Traffic Impact Statement for the proposed Paulputs Concentrated Solar Power (CSP) Project near Pofadder, Northern Cape Province

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June 2016

Summary Sheet

Report Type:	Traffic Impact Statement (TIS)
Title:	Traffic Impact Statement for the proposed Paulputs Concentrated Solar Power (CSP) Project near Pofadder, Northern Cape Province
Location:	Farm Scuitklip 92, located approximately 40km north-east of Pofadder within the Khai-Ma Local Municipality in the Northern Cape
Client - Contact person:	Savannah Environmental (Pty) Ltd – Ms Karen Jodas
Reference Number:	TJ1606WC
Project Team:	Mr. Stephen Fautley (Pr. Tech Eng. 200270171)
Contact Details:	084 300 7722
Date:	23 June 2016
Report Status:	DRAFT
File Name:	C:\Users\User\QSYNC\Techso\Projects 2016\Abengoa Solar\TIS - Abengoa Solar Plant (20160626).docx

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 engineer. Details of any of the calculations on which the results in this report are based will be made available on request.

CONTENTS PAGE

1 PROJECT DESCRIPTION

The proposed development by Paulputs CSP RF (Pty) Ltd entails the development of a Concentrated Solar Power (CSP) Project and associated infrastructure on Portion 4 of the Farm Scuitklip 92, located approximately 40km north-east of Pofadder within the Khai-Ma Local Municipality in the Northern Cape. The facility will make use of Molten Salt Tower (MST) technology.

The project is being 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 greater Pofadder 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 proposed project site is situated within the Northern Corridor defined in terms of Eskom's Electricity Grid Infrastructure Strategic Environmental Assessment (SEA) conducted by the CSIR.

The Paulputs CSP Project will consist of heliostats and a molten salt tower system with a generation capacity of ~200MW. The facility will be constructed over an area of approximately 900 ha in extent, and include inter alia the following infrastructure:

- Molten salt tower up to 300m in height with surrounding heliostat field
- Power island including salt storage tanks, steam turbine generator, heat exchangers, and dry cooled condenser
- On-site project substation, and short 132 kV power line to Eskom's existing Paulputs Transmission Substation
- Water supply abstraction point located at the Gariep River close to Onseepkans
- Filter and booster station at abstraction point
- Water supply pipeline along R357 Onseepkans Road to the site
- On-site lined ground water storage reservoir and various steel water tanks
- Lined evaporation ponds
- Packaged water treatment plant and associated chemical store
- Auxiliary wet cooled chiller plant
- Control room and office building
- Heliostat assembly building and workshop.

The establishment of a CSP facility project is comprised of various phases, including pre-construction, construction, operation, and decommissioning. The construction activities involved for the proposed CSP plant will include the following:

- Conduct pre-construction surveys.
- Establishment of access roads.
- Undertaking site preparation (i.e. including clearance of vegetation; and stripping and stockpiling of topsoil).
- Transportation of equipment to site and establishment of construction camps; laydown areas (i.e. including storage facilities, batching facilities and mirror assembly plant).
- Assemble and construct heliostats.
- Construct power-island and substation.
- Establish and implement a stormwater management plan.
- Undertake site rehabilitation.

The construction phase is expected to take approximately 3 years. The access point to the site during the construction phase is proposed off the R357 Onseepkans road (-28.849 19.582).

2 PURPOSE OF REPORT

This Traffic Impact Statement (TIS) Report provides comment on the traffic volumes, vehicle types and related road network capacity and traffic safety impact due to the proposed Paulputs CSP Project

3 DEVELOPMENT LOCATION

The subject property is located at the intersection of Minor Road (MN) 73[1] and Main Road (MR) 759, some 64 km to the west of Kakamas and 40 km north-east of Pofadder within the Khai-Ma Local Municipality (see Figure 1 to Figure 3 below).

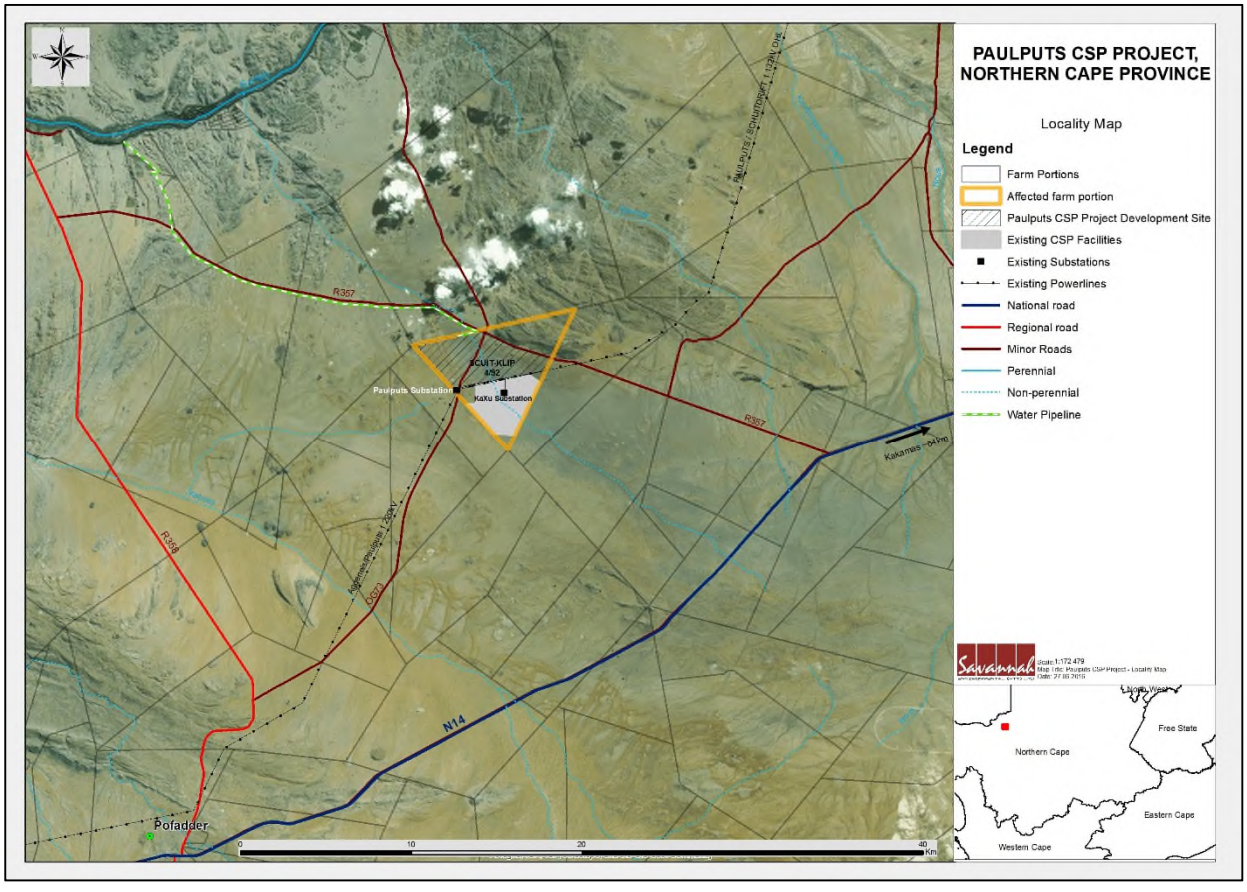


Figure 1 – Locality Map

[1] Also known as the OG73 but referred to as MN73 throughout this document

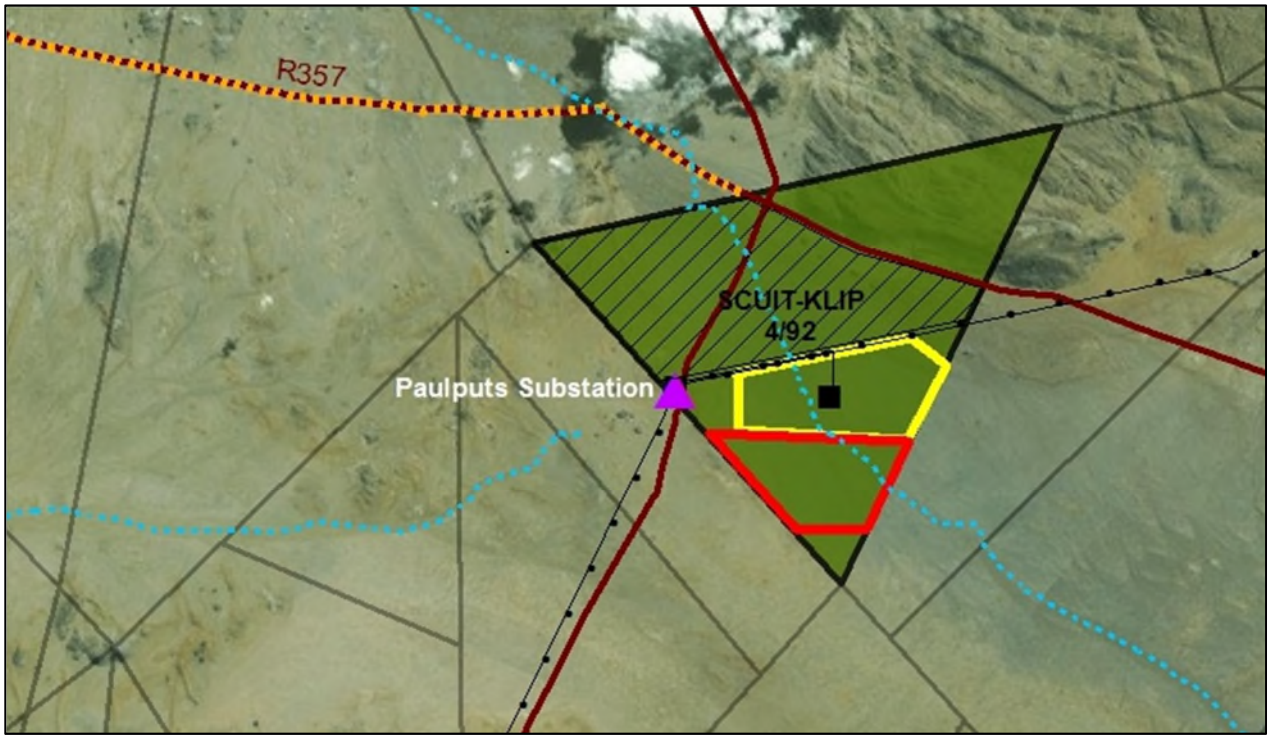


Figure 2 – Close-Up Locality Plan

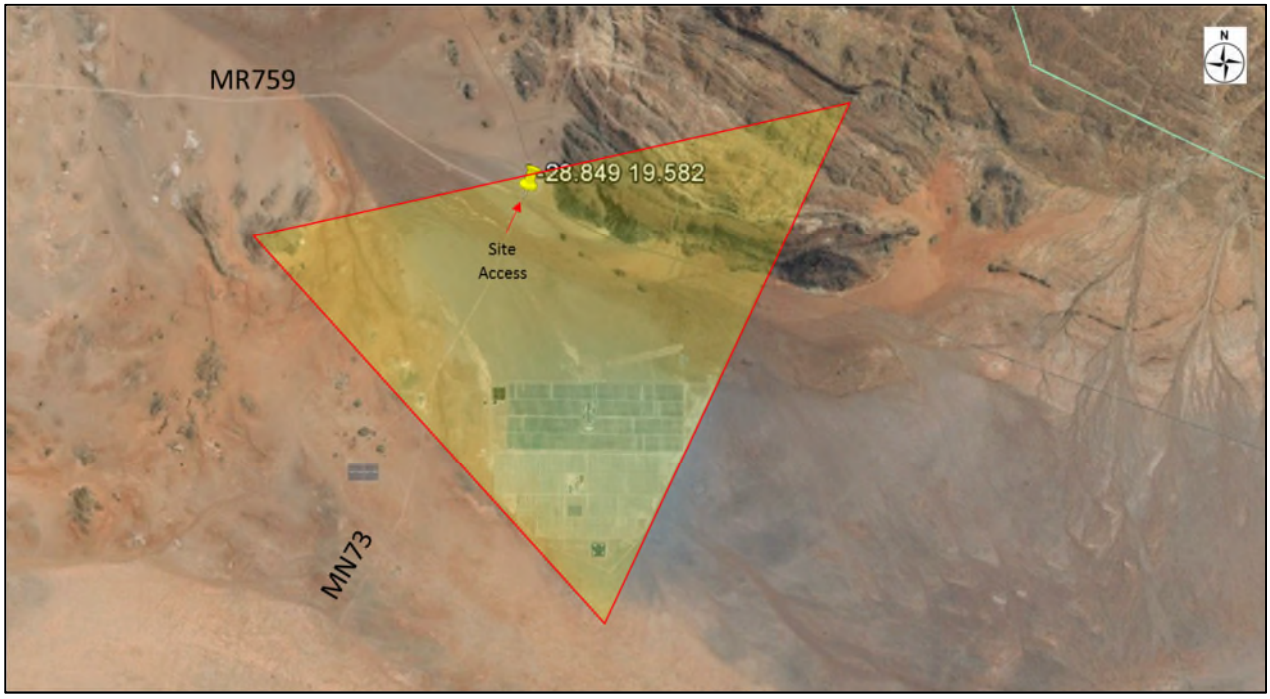


Figure 3 –Close-Up Aerial View

4 CONSTRUCTION AND FUTURE ACCESS

The Paulputs CSP Project will use the existing MN73 intersection on MR759 for site access during construction (see Pictures 1 to 3 below).

		
Picture 1 – Looking left from MN73 (the existing and proposed construction access)	**Picture 2** – View of MN73 (existing and proposed construction access on MR759	**Picture 3** – Looking right from MN73 (the existing and proposed construction access)

MN73 runs through the site and will be realigned as part of the project build.

It is proposed to provide an access road on the eastern side of the property and also an Internal Access road, as an alternative to the eastern access via the MN73, on the northern side of the property.

Said accesses intersect with MR759 and shall adhere to normal access design requirements (setback, sightlines, etc.). The MN73 realignment and the proposed accesses are as shown in Figure 4 below.

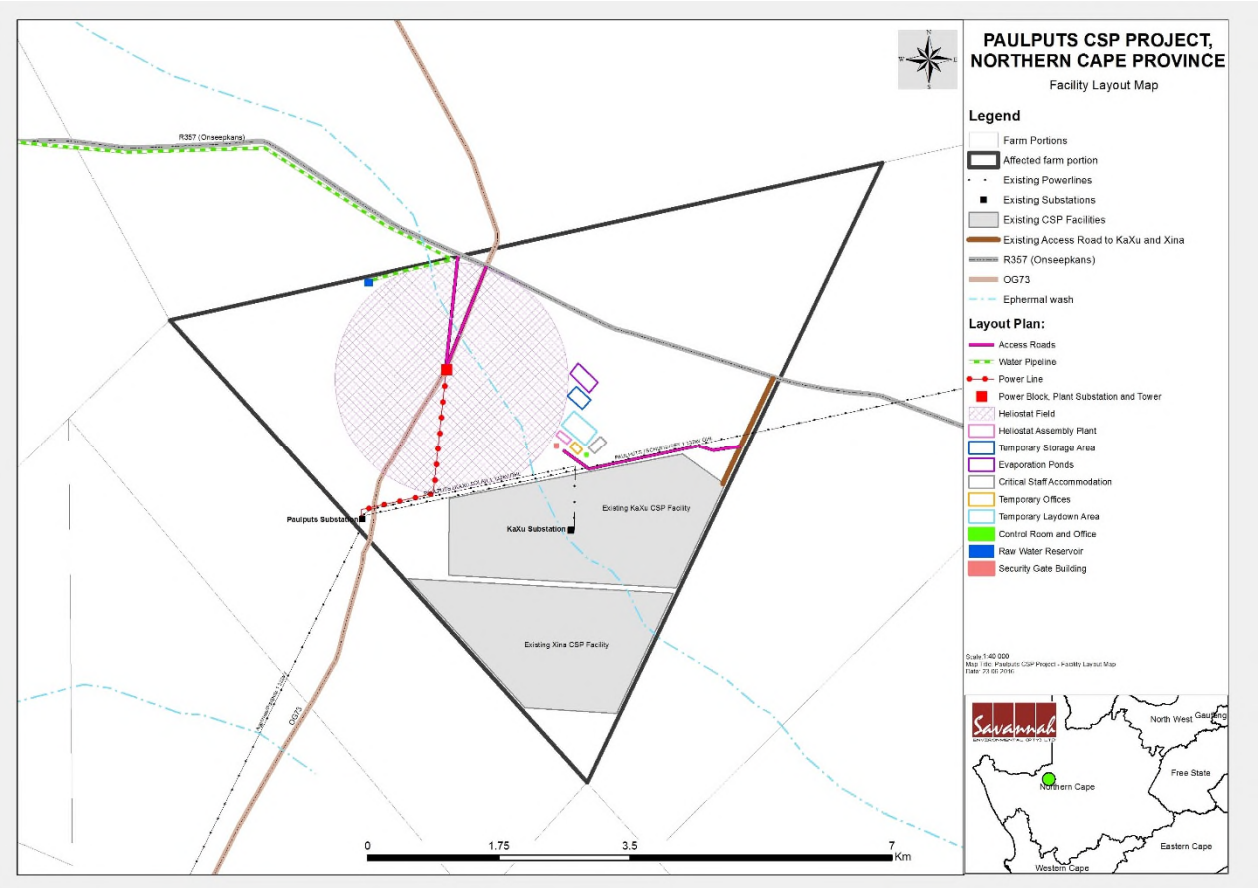


Figure 4 –MN73 realignment and proposed accesses

The site access gates on the MN73 approach to MR759 should be located at least 25 m from the travelled way to allow vehicles to and from the site to stand clear of the travelled way and to reduce the width of the access gate (see Figure 5 below). The proposed access shall be hard surfaced up to the property boundary and this will serve to limit soil being carried onto the MR759 by construction vehicles wheels and will also help protect the road bell-mouth edge.

The temporary nature of the build, relatively low background traffic and low number of vehicles to the site, during and after construction, does not warrant turning lanes.

In view of the 100km/h travelled speed on MR759 road signage warning of possible construction vehicles at the access should be erected during the construction phase.

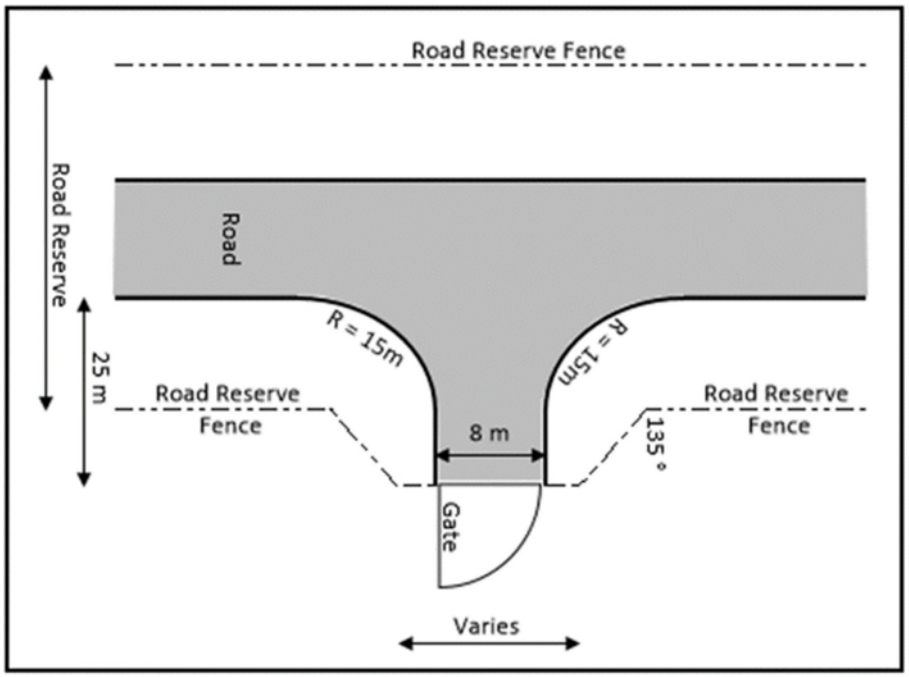


Figure 5 – Typical Site Access

5 SURROUNDING ROAD NETWORK

Existing:

Minor Road 73 (MN73) traverses the site and serves as the site access on Main Road 759 [R357]. It is a gravel road with an 80 km/h posted speed limit and carries very low volumes of traffic, with less than 10 vehicles during peak hours.

MN73 connects with the R358 that intersects with the N14 near Pofadder, to the west of the site.

Main Road (MR) 759 connects to the N14 to the east of the site. It is a tarred road with a 100 km/h speed limit and carries low volumes of traffic, with approximately 100 vehicles during the peak hour.

Future:

MN73 is impacted by the proposed Paulputs CSP Project and will be realigned past the site.

The design of the MN73 realignment (see Figure 4 above) being undertaken by WorleyParsons will be submitted separately to this report and shall adhere to acceptable geometric design standards. The design

is subject to the approval of the relevant Road Authority. MN73 realignment is required due to the proposed Paulputs SCP Project and the road realignment is acceptable in principle.

The site enjoys good access to the Regional and National Road network.

6 TRAFFIC IMPACT

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

1. Lateral displacement from road / encroachment on the 95 m building line on the MN73 and MR759 (relates to traffic safety – driver distraction and vehicle impact);
2. Distance from main road intersections (relates to future road upgrading possibilities and intersection spacing);
3. Construction, delivery and operations (staff and maintenance) vehicles to the proposed Paulputs CSP Project site (relates to increased traffic volumes and traffic safety); and
4. Glare from Heliostats (relates to hazardous glare and traffic safety).

These aspects are discussed below:

1. STATUTORY BUILDING LINES:

Being proclaimed roads, MN73 and MR759 are Building Restriction Roads. As such they are subject to a 95 m building line in terms of the Advertising on Roads and Ribbon Development Act 21 of 1940. The roads are also subject to a 500 m building line measured from road intersections in terms of said Act. The Provincial Roads Authority would need to grant permission for encroachment on said building lines.

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

2. ACCESSES ON MR759:

The existing MN73 access on MR759 shall serve as the Paulputs CSP site access during construction, with the redundant portion of MN73 being incorporated into the site as an internal access driveway/road.

The realignment of MN73 will be submitted separately to this report and shall adhere to the relevant Road Authorities design standards and access spacing requirements. Considering the site and surrounding road network, it is assumed that an acceptable design solution should be found with relative ease.

It is proposed to provide an access road on the eastern side of the property. It is also proposed to provide an Internal Access road, as an alternative to the eastern access via the MN73, on the northern side of the property. Said accesses intersect with MR759.

The proposed future accesses (see Figure 4 above) will carry a low number of vehicles (discussed below) during the project operational phase and shall be designed in accordance with acceptable geometric design standards and submitted to the relevant Roads Authority for approval.

3. TRIP GENERATION:

Construction of the proposed Paulputs CSP Project will take 3 years to complete.

The majority of traffic generated by the proposed Paulputs CSP Project will occur during the construction period and will comprise both light and heavy vehicles.

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 Paulputs CSP Project. Consequently, trip generation estimates are based on the anticipated build requirements and the project programme, as shown in Table 1 below (see Annexure B for larger scale Table 1).

Table 1 – Construction Activity Trips to Site

Construction Activity Trips to Site - Workers and Equipment							
Phase Name and Duration	Items	Duration / Months	Trips to site			Remains on-site (Y/N)	Comments
			In a week	In a work day	In peak hr		
Site Preparation and Grading							
(12 to 20 Months)	Equipment						Minimal (site relatively flat with shrub vegitation)
	• 10 Loader / Excavators	20	10	10	2	Y	Arrive together at start of project over 2 days
	• 15 Graders	12	8	8	1	Y	Arrive together at start of project over 2 days
	SUM		**18**	**18**	**3**		(On 2 occasions at start of project)
Installation							
(35 Months)	Equipment						
	• 20 Cranes	36	4	2	0	Y	Road based
	• 40 Cherry Pickers	36	6	3	0	N	Road based (transport 2 on a Lowbed - Lowbed does not remain on site)
	160 Sedans for Staff and Work Team	36	780	130	91	N	Assume 70% workers arrive in same hour (Workers arrive over 2 hours and 30
	20 Buses for workers	36	120	20	14	N	sedan vehicles remain on site belonging to staff who stay on site)
	500 ISO Container Transport Trucks	36	10	2	0	N	
	40 Abnormal Load Flatbed	24	2	1	0	N	
	10 Concrete Trucks	36	10	3	0	Y	Arrive and stay on site (Mix on-site)
	20 Dump Trucks	24	60	10	2	N	Assume arrive at start of work day
	SUM		**992**	**171**	**107**		Peak period - takes 36 months added deliveries into account
Note - 6 day work week.							

NOTE: Table 1 assumes a worst case scenario, with all weekly vehicles assumed to arrive on the same day during the week. As such, on occasion, there may be 21 heavy vehicles arriving on a day.

General:

- Typical construction work schedules are expected to be during daylight hours wherever possible.
- Truck and delivery activity to and from the site is also planned to occur outside the commuter peak periods.
- The delivery of materials and equipment shown in Table 1 above, as required for the construction of the Paulputs CSP Project.
- There are a number of routes to and from the site and traffic will be dispersed accordingly.

Staff Transport Vehicles:

- A few construction workers are accommodated on-site and buses provide transport for the bulk of workers to the site;
- 20 buses per day to and from the site are required over a two hour AM and PM peak period over a period of 35 months; and
- Approximately 91 light vehicle peak hour trips transporting workers to and from site are expected during the peak hour.

Construction Vehicles:

- 10 Dump trucks deliveries per week to from the site are required over a period of 24 months (see Picture 4 below);
- Approximately 10 concrete mixer trucks are kept on site over the 36 month period (no picture) and concrete is mixed on-site;
- The largest construction equipment is a JCB type excavator to be used on-site. 10 excavators are to be used on site for the project build. These vehicles will be transported to and from the site on small low-bed trucks (see Picture 5 below). The excavators will remain at the site for extended periods of time;

- 40 cherry pickers are required on site over 36 months and remain on site for extended periods of time (see Picture 6 below). Two cherry pickers are transported to site per lowbed truck.
- 7 ton crane trucks will be required at the site and requires approximately 20 visits. This is a road based vehicle (see Picture 7 below).

Picture 4 - 10 Ton Truck

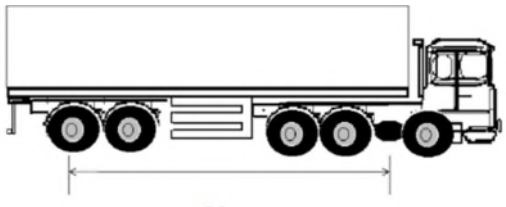
Picture 5 - JCB Excavator

Picture 6 – Cherry picker vehicles

Picture 7 - 7 Ton Crane

Delivery Vehicles:

- Standard Load Vehicles:
  - 500 ISO Container Transport truck loads (see Figure 6 below) are required over the 36 months; and
  - The expected numbers of ISO vehicles to the site during the construction of the proposed Paulputs CSP Project is not particularly significant and should be accommodated on the surrounding and national road network with relative ease.

TYPICAL FREIGHT VEHICLES - MAXIMUM LADEN WEIGHT - 40 TON	
A COMBINATION OF A TRACTOR UNIT WITH A TWO-AXLE TRAILER UNIT.	 X Distance measured from kingpin to centre of rearmost axle

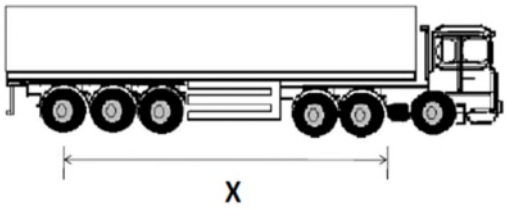
A COMBINATION OF A TRACTOR UNIT WITH A THREE-AXLE TRAILER UNIT.	

Figure 6 – Typical Freight Vehicles for carrying ISO Containers

- Abnormal Load Vehicles:
  - Approximately 40 abnormal load flatbed trucks (see Fig 7 below) are expected over a 24 month period during construction;

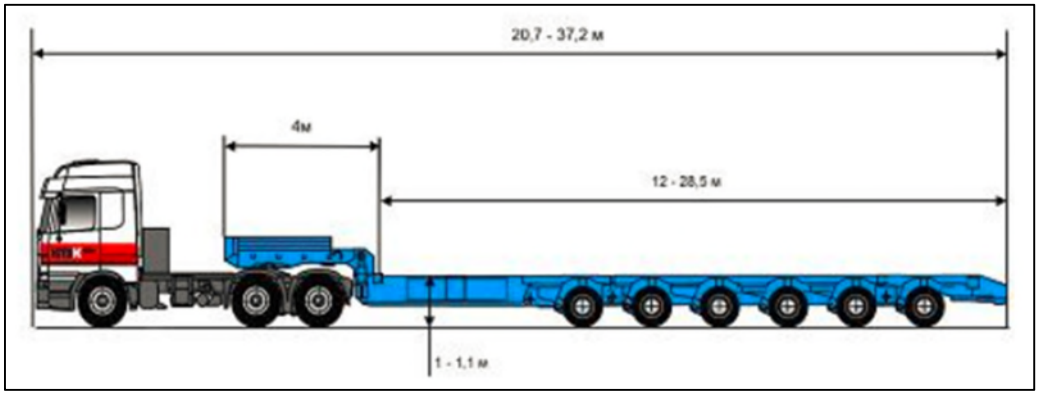


Figure 7 – Typical Low-bed Transport Vehicle (for carrying abnormal loads)

  - Transporting abnormal loads (i.e. substation transformers during peak construction periods with weight of around 85 Tons) will require an abnormal load permit;
  - Approximately 40 abnormal load trucks are anticipated during the construction period of 24 months;
  - An Abnormal Load Permit, must be obtained by the transport carrier, in accordance with Committee of Transport Officials (COTO) TRH 11 - Dimensional and Mass Limitations and Other Requirements for Abnormal Load Vehicles (8th Edition 2010) as published by South African Department of Transport;
  - Vehicle length exceeding 18.5 m are abnormal vehicles and where the maximum permissible length under permit is 26 m;
  - Steerable rear axles or dollies are required for vehicle length of 20 m to 25 m or where the wheelbase exceeds 14.5 m;
  - The substation transformers are less than 3.5 m wide but exceed 2.6 m width, and accordingly an abnormal load permit is required;
  - The load and vehicle height shall not exceed 4.3 m, except by permit;
  - Axle groups may not exceed the values given in Table 3.1 of TRH 11;
  - The vehicle manufacturer axle-mass load limits and other vehicle specifications must be satisfied;
  - The selected route must be indicated for the permit;

- Transport of the abnormal load will require clearance of bridge posted maximum total and maximum axle mass along selected travel routes;
- Abnormal load vehicles must be suitable marked as per Figure 4.4 of TRH 11;
- Vehicle escort requirements are set out in Figure 4.4 of TRH 11; and
- Tracking across bridges under escort may be required as per Figure 4.4 of TRH 11.

Operational Period Vehicles:

- Operations and Maintenance Vehicles:
  - Operations and maintenance staff working in shifts will realise relatively low vehicle trips with a staff component of around 50 people per shift at the plant (i.e. less than 50 vehicles in and 50 trips out during the AM and PM peak hours; and
  - Background traffic is very low and the Paulputs operations traffic will be accommodated on the 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.

Total Development Traffic:

- The total development traffic is dispersed over a wide road network and over a period of three years and is insignificant, apart from abnormal load vehicles that are not peculiar to the road network and that are subject to a specific permit / approvals process;
- On occasion, as a worst case scenario, some 21 heavy vehicles might arrive on a day outside of peak hours (see Note under Table 1). This is an insignificant number of vehicles that will be dispersed on the road network; and
- The site staff related traffic of approximately 100 vehicles per peak hour arrives from a number of routes and is dispersed over the wider road network and consequently will have low traffic impact;
- Low background traffic volumes on the affected road network means that the site construction traffic as well as future site operations traffic will be accommodated with ease, both on the road network and at the site accesses.

4. HAZARDOUS SOLAR GLARE:

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

7 CONCLUSIONS AND RECOMMENDATIONS

It is concluded that;

- The proposed Paulputs CSP Project needs to take cognisance of the statutory building lines along proclaimed MN73 and MR759, in terms of Act 21 of 140;
- The proposed realignment of MN73, necessitated by the Paulputs CSP Project, needs to be submitted to the relevant road authority for approval and it seems likely that an acceptable design should be achieved;
- The existing MN73 access on MR759 is acceptable to serve as the development access during construction;
- Signage warning of construction vehicles at the access should be erected for the site construction period;
- The proposed accesses (eastern and northern side of the property) are acceptable in principle and require approval by the road authority;
- The development access (construction and development) should be hard surfaced for 25 m beyond MR759 through edge;
- The proposed Paulputs CSP Project construction and future operations traffic can be accommodated on the affected road network with ease;
- Abnormal Load Vehicles (transformers, etc.) will require Abnormal Load Permits to be obtained by the transport carrier; and
- Hazardous Glare from the Paulputs CSP Project has been assessed separately from this report, and possible mitigation measures are proposed in the event of such being required.

It is recommended that;

- Favourable consideration be given to the proposed Paulputs CSP Project Subject to:
    - Cognisance be taken of building lines applicable in terms of Act 21 of 1940, and the road authority being approached for approval where required;
    - Approval be obtained from the relevant Roads Authority for the realignment of MN73;
    - The site access gates being located at least 25 m from the travelled way and the driveway being hard surfaced up to MR759 road edge;
    - Road signs warning of construction vehicle activity at the access being erected on MR759 for the construction phase;
    - Abnormal Load Permits being obtained for transport of abnormal loads as and when required; and
    - Hazardous glare be addressed where and if 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 8th Edition
5. Committee of Transport Officials (COTO) TRH 11 - Dimensional and Mass Limitations and Other Requirements for Abnormal Load Vehicles (8th Edition 2010) as published by South African Department of Transport

ANNEXURE A – SITE DRAWING

NOT AVAILABLE AT TIME OF THIS REPORT

ANNEXURE B – TABLE 1 – Construction Activity Trips to Site

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