BETA SOLAR POWER PLANT (PTY) LTD

TRAFFIC MANAGEMENT PLAN FOR THE PROPOSED BETA PV SOLAR ENERGY FACILITY NEAR HERTZOGVILLE, FREE STATE PROVINCE

32745.05C-REP-001-00

TRAFFIC MANAGEMENT PLAN

JUNE 2022

PREPARED FOR:

BETA SOLAR POWER PLANT (PTY) LTD
2ND FLOOR, WEST TOWER
NELSON MANDELA SQUARE
MAUDE STREET
SANDOWN
2196

PREPARED BY:

BVi CONSULTING ENGINEERS WESTERN CAPE (PTY) LTD
BLOCK B2, EDISON SQUARE
C/O EDISON WAY AND CENTURY AVENUE
CENTURY CITY
7441

EXECUTIVE SUMMARY

BVi Consulting Engineers Western Cape (Pty) Ltd was appointed by Beta *Solar Power Plant (Pty) Ltd* to conduct a Traffic Management Plan (TMP) for the proposed development of a 84 MW photovoltaic solar power plant near Hertzogville, in the Free State Province. This specialist study forms part of the Environmental Impact Assessment (EIA) application to the *Department of Forestry, Fisheries and the Environment (DFFE)*.

The following conclusions can be drawn from the traffic management plan:

- The existing traffic volumes were calculated using a growth rate calculated from an existing counting station, and applied to the R708 traffic volume.

- The impact of the construction, operation, and decommissioning trip generation, on the future background traffic volumes near the Beta PV SPP, are expected to be low.

- Two (2) possible ports of entry have been identified from where the solar panel technology and large electrical components will be transported, namely: Durban (668 km) and Richards Bay (770 km). Based on the shortest travel distance, it is recommended that the Port of Durban be the preferred port of entry.

- All construction materials and solar modules will be transported via normal loads. Transformer and substation components will be transported via abnormal loads.

- The preferred access point to the site is situated off the R708. The formalisation of this access point, to the standard, might be a requirement as part of the wayleave approval of the *Free State Department: Police, Roads and Transport*.

- Adequate traffic accommodation signage must be erected and maintained on either side of the access, throughout the construction phase of the Beta PV SPP.

- The route utilised for transporting equipment to and from the site should, as far as possible, avoid urban and residential areas

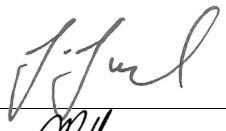
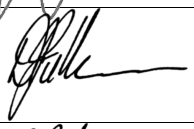
- The movement of construction vehicles shall not be undertaken during peak morning and afternoon traffic times to avoid causing an impact on commuters.

- The traffic safety procedures, transport routes and construction schedules intended to be applied during the construction phase shall be finalised prior to the commencement of construction activities.

This plan needs to be implemented by the contractor during construction in order to create awareness for the other road users and to maintain a safe relationship between the construction traffic and the general traffic in the Hertzogville area.

ISSUE AND REVISION RECORD

QUALITY APPROVAL

	CAPACITY	NAME	SIGNATURE	DATE
By author	Professional Engineering Technologist	Jacques Nel Pr Tech Eng: 200770131		27/06/2022
Reviewed by	Director	Dirk van der Merwe Pr Eng: 20120186		27/06/2022
Approved by Design Centre Leader	Director	Dirk van der Merwe Pr Eng: 20120186		27/06/2022

This report has been prepared in accordance with BVi Consulting Engineers Quality Management System. BVi Consulting Engineers is ISO 9001: 2015 registered and certified by NQA Africa.

REVISION RECORD

REVISION NUMBER	OBJECTIVE	CHANGE	DATE
0	Issue to Client for comments		27/06/2022

TRAFFIC IMPACT STUDY COVER PAGE

INFORMATION ITEM	DETAILS/ DESCRIPTION
Municipality Name	*Tokologo* Local Municipality and *Lejweleputswa* District Municipality
Type of Assessment	Traffic Management Plan
Erf Numbers /Farm Names	The farm Talana 1241, Registration Division Boshoff, Free State
Date of Report	27 June 2022
Details of Assessor	DJP van der Merwe Pr Eng dirkvdm@bviwc.co.za ECSA registration number: 20120186 M Eng (Transport), University of Stellenbosch
Address	*BVi Consulting Engineers Western Cape (Pty) Ltd* Block B2, Edison Square c/o Edison Way & Century Avenue Century City 7441

DJP van der Merwe Pr Eng

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1.1 TERMS OF REFERENCE

BVi Consulting Engineers Western Cape (Pty) Ltd was appointed by Beta *Solar Power Plant (Pty) Ltd* to conduct a Traffic Management Plan (TMP) for the proposed development of a 84 MW photovoltaic solar power plant near Hertzogville, in the Free State Province. This specialist study forms part of the Environmental Impact Assessment (EIA) application to the *Department of Forestry, Fisheries and the Environment (DFFE)*.

1.2 OBJECTIVES

The primary objective of the Traffic Management Plan is to set mitigation measures that will help ensure the health and safety of the road users using the R708 as well as the general public in the surrounding area. The following points will be discussed in more detail in the report:

- A proposal of potential site access points on the project site, including an assessment of any expected conditioning works.
- Calculation of the number and type of vehicles required during both the construction and operation phases and
- Traffic measures, with specific mention to the correct signage, which will need to be put in place during the construction period.

1.3 REFERENCE DOCUMENTATION

The following documents/ sources were used in compiling this report and reference will be made where necessary:

- *Highway Capacity Manual (HCM) 2010*, published by the *Transportation Research Board*, December 2010.
- *TRH 11: Dimensional and Mass Limitations and Other Requirements for Abnormal Load Vehicles*, published by the *Department of Transport (DoT)*, August 2009.
- *TRH 17: Geometric Design of Rural Roads*, published by the *Department of Transport (DoT)*, 1988.
- *TRH 26: South African Road Classification and Access Management Manual*, published by the *Committee of Transport Officials (COTO)*, August 2012.

CHAPTER 2 PROJECT PARTICULARS

2.1 PROJECT DESCRIPTION AND SITE LOCATION

The proposed development site is situated approximately 18 km east-southeast of the town of Hertzogville, located within the *Lejweleputswa District Municipality*, Free State Province. The Beta PV Solar Power Plant (SPP) is situated on the farm Talana 1241, Registration Division Boshoff and comprises of one (1) land parcel of approximately 1151 ha in extent. *Figure 2.1* below provides the location of the Beta PV SPP in relation to the towns of Hertzogville and Bultfontein.

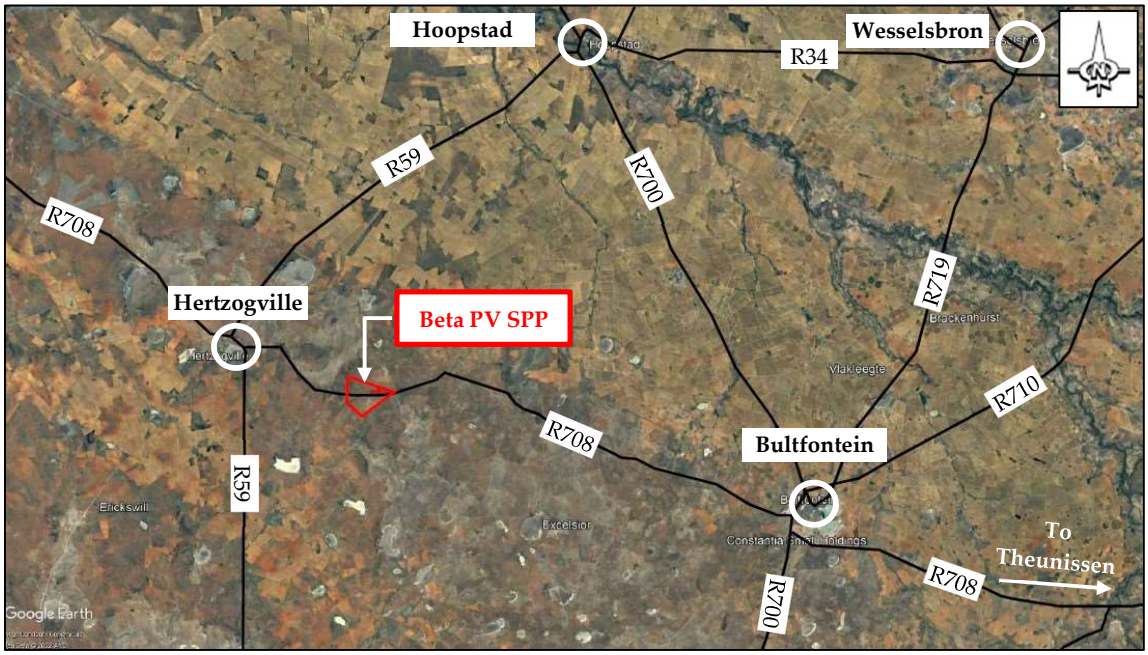


Figure 2.1: Location of the Beta PV Solar Power Plant (SPP)

The Beta PV SPP is expected to generate approximately 84 MW power, that will feed into the *Eskom Holdings SOC Ltd* electricity grid. The proposed development includes solar panels, an on-site substation, a Battery Energy Storage System (BESS) and grid connection infrastructure.

The construction phase of the solar power plant is expected to take place over a period of twelve (12) months, during which regional and local traffic will be affected. The expected traffic and trip generation figures are addressed in *Chapter 5: Trip Generation*.

2.2 EXISTING EXTERNAL ROAD NETWORK

The existing external road network, in the vicinity of the Beta PV Solar Power Plant (SPP), consist of the R708, and R59. These roadways are shown on *Figure 2.2* and described in detail in *Table 2.1* overleaf. The road classification mentioned has been derived from the *South African Classification and Access Management Manual (TRH 26)*.

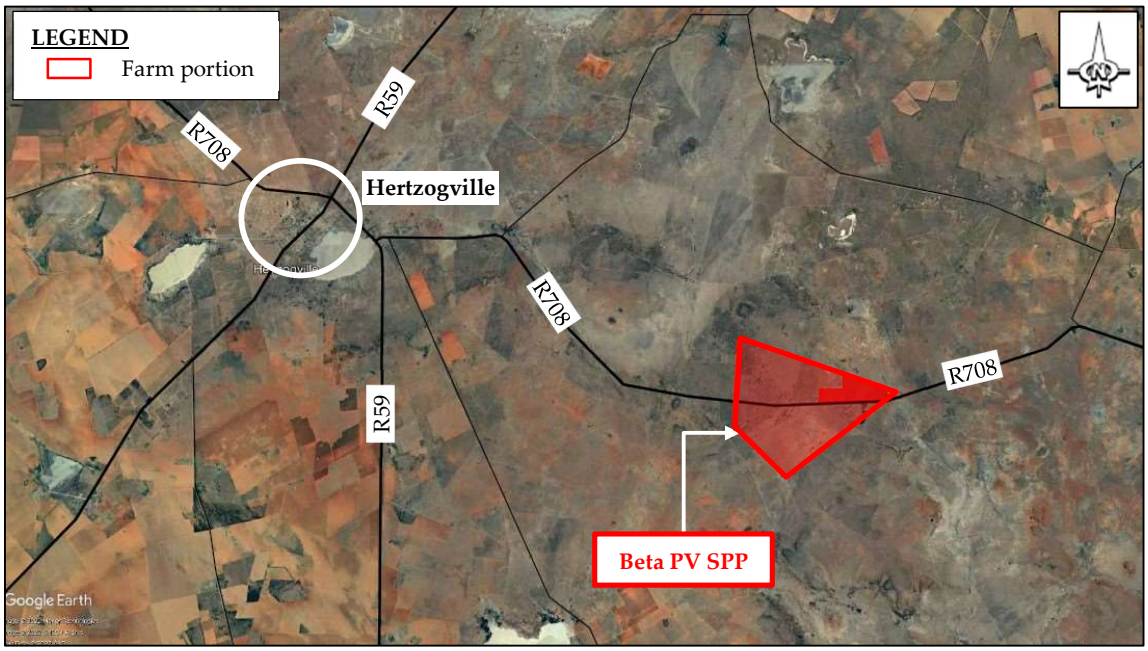


Figure 2.2: Existing external road network surrounding the Beta PV SPP

Table 2.1: Existing external road network

ROAD NAME	ROAD CLASS	DESCRIPTION
Regional Route 59 (R59)	Class R2 – Rural major arterial	The R59 is a provincial road, that connects Hertzogville with Alberton (South-east of Johannesburg) via Bothaville. The R59 is a freeway from the R57 Junction in Sasolburg until the Alberton N12 Reading Interchange, signposted as the Sybrand van Niekerk Freeway.
Regional Route 708 (R708)	Class R3 – Rural minor arterial	The R708 is a regional provincial route in the Free State Province that connects Jan Kempdorp in the Northern Cape with Clocolan in the Free State, via Christiana, Hertzogville, Bultfontein, Theunissen, Winburg and Marquard. This roadway can be classified as a single carriageway, with one lane per direction and vegetated gravel shoulders.

2.3 SITE ACCESS ROUTE

2.3.1 Site access alternatives

Access to the Beta PV Solar Power Plant (SPP) will be off the R708, at the southern point of the development. Two (2) possible access points have been identified for the 84 MW buildable area. The possible access point (1) at the southern point of the development is located opposite an existing two-lane gravel track of the R708. This access point is problematic as it does not have enough shoulder sight distance in the direction of Hertzogville. The second possible access (2) point could be approximately 300m from the previous access point towards Hertzogville. This access point has sufficient shoulder sight distance in both directions, but an extension of the access road would be required adjacent the R708 to the southern point of the development. The site access alternatives are shown on *Figure 2.3* below.

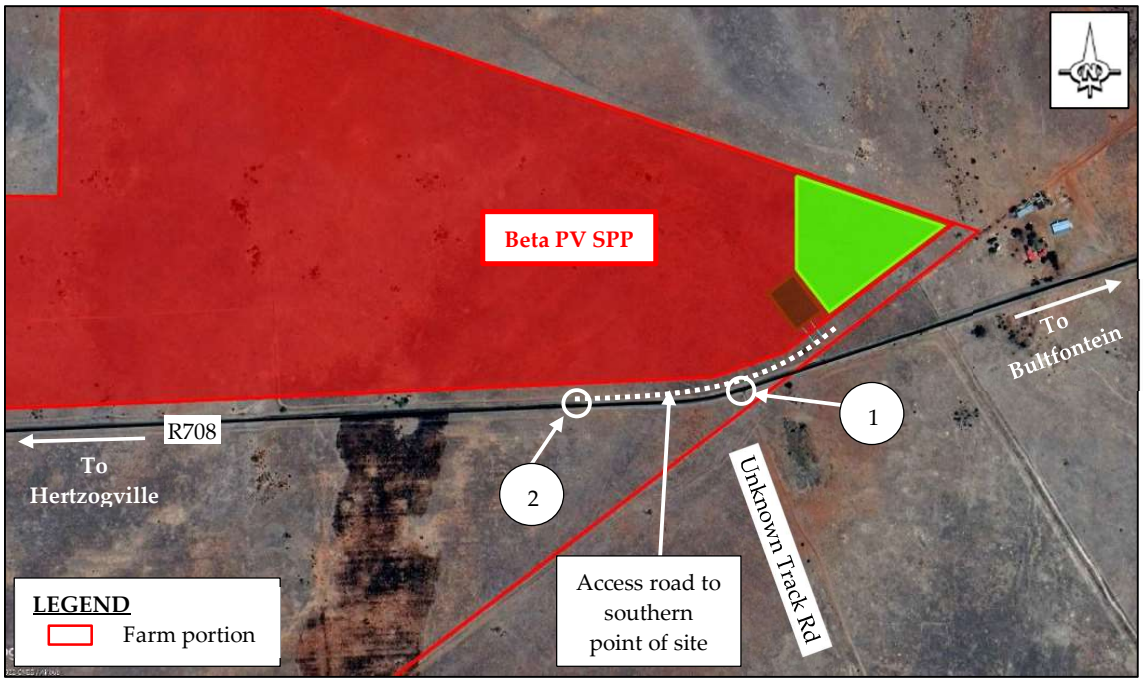


Figure 2.3: Site access alternatives

A formal application for the recommended access point/s will need to be lodged with the *Tokologo Local Municipality* and the *Free State Department: Police, Roads and Transport*. The formalisation of these access points to the standard (*Annexure A*), will in all probability be a requirement as part of the wayleave approval.

2.3.2 Intersection and access spacing

The minimum allowable intersection and access spacing is dependent on the development environment, road classification and type of intersection control. The minimum spacing requirements of the R708 and access 2, in the vicinity of the Beta PV SPP, are shown in *Table 2.2* below. The existing intersection and access spacings, as measured from aerial imagery, are provided in *Table 2.3* below and corresponding *Figure 2.4* overleaf.

Table 2.2: Minimum intersection and access spacing requirements

DEVELOPMENT ENVIRONMENT	ROAD CLASS	MINIMUM SPACING		
		FROM	TO	DISTANCE (m)
Rural	Class R2 – Rural major arterial	Public road/ access	Public road/ access	1345 m
	Class R3– Rural minor arterial	Public road/ access	Public road/ access	820 m

Table 2.3: Existing intersection and access spacing

FROM		TO		EXISTING SPACING (m)
R708 (CLASS R3 – RURAL MINOR ARTERIAL)				
1	Gravel track/ Farm Access	2	Gravel Track/ Farm Access	375 m
2	Gravel Track/ Farm Access	3	Gravel road/ S	2868 m
3	S	4	Farm Access	198 m
4	Farm Access	5	S	3070 m

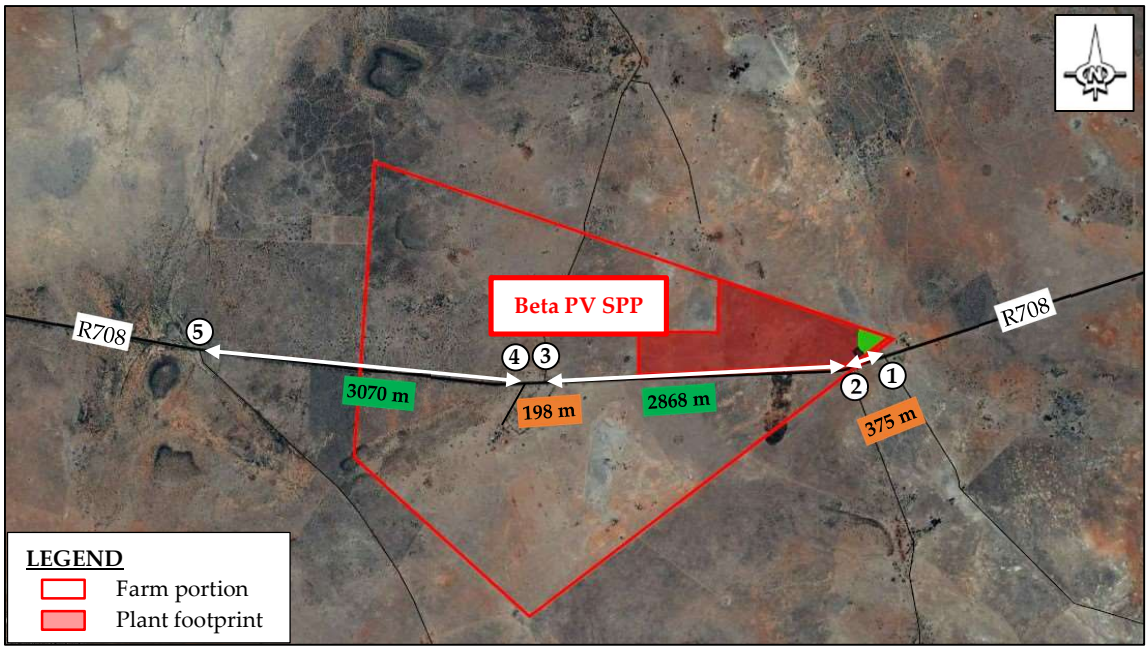


Figure 2.4: Existing intersection and access spacing on R708

2.3.3 Recommendation

Based on the above-mentioned information, it is recommended that the access shown on *Figure 2.5* overleaf be the preferred site access to serve the Beta PV SPP. This recommendation is based on the fact that this access is within the required access spacing as mentioned earlier and sufficient sight distance is available in both directions.

It is, however, essential that adequate traffic accommodation signage be erected and maintained on either side of the proposed preferred access. This should be implemented throughout the construction phase of the plant. This route will also need to be suitably maintained throughout the operational life of the solar power plant.

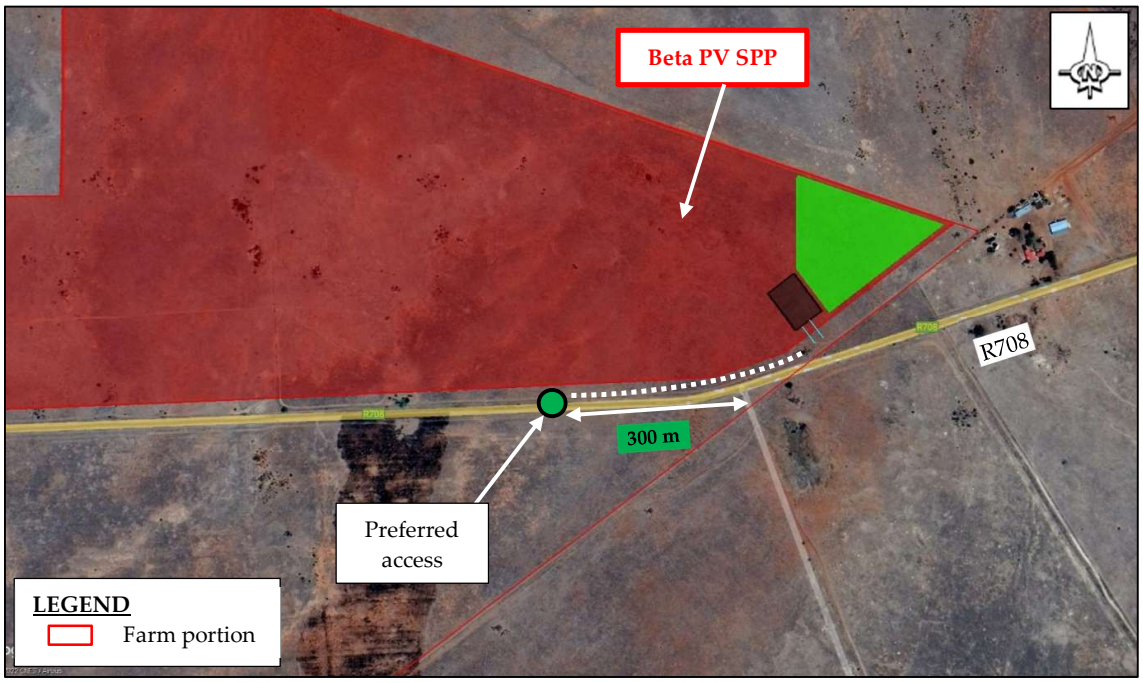


Figure 2.5: Site access recommendation

2.4 AFFECTED COMMUNITIES

It is expected that the communities of Hertzogville and probably Bultfontein and or Hoopstad will participate in the construction of the Beta PV Solar Power Plant (SPP). The development of this solar plant and other renewable energy projects creates an opportunity for temporary employment and economic upliftment of the surrounding communities. *Figure 2.6* overleaf provide the location of the above-mentioned communities in relation to the Beta PV SPP.

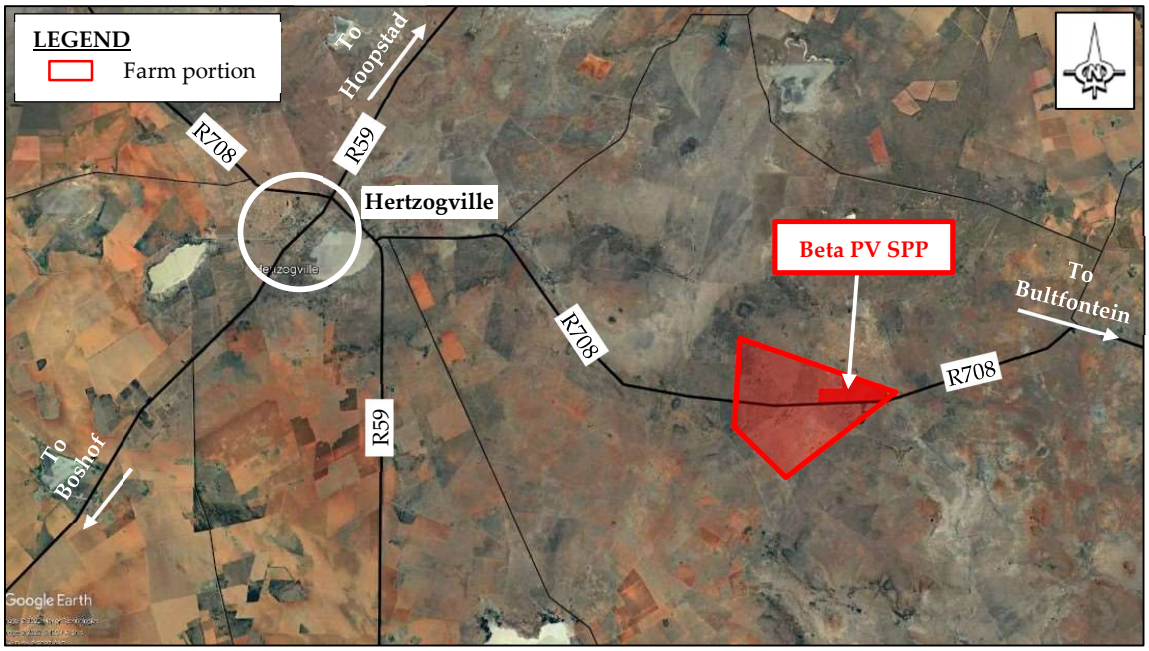


Figure 2.6: Affected communities

CHAPTER 3 TRANSPORTATION ROUTES

3.1 OVERVIEW

Transportation routes affected by the development of the Beta PV SPP have been investigated and will be discussed in the following sub-chapters. Due to the nature of the development, it is anticipated that the solar panel technology and large electrical components will be imported and arrive at ports of entry via ship. This required the identification of the most optimal shipping port(s) at which large components could be delivered to the region, the assessment of feasible transportation routes, route lengths and potential constraints to be considered in further phases of the project.

3.2 HAULAGE FROM SHIPPING PORT(S) ~ NORMAL LOADS

The port of Durban will most likely be the port from where the solar panel technology and large electrical components will be transported. The distance from Durban to the Beta PV SPP, via road, is approximately 668 km via the N3 and N5 and from Richards Bay to the Beta PV SPP is approximately 770 km via the N5. The Port of Durban route is shown on *Figure 3.1*, as this is the shortest travel distance.

The Port of Durban is South Africa's main cargo and container port, handling the largest volume of sea-going traffic of any port in southern Africa. It is ideally placed on major shipping routes and have excellent rail and road links.

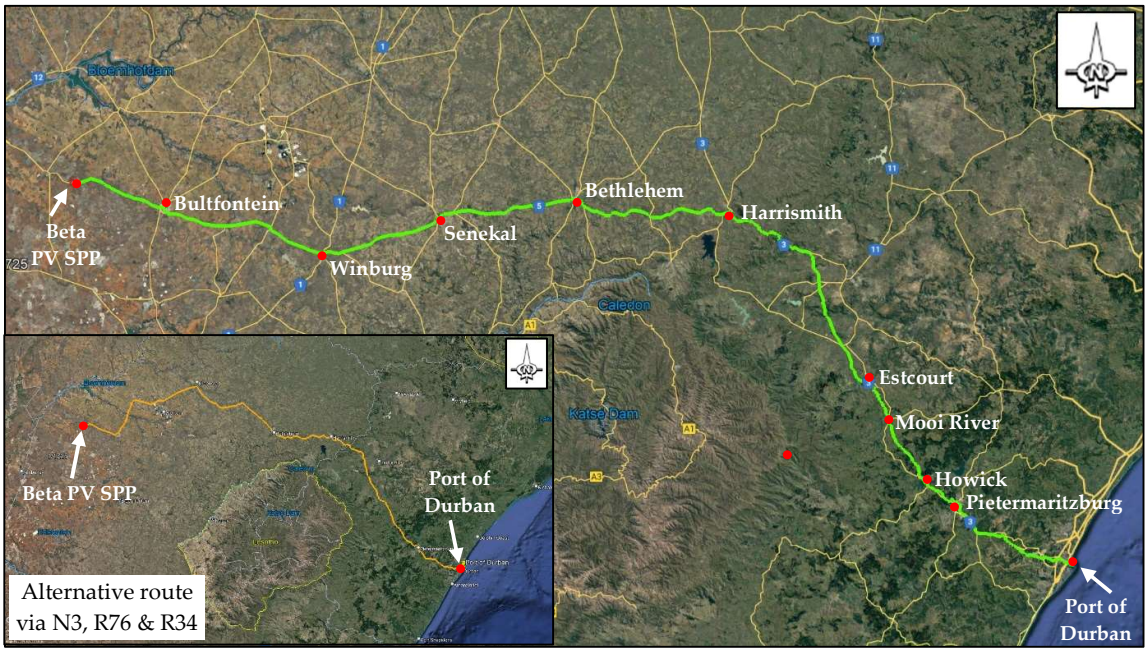


Figure 3.1: Preferred haulage route from Port of Durban to Beta PV SPP(via N3 & N5)

The route overview shown in *Figure 3.1* above is briefly described in *Table 3.1* overleaf.

Table 3.1: Route overview - Port of Durban

PREFERRED ROUTE	ALTERNATIVE ROUTE
• Travel from the Port of Durban towards Pietermaritzburg via the N3; • Continue on the N3 and travel towards and through the towns of Howick, Mooi River and Estcourt; • Turn left onto the N5 and travel north-west towards and through the town of Harrismith; Continue west on the N5 and travel towards and through the towns of Harrismith, Bethlehem and Senekal; • At Senekal, continue north-west onto the R708 and towards and through the towns of Theunissen and Bultfontein; • The Beta PV SPP access road is situated off the R708.	• Travel from the Port of Durban towards Pietermaritzburg via the N3 • Continue on the N3 and travel towards and through the towns of Howick, Mooi River, Van Reenen, and Harrismith • Turn left onto the N5 and travel north-west towards and through the town of Harrismith, Kestel and Bethlehem • Continue north-west on the R76 and travel towards and through the towns of Lindley, Steynsrus and Kroonstad • Turn left onto the R34 and travel south-west towards and through the towns of Odendaalsrus and Wesselsbron • At Wesselsbron, continue south on the R719 and travel towards and through the towns of Bultfontein • Turn right onto the R708, - the Beta PV SPP access road is situated off this roadway.

3.3 HAULAGE FROM LOCAL MANUFACTURERS ~ ABNORMAL LOADS

Transformer and substation components are envisaged to form part of the local trips. It is anticipated that these components would be imported and transported from the preferred harbour (Durban) as abnormal loads. It would then be assembled in Johannesburg and transported to the Beta PV SPP, also requiring abnormal load transport. The distance from Johannesburg to the Beta PV SPP is approximately 377 km, along the N1.

3.4 HAULAGE OF OTHER CONSTRUCTION MATERIALS, EQUIPMENT AND PERSONNEL

Cement will be sourced from local manufacturers within the towns of Welkom and/ or Kroonstad. All other civil construction materials, needed for concrete and wearing course, will be obtained on-site. Furthermore, it is anticipated that construction personnel and labour would originate from the neighbouring towns such as Hertzogville, Bultfontein, Hoopstad and Wesselsbron. These trips can be classified as local trips as vehicles will not be travelling over a very long distance.

3.5 ROUTE CLEARANCE

As mentioned before, it is anticipated that some route clearing may be needed with certain portions of the route already cleared for other renewable energy projects. In addition to this,

temporary widenings of intersections along the route may also be required in order to simplify the turning movements of the abnormal load vehicles.

3.6 LEGISLATION AND PERMIT REQUIREMENTS

The overarching environmental legislation for management of the environment in South Africa, is the *National Environmental Management Act, 1998 (Act 107 of 1998 "NEMA")*. Its forward stated that sustainable development requires the integration of social, economic, and environmental factors in the planning, implementation and evaluation of environmental decisions to ensure that the development serves present and future generations. Traffic impacts are therefore an important aspect to consider in the decision-making process of developments.

3.6.1 Roads

The relevant legislation associated to the road (infrastructure), transportation and traffic include, inter alia:

- *National Water Act (Act 36 of 1998)*, with regards to all crossings of water courses;
- *National Road Traffic Act (Act 93 of 1996)*;
- *Advertising on Road and Ribbon Development Act (Act 21 of 1940)*;
  - *Section 9*: Prohibition of erection of structures or construction of other things near intersections of certain roads; and
  - *Section 10*: Restriction of access to land through fence along certain roads.
- Roads Ordinance Act (Act 19 of 1976);
  - *Section 13*: Erection of gates across public roads and public paths;
  - *Section 17*: Erection of structures on or near public roads; and
  - *Section 18*: Access to and exit from certain public roads and public paths.

3.6.2 Vehicle dimensions

Regulations 221 to *230* of the *National Road Traffic Act* relates to vehicle dimensions. The most important points are summarised below.

- *Regulation 221*: Defines the legislation requirements regarding the overall length of vehicles. The following lengths shall not be exceeded:
  - Rigid vehicle: 12.5 m;
  - Articulated vehicle and semi-trailer: 18.5 m; and
  - Combination vehicle (interlinks, multiple trailers etc.): 22.0 m
- *Regulation 223*: Defines the legislation requirements regarding the overall width of vehicles. Vehicles with a gross mass of 12 000 kg or more, shall not exceed 2.6 m.
- *Regulation 224*: Define the legislation requirements regarding the overall height of a vehicle and transported load, which shall not exceed 4.3 m.

- *Regulation 225*: Defines the legislation requirements regarding the maximum turning radius and wheelbase, which shall not exceed 13.1 m or 10.0 m (semi-trailer) respectively.

3.6.3 Vehicle loads

Regulations 231 to *249* of the *National Road Traffic Act* relates to vehicle loads. The most important points are summarised below.

- *Regulation 240*: Defines the legislation requirements regarding the mass load carrying on roads.
- *Regulation 241*: Defines the legislation requirements regarding the mass load carrying capacity of bridges.

3.6.4 Abnormal load considerations

The *National Road Traffic Act (Act 93 of 1996)* and the *National Road Traffic Regulations (2000)* prescribed certain limitations on vehicle dimensions and axle and vehicle masses that a vehicle using a public road must comply with. Where the prescribed limitations are exceeded, these loads are then classified as an abnormal load. Provision for such abnormal vehicles and loads are made in *Section 81* of the *National Road Traffic Act*, as substituted by *Section 23* of the *National Road Traffic Amendment Act (Act 64 of 2008)*.

The requirements and procedures for transporting of abnormal loads are contained in the following two documents: (1) *TRH 11: Dimensional and Mass Limitations and Other Requirements for Abnormal Load Vehicles*; and (2) *Administrative Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads*.

The specific permits and consents that may be required from the relevant authorities, for the transportation of abnormal loads, are summarised in *Table 3.3* below.

Table 3.2: Permits and consent requirements

PERMIT/ CONSENT TYPE	RELEVANT AUTHORITY	STRATEGY
Abnormal Load/Vehicle Permit in terms of *National Road Traffic Act 93 of 1996, Section 81*	*Free State Provincial Government: Department of Police, Roads and Transport* & *KwaZulu-Natal Provincial Government: Department of Transport*	The contractor will obtain the necessary road transportation permits.
The *South African National Roads Agency Limited* and *National Roads Act, Act 7 of 1998*	*South African National Roads Agency SOC Limited (SANRAL): Eastern Region*	The contractor will obtain clearance from *SANRAL*.

CHAPTER 4 BACKGROUND TRAFFIC VOLUMES

4.1 INTRODUCTION

Background traffic volumes were determined for the study network near the site. No historic traffic data was available for the R708, near the site, however data was identified on the section of the R708 between Theunissen and Bultfontein, and on secondary roads connecting to the R708, between Bultfontein and Hertzogville. The following assumptions were made:

- The traffic volume along the R708, between Theunissen and Bultfontein, can similarly be applied to the section on the R708 between Bultfontein and Hertzogville, based on the assumption that traffic travelling from east to west through Bultfontein will in all probability travel towards Hertzogville in the west, rather than continue along the R700 via Hoopstad towards Hertzogville.
- These traffic volumes were acquired from *Mikros Traffic Monitoring (Pty) Ltd*, to determine what the existing traffic conditions are like in the absence of the proposed solar power plant.
- Only data from 2005 and 2013 were available at these count locations, therefore Average Daily Traffic (ADT) and Average Daily Truck Traffic (ADTT) values, measured as vehicles per day (vpd), were extrapolated by means of calculating a growth rate range, based on historic data from roads in the near vicinity of the R708.

4.2 TRAFFIC RECORDING STATIONS

The following traffic recording station, along the R708, were identified for investigation:

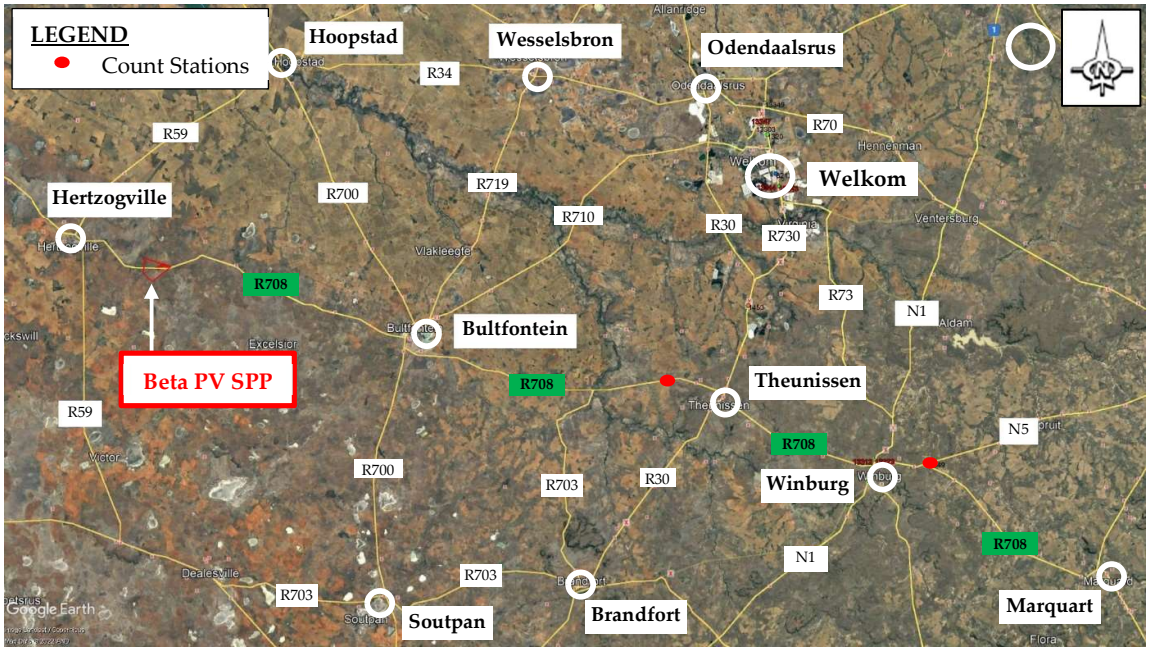


Figure 4.1: Traffic recording stations

Table 4.1: Background traffic data

SITE ID	SITE NAME	SITE DESCRIPTION	ROUTE DESCRIPTION	YEAR	ADT	ADTT
15260	P17/2-6.2	Between S473 & P57/5	R708	2013	460	60
7139	P01704-55	Between S91 & S494	R708 Between Theunissen & Bultfontein	2005	283	47

4.3 BACKGROUND TRAFFIC CALCULATIONS AND LEVEL OF SERVICE

Background traffic is indicated in *Table 4.1*. A growth rate was calculated from a permanent counting station on the N5, just before Winburg. The growth rate obtained (3%) was applied to the traffic volume on the R708. This is shown in *Table 4.2*.

The Level of Service (LOS) calculations have been based on *TRH 17: Geometric Design of Rural Roads* for two-lane stations and *Highway Capacity Manual (HCM) 2010* for stations with two or more lanes in each direction. the LOS of the existing (2022) and projected (2025) background traffic volumes are provided in *Table 4.2* below

Table 4.2:Historic and future traffic data for the R708 and Level of Service

R708 – (Between S473 & P57/5)				
YEAR	ADT	GROWTH	ADTT	LOS
2005	283	3%	47	
2022	457		76	A
2025	497		83	A
R708 – (Between S91 & S494)				
YEAR	ADT	GROWTH	ADTT	LOS
2013	460	3%	60	
2022	593		77	A
2025	645		84	A
AVERAGE	**571**		**83**	**A**

It should be noted that the predicted traffic volumes and LOS calculations are an indication of background traffic growth only, i.e. excludes the impact of the *Beta PV SPP* traffic.

CHAPTER 5 TRIP GENERATION

5.1 INTRODUCTION

The proposed *Beta PV Solar Power Plant* (SPP) will generate additional traffic on the surrounding road network in three distinct phases, namely: *construction*, *operation* and *decommissioning*. It must be noted that these phases will generate traffic consecutively and not simultaneously, and therefore will be considered separately from each other.

TMH 17 Volume 1: South African Trip Data Manual does not provide trip generation rates for the construction, operation, and decommissioning of solar power plants. Consequently, trip generation estimates were based on principles related to similar solar energy projects.

5.2 CONSTRUCTION PHASE

Trips generated during the construction phase will primarily comprise of transporting equipment, energy facility components, personnel, construction and other facility materials. These trips will comprise of normal, medium and heavy vehicles.

The following assumptions were made in order to calculate trips generated during the construction phase of the project:

- It is estimated that the construction period will last approximately eighteen (18) to twenty-four (24) months, with twenty-two (22) working days per month. This results in approximately 790 working days over the construction period.
- The *Beta PV Facility* will most likely be constructed from components that will be shipped to South Africa via the Port of Durban. These components will be transported to site via road transport using medium and heavy vehicles.
    - The solar energy facility will generate approximately up to 84 MW electrical power.
    - Approximately 190 900 PV modules of approximately 300 – 550 W each will be delivered to site. Approximately 660 of these 300 – 550 W units can fit into one (1) container (30 units per pallet; 22 pallets per container). This results in approximately 290 container loads in total being delivered to site.
- Other plant, materials and equipment will be sourced from the nearest towns. An average of 200 -300 trips per 7MW is assumed. For this site, this has been assumed to be 40 trips per MW. This results in approximately 3 360 trips over the 24-month construction period.

Another contributor to trips generated during the construction phase will be daily commuters/ workers. The following assumptions were made in this regard:

- The construction labour force will be mostly local.
- It is assumed that approximately 450 staff members/workers will be on site.

- Based on the composition it is assumed that 10% of the staff members will make use of private or company vehicles (cars and LDVs). These staff members will travel from their permanent or temporary residences to site on a daily basis.
- It is assumed that the remainder of the staff members (90%) will be transported to site with 15-seater minibus-taxis. The quantities of these vehicles will fluctuate and will depend on the number of labourers, costs, routes and operating hours.

The table below summarises the estimated total trips that will be generated during the construction phase of the project:

Table 5.1: Trip generation (construction phase)

TRANSPORT TYPE	PARAMETER	AVERAGE DAILY TRAFFIC	MONTHLY TRAFFIC	TOTAL TRIPS (24mo.)
Normal heavy load (solar panels)	660 panels per container	1	22	290
Normal heavy load (construction materials)	40 trips/MW	7	154	3 360
LDVs and cars (Staff)	350 staff	72	1 584	38 160
TOTAL TRIPS FOR CONSTRUCTION PERIOD		80	1 760	41 810

It can be seen from the table above that the construction phase of *Beta PV Facility* will generate approximately **41 810** trips over the twenty-four (24) month period.

5.3 OPERATIONAL PHASE

The following assumptions were made with regards to the trip generation during the operational phase of the solar power plant:

- The *Beta PV Facility* will be in operation for twenty (20) years.
- The solar energy facility will be in operation seven (7) days a week. Therefore, personnel will operate according to shifts.
- Based on global employment ratios per MW of Solar PV installed (0.7 direct long term / MW) the proposed Beta PV SPP, would create 60 employment opportunities over a 20-year period

The traffic impact during the operational phase will therefore be insignificant, as approximately only sixty (40) people will work at the solar power plant.

5.4 DECOMMISSIONING PHASE

The decommissioning phase will start at the end of the *Beta PV Facility* lifetime (20 years) and will last approximately six (6) months, involving a team of sixty (40) workers. As per the operational phase, the traffic impact will be insignificant.

CHAPTER 6 TRAFFIC IMPACT ASSESSMENT

6.1 INTRODUCTION

The expected effects of traffic that would be generated by the proposed *Beta PV* Solar Power Plant (SPP) were analysed as follows:

- The background traffic volumes were determined for the study network near the site (refer to *Chapter 4: Background Traffic Volumes*)
- The existing traffic volumes for the years 2013 to 2025 were predicted and were based on an average growth rate as indicated.
- Construction phase traffic (site-generated trips) were estimated for the proposed solar power plant.
- The construction phase traffic is then added to the 2025 background traffic volumes to determine the total traffic conditions with the solar power plant completed.

The sub-chapters below provide the impact the development of the Beta PV SPP will have on the local road network.

6.2 ASSESSMENT OF IMPACTS ON LOCAL TRAFFIC

The capacity of a two-lane highway is 3200 vehicles per hour (vph), under ideal conditions, *HCM 6th Edition Chapter 15: Two Lane Highways*. The ideal conditions referred to is the absence of any restrictive geometry, traffic, or environmental factors.

From traffic count data and Level of Service calculations, the R708 around Hertzogville have sufficient spare capacity to accommodate the additional traffic due to the development. The table below indicate the effect of the commuter trips on the R708.

Table 6.1 and *Table 6.2* below provide the traffic impact of the Beta PV SPP, during the construction phase.

Table 6.1: Traffic impact on R708 (commuter trips)

SITE ID	ROUTE	2025 EST. ADT ON ROUTE (vpd)	CONSTRUCTION TRIPS (vpd)	TOTAL TRIPS (vpd)	LOS
15260	R708	497	80	**577**	**A**
7139	R708	645	80	**725**	**A**
Average		571	80	**651**	**A**

* Note: These trips include construction-, delivery- and staff trips.

It can be concluded from Table 6.1 above that the estimated additional traffic generated by the development, when travelling to/from the Beta *PV Facility*, can be accommodated on the

existing road network and minimal impact is predicted. Mitigation measures would not be required to due to the increased traffic.

- The photovoltaic equipment only require standard container trucks for transportation, Abnormal Load Vehicles with the associated permits or approval are not necessary.
- Additional estimated traffic on the R708 is low and falls well within the ultimate accepted capacity of a two lane highway (3200 vehicles per hour).

CHAPTER 7 TRAFFIC MEASURES

7.1 ROUTING AND DIRECTION OF TRAFFIC AND SITE ACCESS

The movement of all vehicles to and from site shall be along designated public roads and site access roads. The most appropriate route for large project vehicles (such as trucks and buses) transporting equipment, materials, and employees (along public roads) to and from the site shall be determined by the client in consultation with the local Municipality, local road traffic authorities and the local community. A copy of the approved routes must be maintained on site.

Any anticipated or scheduled traffic delays occasioned by project vehicles (such as abnormal loads, i.e. the transformers) should be co-ordinated with local traffic authorities in advance

7.2 ABNORMAL LOADS

7.2.1 Permits

The National Road Traffic Act 93 of 1996 (NRTA) and associated regulations prescribe the permissible vehicle dimensions and masses of vehicles travelling on public roads. As mentioned earlier, the transformer and substation components are envisaged to be imported and transported from the harbour as abnormal loads, and a transport permit will be required and needs to be obtained by the contactor responsible for the transport of the components.

7.2.2 The Route

The route utilised for transporting equipment to and from the site should, as far as possible, avoid urban and residential areas, and should avoid areas of high pedestrian traffic (such as schools) so that the interaction of pedestrians with all project-related traffic will be minimized as far as reasonably possible. No deviation from approved access routes must be allowed by the contractor, unless roads forming part of the approved routes are closed for any reason. Where traffic delays due to transport requirements for the project are likely, the Contractor must liaise and coordinate such events with the responsible authorities.

The movement of construction vehicles shall not be undertaken during peak morning and afternoon traffic times to avoid causing an impact on commuters. Materials and labour shall, as far as possible, be sourced locally to minimise transport related impacts and transport safety risks.

The site access will be clearly sign posted and shall not be located to cause a traffic risk, and to ensure safe entry and exit.

7.2.3 Speed limit

The speed limit on the site and access roads shall be 30km/h for construction vehicles and 40km/h for light vehicles and passenger vehicles.

All speed limits applicable to public roads shall be strictly adhered to by all drivers operating vehicles as part of the project.

7.3 TRAFFIC ACCOMMODATION

It is the responsibility of the project managers in consultation with the construction safety officer to ensure that signage is placed at appropriate locations along all access roads, and public roads.
The necessary temporary traffic accommodation signage will be erected and maintained on either side of the roadway, 600m before the turn off onto the access road from the R708. Speed reduction and warning signage will be spaced every 100m along this section. This repetition will have a greater impact on creating driver awareness and cautioning drivers to reduce their speed to accommodate the heavy vehicles entering and exiting the access road from the R708. A layout detail and proximity plan is provided in *Annexure B*.

7.4 ADDITIONAL PROVISIONS

The construction of this solar energy facility and its associated traffic activities will not hinder the movement and/or access of emergency vehicles, cyclists or pedestrians. As previously stated, the additional traffic generated during the construction of the photovoltaic solar energy facility will have minimal impact on the current traffic volume and therefore not affect the mobility of these specific road users. Furthermore, no road closures will be erected as part of this project and therefore no special provisions are made for emergency vehicles, cyclists or pedestrians.

7.5 PEDESTRIAN AND PASSENGER SAFETY

All personnel transported to and from the site shall be safely accommodated in appropriate passenger vehicles. No employee shall be transported on the back of open trucks. The Construction Safety Officer shall ensure that this requirement is adhered to at all times.
All vehicles transporting employees shall be appropriately maintained and shall not carry more passengers than the number of persons for whom seating accommodation is provided.

Assembly points for passengers embarking passenger vehicles shall be located a safe distance from areas/routes of high vehicle traffic. Roads and areas used by construction vehicles shall, as far as possible be avoided by all personnel. Designated pedestrian routes shall be demarcated where appropriate.

7.6 OCUPATIONAL HEALTH AND SAFETY

The Client is responsible for compiling a detailed health and safety specification which complies with the legal requirements and regulations of the South African Occupational Health and Safety Act of 1993 (OSH Act 85 of 1993). The Contractor is responsible for compiling a detailed health and safety plan which complies with the Clients' specifications.

The Contractor is liable to implement this plan as well as submitting to regular assessment by the Clients' Occupational Health and Safety Representative.

7.7 PROPOSED PUBLIC NOTIFICATION

As previously mentioned, no road closures will be erected for the duration of this project. Therefore local access to properties will not be restricted in any way. It is advised that the general public of Hertzogville and the surrounding area are notified of the extent of the works before construction commences.

7.8 STAKEHOLDER ENGAGEMENT

The traffic safety procedures, transport routes and construction schedules intended to be applied during the construction phase shall be finalised in consultation with members of the local community, the local authority and affected landowners prior to the commencement of construction activities.

7.9 TRANSPORT OF EQUIPMENT AND MATERIALS

It is the responsibility of the contractor (for the duration of the construction phase) to ensure the following:

- All equipment and/or materials transported to or from site shall be appropriately secured to, or contained in, vehicles.
- No construction vehicles shall be loaded in excess of its manufacturer-specified weight bearing capacity.
- All vehicles used during the project shall have the appropriate load-bearing capacity for the materials and/or equipment intended to be transported.
- Drivers shall be appropriately trained in driving techniques applicable to specific loads (e.g. hazardous substances) where necessary

CHAPTER 8 SUMMARY AND CONCLUSION

The following conclusions can be drawn from the traffic and transportation study:

- A growth rate was calculated from a permanent counting station on the N5 and applied to the traffic volume on the R708.

- The impact of the construction, operation, and decommissioning trip generation, on the future background traffic volumes near the Beta PV SPP, is expected to be low.

- The port of Durban have been identified from where the solar panel technology and large electrical components will be transported, based on the shortest travel distance.

- All construction materials and solar modules will be transported via normal loads. Transformer and substation components will be transported via abnormal loads.

- The preferred access point off the R708, to be formalised, to the standard of the *Free State Department: Police, Roads and Transport,* and could be part of the wayleave application from the department.

- Adequate traffic accommodation signage must be erected and maintained on either side of the access, throughout the construction phase of the Beta PV SPP.

- No road closures to accommodate the construction traffic during the construction period is necessary.

This plan needs to be implemented by the contractor during construction in order to create awareness for the other road users along the haulage route and to maintain a safe relationship between the construction traffic and the general traffic in the Hertzogville area.

ANNEXURE A:

TYPICAL ACCESS GEOMETRY

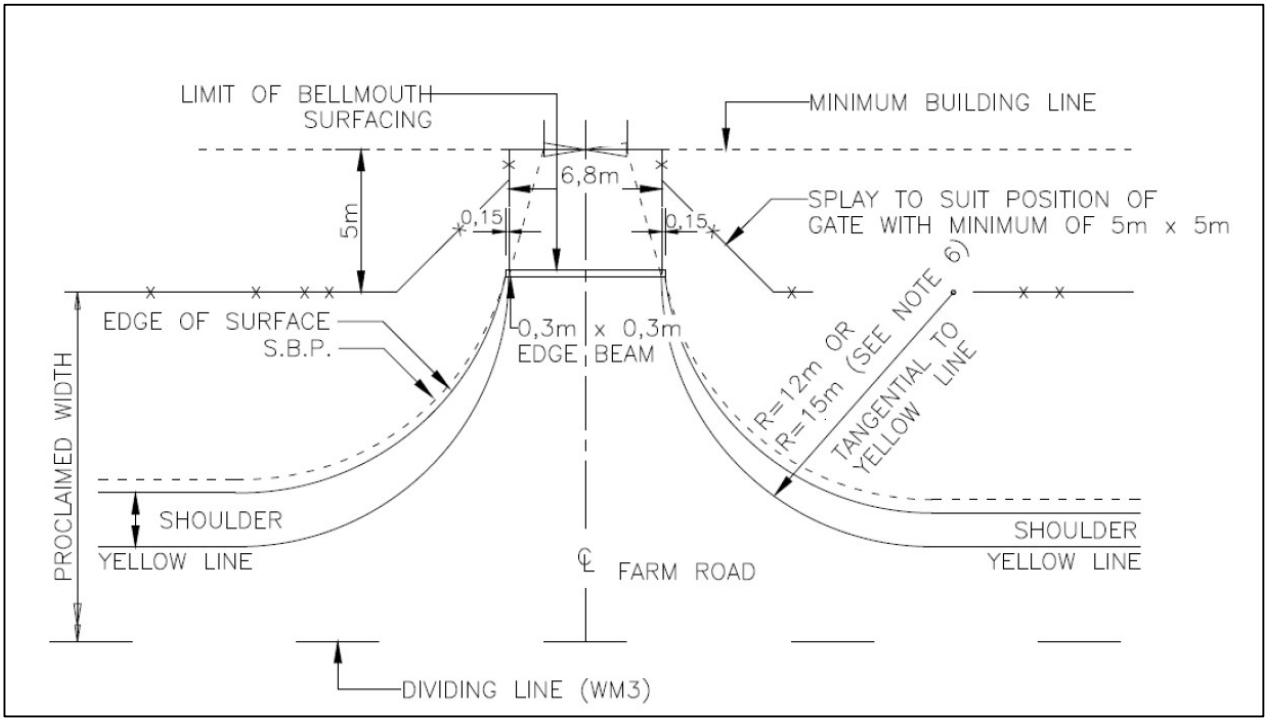
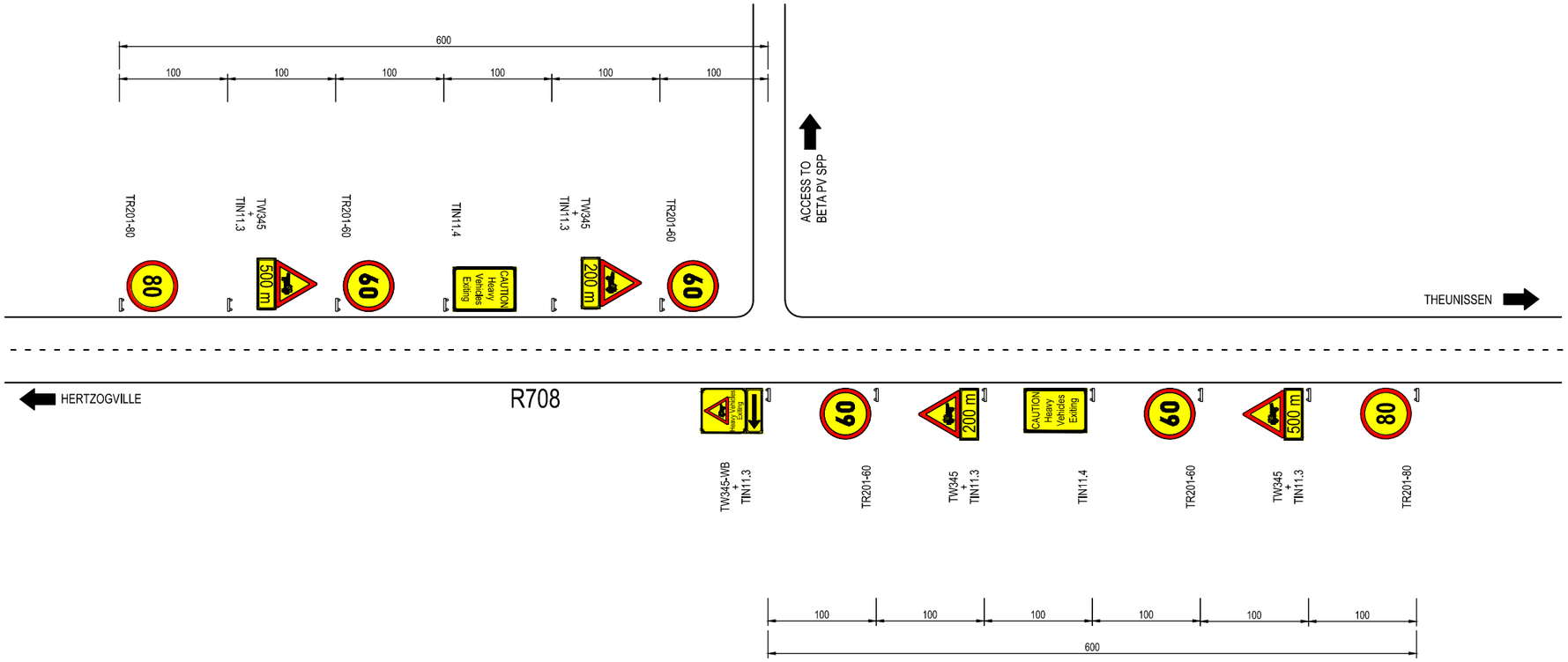


Figure B.1: Main farm access

ANNEXURE B:
TRAFFIC ACCOMMODATION



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Western Cape — Cape Town — (021) 527-7000 — cpt@bviwc.co.za

Registration no. 1998/000157/07

PROJECT

TRAFFIC MANAGEMENT PLAN FOR THE PROPOSED BETA PV SOLAR ENERGY FACILITY NEAR HERTZOGVILLE, FREE STATE PROVINCE

DRAWING TITLE

ACCOMMODATION OF TRAFFIC

APPROVED BY BVi

ENGINEER/TECHNOLOGIST | REG. NO. | DATE

SCALE	1:5000	DRAWN	J.N.
DESIGNED	J.N.	CHECKED	D.vd M.
PLAN NUMBER		REVISION NO.	DATE SAVED
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