0	0
17-18h00	146	20	0	0
Sub-Totals	**2147**	**284**	**2**	**13**
18-19h00	99	12	0	1
19-20h00	48	5	1	0
20-21h00	27	7	0	0
21-22h00	18	4	0	0
22-23h00				
23-24h00				
Sub-Totals	**192**	**28**	**1**	**1**
Totals	**2435**	**326**	**3**	**14**

Station AADT's

Light	Heavy	Taxis	Buses
2946	394	4	17

Total 3361

Station Data

Station No	0123C
Road No	TR02101
Km Distance	52.67
Count Date	22/03/2022
Hours Counted	18
Day Counted	Tuesday
Counted by	C
Expansion Factor	1.21
Stratum	RA
Peak Hour Ratio	0.00
Total AADT	3361

Sketch (Click on Leg to Display Data)

Print
Print
Intersection
Diagram
Growth Rate
Growth Rate Chart
Historical Data 1 of 1
< 2022/03/22 >
Exit
Station Data

Station Counts Chart Light Heavy Taxis Buses Total Stratum Pattern

Figure 13: Traffic data for Station No. 0123 on the R45 (TR21/1)

Counting Station 0123C recorded an Average Annual Daily Traffic (AADT) of 3 361 veh/day along the R45 (TR21/1) with approximately 220 vph (two-way) in the AM peak hour, 271 vph (two-way) in the midday peak hour and 180 vph (two-way) in the PM peak hour in 2022. The traffic growth rate on the R45 (TR21/1) was calculated as approximately 5% per annum. This relates to approximately 230 vph, 285 vph and 190 vph (two-way) during the 2023 AM, midday and PM peak hours, respectively.

The typical link capacity of a Class 2 road with two lanes is in the order of 1 650 veh/h in the peak direction. Therefore, the R45 (TR21/1) operates well below capacity in the vicinity of the site.

5.2 Main Road 234 (MR234)

Traffic count information was obtained from the Provincial Road Network Information System (RNIS) for the count station nearest to the development located along the MR234. The latest traffic counts were conducted in 2022. The nearest counting station that would provide realistic counts is at Station 0126D at km 2.21 on the MR234 at the R45 (TR21/2) / MR234 intersection:

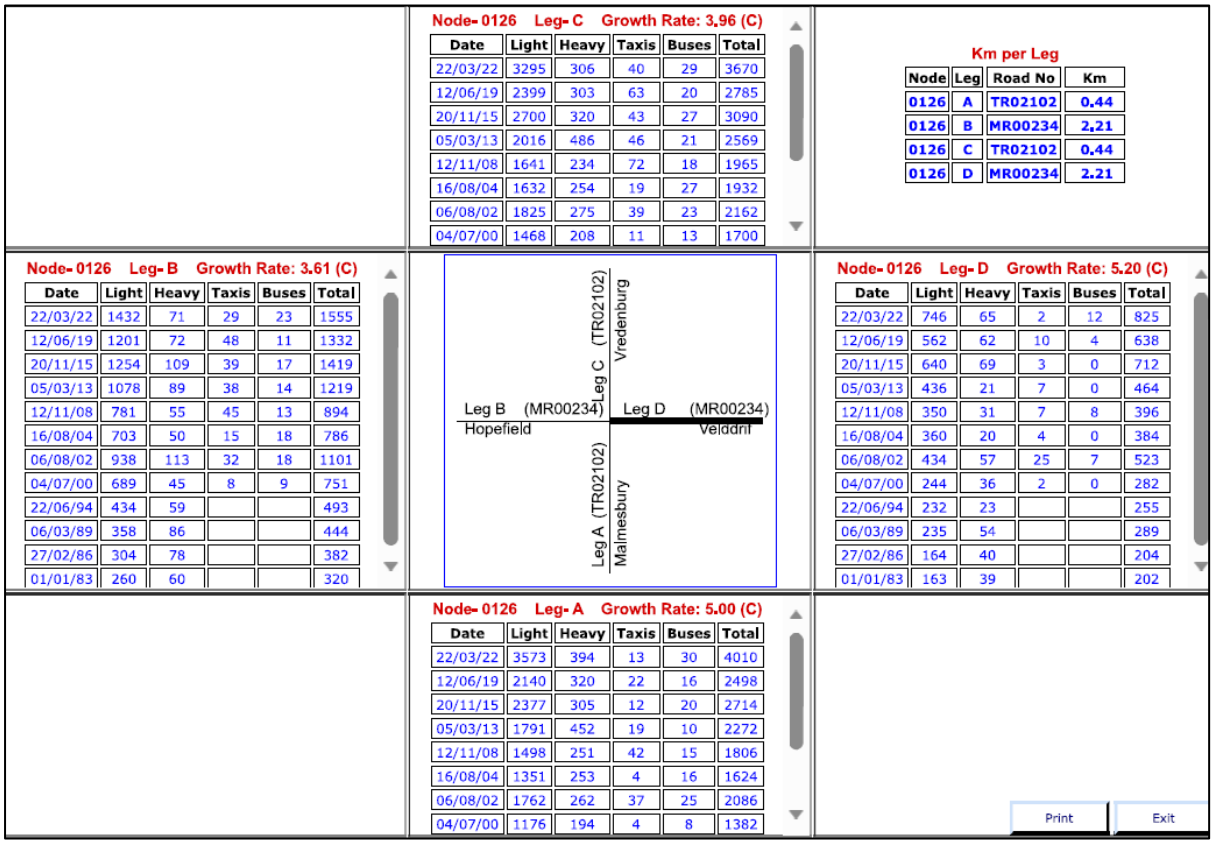
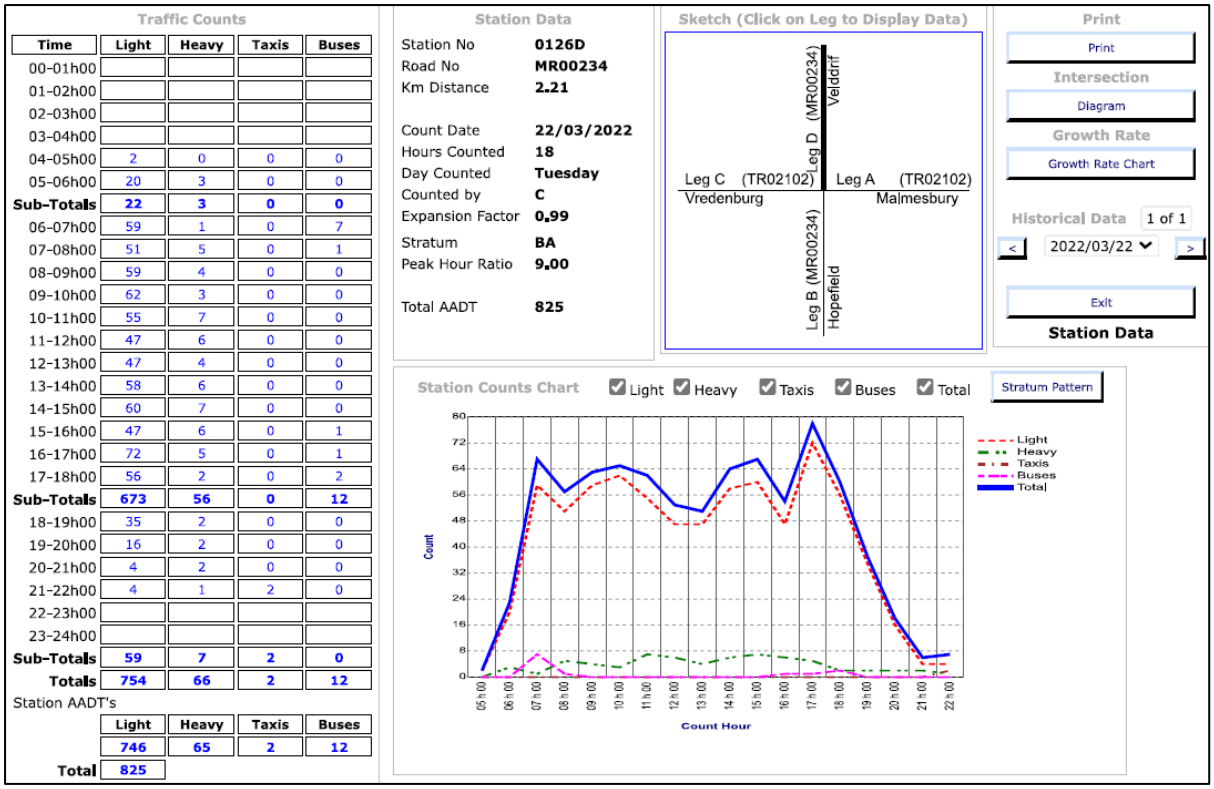


Figure 14: Total Traffic Data for Station No. 0126 on the MR234



Time	Light	Heavy	Taxis	Buses
00-01h00				
01-02h00				
02-03h00				
03-04h00				
04-05h00	2	0	0	0
05-06h00	20	3	0	0
Sub-Totals	**22**	**3**	**0**	**0**
06-07h00	59	1	0	7
07-08h00	51	5	0	1
08-09h00	59	4	0	0
09-10h00	62	3	0	0
10-11h00	55	7	0	0
11-12h00	47	6	0	0
12-13h00	47	4	0	0
13-14h00	58	6	0	0
14-15h00	60	7	0	0
15-16h00	47	6	0	1
16-17h00	72	5	0	1
17-18h00	56	2	0	2
Sub-Totals	**673**	**56**	**0**	**12**
18-19h00	35	2	0	0
19-20h00	16	2	0	0
20-21h00	4	2	0	0
21-22h00	4	1	2	0
22-23h00				
23-24h00				
Sub-Totals	**59**	**7**	**2**	**0**
Totals	**754**	**66**	**2**	**12**

Station AADT's

Light	Heavy	Taxis	Buses
746	**65**	**2**	**12**

Total **825**

Figure 15: Traffic data for Station No. 0126 on the MR234

Counting Station 0126D recorded an Average Annual Daily Traffic (AADT) of 825 veh/day along the MR234 with approximately 63 vph (two-way) in the AM peak hour, 65 vph (two-way) in the midday peak hour and 78 vph (two-way) in the PM peak hour in 2022. The traffic growth rate on the MR234 was calculated as approximately 5% per annum. This relates to approximately 65 vph, 70 vph and 80 vph (two-way) during the 2023 AM, midday and PM peak hours, respectively.

The typical link capacity of a Class 3 road with two lanes is in the order of 1 530 veh/h in the peak direction. Therefore, the MR234 operates well below capacity in the vicinity of the site.

5.3 Divisional Road 1173 (DR1173)

Traffic count information was obtained from the Provincial Road Network Information System (RNIS) for the count station nearest to the development located along DR1173. The latest traffic counts were conducted in 2022. The nearest counting station that would provide realistic counts is at Station 0120D at km 29.82 on DR1173 at the R45 (TR21/1) / DR1173 intersection:

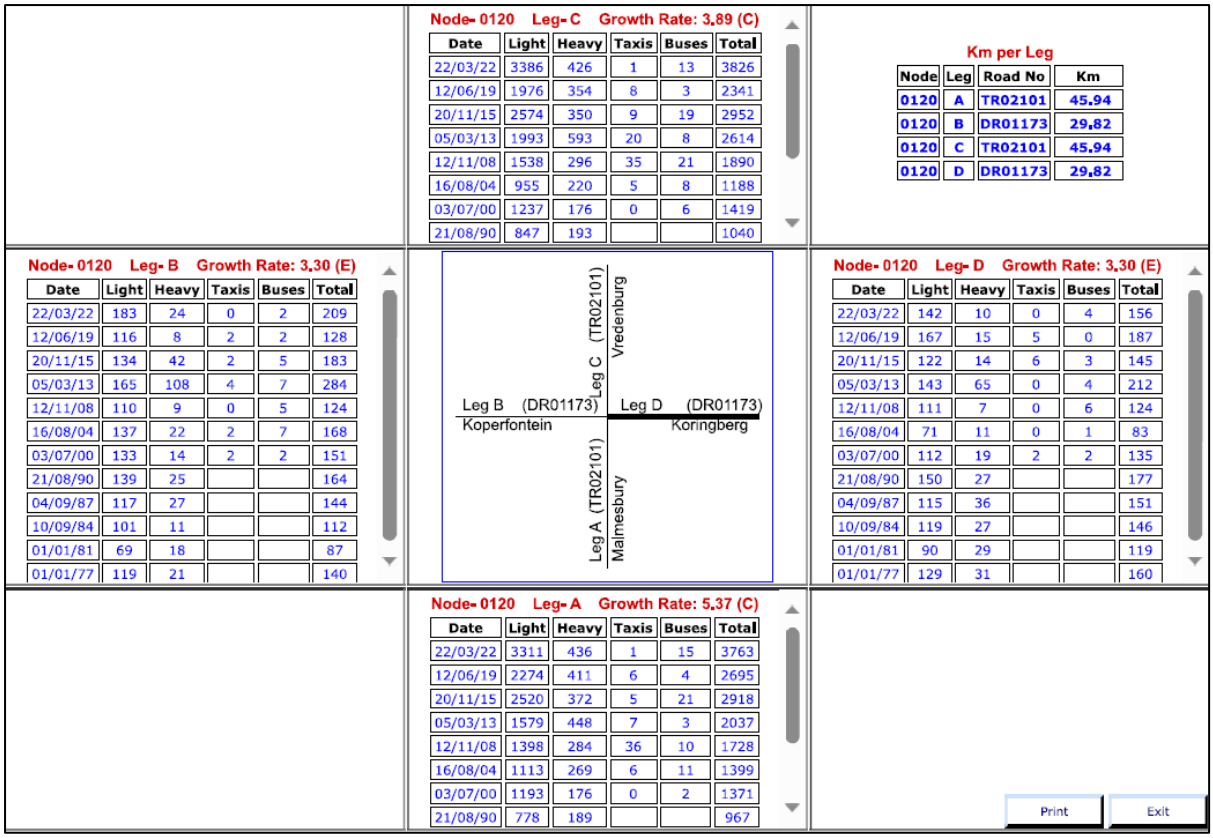


Figure 16: Total Traffic Data for Station No. 0120 on DR1173

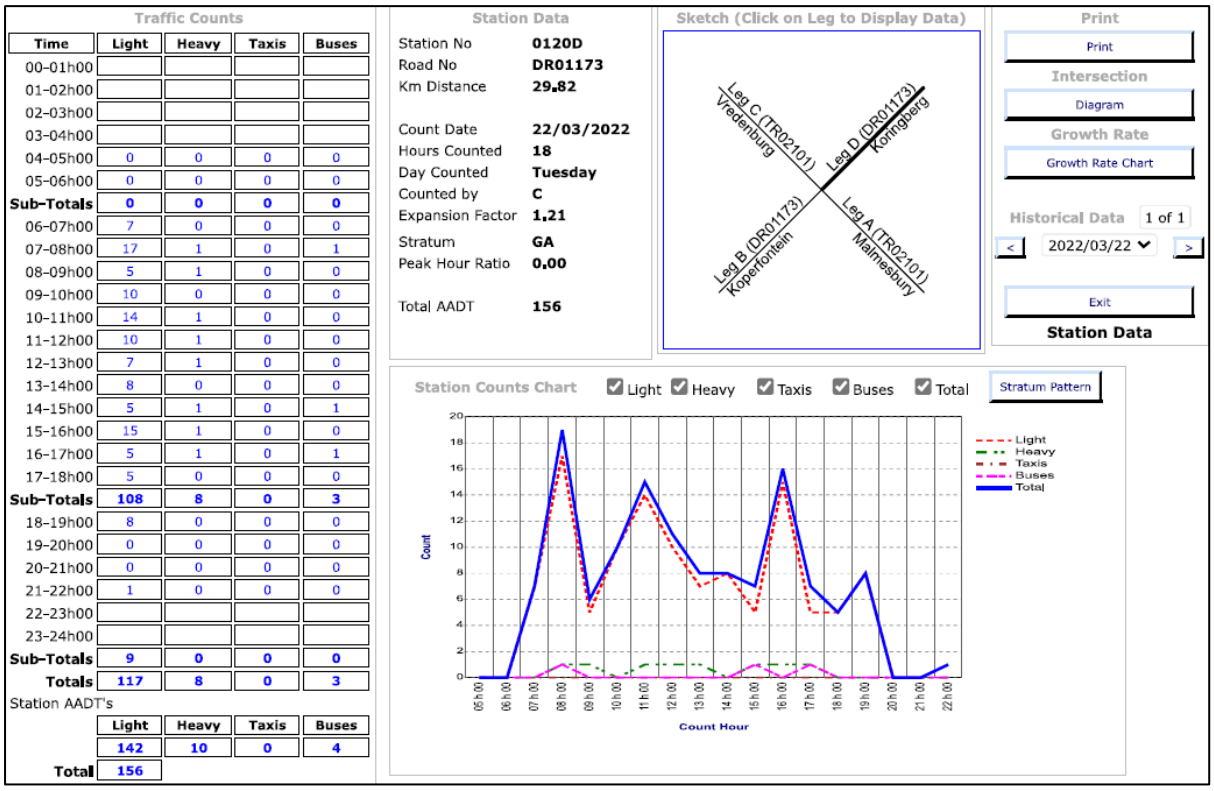


Figure 17: Traffic data for Station No. 0120 on DR1173

Counting Station 0120D recorded an Average Annual Daily Traffic (AADT) of 156 veh/day along DR1173 with approximately 19 vph (two-way) in the AM peak hour, 15 vph (two-way) in the midday peak hour and 16 vph (two-way) in the PM peak hour in 2022. The traffic growth rate on DR1173 was calculated as approximately 3% per annum. This relates to approximately 20 vph, 15 vph and 16 vph (two-way) during the 2023 AM, midday and PM peak hours, respectively.

The typical link capacity of a Class 4 road with two lanes is in the order of 1 410 veh/h in the peak direction. Therefore, DR1173 operates well below capacity in the vicinity of the site.

Please refer to Figure 18 for the location of the above-mentioned traffic counting stations in relation to the proposed development.

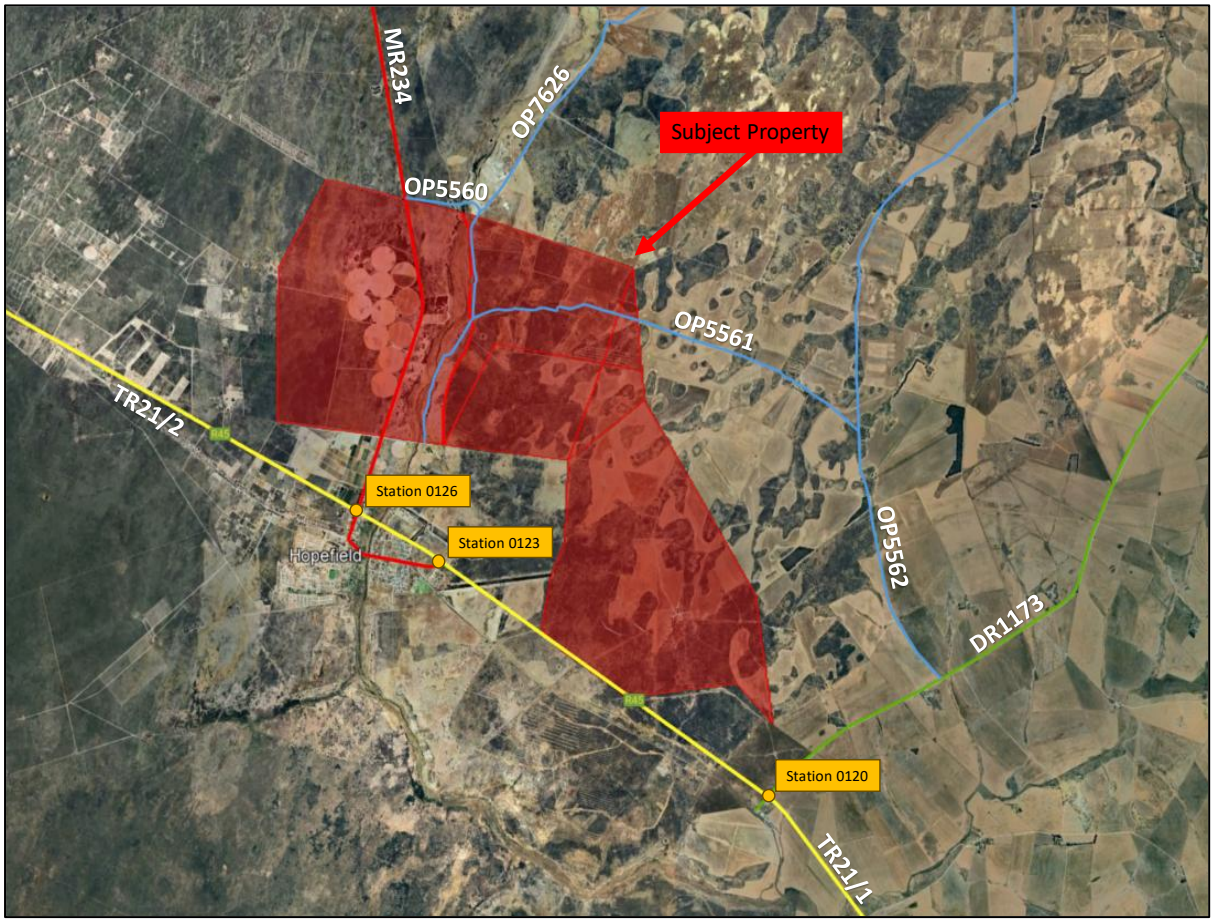


Figure 18: Location of Traffic Counting Stations

6. Trip Generation Rates

The trip generation rates discussed below are based on similar studies that have been undertaken for Solar Energy Facilities and associated electrical infrastructure (e.g. collector substation and transmission line). The trip generation rates discussed below relates to the anticipated trip generation rates associated with a typical 150MW Solar PV Facility.

6.1 Construction Phase

It is expected that the Construction Phase of a 150MW Solar PV Facility will be 12 to 18 months.

From experience with similar projects, it was assumed that for projects up to 150MW, the following number of truck trips (one-way) are expected:

- Panels = 273 truck trips
- Mounting Structure = 300 truck trips
- Inverters = 13 truck trips
- Field Transformers = 12 truck trips
- Cable and Battery Operating System (BOS) = 120 truck trips

It is assumed that each project will be constructed over a 12 to 18 month period. Therefore, based on an 18-month construction period and a 6 day work week (78 x 6 = 468 work days), this could result in approximately **2 daily truck trips (one-way)**.

It is also expected that approximately 3 single unit trucks carrying construction materials will visit the site on a daily basis, resulting in **3 daily single unit truck trips (one-way)**.

Furthermore, it is expected that approximately 150 workers will be transported to the site daily. It is assumed that 50% the workers will be transported to/from the site by 15-seater minibus taxis and 50% of the workers will be transported to/from the site by 80-seater buses from the surrounding areas resulting in approximately **5 daily staff minibus taxi trips (one-way)** and **1 daily bus trip (one-way)**. Experience has shown that during the construction period, approximately **2 daily private vehicle trips** are expected to come to/from the site from supervisors or senior personnel. Therefore, a total of **8 daily staff trips (one-way)** are expected.

Water will also be required during the construction phase for human consumption and construction activities, such as the installation of the solar panels, dust control along the gravel roads and potable water. Water may be sourced from the following sources, in order of priority: local municipality, third-party water supplier, existing boreholes or new drilled boreholes on site. The maximum development scenario in terms of water supply is used i.e. trucking in water from the local municipality. The water will be delivered to the site from a municipal water supply by 12 kilolitre water trucks on a daily basis. Based on similar projects, water demand will be in the order of approximately 9 000 m^3 per year for the construction phase for construction purposes and potable water. This equates to 750 000 litres per month. This relates to an additional ~ **2 daily water truck trips (one-way)** to the site.

Based on the above, a total of **15 one-way trips per day**, i.e. **30 trips in total per day (two-way)** are expected during the 18 month period construction phase.

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 1 - 2 light load trucks will visit the site on a weekly basis. This will conservatively equate to **1 daily light load truck trip (one-way)**.

It is expected that a workforce of 8 members, made up of staff, supervisors or senior personnel will commute to the site by private vehicles daily. It is assumed that 3 workers will share a private vehicle, resulting in a total of **3 daily staff trips (one-way)**.

Water will be required for cleaning the solar panels, which must be done 4 times per year. It is also anticipated that the gravel district road be watered daily to suppress dust during operation depending on traffic volumes. Based on similar projects, water demand will be in the order of approximately 1 000 m^3 per year during the operational phase. This equates to 83 333 litres per month. The water will be delivered to

the site from a municipal water supply by 12 kilolitre water trucks on a daily basis, resulting in **1 daily water truck trip (one-way)**.

Based on the above, a total of **5 one-way trips per day**, i.e. **10 trips in total per day (two-way)** are expected during the operational phase.

6.3 Decommissioning Phase

The Decommissioning Phase will generate similar trips as the Construction Phase over a similar time period of 18 months. This includes **2 daily truck trips (one-way)** trips for the transportation of the solar panels, **3 daily single unit truck trips (one-way)**, for the transportation of construction materials, **8 daily staff trips (one-way)** and **2 daily water truck trips (one-way)**.

Based on the above, a total of **15 one-way trips per day**, i.e. **30 trips in total per day (two-way)** are expected during the 18 month period decommissioning phase.

7. Issues, Risks and Impacts

7.1 Identification of Potential Impacts/Risks

The potential transport and traffic related impacts identified are described below.

7.1.1 Construction Phase

The potential transport and traffic related impacts during the construction phase are listed below:

- 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.

7.1.2 Operational Phase

The traffic generated during the operational phase are mainly related to the staff that will be transported to and from the sites and are not anticipated to have a significant traffic impact on the surrounding road network.

7.1.3 Decommissioning Phase

The potential transport related impacts during the decommissioning phase are similar to the potential transport related impacts during construction phase and are listed below:

- 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.

7.1.4 Cumulative Impacts

The cumulative transport impacts related to the proposed facility are listed below and apply to the construction and decommissioning phases:

- Congestion and delays on the surrounding road network.
- Impact on traffic safety and increase in accidents with other vehicles or animals.
- Change in the quality of the surface condition of the roads.
- Noise and dust pollution.

8. Scoping Level - Impact Assessment

8.1 Potential Impacts during the Construction Phase

The impacts associated with the traffic generation of the proposed PV Facility during the construction phase are summarised in Table 2 below, and discussed in detail below:

8.1.1 Potential congestion and delays on the surrounding road network.

Congestion and delays on the surrounding road network are identified as a potential impact as a result of increased traffic volumes relating to the trip generation of the facility during the peak hour periods. This impact is rated as neutral, with a local spatial extent and a medium-term duration. The impact is rated with a high reversibility (meaning that the potential impact is highly reversible at the end of the project life); and is rated as replaceable (meaning the resources i.e. road network are replaceable). The potential impact is allocated a slight consequence and likely probability, which will render the impact significance as very low, without the implementation of mitigation measures. With the implementation of mitigation measures, the significance of the impact is also rated as very low. The recommended mitigation measures are detailed in Table 2 below.

8.1.2 Potential impact on traffic safety and increase in accidents with other vehicles or animals.

Traffic safety and increase in accidents with other vehicles and animals is identified as a potential impact as a result of more vehicles travelling on the road to and from the facility, increasing the likelihood of incidents. This impact is rated as negative, with a local spatial extent and a medium-term duration. The impact is rated with a low reversibility and high irreplaceability if the incident results in a fatality. The potential impact is allocated a substantial consequence and likely probability, which will render the impact significance as moderate, without the implementation of mitigation measures. With the implementation of mitigation measures, the significance of the impact is also rated as low. The recommended mitigation measures are detailed in Table 2 below.

8.1.3 Potential change in the quality of the surface condition of the roads.

The potential change in the quality of the surface condition of the roads is identified as a potential impact as a result of the increase in especially heavy vehicle traffic on the roads. This impact is rated as neutral, with a local spatial extent and a medium-term duration. The impact is rated with a high reversibility (meaning that the potential impact is highly reversible at end of the project life); and is rated as replaceable (meaning the resources i.e. road network are replaceable). The potential impact is allocated a slight consequence and likely probability, which will render the impact significance as very low, without the implementation of mitigation measures. With the implementation of mitigation measures, the significance of the impact is also rated as very low. The recommended mitigation measures are detailed in Table 2 below.

8.1.4 Potential noise pollution.

The potential of noise pollution is identified as a potential impact as a result of increased traffic volumes during the construction phase of the project. This impact is rated as neutral, with a local spatial extent and a medium-term duration. The impact is rated with a high reversibility (meaning that the potential impact is

highly reversible at end of the project life); and is rated as replaceable (meaning the resources i.e. road network are replaceable). The potential impact is allocated a moderate consequence and likely probability, which will render the impact significance as low, without the implementation of mitigation measures. With the implementation of mitigation measures, the significance of the impact is also rated as low. The recommended mitigation measures are detailed in Table 2 below.

8.1.5 Potential dust pollution.

The potential of dust pollution is identified as a potential impact as a result of increased number of vehicles using the gravel roads to access the proposed facility. This impact is rated as neutral, with a local spatial extent and a medium-term duration. The impact is rated with a high reversibility (meaning that the potential impact is highly reversible at end of the project life); and is rated as replaceable (meaning the resources i.e. road network are replaceable). The potential impact is allocated a moderate consequence and likely probability, which will render the impact significance as low, without the implementation of mitigation measures. With the implementation of mitigation measures, the significance of the impact is also rated as low. The recommended mitigation measures are detailed in Table 2 below.

Table 2: Rating of Traffic Related Impacts During the Construction Phase

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
CONSTRUCTION PHASE						
Congestion and delays on road network	Status	Neutral	Very Low (5)	▪ Stagger delivery trips and schedule trips, including staff trips outside of peak hours where possible.	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	Negative	Moderate (3)	▪ Implement speed control by means of a stop and go system and speed limit road signage within the construction site. ▪ Ensure all vehicles are roadworthy, visible, adequately marked, and operated by an appropriately licenced operator.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Substantial				
	Probability	Likely				
	Reversibility	Low				
	Irreplaceability	High				
Condition of road surface	Status	Neutral	Very Low (5)	▪ Regular maintenance of internal farm access roads by the contractor. ▪ Ensure private access roads that are impacted on by the proposed development 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 (4)	▪ Implement dust control on gravel roads within the construction site. ▪ Implement speed control by means of a stop and go system and speed limit road signage within the construction site.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Noise Pollution	Status	Neutral	Low (4)	▪ Stagger delivery trips.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Moderate				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Replaceable				

8.2 Potential Impacts during the Operational Phase

The traffic generated during the operational phase will not have a significant impact on the surrounding road network.

8.3 Potential Impacts during the Decommissioning Phase

The impacts associated with the traffic generation of the proposed PV Facility during the decommissioning phase will be similar to the potential impacts during the construction phase, as discussed in Section 6.1 and Table 2.

8.4 Cumulative Impacts

It is very unlikely that all 13 phases of the proposed PV facility will occur at the same time and construction will most likely be staggered based on project and site-specific aspects. However, the potential cumulative traffic impact related to the construction and decommissioning phases are shown in the table below based on the assumption of all 13 phases of the proposed PV projects being constructed at the same time. The cumulative traffic impact related to the operational phase can still be regarded as insignificant. A cumulative effect must be considered with other renewable energy and EGI developments within a 30 km radius will be considered in the EIA Phase. It is however very unlikely that all 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 renewable energy facilities 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.

Refer to Table 3 below for a high-level rating of the potential cumulative impacts.

Table 3: Rating of Cumulative Traffic Related Impacts during the Construction and Decommissioning Phase

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
CONSTRUCTION AND DECOMMISSIONING PHASE						
Congestion and delays on road network	Status	Neutral	Moderate (	▪ Stagger delivery trips and schedule trips, including staff trips outside of peak hours where possible.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Substantial				
	Probability	Unlikely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Potential impact on traffic safety and increase in accidents with other vehicles and animals	Status	Negative	Moderate (3)	▪ Implement speed control by means of a stop and go system and speed limit road signage within the construction site. ▪ Ensure all vehicles are roadworthy, visible, adequately marked, and operated by an appropriately licenced operator.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Substantial				
	Probability	Unlikely				
	Reversibility	Low				
	Irreplaceability	High				
Condition of road surface	Status	Neutral	Moderate (3)	▪ Regular maintenance of internal farm access roads by the contractor. ▪ Ensure private access roads that are impacted on by the proposed development are restored to original pre-construction road condition.	Very Low (5)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Substantial				
	Probability	Unlikely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Dust Pollution	Status	Neutral	Low (4)	▪ Implement dust control on gravel roads within the construction site. ▪ Implement speed control by means of a stop and go system and speed limit road signage within the construction site.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Moderate				
	Probability	Unlikely				
	Reversibility	High				
	Irreplaceability	Replaceable				
Noise Pollution	Status	Neutral	Low (4)	▪ Stagger delivery trips.	Low (4)	High
	Spatial Extent	Local				
	Duration	Medium Term				
	Consequence	Moderate				
	Probability	Unlikely				
	Reversibility	High				
	Irreplaceability	Replaceable				

9. Scoping Level Impact Assessment Summary

The overall impact significance findings, following the implementation of the proposed mitigation measures are shown in the table below:

Phase	**Overall Impact Significance**
Construction	Low to Very Low Risk / Impact (4-5)
Operational	Insignificant
Decommissioning	Low to Very Low Risk / Impact (4-5)
Nature of Impact	**Overall Impact Significance**
Cumulative - Construction	Low Risk / Impact (4)
Cumulative - Operational	Insignificant
Cumulative - Decommissioning	Low to Very Low Risk / Impact (4-5)

10. Legislative and Permit Requirements

The Legislative and Permit requirements pertaining to the transport requirements for the proposed project is listed below:

- Abnormal load permits, (Section 81 of the National Road Traffic Act)
- Port permit (Guidelines for Agreements, Licenses and Permits in terms of the National Ports Act No. 12 of 2005), and
- Authorisation from Road Authorities to modify the road reserve to accommodate turning movements of abnormal loads at intersections.

11. References

- Department of Transport, Guidelines for Traffic Impact Studies, Report No. PR93/645, Pretoria, 1995.
- Department of Transport, South African Trip Generation Rates, Report No. RR92/228, Pretoria, 1995.
- Committee of Transport Officials (COTO), South African Trip Data Manual, TMH 17, Committee Draft 2.2, August 2020.
- Committee of Transport Officials (COTO), South African Traffic Impact and Site Traffic Assessment Manual Standards and Requirements Manual, Volume 2 TMH 16, Committee Draft 2.0, October 2020.
- Committee of Transport Officials (COTO), South African Traffic Impact and Site Traffic Assessment Manual, Volume 1 TMH 16, Committee Draft 2.0, May 2018.
- SANRAL Geometric Design Guide
- Department of Transport, TRH17, Geometric Design of Rural Roads, 1988

12. Appendices

Appendix A - Specialist Expertise

Traffic Engineering & Transport Planning
STURGEON CONSULTING

CURRICULUM VITAE **ANNEBET KRIGE**

GENERAL INFORMATION:

Name	:	**ANNEBET KRIGE**
Date of Birth	:	20 November 1984
Marital Status	:	Married
Home Language	:	Afrikaans
Profession	:	Civil Engineer
Specialism	:	Transport Planning and Traffic Engineering
Joined Sturgeon	:	2018
Nationality	:	South African
Years' Experience	:	15+
Qualifications	:	M Eng (Transportation), B Eng (Civil)
Professional Associations	:	Engineering Council of South Africa (ECSA): Professional Engineer (20150161) South African Institution of Civil Engineering (SAICE): Member (206324)

KEY EXPERTISE:

AnneBet Krige is registered as a Professional Civil Engineer with the Engineering Council of South Africa (ECSA). Over the past 15 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

EMPLOYMENT RECORD:

2021 – Present	Director, Sturgeon Consulting
2018 – 2021	Associate, Sturgeon Consulting
2011 – 2018	Traffic Engineer, Element Consulting Engineers
2006 – 2011	Engineer in Training, EFG Engineers

Traffic Engineering & Transport Planning
STURGEON CONSULTING

CURRICULUM VITAE **ANNEBET KRIGE**

KEY QUALIFICATIONS/EDUCATION:

2010 : M Eng (Transportation), University of Stellenbosch
2006 : B Eng (Civil), University of Stellenbosch

PROFESSIONAL AFFILIATIONS

Professional Engineer, Engineering Council of South Africa (ECSA) – 20150161 – 1 May 2015

PROJECT EXPERIENCE – TRANSPORTATION ENGINEERING (TRAFFIC STUDIES)

Bottling Plant Farm Kaaldraai	Normandien Farms
Traffic Impact Study for the proposed Water Bottling Plant, Tulbagh	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2021	Study Value: R35 000

Ceres PV Farms	Veroniva Energy
Traffic Impact Assessment for nine 175MW Solar Photo Voltaic Farms, Tankwa Karoo	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2021	Study Value: R57 000

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

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

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

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

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

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

PROJECT EXPERIENCE - GENERAL TRANSPORTATION ENGINEERING

Bonnievale Speed Survey	WCG
Speed Limit Survey for TR32/1, Bonnievale	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2021	Study Value: R70 000

Road Safety Audit	Namibia Roads Authority
Road Safety Audit for T0602: Gobabis to Buitepos	
Role & Responsibilities:	Traffic Engineer
Completed/Current: 2016	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: 2016	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: 2014	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: 2014	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: 2014	Contract Value: R35 million

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 C
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	
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

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

Appendix B - Specialist Statement of Independence

Appendix C - Site Sensitivity Verification

It is important to note that there are no dedicated traffic or transport related themes on the National Web-based Environmental Screening Tool (Screening Tool), therefore the environmental sensitivity of the proposed project area as identified by the Screening Tool is not applicable. Therefore, no site sensitivity verification report is required. Furthermore, there is no dedicated assessment protocol prescribed for Traffic. Therefore, the specialist assessment has been undertaken in compliance with Appendix 6 of the NEMA EIA Regulations of 2014.

Appendix D - Impact Assessment Methodology

The impact assessment includes:

- *the nature, status, significance and consequences of the impact and risk;*
- *the extent and duration of the impact and risk;*
- *the probability of the impact and risk occurring;*
- *the degree to which impacts and risks can be mitigated;*
- *the degree to which the impacts and risks can be reversed; and*
- *the degree to which the impacts and risks can cause loss of irreplaceable resources.*

Terminology used in impact assessment can overlap. To avoid ambiguity, please note the following clarifications (that are based on NEMA and the EIA Regulations):

- *The term environment is understood to have a broad interpretation that includes both the natural (biophysical) environment and the socio-economic environment. The term socio-ecological system is also used to describe the natural and socio-economic environment and the interactions amongst these components.*
- *Significance = Consequence x Probability, which means that significance is equivalent to risk.*
- *The impact can have a positive or negative status. The significance of a negative impact may be called a risk, and the significance of a positive impact may be called an opportunity.*

The following principles are to underpin the application of this methodology:

- *Transparent and repeatable process - specialists are to describe the thresholds and limits they apply in their assessment, wherever possible.*
- *Adapt parameters to context (where justified) – the methodology proposes some thresholds (e.g. for spatial extent, in Step 3 below), however, if the nature of the impact requires a different definition of the categories of spatial extent, then this can be provided and described.*
- *Combination of a quantitative and qualitative assessment – where possible, specialists are to provide quantitative assessments (e.g. areas of habitat affected, decibels of noise, number of jobs), however, it is recognised that not all impacts can be quantified, and then qualitative assessments are to be provided.*

As per the DFFE Guideline 5: Assessment of Alternatives and Impacts, the following methodology is applied to the prediction and assessment of impacts and risks. Potential impacts and risks have been rated in terms of the direct, indirect and cumulative:

- *Direct impacts are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.*
- *Indirect impacts of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.*
- *Cumulative impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.*

The impact assessment methodology includes the aspects described below.

- ***Step 1**: **Nature** of impact/risk - The type of effect that a proposed activity will have on the environment.*

- ***Step 2**: **Status** - Whether the impact/risk on the overall environment will be:*
    - *Positive - environment overall will benefit from the impact/risk;*

- *Negative - environment overall will be adversely affected by the impact/risk; or*
- *Neutral - environment overall not be affected.*

- ***Step 3**: **Qualitatively** determine the **consequence** of the impact/risk by identifying the **a) SPATIAL EXTENT; b) DURATION; c) REVERSIBILITY; AND d) IRREPLACEABILITY**.*

  - ***A) Spatial extent** – The size of the area that will be affected by the impact/risk:*
    - *Site specific;*
    - *Local (<10 km from site);*
    - *Regional (<100 km of site);*
    - *National; or*
    - *International (e.g. Greenhouse Gas emissions or migrant birds).*

  - ***B) Duration** – The timeframe during which the impact/risk will be experienced:*
    - *Very short term (instantaneous);*
    - *Short term (less than 1 year);*
    - *Medium term (1 to 10 years);*
    - *Long term (the impact will cease after the operational life of the activity (i.e. the impact or risk will occur for the project duration)); or*
    - *Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient (i.e. the impact will occur beyond the project decommissioning)).*

  - ***C) Reversibility** of the Impacts - the extent to which the impacts/risks are reversible assuming that the project has reached the end of its life cycle (decommissioning phase):*
    - *High reversibility of impacts (impact is highly reversible at end of project life i.e. this is the most favourable assessment for the environment);*
    - *Moderate reversibility of impacts;*
    - *Low reversibility of impacts; or*
    - *Impacts are non-reversible (impact is permanent, i.e. this is the least favourable assessment for the environment).*

  - ***D) Irreplaceability** of Receiving Environment/Resource Loss caused by impacts/risks – the degree to which the impact causes irreplaceable loss of resources assuming that the project has reached the end of its life cycle (decommissioning phase):*
    - *High irreplaceability of resources (project will destroy unique resources that cannot be replaced, i.e. this is the least favourable assessment for the environment);*
    - *Moderate irreplaceability of resources;*
    - *Low irreplaceability of resources; or*
    - *Resources are replaceable (the affected resource is easy to replace/rehabilitate, i.e. this is the most favourable assessment for the environment).*

*Some of the criteria are quantitative (e.g. spatial extent and duration) and some may be described in a quantitative or qualitative manner (e.g. reversibility and irreplaceability). The specialist then combines these criteria in a qualitative manner to determine the **consequence**.*

The consequence terms ranging from slight to extreme must be calibrated per Specialist Study so that there is transparency and consistency in the way a risk/impact is measured. For example, from a biodiversity and ecology perspective, the consequence ratings could be defined according to a reduction in population or occupied area in relation to Species of Conservation Concern (SCC) status, ranging from slight consequence for defined areas of Least Concern, to extreme consequence for defined areas that are Critically Endangered. For example, from a social perspective, a slight

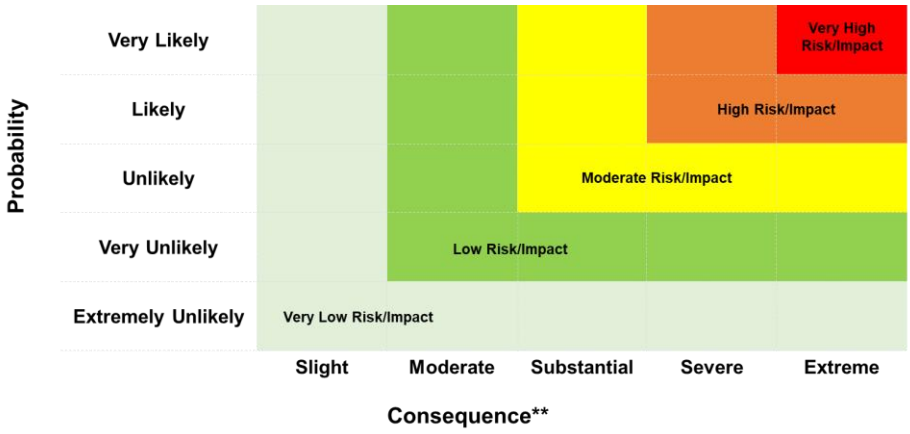
consequence could refer to small and manageable impacts, or impacts on small sections of the community; a moderate consequence could refer to impacts which affect the bulk of the local population negatively or may produce a net negative impact on the community; and an extreme consequence could refer to impacts which could result in social or political violence or institutional collapse.

- ***Consequence*** *– The anticipated consequence of the risk/impact is generally defined as follows:*
    - *Extreme (extreme alteration of natural or socio-economic systems, patterns or processes, i.e. where environmental or socio-economic functions and processes are altered such that they permanently cease);*
    - *Severe (severe alteration of natural or socio-economic systems, patterns or processes, i.e. where environmental or socio-economic functions and processes are altered such that they temporarily or permanently cease);*
    - *Substantial (substantial alteration of natural or socio-economic systems, patterns or processes, i.e. where environmental or socio-economic functions and processes are altered such that they temporarily or permanently cease;*
    - *Moderate (notable alteration of natural or socio-economic systems, patterns or processes, i.e. where the natural or socio-economic environment continues to function but in a modified manner; or*
    - *Slight (negligible and transient alteration of natural or socio-economic systems, patterns or processes, i.e. where natural systems/environmental or socio-economic functions, patterns, or processes are not affected in a measurable manner, or if affected, that effect is transient and the system recovers).*

- ***Step 4****: Rate the* ***probability*** *of the impact/risk using the criteria below:*

    - ***Probability*** *– The probability of the impact/risk occurring:*
        - *Extremely unlikely (little to no chance of occurring);*
        - *Very unlikely (<30% chance of occurring);*
        - *Unlikely (30-50% chance of occurring)*
        - *Likely (51 – 90% chance of occurring); or*
        - *Very Likely (>90% chance of occurring regardless of prevention measures).*

- ***Step 5****: Use both the* ***consequence*** *and* ***probability*** *to determine the* ***significance*** *of the identified impact/risk (qualitatively as shown in Figure 1). Significance definitions and rankings are provided below:*



[Qualitatively determined based on Spatial Extent, Duration, Reversibility and Irreplaceability]

Figure 1. Guide to assessing risk/impact significance as a result of consequence and probability.

- ***Significance*** *– Will the impact cause a notable alteration of the environment?*
    - *Very low (the risk/impact may result in very minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);*
    - *Low (the risk/impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);*
    - *Moderate (the risk/impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated);*
    - *High (the risk/impact will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making); and*
    - *Very high (the risk/impact will result in very major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making (i.e. the project cannot be authorised unless major changes to the engineering design are carried out to reduce the significance rating)).*

With the implementation of mitigation measures, the residual impacts/risks are ranked as follows in terms of significance:

- *Very low = 5;*
- *Low = 4;*
- *Moderate = 3;*
- *High = 2; and*
- *Very high = 1.*

The specialists must provide a written supporting motivation of the assessment ratings provided.

- ***Step 6****: Determine the* ***Confidence Level*** *– The degree of confidence in predictions based on available information and specialist knowledge:*
    - *Low;*
    - *Medium; or*
    - *High.*