

**Desktop Traffic Study for the  
proposed Concentrated Solar Power  
(CSP Project) Plant on RE of Farm 207,  
Portion 1 and Portion 4 of Farm  
Carolus Poort 167, near Noupoort,  
Northern Cape Province**



**December 2016**

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## Summary Sheet

Report Type: Desktop Traffic Study

Title: Desktop Traffic Study for the proposed Concentrated Solar Power (CSP Project) Plant on the Remaining Extent of Farm 207, Portion 1 and Portion 4 of Farm Carolus Poort 167, near Noupoot, Northern Cape

Location: Remaining Extent of Farm 207, Portion 1 and Portion 4 of Farm Carolus Poort 167, near Noupoot, Northern Cape Province

Client - Contact person: Savannah Environmental (Pty) Ltd – Ms Thalita Botha

Reference Number: TJ1622WC

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Contact Details: 084 300 7722

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*This Traffic Impact Statement Report has been prepared in accordance with the National Department of Transport's Guidelines for Traffic Impact Studies' PR93/635 (1995) by a suitably qualified and registered professional traffic engineering technologist. Details of any of the calculations on which the results in this report are based will be made available on request.*

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# 1 PROJECT DESCRIPTION

CRESCO Energy (Pty) Ltd proposes the construction of a Concentrated Solar Power (CSP Project) Project and associated infrastructure (known as the Noupoort CSP Project Project) on the Remaining Extent of the Farm207, Portion 1 and Portion 4 of Farm Carolus Poort 167, situated approximately 4 km north west of Noupoort. The proposed site falls within the jurisdiction of the Umsobomvu Local Municipality and within the greater Pixley ka Seme District Municipality in the Northern Cape Province.

The contracted capacity of the Noupoort CSP Project Project will be up to 150MW with a development footprint of approximately 290 ha in extent.

The proposed Noupoort CSP Project Project will utilise parabolic trough technology. The parabolic trough system is comprised of two components: a heat collection system (a solar field comprising rows of parabolic troughs) and an energy centre. The heat from the solar field creates steam from the heat transfer fluid (HTF) in a closed loop system which heats the storage medium in the energy centre. The HTF (water) in a separate closed loop system is then heated, creating steam and releasing it directly into the turbine inlet, which turns the turbine creating electricity.

Infrastructure associated with the CSP Project Plant includes:

- » » Parabolic trough technology utilising a heat transfer fluid
- » » Energy centre» Water supply pipeline
- » » Water storage tanks
- » » Water treatment plant
- » » Wastewater treatment plant
- » » Lined evaporation pond
- » » Workshop and office buildings
- » » Access roads and fencing around the development area
- » » On-site substation and overhead power line (to connect to the Eskom's electricity grid)
- » » Auxiliary boilers for facility start-up/shut-down/maintenance of boiler and steam production stability
- » » Plant assembly facility
- » » Offices and workshop areas for maintenance and storage
- » » Temporary laydown areas.

Additional auxiliary electrical equipment includes:

- » Diesel generator sets will supply power to security and monitoring systems in the event of a grid failure;
- » Security system, fence and access control;
- » Fire detection system;
- » Weather monitoring equipment (rainfall, wind speed/direction, solar irradiation, air moisture);
- » Plant monitoring equipment and associated telecommunication links;» Steam turbine building; and
- » Air cooled condenser.

The project is proposed in response to the requirement for additional electricity generation capacity at a national level and in response to identified objectives of the national, provincial, local and district municipalities to develop renewable energy facilities.

From a regional perspective, the Northern Cape area is considered favourable for the development of commercial solar electricity generating facilities by virtue of the prevailing climatic conditions (primarily as the economic viability of a solar energy facility is directly dependent on the annual solar irradiation values for a particular area), relief and aspect.

The construction phase is planned to take approximately 36 months and the site operations are planned for some 20 to 25 years.

## 2 PURPOSE OF REPORT

This Desktop Traffic Impact Study (TIS) Report informs on the traffic volumes, vehicle types and related road network capacity and traffic safety impact due to the proposed Concentrated Solar Power (CSP) Project.

## 3 DEVELOPMENT LOCATION

The proposed site is situated approximately 4 km north west of Noupoort. The proposed site falls within the jurisdiction of the Umsobomvu Local Municipality and within the greater Pixley ka Seme District Municipality in the Northern Cape Province, and covers a development footprint of some 290ha (see Figure 1 below).

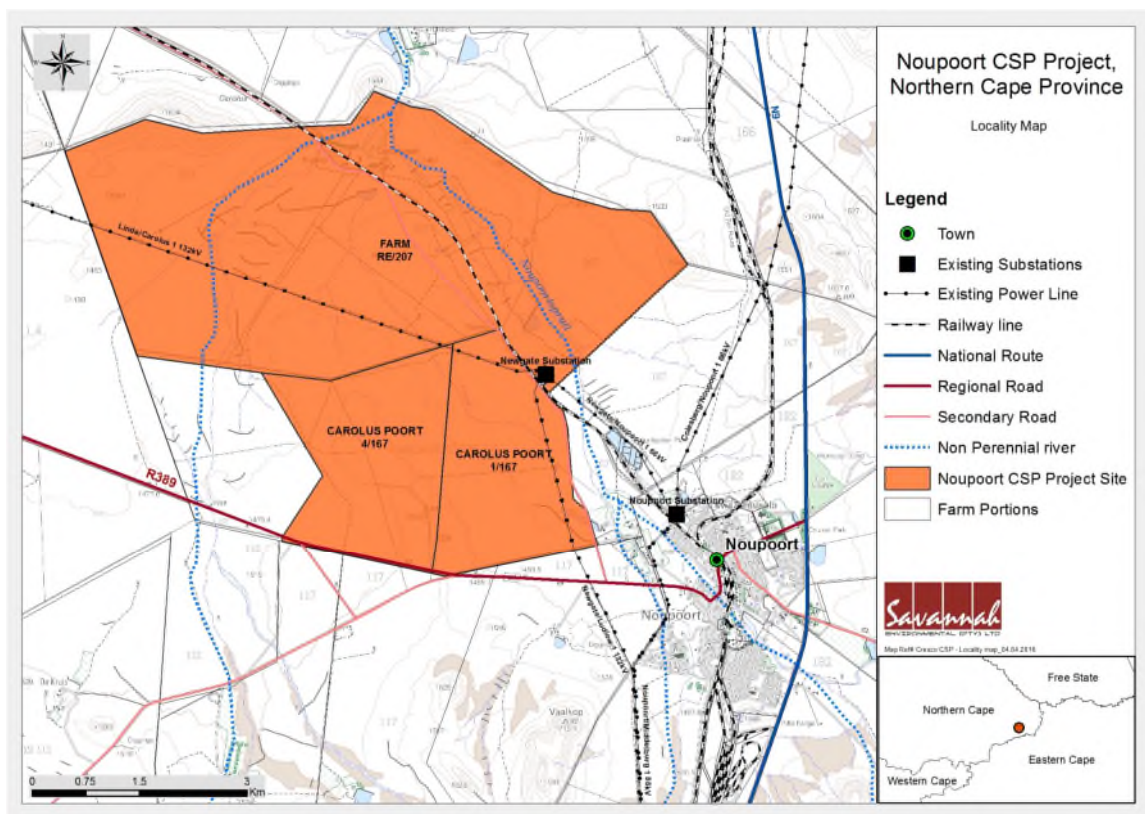
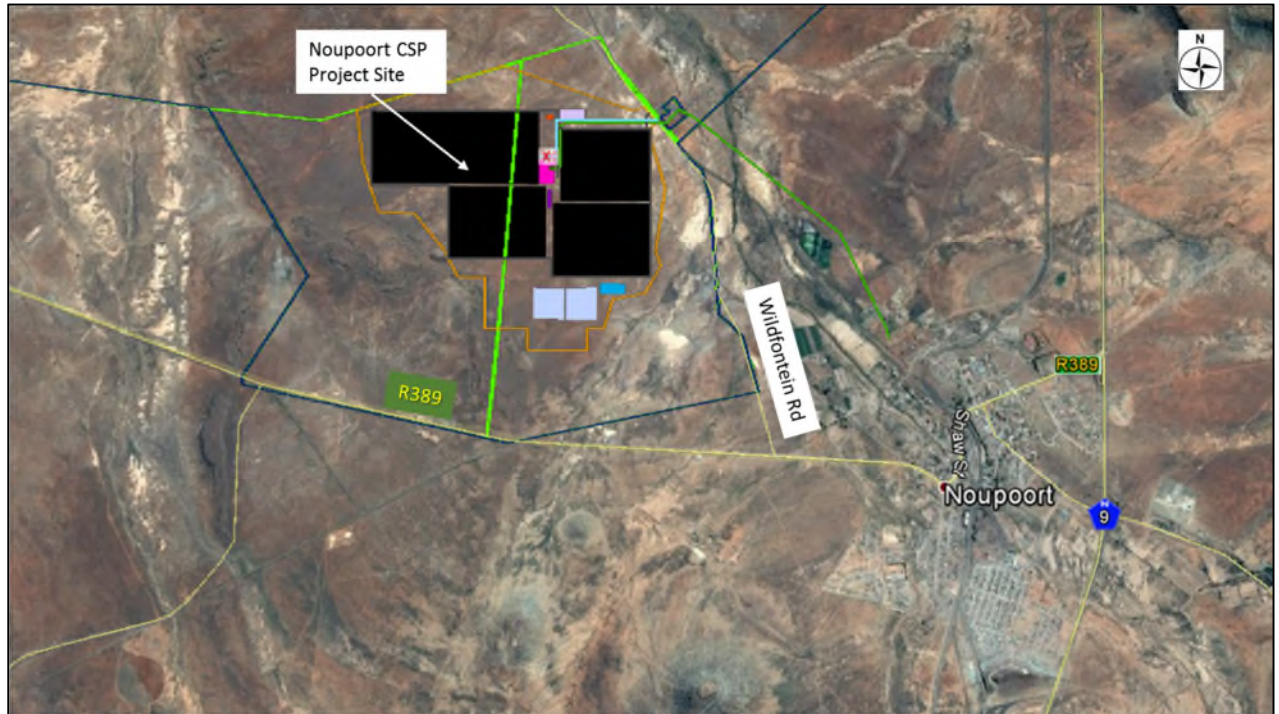


Figure 1 – Locality Map (provided by Savannah Environmental)

## 4 SITE ACCESS AND TRANSPORT ROUTES

The access to the Noupoort CSP Plant will be off the Wildfontein Road (a gravel road) which intersects with the R389. Wildfontein Road is 6 m wide with a 12 m road reserve that is mainly used by local farmers residing in the area and for maintenance and upgrading of the railway line (see Figure 2 below).



**Figure 2** – Proposed CSP Project site and Wildfontein access road

The primary roads that will be used for transportation of project components (CSP troughs) and equipment from Port Elizabeth Harbour will be the N2, N10, N9 national Roads and the R389 regional road (see Figure 3 below).

The N1 and N9 national roads will be used to transport structural steel elements from Johannesburg and CSP troughs from Port Elizabeth (see Figure 3 below).





**Figure 3** – Proposed CSP Project site and primary transport roads near the site

It is recommended that the condition of gravel roads (Wildfontein Road) travelled for construction purposes be monitored before, during and after construction, and that the developer institute remedial measures if and where required, both during and after construction.

Six (6) m wide internal access roads located in a 8 m road reserve around the CSP trough periphery and tracks (in-between the solar troughs to be used for maintenance and cleaning of solar troughs) will be constructed on the solar site. Where necessary, gravel may be used to service sections of the access road.

The internal road network within the CSP site should be comprised of gravel tracks or of compacted rock-fill with layer of higher quality surface stone in the upper pavement layer.

It is recommended that a servitude Right-of-Way be registered or alternatively a suitable agreement be entered into to secure right of access over the subject property for the CSP Project.

The temporary nature of the build, low background traffic and low number of vehicles to the site, during and after construction (see below), does not warrant turning lanes at the proposed access to the site.

Road signage warning of possible construction vehicles should be erected, at the Wildfontein Road farm access and on the R389 at the R389 / Wildfontein Road intersection, during the construction phase.

A typical site access with the gate set back to accommodate larger vehicles turning movements is shown in Figure 4 below.

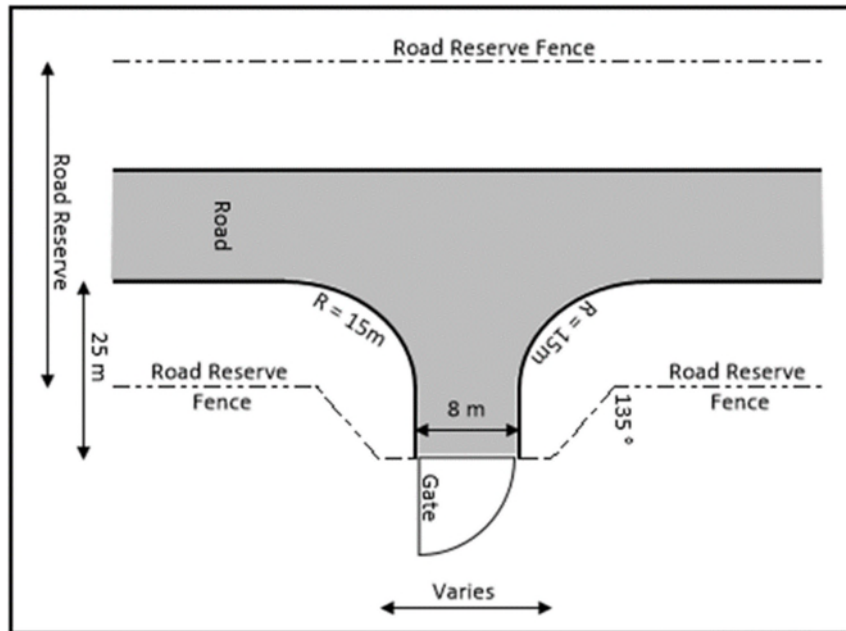


Figure 4 – Typical Site Access diagram

## 5 TRAFFIC IMPACT

The following traffic related aspects are relevant to the proposed Noupoort CSP Project;

- » STATUTORY BUILDING LINES:
  - Lateral displacement from road / encroachment on the 95 m building line on the R389 (relates to traffic safety – driver distraction and vehicle impact);
- » TRIP GENERATION:
  - Construction, delivery and operations (staff and maintenance) vehicles to the proposed Noupoort CSP Project (relates to increased traffic volumes and traffic safety); and
- » HAZARDOUS GLARE
  - Glare from CSP mirrors (relates to hazardous glare and traffic safety).

These three aspects are discussed below:

### 5.1 STATUTORY BUILDING LINES:

Being a Proclaimed Road, the R389 is a Building Restriction Road.

As such it is subject to a 95 m building line (measured from the centre of the statutory road reserve) in terms of the Advertising on Roads and Ribbon Development Act 21 of 1940 and are also subject to a 5m building line (measured from the statutory road reserve boundary) in terms of Road Ordinance 19 of 1976.

The Provincial Roads Authority would therefore need to grant permission for encroachment on said building lines.

Detail building plans were not available at the time of this report and the matter of encroachment on building lines should be addressed outside of this report, during building plan submission.



## 5.2 TRIP GENERATION:

This section covers the various vehicle types and associated trips to and from the site, as listed below:

- a) General
- b) Trip Generation aligned with Project Programme
- c) Staff Transport Vehicles
- d) Construction Vehicles
- e) Delivery Vehicles
- f) Operational Period Vehicles
- g) Total Development Traffic

### a) **General:**

- » Construction of the proposed Noupoort CSP Project will take 36 months to complete;
- » The majority of traffic generated by the proposed Noupoort CSP Project will occur during the construction period and will comprise both light and heavy vehicles;
- » Construction work, with a maximum of 300 workers on-site at a time, is in one shift during daylight hours;
- » Vehicle and equipment delivery to and from the site would generally, but not necessarily, be outside the commuter peak periods;
- » The delivery of materials and equipment required for the project is shown in Table 1;
- » Access to the site is from the Wildfontein Road that accesses the R389 that intersects with the N1 near Hanover and the N9 near Noupoort.

### b) **Trip Generation aligned with Project Programme:**

The South African Trip Generation Rates and the Institute of Transportation Engineers (ITE) Trip Generation Manual do not provide data on construction traffic generation for developments such as the Noupoort CSP Project. Consequently, trip generation estimates are based on first principles related to the anticipated build requirements and assumed project programme, as shown in Table 1 below (see Annexure B for larger scale Table 1).

**Table 1 – Construction Activity Trips to Site**

150 MW NOUPOORT CSP PROJECT, NEAR NOUPOORT, NORTHERN CAPE, EXECUTION PLAN										
Construction Stages										
1	Site Establishment and Civils	x	x	x						
2	Delivery of PV Modules and Structures		x	x	x	x	x			
3	Construction of Trackers and Mounting Modules		x	x	x	x	x			
4	Electrical Works				x	x	x	x		
5	Commissioning						x	x	x	

Vehicles to Site										
ITEM	DESCRIPTION	MONTHS								TOTAL
		1	3	5	6	6	6	5	1	
From Month		1	3	8	13	19	25	31	36	1
To Month		2	7	12	18	24	30	35	36	36
# Months		2	5	5	6	6	6	5	1	36
1	Employees on site (Day shift only)	150	300	300	300	300	300	250	200	
2a	Vehicles to site (Daily)	25	50	50	50	50	50	42	33	
2b	Busses to site (Daily)	2	4	4	4	4	4	3	3	
3a	Vehicles to site (Monthly)	650	1300	1300	1300	1300	1300	1083	867	43983
3b	Busses to site (Monthly)	52	104	104	104	104	104	87	69	3519
4	Machinery & Equipment to site: (Monthly)									
4a	Grader	8	6	6	3	0	0	0	0	90
4b	Excavator	8	6	6	3	0	0	0	0	90
4c	Front Wheel Loader	8	6	6	3	0	0	0	0	108
4d	Tipper/Dump Truck (10m <sup>3</sup> )	45	18	18	15	5	0	0	0	390
4e	Drill Rig	0	9	9	8	8	3	0	0	195
4f	Ready Mix Truck - Concrete to site Limited to foundations only	0	0	0	10	0	0	0	0	60
4g	Tractor Loader Backhoe (TLB)	8	6	6	3	3	0	0	0	105
4h	Watercar	8	6	6	3	3	0	0	0	108
4i	Small equipment / vehicles (should remain on site for extended periods of time)	23	9	9	8	8	8	9	23	338
5	Steel Structure to site (Interlinks from Johannesburg)	0	5	5	5	5	0	0	0	110
6	CSP Mirrors to site (12 m container trucks from Port Elizabeth harbour)	0	10	10	10	10	0	0	0	220
Vehicle Trips										
1	Heavy Vehicles Monthly (Incl buses)	157	185	185	172	148	114	96	82	
2	Heavy Vehicles Daily (Incl buses)	6	7	7	7	6	4	4	3	
3	Assume 30% bunching for heavy vehicle deliveries (Daily - Outside peak hr)	5	4	4	3	2	1	0	1	
4	Light Vehicles to site Daily in Peak Hour	25	50	50	50	50	50	42	33	
5	EVU to site Daily (EVU factor 3)	47	74	74	72	69	64	53	45	
6	Peak Hour Trips (Light vehicles to site and buses to & from site)	29	58	58	58	58	58	48	39	

**NOTE:** 1) No staff will be housed on site, site will use local employees and management/permanent staff will be housed close by.  
2) No shifts hours only normal working hours.

**NOTE:** Table 1 (vehicle trips) item 3 assumes a 30% bunching factor for Machinery and Equipment arriving on site on a day as a worst case scenario.

**c) Staff Transport Vehicles:**

- » A maximum of 300 construction staff and construction workers will be on site at any one time. Approximately 50 vehicles and 4 buses will provide transport to and from the site during the commuter peak periods, for much of the 36 month build period.

**d) Construction Vehicles:**

These vehicles are classified as heavy vehicles and the maximum visits to site in a month are show below:

- » A grader is expected at site on 8 occasions in month 1. These vehicles will be transported to and from the site on small low-bed trucks (see Picture 1 below). The grader may remain at the site for extended periods of time;
- » An excavator is expected at site on 8 occasions in month 1 (see Picture 2 below);
- » A front wheel loader is expected at site on 8 occasions in month 1 (see Picture 3 below);
- » 10m<sup>3</sup> Dump trucks is expected on site 45 times in month 1 (see Picture 4 below);
- » A drill rig is expected on site 9 times per month for 4 months of the project build (see Picture 5 below);
- » Approximately 10 concrete mixer truck deliveries are required on site in month 4 (see Picture 6 below);
- » A Tractor-Loader-Backhoe (TLB) type excavator is expected at site on 8 occasions per month. These vehicles will be transported to and from the site on small low-bed trucks (see Picture 7 below). The excavators will remain at the site for extended periods of time;

- » A water car is expected at site on 23 occasions per month (see Picture 8 below);
- » Small equipment vehicles are also required on site, i.e. tippers, fork lifts, etc. (see Picture 9 below).



**Picture 1– Grader**



**Picture 2 –Excavator**



**Picture 3 – Front End Loader**



**Picture 4 – Front Wheel Loader**



**Picture 5 – Drill Rig**



**Picture 6 – Cement Mixer / Ready-Mix Truck**



**Picture 7** – Tractor-Loading-Backhoe (TLB)



**Picture 8** – Water Car



Dumper truck



Pile Driving (Ram) Machine



Roller Compactor



Fork Lift

**Picture 9** – Other/typical small equipment vehicles

e) **Heavy Delivery Vehicles:**

- » Standard Load Vehicles (12 m container trucks) (see Figure 5 below):



**Figure 5** – Typical Heavy Delivery/Freight Vehicles for carrying ISO Containers

- Approximately 110 truck loads are required over 21 months, transporting structural steel elements from Johannesburg;
  - Approximately 222 twelve (12) m container trucks are expected over 21 months, carrying a total of 12 291 CSP troughs from Port Elizabeth Harbour.
  - Heavy vehicle deliveries are generally anticipated to arrive at site outside the commuter peak period, and
  - The expected numbers of heavy vehicle deliveries to the site during the construction of the proposed Noupoot CSP Project, estimated at 1 to 2 per day over the construction period is not significant and should be accommodated on the national and provincial road network with relative ease.
- » Abnormal Load Vehicles:
- No abnormal load vehicles are expected during construction;

**f) Operational Period Vehicles:**

- » Operations Staff Requirements:

The Noupoot CSP Project will be operational during all hours, except during maintenance, breakdowns or interruption of the connection to the Eskom grid.

Regular maintenance will typically include periodic cleaning, greasing of bearings and inspection. The CSP solar panels will be cleaned with water or compressed air.

An estimated total of six (5) full-time staff members will typically be required during the operation phase of the project, which includes technicians, maintenance and security personnel. Approximately three (2) unskilled labourers will be required for maintenance purposes and two (2) security personnel will be deployed on a shift basis. One (1) skilled staff member will be needed to manage and oversee the operations.

From time to time additional contract staff (10) may be required for ad-hoc ground cleaning or special CSP trough cleaning. Therefore, a total of between 5 – 20 people will be employed during the site operational period.



- » Operations and Maintenance Vehicles:
  - Operations and maintenance related trips will be minimal;
  - Staff can be transported around the site using utility vehicles and a typical mini-bus. These vehicles will additionally be used to transport staff from the nearby towns of Noupoort or Middleburg;
  - Cleaning of CSP troughs would be done occasionally and security personnel would visit the site periodically; and
  - It is assumed that one light vehicle or truck could visit the site daily for either cleaning or security purposes.

**g) Total Development Traffic:**

- » Trip generation is considered for both the off-peak and the commuter peak hours, as shown below:
  - Off-Peak daily trips: It is anticipated that the development will generate 5 heavy vehicle trips to the site on a day, comprising 1 heavy vehicle deliveries to site (outside commuter peak) plus 4 buses transporting staff to site (during the commuter peak) in Months 2 & 5. It is however anticipated that Machinery and Equipment will generally arrive outside of the commuter peak hours.
  - Peak Hour Trips: It is anticipated that the development will generate 58 peak hour trips (50 sedan vehicles arriving and 4 buses arriving and leaving site in the AM and visa-versa in the PM (for most of the project construction)).
- » The total development traffic is dispersed over a wide road network, with CSP troughs deliveries arriving from Port Elizabeth Harbour and Steel Structure elements originating in Johannesburg, over a period of 21 months); and
- » The expected average daily numbers of light and heavy vehicles to the site during the construction of the proposed Noupoort CSP Project is low and should be accommodated on the main road network with ease.

*Note, the information provided is an informed estimate. Construction related traffic may however vary and be different from the information provided above during some construction periods due to suppliers' delivery schedule updates/changes.*

**6.1 HAZARDOUS SOLAR GLARE:**

This aspect is not covered in this report, it being addressed in the Environmental Impact Assessment (EIA) as part of the Visual Impact Assessment Report. It is mentioned in this report for completeness.

## 7 CONCLUSIONS AND RECOMMENDATIONS

It is concluded that;

1. The proposed Noupoot CSP Project needs to take cognisance of the statutory building lines along proclaimed R389, in terms of Act 21 of 1940 and Road Ordinance 19 of 1976;
2. Servitude Right-of-Way or similar legal binding agreement needs to be in place to ensure legal access for the CSP project,
3. Signage warning of construction vehicles at the farm access should be erected for the site construction period;
4. The development access (construction and development) need not be hard surfaced as Wildfontein Road is not hard surfaced;
5. The proposed Noupoot CSP Project construction and future operations traffic volumes are low and can be accommodated on the affected road network with ease;
6. No Abnormal Load Vehicles are required for the CSP Project; and
7. Hazardous Glare from the Noupoot CSP Project will be assessed separately from this report, and mitigation measures should be proposed in the event of such being required.

It is recommended that;

1. Cognisance be taken of building lines applicable in terms of Act 21 of 1940 and Roads Ordinance 19 of 1976, and the Road Authority being approached for approval where required;
2. A servitude Right-of-Way be registered over Noupoot Farm, in favour of the proposed Noupoot CSP Project, or a similar legal contract securing access rights for the Noupoot CSP Project being obtained;
3. The site access gates being located at least 25 m from the travelled way to facilitate entry and exit to the site;
4. Road signs warning of construction vehicle activity at the access being erected on Wildfontein Road for the construction phase; and
5. Hazardous glare be addressed as and where required as per the EIA report.

## 8 REFERENCES

1. National Department of Transport's Guidelines for Traffic Impact Studies' PR93/635 (1995)
2. Advertising on Roads and Ribbon Development Act – Act 21 of 1940
3. South African Trip Generation Rates, Second Edition, Department of Transport – June 1995
4. Institute of Transport Engineers Trip Generation Manual 8<sup>th</sup> Edition
5. Background Information Document April 2016: Construction of the 150MW Concentrated Solar Power (CSP) Project, Northern Cape Province: by Savannah Environmental
6. Jinko Solar's Production Facility – Case Study on logistics presented by Lourens Vermaak at African Utility Week held in Cape Town (12 – 14 May 2015)

## ANNEXURE A – SITE DRAWING

NOT AVAILABLE AT TIME OF THIS REPORT

# ANNEXURE B – TABLE 1 – Construction Activity Trips to Site

## 150 MW NOUPOORT CSP PROJECT, NEAR NOUPOORT, NORTHERN CAPE, EXECUTION PLAN

Construction Stages												
1	2	3	4	5	6	7	8	9	10	11	12	13
Site Establishment and Civils												
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Vehicles to Site													
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4	Light Vehicles to site Daily in Peak Hour	25	50	50	50	50	50	42	33				
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