DOCUMENT CONTROL SHEET			
Document Title	**Traffic Assessment for the Proposed Construction of the Paulputs Wind Energy Facility and associated infrastructure, near the town of Pofadder, Northern Cape Province**		
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Short Description	This Traffic Assessment Report provides input to the EIA Report for the construction, operations and decommissioning of the proposed Paulputs WEF and associated infrastructure (and includes the grid).		
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1. Project Description

Paulputs WEF Project Description

Paulputs Wind Energy Facility (RF) (Pty) Ltd is proposing the development of the 300 MW Paulputs Wind Farm, in the Northern Cape Province, located some 32 km east of Pofadder. The wind farm will comprise up to 75 wind turbines.

The project will also include a grid connection to the existing Eskom Paulputs substation located approximately 16 km North West of the site. In view of the nature of this report that considers traffic aspects, the grid is included in this report.

The proposed 300 MW Paulputs WEF would typically consist of the following infrastructural components:

* Maximum of 75 turbines with a generation capacity of a maximum of 6 MW;
* The turbines will have a maximum rotor diameter of 180 m, a maximum hub height of 150 m and a maximum blade length of 90 m;
* Foundations, crane pad and hardstands associated with the wind turbines of 0.8 ha each;
* Approximately 80 km of internal access roads, mostly 6 m up to 12 m wide at turning points;
* Medium voltage underground (where technically feasible) electrical cables will be laid to transmit electricity generated by the wind turbines to the on-site substation;
* 3 x on-site 33/132 kV substation, transformers and control building to facilitate stepping up the voltage from medium to high voltage (132 kV) to enable the connection of the WEF to the existing Eskom Paulputs Substation and national grid; and
* 10 000 m2 laydown area and 10 000 m2 construction site camp.
* 83 ha Grid Connection footprint with a 31 m servitude

The total size of the development site is 219 ha.

A 23 km 132 kV overhead powerline will connect the WEF to the existing Paulputs substation and the generated power will be fed to the national grid. A number of powerline route options are proposed.

2. Baseline Conditions

The proposed Paulputs 300 MW WEF is located approximately 50 km north east of Pofadder, and straddles the N14.

The location of the proposed WEF site is shown in **Figure 1** and **Figure** 2 below.

Figure 1: Site Location

Main Road (MR) 759 lies just east of the site (see Figure 2 below). MR759 carries low traffic volumes, as observed during a site visit on a normal traffic day, on 24 August 2018.

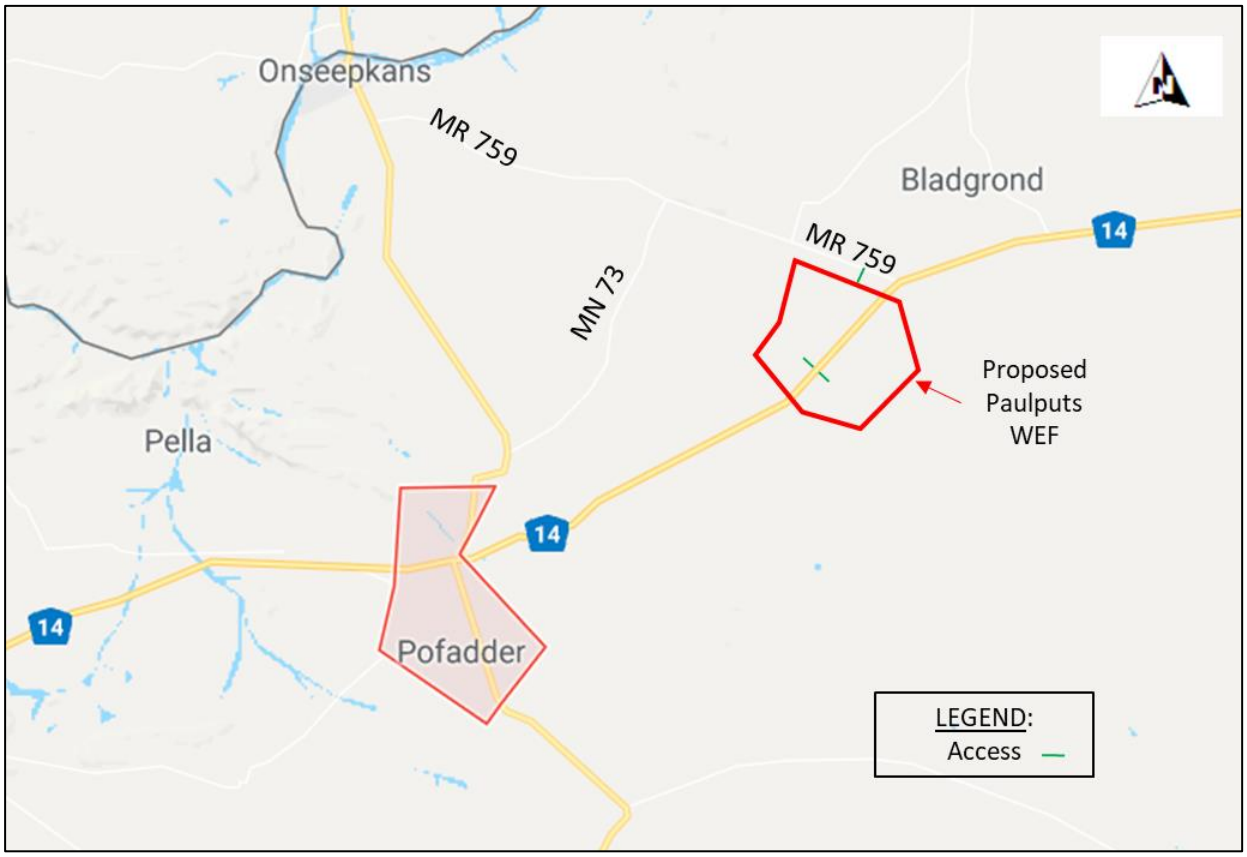


Figure 2: Site and surrounding road network

The proposed site accesses to the N14 are located approximately 9.5 km southwest of the N14/MR759 (Onseepkans Road) intersection (see **Figure 2** above and picture below).

An access to the north western site is proposed via MR759, some 3.0 km from the N14. This access is to be used by LDVs and construction plant during the construction phase.

The proposed development will comprise of the following:

Paulputs WEF:
Maximum 75 wind turbines with a maximum generation capacity of 6 MW per turbine. Internal roads (6 to 12 m wide road reserves) will provide access to the turbines. On-site cabling will largely follow the road infrastructure where possible, and will be either overhead, or underground.

Electrical Grid Connection and Associated Infrastructure:
The Grid Connection will connect the existing Paulputs substation feeding to the Eskom transmission line. The Grid Connection will be a 132 kV line. The maximum length of the line will be 23 km with a 31 m wide servitude.

3. Purpose of Report

This report assesses the expected traffic and transport impact for the project lifecycle, for the WEF as well as the associated grid.

4. Traffic Specialist Credentials

This Site Assessment is undertaken by Mr. Stephen Mark Fautley, who is a Professional Engineering Technologist registered with the Engineering Council of South Africa (ECSA) and is a member of The South African Institution of Civil Engineering (SAICE) (see Curriculum Vitae Annexure A).

His career encompasses the civil, traffic and transportation engineering discipline for ten (10) years at the Western Cape Government, 1.5 years with Kantey and Templer Consulting Engineers and 10 years at local authority (City of Cape Town) before joining Techso in 2008, as a Senior Transport Engineer.

Stephen has extensive experience in Traffic Impact Assessments and Site Assessments, including Impact Assessments for various renewable energy plants in South Africa, and is a registered Road Safety Auditor.

5. Impact Assessment Methodology

This report assesses the expected traffic and transport impact during the Construction Phase, Operation Phase and Decommissioning Phase of the proposed Paulputs WEF and associated grid connections.

The requirements in the TMH 16 Vol 1 & 2 South African Traffic Impact and Site Traffic Assessment Manual, August 2012, compiled by the Committee of Transport Officials (COTO) were used for this study.

The requirements as per Regulation GNR 326 of 4 December, as amended 1 April 2017, Appendix 6, are adhered to (see Annexure C).

Trip generation rates were based on the Scope of Work and the anticipated build programme.

A site visit was conducted on 24 August 2018, a normal traffic day, to assess possible routes to site and to gain insight to possible issues and constraints along the various routes, from Saldanha Port (point of origin) to the proposed WEF site (destination), and to assess the roadside and site environment from a transport perspective.

Traffic impacts resulting from other similar developments within 35 km of the site were estimated, based on previous experience of similar developments, and understanding of their cumulative impact on the subject WEF and grid.

The Impact Assessment Methodology assists in evaluating the overall effect of a proposed activity on the environment. The environmental impact is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the environmental practitioner through the process of the environmental impact assessment. The impact evaluation of predicted impacts is undertaken through an assessment of the significance of the impacts.

SIGNIFICANCE OF ENVIRONMENTAL ASPECTS

The significance of environmental aspects can be determined and ranked by considering the criteria presented in Table 1. In some cases it may be necessary to undertake the impact assessment to determine whether a particular aspect is significant. Therefore, a fair degree of iteration is unavoidable during the assessment process.

Table 1 – Criteria used to determine the significance of environmental aspects

Significance Ranking	Negative Aspects	Positive Aspects
H (High)	Will always/often exceed legislation or standards. Has characteristics that could cause significant negative impacts.	Compliance with all legislation and standards. Has characteristics that could cause significant positive impacts.
M (Moderate)	Has characteristics that could cause negative impacts.	Has characteristics that could cause positive impacts.
L (Low)	Will never exceed legislation or standards. Unlikely to cause significant negative impacts.	Will always comply with all legislation and standards. Unlikely to cause significant positive impacts.

The aspect identification and ranking process is largely a screening exercise whereby the aspects that do not have the potential to cause significant impacts are eliminated.

Aspects ranked "high" and "moderate" are significant and the possible impacts associated with their presence will need to be determined. Aspects ranked "low" do not warrant further attention.

The significance of the aspects should be ranked on the assumption that the management recommended in the EIA will be in place i.e. *with management*. This represents the scenario that the proponent wishes to have considered for approval. The environmental aspects associated with the proposed project activities during the construction, operational, closure phases (where appropriate) need to be identified. The influence of various project alternatives on the significance of the aspects must also be considered.

It may be desirable to also undertake a *without management* aspect ranking, since this highlights the sensitivity of the key risk areas to management and, hence, the management priorities. However, the dilemma in such an exercise is deciding on how much management to include. In the case of a mining project, for example, does one assume that the tailings dam will be completely absent or merely operated poorly?

A useful rule of thumb is to assume that all the management required for operational reasons will be in place, but that any management specifically for environmental control will be absent. The danger in presenting *without management* ranking scenario in an EIA report is that it does not represent the scenario that the proponent wishes to have approved.

SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

Where significant environmental aspects are present ("high" or "moderate"), significant environmental impacts ***may*** result. The significance of the impacts associated with the significant aspects can be determined by considering the risk:

Significance of Environmental Impact (Risk) = Probability x Consequence

The consequence of impacts can be described by considering the severity, spatial extent and duration of the impact.

Severity of Impacts

Table 2 presents the ranking criteria that can used to determine the severity of impacts on the bio- physical and socio-economic environment. Table 3 provides additional ranking criteria for determining the severity of negative impacts on the bio-physical environment.

Table 2 – Criteria for ranking the *Severity* of environmental impacts

Type of Criteria	Negative			Positive		
	H-	M-	L-	L+	M+	H+
Qualitative	Substantial deterioration. Death, illness or injury.	Moderate deterioration . Discomfort.	Minor deteriorati on. Nuisance or minor irritation.	Minor improve ment.	Moderate improvem ent.	Substantial improvement.
Quantitative	Measurable deterioration.		Change not measurable i.e. will remain within current range.		Measurable improvement.	
	Recommended level will often be violated.	Recommended level will occasionally be violated.	Recommended level will never be violated.		Will be within or better than recommended level.	
Community Response	Vigorous community action.	Widespread complaints.	Sporadic complaints.		No observed reaction.	Favorable publicity

Table 3 – Criteria for ranking the *Severity* of negative impacts on the bio-physical environment

Environment	Ranking Criteria		
	Low (L-)	**Medium (M-)**	**High (H-)**
Soils and land capability	Minor deterioration in land capability. Soil alteration resulting in a low negative impact on one of the other environments (e.g. ecology).	Partial loss of land capability. Soil alteration resulting in a moderate negative impact on one of the other environments (e.g. ecology).	Complete loss of land capability. Soil alteration resulting in a high negative impact on one of the other environments (e.g.
Ecology (Plant and animal life)	Disturbance of areas that are degraded, have little conservation value or are unimportant to humans as a resource. Minor change in species variety or prevalence.	Disturbance of areas that have some conservation value or are of some potential use to humans. Complete change in species variety or prevalence.	Disturbance of areas that are pristine, have conservation value or are an important resource to humans. Destruction of rare or endangered species.
Surface and Groundwater	Quality deterioration resulting in a low negative impact on one of the other environments (ecology, community health etc.)	Quality deterioration resulting in a moderate negative impact on one of the other environments (ecology, community health etc.).	Quality deterioration resulting in a high negative impact on one of the other environments (ecology, community health etc.).

Spatial Extent and Duration of Impacts

The duration and spatial scale of impacts can be ranked using the following criteria:

Table 4 – Ranking the *Duration* and *Spatial Scale* of impacts

	Ranking Criteria		
	L	**M**	**H**
Duration	Quickly reversible Less than the project life Short-term	Reversible over time Life of the project Medium-term	Permanent Beyond closure Long-term
Spatial Scale	Localised Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread. Far beyond site boundary Regional/national

Where the severity of an impact varies with distance, the severity should be determined at the point of compliance or the point at which sensitive receptors will be encountered. This position corresponds to the spatial extent of the impact.

Consequence of Impacts

Having ranked the severity, duration and spatial extent, the overall consequence of impacts can be determined using the following qualitative guidelines:

Table 5 – Ranking the *Consequence* of an impact

SEVERITY = L

DURATION	Long-term	**H**			
	Medium-term	**M**			**MEDIUM**
	Short-term	**L**	**LOW**		

SEVERITY = M

DURATION	Long-term	**H**			**HIGH**
	Medium-term	**M**		**MEDIUM**	
	Short-term	**L**	**LOW**		

SEVERITY = H

DURATION	Long-term	**H**			
	Medium-term	**M**			**HIGH**
	Short-term	**L**	**MEDIUM**		
			L	**M**	**H**
			Localised Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary Regional/national
			SPATIAL SCALE		

To use Table 5, firstly go to one of the three "layers" based on the severity ranking obtained from Table 2 and/ or Table 3. Thereafter determine the consequence ranking by locating the intersection of the appropriate duration and spatial scale rankings.

Overall Significance of Impacts

Combining the consequence of the impact and the probability of occurrence, as shown by Table 6, provides the overall significance (risk) of impacts.

Table 6 – Ranking the *Overall Significance* of impacts

PROBABILITY	Definite Continuous	**H**	**MEDIUM**		**HIGH**
	Possible Frequent	**M**		**MEDIUM**	
	Unlikely Seldom	**L**	**LOW**		**MEDIUM**
			L	**M**	**H**
			CONSEQUENCE (from Table 5)		

The overall significance ranking of the negative environmental impacts provides the following guidelines for decision making:

Table 7 – Guidelines for decision-making

Overall Significance Ranking	Nature of Impact	Decision Guideline
High	Unacceptable impacts.	Likely to be a fatal flaw.
Moderate	Noticeable impact.	These are unavoidable consequences, which will need to be accepted if the project is allowed to proceed.
Low	Minor impacts.	These impacts are not likely to affect the project decision.

6. Traffic Assessment

6.1 Routes to site

Considering the site location, Saldanha Port is the preferred port for particularly large equipment and machinery for the proposed WEF.

Three routes (Coastal, Inland and N7) were considered, as discussed below:

- **Coastal Route:** This route was considered to avoid the N7 as far as possible, gaining access to the N7 at Clanwilliam (see **Figure 3** below).

  * From Saldanha Port to Velddrif (along R27) (road in good condition),
  * Along R399 to Main Road through Dwarskersbos (road in fair condition),
  * Along Main Road towards Elandsbaai (Road in poor condition with potholes and extensive patching),
  * Along Main Road (R366) turning north into south-north orientated road (approximately 5 km from Elandsbaai) and heading north towards Leipoldtville (roads in poor condition),
  * Along R365 (road in poor condition with extensive patching) onto the south-north orientated road near Leipoldtville that links the R365 to the R364,
  * From the R364 travel east past Graafwater, to join the N7 near Clanwilliam,
  * From Clanwilliam the route follows the N7 northwards towards Springbok,
  * At Springbok the route takes the N7 northbound off-ramp to travel east along the R355,
  * The route follows a short section of the R355 and turns north to follow the N14,
  * The N14 turns east into Voortrekker Road (N14),
  * The N14 passes through Pofadder to reach the proposed Paulputs WEF located on the N14, some 32 km east of Pofadder.

The Coastal Route has a similar travel time to the N7 Route despite it being 30 km shorter than the N7 route (see **Figure 3** and **Figure 4** below).

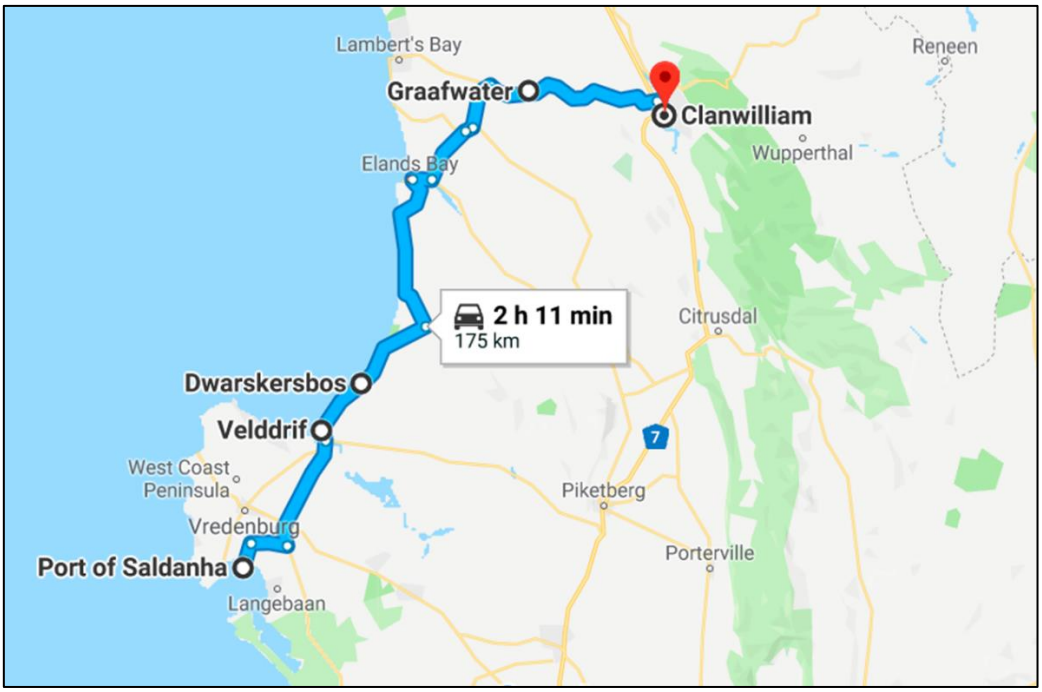


Figure 3: Coastal Route

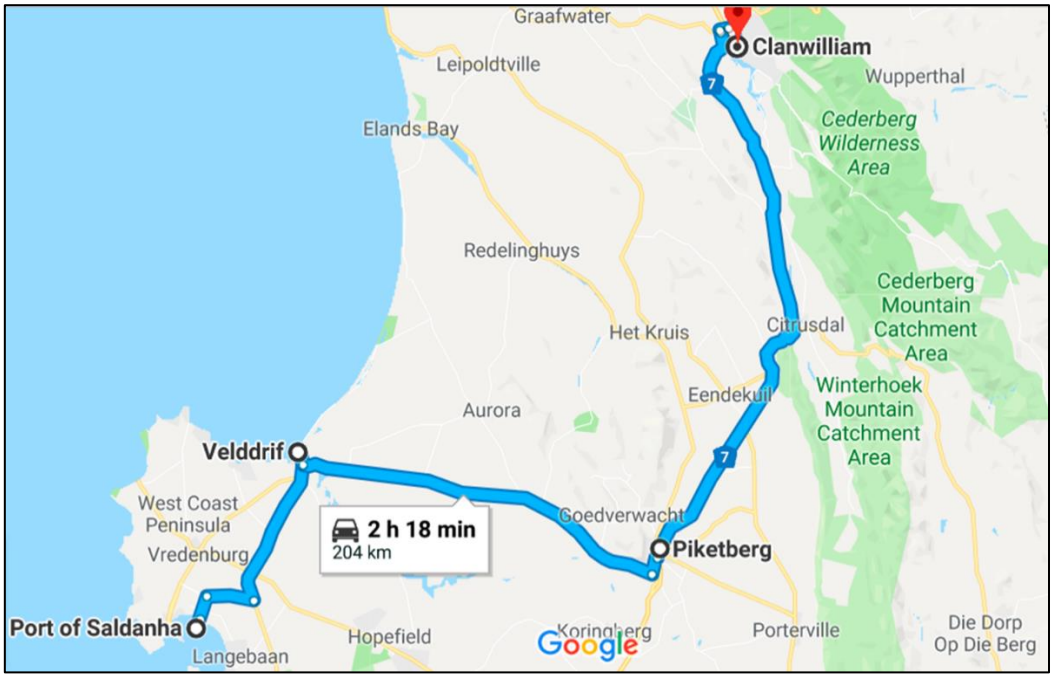


Figure 4: N7 Route to Clanwilliam

The Coastal Route is however **not recommended** due to the poor condition of the coastal roads north of Dwarskersbos, with extensive patching and pothole repair currently underway (see pictures below). Heavy vehicle traffic will exacerbate the deterioration of these roads.

Coastal Route - Poor road structure on Coastal Route north of Dwarskersbos.

- **Inland Route: (**see **Figure 5** below**)**
  - The route starts at Saldanha Port and follows the Port access road;
  - The route turns east at the west-east orientated route (i.e. turn east at the link road between the R399 and the R27 that is planned to cross the R27 and join the R45);
  - At the junction with the R27, the route turns north and follows the R27 towards Velddrif;
  - At Velddrif the route turns east along the R399 to join the N7 south of Piketberg;
  - The route then follows the N7 towards Vanrhynsdorp;
  - At Vanrhynsdorp the route turns eastwards onto the R27 and follows the R27 through Calvinia and Kenhardt to join the N14 at Keimoes;
  - The route follows the N14 westwards through Keimoes and Kakamas towards the proposed Paulputs WEF, located just west of MR759.

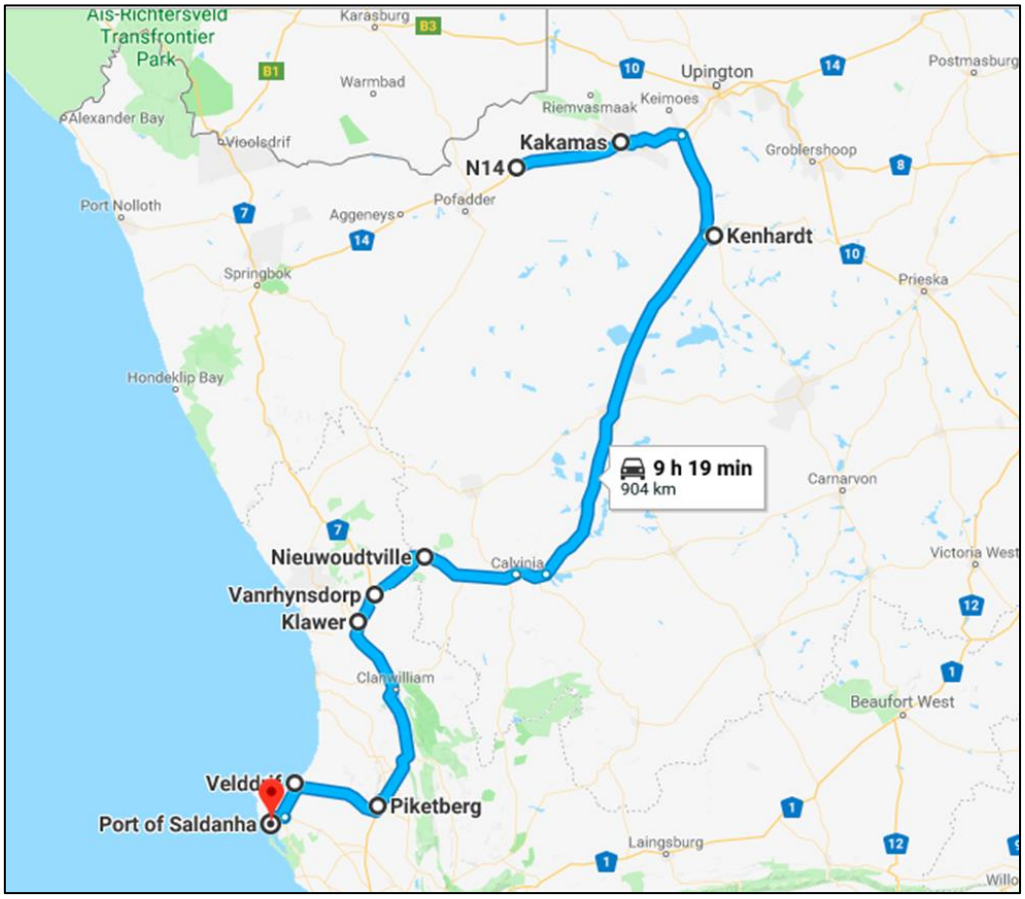


Figure 5: Inland Route from Clanwilliam

The Inland route is **not recommended** and should be avoided. It presents a considerably longer travel distance (adds 158 km) and would add some 2 hours to a normal journey (see **Figure 5** above and **Figure 6** below). More critically though, it also traverses the Vanrhyns Pass that has tight horizontal curves to negotiate. The horizontal curvature with super elevation on Vanrhyns Pass will be particularly problematic for super-load vehicles (see pictures below).

Inland Route - Typical cross section on Vanrhyns Pass with tight chicane curves and super elevation

- **N7 route:** This is the **recommended route** for the proposed WEF project (see **Figures 6, 7** and **8** below), with the N7 and N14 being in a good condition.

* The route starts at Saldanha Port and follows the Port access road;
* The route turns east at the west-east orientated route (i.e. turn east at the link road between the R399 and the R27 that is planned to cross the R27 and join the R45);
* At the junction with the R27, the route turns north and follows the R27 towards Velddrif;
* At Velddrif the route turns east along the R399, turns north at Lang St, and joins the N7 south of Piketberg;
* The route then follows the N7 towards Springbok;
* At Springbok the route takes the N7 northbound off-ramp to travel east along the R355;
* The route follows a short section of the R355 and turns north at the N14;
* The N14 turns east into Voortrekker Road (N14);
* The N14 passes through Pofadder;
* The proposed Paulputs WEF is located on the N14, some 32 km east of Pofadder.

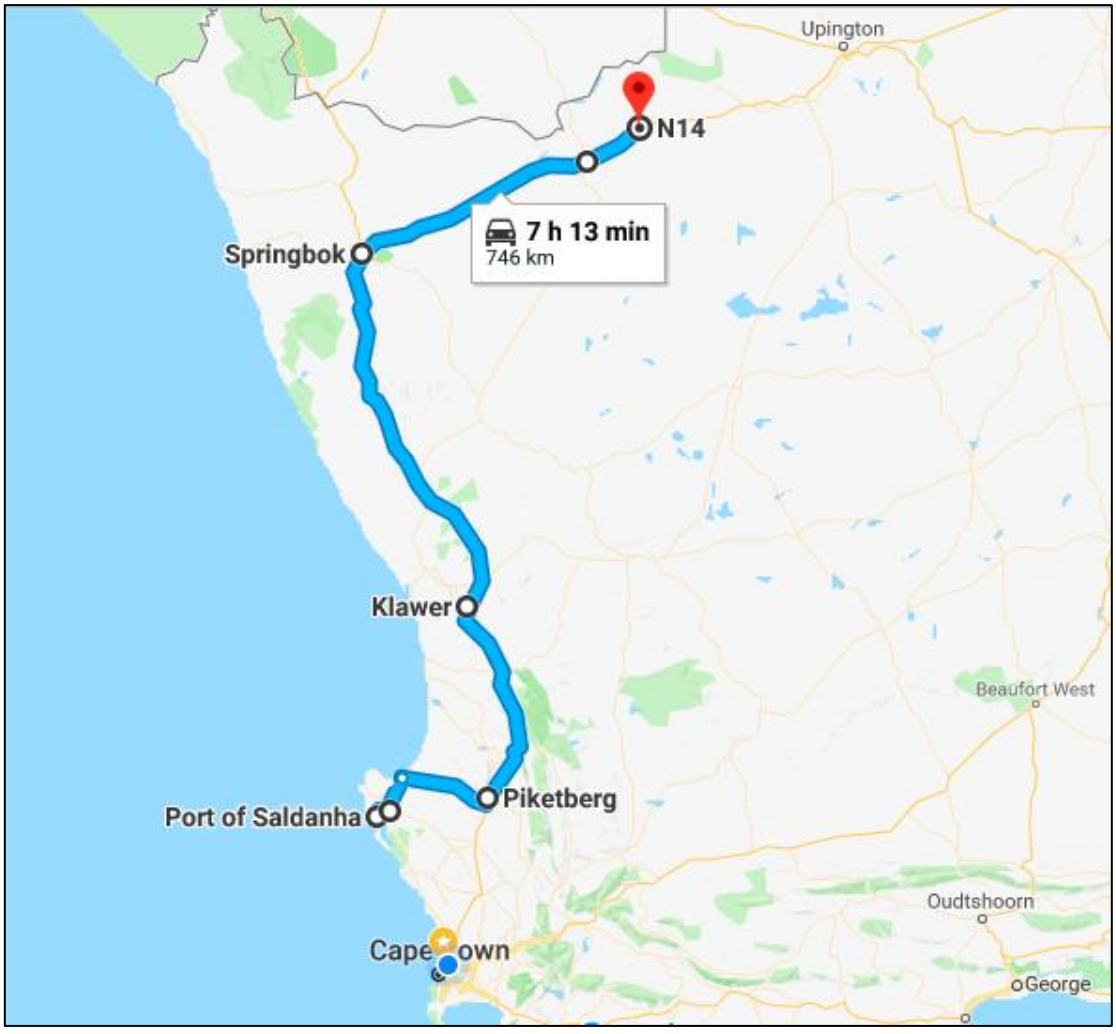


Figure 6: Preferred Route to site following N7 and N14 from Piketberg

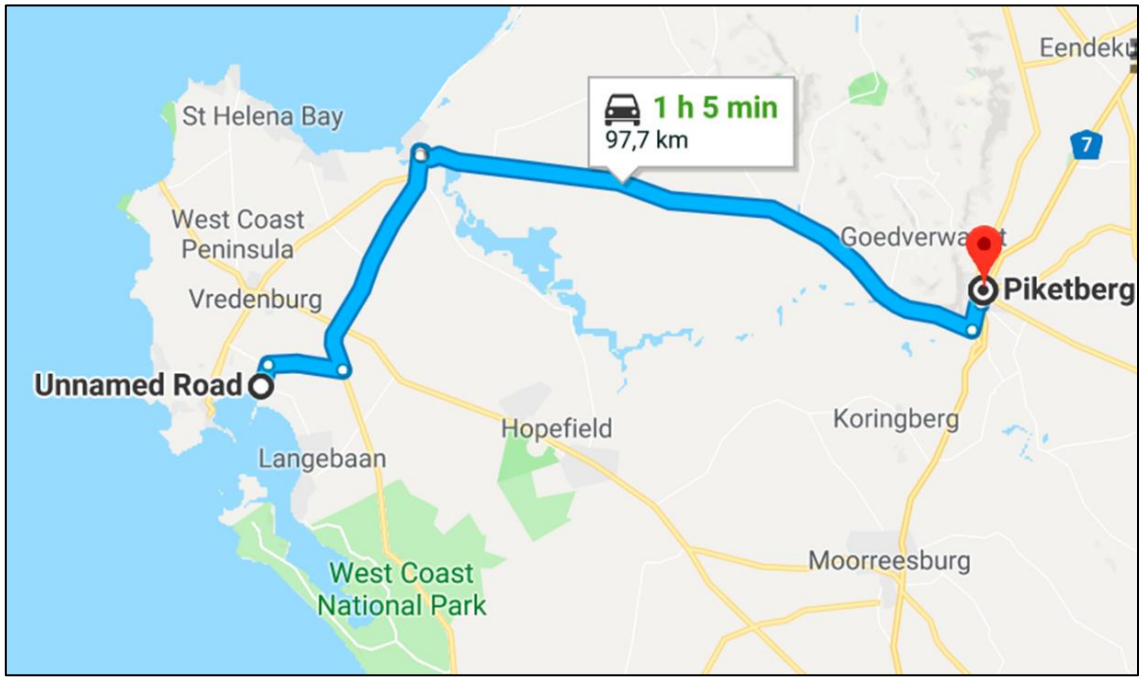


Figure 7: Close up - Route from Saldanha Port, to R27, to join the N7 south of Piketberg

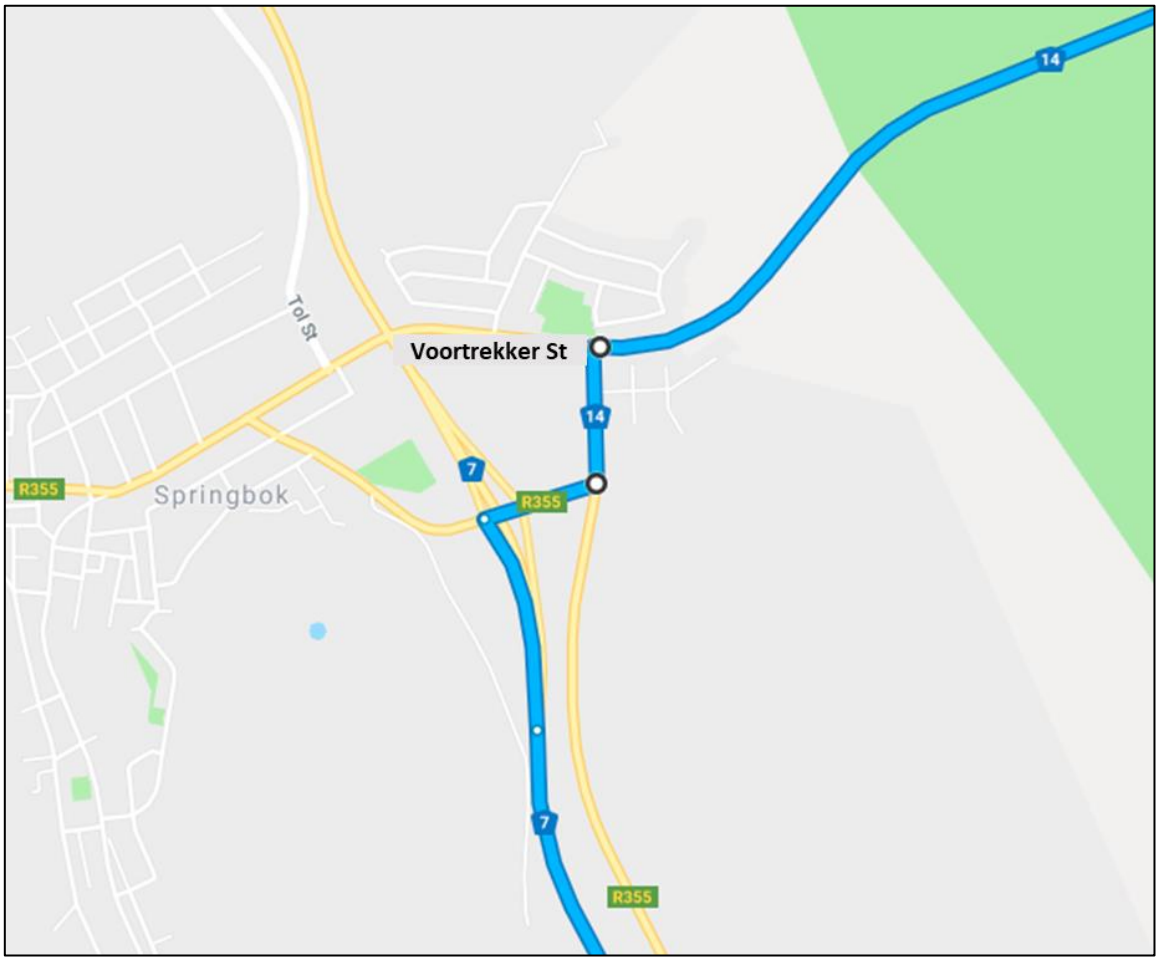


Figure 8: Close up - R355, linking N7 to N14 and bypassing Springbok

The Piekenierskloof pass (near Citrusdal) presents some challenges for super-load vehicles, i.e. extra-long vehicles transporting wind turbine blades, particularly on sharp horizontal curves.

It is noted that a new interchange is being built at the intersection of the R27 / west-east orientated route serving Saldanha Port. The west-east route is being extended east of the R27 to link to the R45).

Very long vehicles (i.e. carrying wind turbine blades) would need to turn-left at the interchange on-ramp to access the R27, but on returning to Saldanha Port, would need to turn-right on the interchange off-ramp (assuming a diamond interchange). The detail design of the interchange would need to be assessed to determine suitability for super-load vehicles carrying long sections such as turbine wind blades. It is assumed that the important interchange serving the Saldanha Port access to the R27 is designed to accommodate some larger transport vehicles, but the extent of this needs to be ascertained. Where necessary an alternative route of temporary bypass lane would need to be considered.

At Springbok, the route section takes the N7 northbound off-ramp and turns right onto the R355, turns left at the R355 intersection with the N14 and turns right at Voortrekker Street (N14), all requiring intersection adjustments to accommodate particularly long vehicles.

6.2 "N7" Route Characteristics and Capacity

The various roads along the route are all two-way single carriageways, with varying posted speeds and shoulder widths (see pictures below).

R27 (south bound approach to new interchange at Port access road)

R399

N7

N14

Shoulder width varies on road sections along the route and sections of the N7 have passing lanes (i.e. in Piekenierskloof Pass). The N7 mountainous sections through Piekenierskloof Pass requires special attention for particularly long super-load vehicles.

Two-way traffic flow service level (at Level of Service E) are some 2500 passenger car vehicles per hour (pcvph) on the 120 km/h rolling terrain sections of the N7, 1410 pcvph on the 80 km/h two-lane mountainous sections of the N7 (i.e. Piekenierskloof Pass near Citrusdal), and 2500 pcvph on rolling sections on other regional routes.

During the site visit on 24 August 2018, a normal traffic day, it was observed that the above roads have sufficient spare capacity to accommodate the proposed development traffic, as well as expected traffic from other similar (wind/solar) energy projects in the Paulputs area.

This is also apparent from the N7 traffic count data in year 2017 which shows the N7 operating well below capacity. See Table below with extracts of Traffic Count Data showing highest road volumes recorded (TS1 northbound and TS2 southbound) on various sections of the N7. The highest road traffic volume was 743 pcvph, which is far below capacity of 2500 vph on rolling road sections and 1410 vph on mountainous road sections.

TRAFFIC COUNTS AT VARIOUS COUNTING STATIONS ON THE N7

Site ID	Dis-tance	Location	Lanes	Spd-Lmt	Traffic Stream 1 (TS1)	Traffic Stream 2 (TS2)	ADT	ADTT	% Heavys	Highest Vol Road	Highest Vol TS1	Highest Vol TS2
292	41.000	Between Piketberg and Citrusdal	3	80	To Citrusdal	To Piketberg	3972	837	21.1	478	292	243
18077	42.200	Between Piketberg & R365 Porterville T/O	2	120	Towards Citrusdal	Towards Piketberg	2836	638	22.5	388	235	196
18078	60.200	Between R365 Porterville T/O & R365 Eendekuil T/O	2	120	Towards Citrusdal	Towards Piketberg	3414	769	22.5	452	282	231
5015	76.000	Between Citrusdal and Clanwilliam (0054C)	2	100	To Clanwilliam	To Citrusdal	3378	766	22.6	743	449	615
18079	21.400	Between Clanwilliam T/O & R363 Melkboom T/O	2	120	Towards Van Rhynsdorp	Towards Clanwilliam	2407	709	29.4	281	142	179
18007	50.700	Between Clanwilliam and Klawer	2	120	Towards Klawer	Towards Clanwilliam	3025	839	27.7	321	182	170
18008	18008	Between Nuwerus and Bitterfontein	2	120	Towards Bitterfontein	Towards Nuwerus	895	248	27.7	107	56	61
18009	18008	Between Bitterfontein and Pofadder T/O	2	120	Towards Pofadder T/O	Towards Bitterfontein	806	246	30.5	92	46	46
18010	18008	Between Pofadder T/O and WC Border	2	120	Towards WC Border	Towards Pofadder T/O	763	209	27.4	85	45	46

During the site visit it was also observed that the N14 carries lower traffic volumes than the N7 and has abundant spare capacity. There are no traffic counts available for the N14 in the vicinity of the site but the traffic counts on the N14, between Springbok and Pofadder relatively close to the site are shown below.

TRAFFIC COUNTS AT STATION 814 ON THE N14

SiteID	Dis-tance	Location	Lanes	Spd-Lmt	Traffic Stream 1 (TS1)	Traffic Stream 2 (TS2)	ADT	ADTT	% Heavys	Highest Vol Road	Highest Vol TS1	Highest Vol TS2
205	2.5	Between Springbok and Pofadder	2	120	Towards Pofadder	Towards Springbok	1312	138	10.5	317	152	165

Traffic volumes on the N14 in the vicinity of the site should be similar to the above counts. (i.e. 317 vph (counted in year 2013). Allowing a very high 5% compound annual traffic growth, the traffic flow would increase to a modest 425 vph, which is far below the N14 road capacity of 2500 vph.

By observation, the Regional routes carry substantially lower traffic volumes and have ample spare capacity to accommodate proposed development traffic, as well as expected traffic from other similar (wind and solar) energy projects in the Paulputs area. No traffic counts are available on these routes.

The new Road over River bridge construction on the N7 south of Klawer is a present constraint on the N7 route for super-load vehicles in particular. This project is nearing completion and will be completed well ahead of the Paulputs WEF Project.

The new interchange on the R27 (planned to provide east-west access to the R45) is however at an early stage of construction. The interchange could impact on this project, and could require a temporary bypass lane or an alternate route from Saldanha Port to the N7.

The Paulputs WEF will require an extensive on-site road network to facilitate access to the wind turbine sites.

6.3 Trip Generation

The WEF construction period is expected to last at least 24 months. The grid substation and connections are expected to take 18 months. The WEF and the grid construction will run concurrently. The construction period will generate the most traffic, both on public roads and on-site.

For the purposes of this report it is assumed that all construction will be completed within 24 months, as a worst-case scenario, and that a maximum of 75 Wind Turbine Generators will be constructed.

The trip generation and average daily trips to site are insignificant, as detailed below:

WEF Build:
The construction of the WEF is expected to generate some 30699 trips to site (average of 58 trips to site per day over a 24 month build period (see Table below)). Many of these trips will be from surrounding areas.

Wind Tower components to be imported from overseas will arrive in SA by sea and will be transported overland from Saldanha Port to site, primarily along the N7 and N14.

The freight and transport requirements for Construction, Operations and Maintenance and Decommissioning are shown below:

WEF Construction Phase

The freight and transport requirements during construction are summarised in the Table below and are discussed hereunder:

Expected Traffic Volumes for Paulputs WEF								
No	Description of Transport	Development Stage	Vehicle Types	Estimated number of vehicle trips		Expected trip frequency / day	Number of transport days	Expected Impact to Public traffic
				Per WTG	Total for WEF (*)			
1	Turbine Foundation Assembly	Construction Stage	Std Container Trucks	1	75	8	9	No / Minimal Impact
2	Turbine Tower Sections	Transport Stage	Special Abnormal Vehicles	5	375	5	75	Selected Transport Routes: Road and intersection adjustment/upgrades and management of abnormally long vehicles on tight bends (Pikenierskloof Mountain Pass on N7)
3	Turbine Blades	Transport Stage	Special Abnormal Vehicles	3	225	3	75	
4	Turbine Nacelle, Hub and Rotor	Transport Stage	Special Abnormal Vehicles	3	225	3	75	
5	Turbine Tools and Installation Material	Transport Stage	Std Container Trucks	1	75	8	9	No / Minimal Impact
6	Mobile Cranes	Transport Stage	Self Driven Low-bed	0	4	4	1	No / Minimal Impact
7	Main "Lattice Boom" type cranes	Transport Stage	Large Delivery Trucks	0	10	6	2	No / Minimal Impact
8	Earthmoving Plant (Roads and Platform)	Construction Stage	Standard Tipper Trucks	220	16500	20	825	Mainly from borrow pit to site and on site - no impact on Public Roads outside of Development Footprint
9	Concrete Mixing Trucks (Foundations)	Construction Stage	Ready Mix Concrete Trucks	150	11250	50	225	Mainly from Concrete Batching Plant (near WEF) to site. Minimal Impact.
10	Deliveries of Aggregate, Cement, etc	Construction Stage	Large Tipper Trucks	25	1875	8	234	No / Minimal Impact
11	Deliveries of bricks and building material	Construction Stage	Large Delivery Trucks	0	10	2	5	No / Minimal Impact
12	Deliveries of Electrical Cables and Material	Construction Stage	Large Delivery Trucks	1	75	1	75	No / Minimal Impact
* Based on 75 Wind Turbine Generators (Some numbers rounded).					**30699**		**1611**	**TOTALS**
SUMMARY: 75 Wind Turbine Generators								
24	**Months build**	**Days for build**	**528**		**58**	**Average number of trips per day over build period**		

Ref: Report R1011-TR/01 of March 2016 by Africoast

Approximately 3.3% of the trips will be special abnormal load (super-load) vehicles, at a frequency of 3.7 vehicles per day for some 225 days (or 11 vehicles per day over 75 days).

150 standard container trucks transporting Turbine Foundation Assembly, Turbine tools and installation material over 18 days (8 per day) is also anticipated, from Saldanha Port to site.

58 trips to site by delivery vehicles (ready mix cement, tipper trucks, etc. per day from local area are anticipated during the peak construction period.

A low number of large trucks delivering building materials, cables, aggregate, etc. are expected from local towns.

Mobile and lattice cranes will be driven to site and will remain on site for an extended period for offloading of wind blades and for erection of the wind towers.

Staff and worker transport to site is approximately 18 AM and 18 PM peak hour trips to/from site, 2 of which would be buses (see Table below). These trips would originate in nearby towns such as Pofadder, Kakamas and Keimoes and would have a negligible traffic impact.

Staff and Workers Transport:
Approximately 200 persons are expected to be employed in the construction of the WEF. This would generate some 18 AM and PM peak hour trips to site, 2 of which would be buses (see Table below). These trips would originate in nearby towns such as Pofadder, Kakamas and Keimoes and would have a negligible traffic impact.

Expected Staff daily traffic volumes for Paulputs WEF Construction			
Staff	**# Staff**	**Vehicle Type**	**# Vehicles**
Skilled,Professional, Technical	20	Private Vehicles	13
Semi-Skilled	50	Quantum Taxi	3
Unskilled	130	Bus	2
TOTALS	**200**		**18**

WEF Operations and Maintenance Phase

It is anticipated that some 30 people would visit the site per day during operations, for security and maintenance.

Maintenance vehicles travelling to site, could possibly include super-load or abnormal load vehicles (i.e. to replace a damaged wind turbine), resulting in slow speeds, impedance to other traffic on local, national, regional and minor roads.

This can be mitigated in a Transportation Plan that should indicate preferable times for abnormal load and super-load vehicles to travel on the road network when background traffic is lower and would include procedures for safe transportation to site.

In general, operations (including maintenance) will generate very low traffic volumes and should have a negligible impact.

WEF Decommissioning Phase

Trip generation at the decommissioning stage, expected to last between 6 and 12 months, is likely to be outside commuter peak hours.

Decommissioning will entail less traffic than the construction phase, and components would be transported to the local dump if not recyclable, or sold to local scrap merchants or other buyers if the items have salvage value.

Decommissioning should be in accordance with the agreement reached with the affected land owner.

Daily trips for the decommissioning period is expected to be low and will typically comprise dump trucks or low-bed vehicles, with equipment and components cut to size on site.

6.4 Transportation Clearances

The general categories of items to be transported for the WEF include: turbine components, facility and construction equipment, and facility and construction material. Further detail on each category is provided below.

The WEF turbine components are the largest transportation equipment for the project. Turbine components are described in three sections: blades, towers, and the nacelle as below. The weights and dimensions for all these components vary depending on the manufacturer.

Blades vary in dimension and weight according to manufacture. Each blade typically weighs from 6t to 13t. Blade lengths are typically between 30m and 60m, but blades exceeding 80m are now being produced. 90m long blades weighing some 20t are envisaged for this project

Tower sections vary in length and dimension depending on where they are positioned in the tower. In general lower (Base) sections are the shorter and heavier while higher (Top) sections are taller and lighter. The Tower will weigh some 700t, with sections varying in weight and length. Tower sections tapering diameters range between 6 and 9 m depending on the section type and position (lower, middle, top).

Nacelles (the section of the turbine at the top of the tower) are shipped in various configurations. The indicated weight include all sub-components to the nacelle. The anticipated weight of the nacelles is around 85t (including the weight of the rotor hubs). Dimensions for nacelles vary, but do not typically exceed standard construction trailer dimensions.

WEF Facility and Construction Equipment

Major equipment for the WEF includes the main step up transformers, pad mounted transformers, substation equipment, and WEF Facility Operations building. Major construction equipment includes turbine offloading cranes, turbine installation cranes, earthmoving equipment, trenching equipment, and miscellaneous cranes, forklifts, and lifting equipment.

WEF Facility and Construction Material

Significant material for the project includes road aggregate, concrete, steel reinforcing, underground electrical conductor and fiber optic cable, grounding cable, transmission wiring and poles, and materials for the WEF operations building.

The future/theoretical Wind Tower envisaged for the project has the following critical dimensions:

- Maximum Rotor Diameter: 180 m (90 m blades)
- Maximum Tip Height: 230 m
- Maximum Hub Height: 140 m

The wind turbine components transport particulars as below are extracted from the supplier document, *T09 - Manual Requirements for transport routes and crane positioning surfaces (Planning and implementing) Date: 2017-06-23 Public" Source - Vestas Wind Systems A/S · Hedeager 44 · 8200 Aarhus N · Denmark · www.vestas.com*

In the above-mentioned document the V150, being the largest wind turbine, is similar to the envisaged Paulputs WEF wind turbine:

"3 Requirements for crane spaces
This section defines the further general requirements for the crane spaces.

3.1 Overview of vehicles, cranes, components and materials

The following list provides an overview of the vehicles, cranes, components and materials to be used:

- Escort vehicles approx. 3.5 t total weight
- Approx. 55-65 lorries and heavy-duty transporters Axial load 12 t
- 2 wrecking cranes, 1 pre-assembly crane, 1 heavy-duty crane Axial load 12 t
- Tower sections 42 t to 80 t
- Nacelle, hub, cooler top 72 t, 34.5 t, 2.6 t
- Drive train 62 t
- 3 rotor blades each 12 t

Tool container

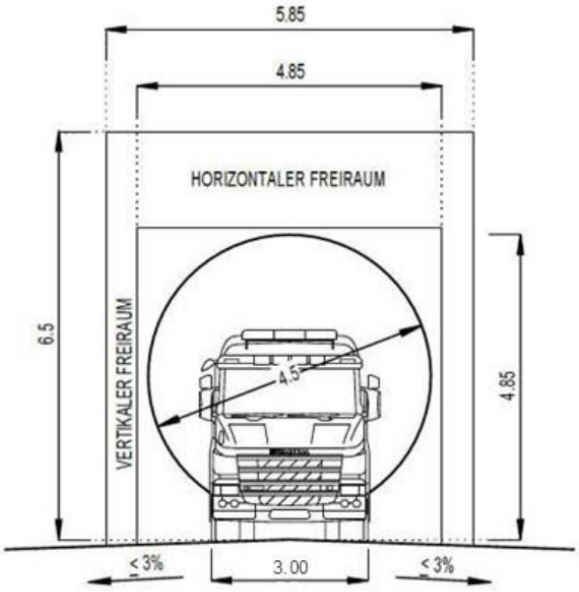
Overview of geometric requirements

When planning the transport routes, minimum dimensions must be considered as specified in the following sections:

Table 3: Geometric minimum requirements

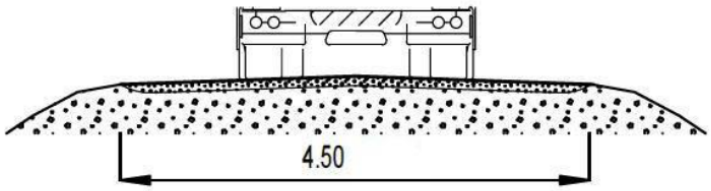
Minimum clearance outline steel tower	**Value**
Clearance width in curves	see chapter 2.3.4
Clearance width on straights	5.85 m
Clearance height	6.50 m
Transport width	4.85 m
Transport height	4.85 m
Wheelbase (outer edge of tyres)	3.00 m
Max. Outer diameter of tower	4.50 m

Figure 2: Example minimum clearance outline steel tower on straight transport routes



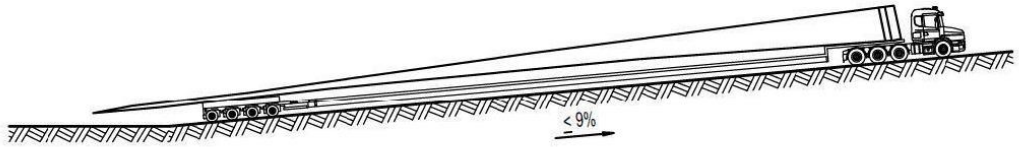
Minimum clearance outline pre-mounted LDST sections		**Value**
Clearance width	in curves	see chapter 2.3.4
	on straights	8.00 m
Clearance height		8.00 m
Transport width		6.50 m
Transport height		7.00 m
Wheelbase (outer edge of tyres)		3.00 m
Max. Outer diameter of tower		6.00 m
Width of load-bearing road surface	in curves	see chapter 2.3.4
	on straights	4.50 m

Figure 3: Definition of the load-bearing surface



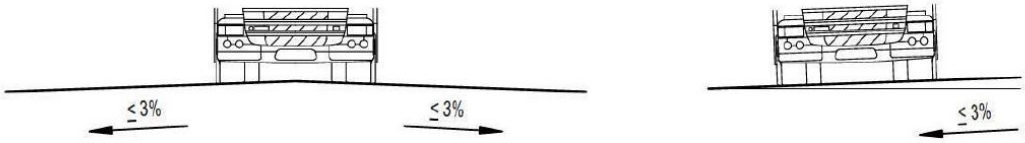
Curve radii		see chapter 2.3.4
Longitudinal slope (maximum values) for inclines	without covering layer	9 %
	with covering layer	12 %

Figure 4: Limit for inclines



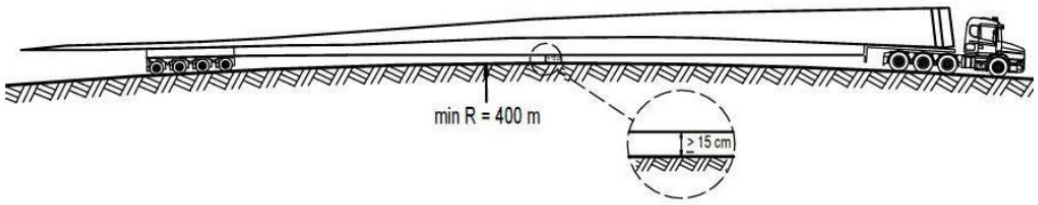
Lateral slope (maximum values) for	in curves	3 %
	on straights	3 %

Figure 5: Limit for lateral inclines



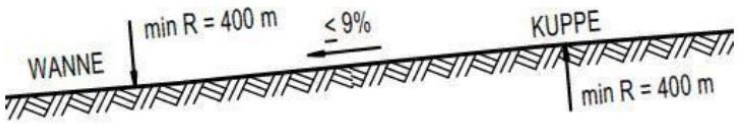
Differences in height	Ground clearance	≥ 15.0 cm

Figure 6: Definition of ground clearance



Troughs (minimum values)	Radius	400 m
Crests (minimum values)	Radius	400 m

Figure 7: Minimum radii for the formation of troughs and crests



The planning of curves must be carried out by observing minimum dimensions. These must be applied according to the below examples.

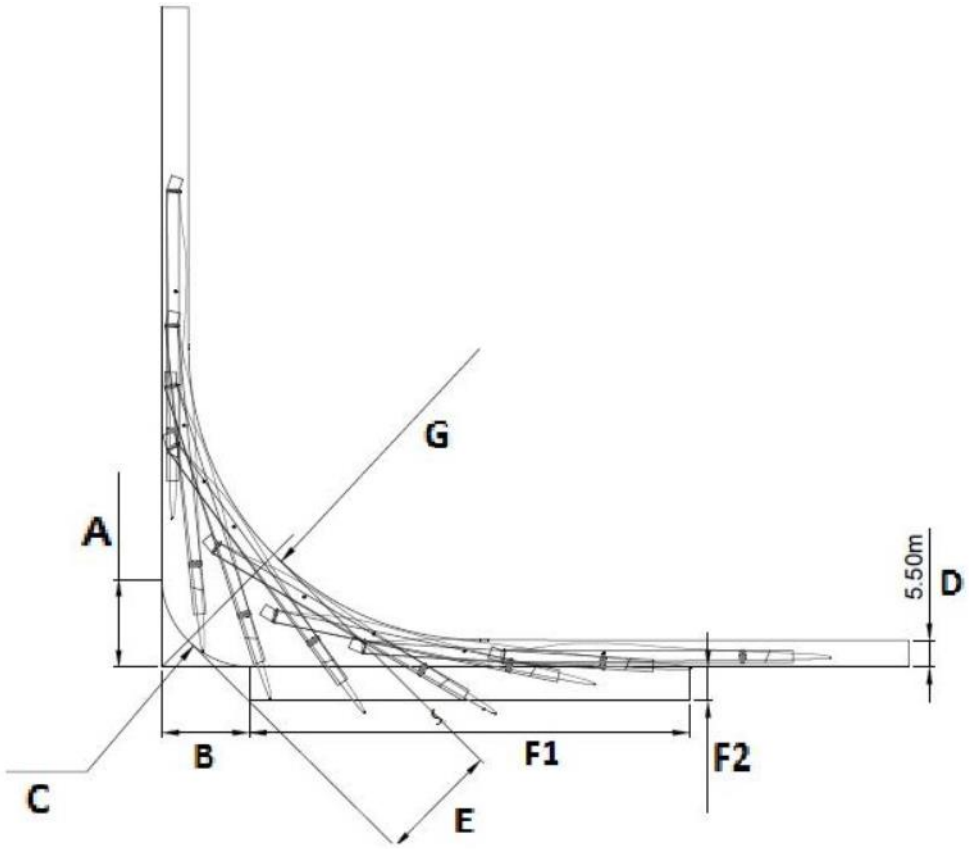
Remarks:

- Graphic examples are not to scale
- Curves are valid for all components
- Load-bearing road width before entering curve: 4.50 m
- Before entering a curve, at least the entire transport length must be able to be positioned straight
- In the graphic, street surfaces assume that the overhang can be swung over the road and that the attached information is the curve to be extended.
- If lengths and curve options on construction sites are smaller or larger, this must be checked in a project-specific manner, since changing one of the dimensions indicated will lead to a change in the other parameters

- All illustrated curve expansion spaces are transport route spaces which must meet the static and constructive requirements defined in the preceding chapters.

- The minimum clearance outline for all areas shown must be kept completely clear of obstacles, corresponding to Figure 2. Below is example of 90 degree turn.

Drawing of a 90 degree curve

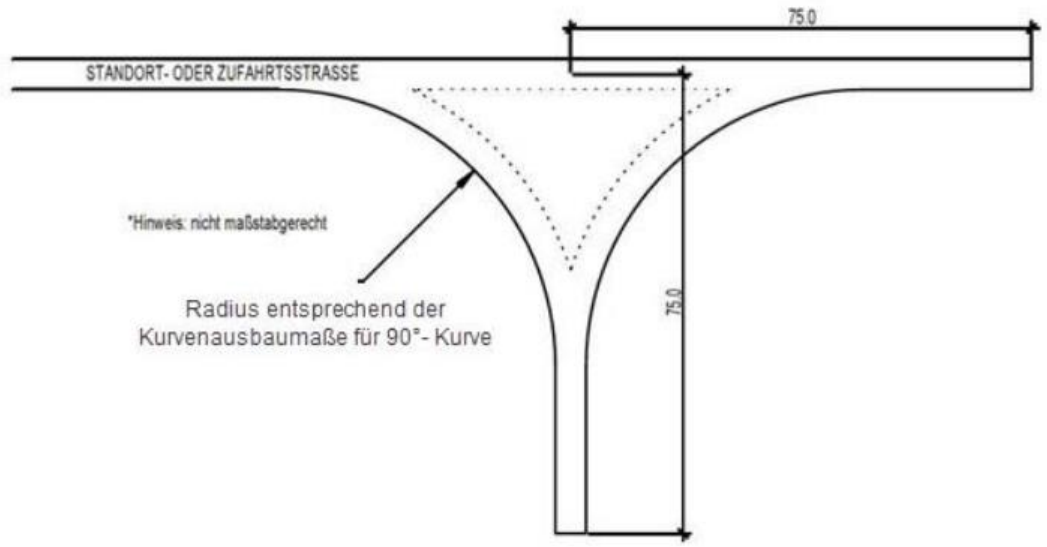


90° Turbine Types	**A** Length	**B** Length up to the open space	**C** External radius	**D** Street width	**E1** Maximum curve distance	**F1** Length of cutting surface	**F2** Length of cutting surface	**G** Internal radius	**Overhang**
V90	25.00	25.00	46.50	5.50	12.00	35.00	4.00	40.00	9.50
V110	27.50	27.50	50.00	5.50	14.00	37.50	4.00	45.00	9.50
V112	28.00	28.00	50.00	5.50	14.00	38.00	4.00	45.00	9.50
V117	28.50	28.50	50.00	5.50	14.00	39.00	4.00	45.00	9.50
V126	30.00	30.00	55.00	5.50	14.50	45.00	4.00	50.00	9.50
V136	32.50	32.50	60.00	5.50	15.00	47.50	4.00	55.00	9.50
V150	35.00	35.00	70.00	5.50	15.00	50.00	4.00	65.00	9.50

Requirements for passing and turning areas

- For all route sections of ≥ 1.5 km length and in the main access, a turning area with a minimum size of 55 m (length) x 5.5 m (width of additional lane) must be constructed in order to guarantee oncoming traffic can pass (heavy-duty transports are excluded) and allow for free passage of emergency vehicles in particular.
- Turnouts may only be constructed in straight passages.
- Every wind farm must have turning options. Crane spaces can also be used as a turning option, provided that you meet the below geometrical requirements and no other components or vehicles are using the space at the same time.
- All turnouts and turning bays underlie the same static and constructional requirements as the transport routes.

Turning point with a reversing length ≥75m.



Grid Build:

» Grid - 108 trips to site = average of 0.20 trips to site per day over 24 month build period.

Grid Construction Phase

The Trip generation for equipment, machinery and materials for the grid build are shown in the Table below.

Expected Traffic Volumes for Paulputs GRID								
No	Description of Transport	Development Stage	Vehicle Types	Items	Estimated number of vehicle trips	Expected trip frequency / day	Number of transport days	Expected Impact to Public traffic
				Total for GRID	Total for GRID (*)			
1	Earthmoving Plant (clear site and dig foundations)	Construction Stage	Grader, JCB, Tipper Trucks	3	3	3	1	Mainly from borrow pit to site and on site - no impact on Public Roads outside of Development Footprint
2	Pylons Foundations	Construction Stage	Ready Mix Concrete Trucks	617	77	26	3	Low Impact
3	Pylon Assembly	Construction Stage	Crane lorries (8 and 20 Ton)	154	2	2	1	No / Minimal Impact
4	Pylons	Transport Stage	Lowbed	154	3	1	3	No / Minimal Impact
5	Electricity cable coils	Transport Stage	8 Ton trucks	138	23	1	23	No / Minimal Impact
*** Based on 23 km GRID connections**					**108**		**31**	**TOTALS**
SUMMARY:								
24 Months build		528 Days for build			0.20 Average number of trips per day over build period			

Some 20 persons are expected to be employed in the construction of the grid. This would generate around 4 AM and PM peak hour trips to site (see Table below). These trips are expected to originate in nearby towns such as Pofadder, Kakamas and Keimoes, and would have a negligible traffic impact.

Expected Staff daily traffic volumes for Paulputs GRID Construction			
Staff	**# Staff**	**Vehicle Type**	**# Vehicles**
Supervisors	4	Private Vehicles	3
Semi-Skilled	16	Quantum Taxi	1
TOTALS	**20**		**4**

Grid Operations and Maintenance Phase

The Trip generation for the grid operations and maintenance are expected to be insignificant / negligible.

Grid Decommissioning Phase

The Trip generation for the grid decommissioning is expected to be insignificant / negligible, with pylons, etc. taken apart and cut into sections on site.

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

6.5 Potential Impacts

6.5.1 Construction Period

» **Restrictions on route**. As observed, the N7 route poses a number of constraints for super-load vehicles, as listed and shown in the pictures below.

* Saldanha Port does not provide holding areas for storage of off-loaded cargo. A temporary holding area outside the Port should be provided to store cargo off-loaded from ships (such as wind turbine blades) before they are transported to site;
* The overhead structure (rail over road bridge) on the access road leading from Saldanha Port has a 5.6 m height clearance.
* There are two bridge structures on the N7 that have low clearance (road to bridge soffit) as shown in the Table below:

Section	Km	Place	Height
5	25,06	North of Vanrhynsdorp	5,43m
6	113,02	Springbok	5,59m

* The minimum bridge height clearance is 5.1 m, but this could be compromised by pavement overlays. It is the responsibility of the transport carrier to obtain route clearance and ascertain heights of structures (including overhead powerlines, etc.). These matters should be covered by the Transportation Plan, which is recommended due to the transport logistics issues for this project.
* The Saldanha Port access route T-intersection with the R27 is being upgraded to an interchange. The impact of the interchange needs to be assessed for abnormal and super-load vehicles access to and from the R27. Traffic law-enforcement would need to be on duty to assist some super-load and possibly abnormal load vehicle access to the R27;
* The right-turn movement for super-load vehicles at the R27 / R399 intersection in Velddrif requires temporary traffic accommodation (temporary removal of street furniture, closure of the intersection for general traffic, adjustment to kerbed islands, etc.). Traffic law-enforcement would need to be on duty to enforce one-way travel through this intersection. The same consideration needs to be given where these vehicles pass through intersections in other towns;
* The R399 has some tight bends where extra-long vehicles may encroach into the opposing lane. Traffic law enforcement will be required to assist extra-long vehicles on the road section. Consideration should also be given to travelling during off-peak periods and on days when traffic flow is lower (i.e. possibly Tuesday to Thursday);

* The R399 intersection with the road leading to the N7 has traffic islands impacting on turning circles for large vehicles (it may be necessary to temporary close the intersection to general traffic and use left-turn lane for the super-load right-turn movement);
* The traffic roundabout on the N7/R366/R44 intersection at Piketberg requires temporary adjustment to accommodate super-load vehicles. Traffic law-enforcement would need to be on duty to assist super-load and possibly abnormal load vehicles at this intersection;
* The N7 Mountain pass at Piekenierskloof Pass (north of Citrusdal) has some tight bends where extra-long vehicles may encroach into the opposing lane. Traffic law enforcement may be required to assist extra-long vehicles through the mountain pass. Consideration should also be given to travelling during off-peak periods and on days when traffic flow is lower (i.e. Tuesday to Thursday). Super-load vehicles should travel at 10 km apart, and would need to hold / wait ahead of the mountain pass to form a convoy of some 3 to 4 vehicles, before being assisted through the pass;
* The N7 northbound off-ramp access to the R355, R355 intersection with the N14 and the N14 right-turn at Emerald Street/Voortrekker Street (N14) will require traffic accommodation (temporary intersection improvements) and traffic law enforcement assistance for super-load vehicles.
* The route through towns (such as Velddrif and Pofadder) will require assistance of traffic law-enforcement for super-load vehicles.

The number of issues identified along the route for super-load vehicles requires a Transportation Plan, which should also identify and deal with other possible vehicle transport issues along the route. The Transportation Plan would need to be presented to the Western Cape Government, Public Works and Transport and the Northern Cape Government, Public Works and Transport, for approval prior to transport of equipment. This is similar to obtaining approval for transport of an abnormal load, except that the specific transport requirements exceed abnormal load and requires supporting information, such as drawings detailing how the route constraints will be dealt with which could include a temporary bypass route; relocation of signage; road widening at intersections; road closures; transport under escort, etc. This is particularly required for road transport of 90 m long blades.

Pictures and images relating to the above are shown below:

<table>
<tr><th colspan="2">Constraints for super-load vehicles as observed on the preferred inland (N7) route</th></tr>
<tr><td> 
Pic 1 - Saldanha Port (port for arrival of large equipment)</td><td> 
Pic 2 - 5.60 m height restriction bridge on roadway leading from Saldanha Port</td></tr>
<tr><td> 
Pic 3 – West East orientated road intersection with R27 near old Weighbridge (note new interchange in construction to connect west-east orientated link road to the R45)</td><td> 
Pic 4 – Access route from N7 intersection with R399 to Velddrif (extra long right-turn vehicles requires temporary intersection upgrade, or temporary intersection closure to accommodate right-turn movement to R399 via the left-turn lane)</td></tr>
</table>

Google Earth image – R27 approach to R399 at Velddrif (Right-turn towards N7 restricted by intersection geometry and street furniture)

Google earth image – Sharp curve on R399 near T-intersection to Moreesburg/Piketberg

Google Earth image – Traffic roundabout on N7 at R366 / R44 intersection at Piketberg

Google Earth image – Tight curve on Piekienierskloof Mountain Pass on N7

Pic 5 - Tight right-turn at N7 off-ramp intersection with R355 (near Springbok)

Pic 6a – Tight left-turn at R355 intersection with N14 (Viewed from R355).

Pic 6b – Tight left-turn at R355 intersection with the N14 (viewed from N14)

Google earth image - Tight right-turn at N14 intersection with Voortrekker Road (N14) near Springbok

Pic 7 – N7 through Pofadder

Pic 8 - Westernmost end of site (viewing north)

Pic 9 - Westernmost end of site (viewing south)

Pic 10 - Westernmost end of site (viewing west towards Pofadder)

Pic 11 - Westernmost end of site (viewing east towards Keimos)

Pic 12 - Easternmost end of site (viewing south)

Pic 13 - Easternmost end of site (viewing north)

Pic 14 - Easternmost end of site (viewing west towards Pofadder)

Pic 15 - Easternmost end of site (viewing east towards Keimoes)

Pic 16 - MR759 T-intersection with N14

Pic 17 - Viewing west from M759 along N14

Pic 18 - MR759 viewed from its intersection with the N14

» **Increased traffic flow** on route to site, with abnormal load vehicles and super-load vehicles, resulting in slow speeds and impedance to other traffic on National and Regional routes.

This can be mitigated with a Transportation Plan that should incorporate a transport logistics strategy including preferable times for abnormal and super-load vehicles to travel on critical sections of the road network, when background traffic is lower.

» **Potential for crashes at intersections.**
The proposed WEF sites accesses to the N14 are located opposite one another, approximately 9.5 km southwest of the N14/MR759 (Onseepkans Road) intersection (see **Figure 2**). The N14 has a 120 km/h posted speed limit and experiences high travelled speeds.

An additional access to the northwestern site is proposed from MR759, which is a hard surfaced road with a speed limit of 100 km/h (presumed 100 km/h, missing speed restriction signage).

MR759 intersection with the N14 operates under priority (stop) control.

A Traffic Management Plan is required to ensure safe access to and from the site, particularly for abnormal load vehicles. The site access design must be designed in according to engineering standards, with adequate sight distance and turning space for vehicles to the site. The Traffic Management Plan must include the N14/MR759 intersection.

A Traffic Management Plan is required to ensure safe access to and from the site, particularly for abnormal load vehicles. The site access design must be designed in according to engineering standards, with adequate sight distance and turning space for vehicles to the site.

» **Inadequate road network on-site**: The WEF site will require an extensive road network to enable vehicles to reach the laydown areas, substation sites and locations for the wind turbines and pylons.

This can be mitigated by a Traffic Management Plan with roads on-site designed according to vehicle requirements. To save costs, the on-site roads providing access to the Wind Turbine locations could be narrow (6m and wider where required). This poses potential conflict for two-way traffic movement by large vehicles. It is possible that a one-way route could be considered to overcome this potential issue.

» **Crash risk in work-zones**: There is increased potential for workers being injured by vehicles on-site where the WEF and the grid build construction activities overlap.

This can be mitigated by proper planning to limit overlapping of WEF and grid work zone construction activities.

6.5.2 Operations Period

The WEF is expected to be operational for 20 years with the possibility of extending operations for a further 20 years. The WEF will be operational all hours, except during maintenance, breakdowns or interruption of the connection to the Eskom grid.

Regular maintenance will be minimal with very few vehicles.

A small staff component (30 persons) is anticipated during the 20 year operation phase of the project, with technicians/maintenance and security personnel on site as required. This would generate very low vehicle trips to site, as shown in the Table below:

Expected Staff daily traffic volumes for Pulputs WEF Operations			
Staff	**# Staff**	**Vehicle Type**	**# Vehicles**
Maintenance, Security	5	Private	3
Maintenance, Security	25	Quantum Taxi	2
TOTALS	**30**		**5**

» **Route Constraints.** Maintenance vehicles travelling to site, could possibly include super-load or abnormal load vehicles, resulting in slow speeds, impedance to other traffic on local, national, regional and minor roads.

This can be mitigated in a Transportation Plan that should indicate preferable times for abnormal load and super-load vehicles to travel on the road network when background traffic is lower and would include procedures for safe transportation to site.

In general, operations (including maintenance) will generate very low traffic volumes and should have a negligible impact.

» **Intersection Safety.** The additional traffic to the site increases the risk of crashes at the site accesses to the N14, the north western site access to MR759 and at the N14/MR759 intersection.

A Traffic Management Plan is required to ensure safe access to and from the site, particularly for abnormal load vehicles. The site access design must be designed in according to engineering standards, with adequate sight distance and turning space for vehicles to the site.

6.5.3 Decommissioning Period

Trip generation at the decommissioning stage, expected to last between 6 and 12 months, is likely to be outside commuter peak hours.

Decommissioning will entail less traffic than the construction phase, and components would be transported to the local dump if not recyclable, or sold to local scrap merchants or other buyers if the items have salvage value.

Decommissioning should be in accordance with the agreement reached with the affected land owner.

Daily trips for the decommissioning period is expected to be low and will typically comprise dump trucks or low-bed vehicles, with equipment and components dismantled and / or cut to size on site.

» **Intersection Safety.** The additional traffic to the site increases the risk of crashes at the site accesses to the N14, the north western site access to MR759 and at the N14/MR759 intersection. Motorists could be surprised by construction / heavy vehicles at the access that will be used over an extended period of time.

A Traffic Management Plan is required to ensure safe access to and from the site, particularly for abnormal load vehicles.

The vehicles associated with the decommissioning stage would typically be tipper trucks or low bed vehicles and should not require a reduction in the speed limit at the site access and at the N14/Paulputs Site Accesses.

6.6 Impact Assessment

The Impact Assessment ratings for the proposed WEF are shown in the Tables below.

6.6.1 WEF Impacts

The following impacts are identified for the WEF project lifecycle.

» **Construction:**
  * Storage of Cargo
  * Route Constraints
  * Traffic Congestion
  * Intersection Safety
» **Operations**
  * Route Constraints
  * Intersection Safety
» **Decommissioning:**
  » Intersection Safety
» **Cumulative:**
  * Route Constraints

6.6.1.1 Construction

WEF Impact Table – Construction – Storage of Cargo

Impact Phase: Construction							
Potential impact description: Cargo (machinery, equipment, etc.) off-loaded at Saldanha Port will need to be transported to a holding area (storage facility) close to Saldanha Port, before being transported to site.							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Low	Low	Negative	Medium	Medium	Medium
With Mitigation	High	Low	Low	Negative	Low	Low	Medium
Can the impact be reversed?			Yes				
Will the impact cause irreplaceable loss of resources?			No				
Can the impact be avoided, managed or mitigated?			Yes, impacts can be managed and mitigated				
Mitigation measures to reduce risk or enhance opportunities: This should form part of the Transportation Plan: • Provide a holding facility for cargo, close to Saldanha Port, to prevent unnecessary travel on the road network and to limit associated traffic loading on roads in close proximity to Saldanha Port.							

Rationale for scoring as shown in the table above.

Extent: Low due to vehicle travel on roads in close proximity to Saldanha Port.

Duration: Low due to build period less than 5 years.

Intensity: High due to risk of fatal or serious injury crashes if transport is not scheduled and if transport of cargo from Port to the Holding Area is not managed properly.

WEF Impact Table – Construction – Route Constraints

Impact Phase: Construction							
Potential impact description: Constraints for super-load vehicles en-route to site could result in unacceptable traffic impact (compromised road safety and increased traffic congestion). Super-load (extra-long, low or tall vehicles exceeding abnormal load vehicle dimensional and mass limitations as defined in TRH11) will experience constraints along the chosen route, i.e. inadequate space to accommodate vehicle turning movements at R27 interchange under construction, spatial constraints at various intersections due to intersection geometry and street furniture (i.e. R27 / R399 intersection, R399 / N7 intersection, N7 traffic roundabout at Piketberg, N7/R355 and R355/N14 and N14 Voortrekker Road (N14) intersections), tight horizontal curves on R399 and on N7 in Piekenierskloof Pass might be inadequate for very long vehicles (transporting turbine blades and other) resulting in abnormally long vehicles centre-line tracking (encroaching into the opposing lane), no suitable roads exist on-site to access Wind Turbine locations.							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	High	Low	Negative	High	High	High
With Mitigation	Low	High	Low	Negative	Low	Medium	High
Can the impact be reversed?			Yes				
Will the impact cause irreplaceable loss of resources?			No				
Can the impact be avoided, managed or mitigated?			Yes, impacts can be managed and mitigated				
Mitigation measures to reduce risk or enhance opportunities: • Implement an approved Transportation Plan to ensure safe transport of materials and equipment to site.							

Rationale for scoring as shown in the table above.

Extent: High due to vehicle travel on selected National and Regional Routes in the Western Cape and Northern Cape Provinces.

Duration: Low due to build period less than 5 years.

Intensity: High due to risk of fatal crashes. Low due to risk of minor damage crashes.

WEF – Impact Table – Construction – Traffic Congestion

Impact Phase: Construction							
Potential impact description: Traffic congestion, impedance to traffic flow due to increase in traffic volumes en-route to site.							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	Medium	High	Low	Negative	Medium	Medium	Medium
With Mitigation	Medium	High	Low	Negative	Low	Low	Medium
Can the impact be reversed?			Yes				
Will the impact cause irreplaceable loss of resources?			No				
Can the impact be avoided, managed or mitigated?			Yes, manage and mitigate traffic				
Mitigation measures to reduce risk or enhance opportunities: • Implement approved Traffic Management Plan and approved Transportation Plan to ensure safe transport of materials, equipment, etc. to site and to limit traffic congestion.							

Rationale for scoring as shown in the table above.

Extent: High due to vehicle travel on National and Regional Routes in the Western Cape and Northern Cape Provinces.

Duration: Low due to build period less than 5 years.

Intensity: Medium due to small increase in risk of crashes (damage, serious injury and fatal) due to increased traffic volumes.

WEF Impact Table – Construction – Intersection Safety

Impact Phase: Construction							
Potential impact description: The additional traffic to the site increases the risk of crashes at the site accesses to the N14, the north western site access to MR759 and at the N14/MR759 intersection.							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Low	Low	Negative	High	Medium	Medium
With Mitigation	High	Low	Low	Negative	Medium	Medium	Medium
Can the impact be reversed?			Yes				
Will the impact cause irreplaceable loss of resources?			No				
Can the impact be avoided, managed or mitigated?			Yes, impacts can be managed and mitigated				
Mitigation measures to reduce risk or enhance opportunities: • Implement approved Traffic Management Plan to ensure safe access to site from the N14.							

Rationale for scoring as shown in the table above.

Extent: Low due to single location for site accesses to the N14.

Duration: Low due to build period less than 5 years.

Intensity: High due to risk of fatal and / or serious injury crashes.

6.6.1.2 Operations

WEF Impact Table – Operations – Route Constraints

Impact Phase: Operations							
Potential impact description: Constraints for abnormal load vehicles carrying certain replacement parts (i.e. new wind turbine blade) could result in unacceptable traffic impact (road safety and traffic congestion).							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	High	High	Negative	Medium	High	Medium
With Mitigation	Low	High	High	Negative	Medium	Medium	Medium
Can the impact be reversed?			Yes				
Will the impact cause irreplaceable loss of resources?			No				
Can the impact be avoided, managed or mitigated?			Yes, impacts can be managed and mitigated				
Mitigation measures to reduce risk or enhance opportunities: • Implement approved Transportation Plan to ensure safe transportation of materials and equipment to site.							

Rationale for scoring as shown in the table above.

Extent: High due to vehicle travel on National and Regional Routes in the Western Cape and Northern Cape Provinces.

Duration: High due to operations period more than 10 years.

Intensity: High due to risk of fatal crashes. Low due to risk of minor damage crashes.

WEF Impact Table - Operations – Intersection Safety

Impact Phase: Operations							
Potential impact description: Additional traffic to the site increases the risk of vehicle crashes at the WEF sites accesses to the N14.							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Low	High	Negative	Medium	High	Medium
With Mitigation	High	Low	High	Negative	Low	Medium	Medium
Can the impact be reversed?			Yes				
Will the impact cause irreplaceable loss of resources?			No				
Can the impact be avoided, managed or mitigated?			Yes, impacts can be managed and mitigated				
Mitigation measures to reduce risk or enhance opportunities: • Implement approved Traffic Management Plan to ensure safe access to sites from the N14.							

Rationale for scoring as shown in the table above.

Extent: Low due to single location for site accesses to the N14.

Duration: High due to operations lasting over 10 years.

Intensity: High due to risk of fatal and / or serious injury crashes.

6.6.1.3 **Decommissioning**

WEF Impact Table - Decommissioning – Intersection Safety

Impact Phase: Construction							
Potential impact description: Additional traffic to the site increases the risk of vehicle crashes at the WEF sites accesses to the N14.							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Low	Low	Negative	High	Medium	Medium
With Mitigation	High	Low	Low	Negative	Medium	Medium	Medium
Can the impact be reversed?			Yes				
Will the impact cause irreplaceable loss of resources?			No				
Can the impact be avoided, managed or mitigated?			Yes, impacts can be managed and mitigated				
Mitigation measures to reduce risk or enhance opportunities: • Implement approved Traffic Management Plan to ensure safe access to site from the N14.							

Rationale for scoring as shown in the table above.

Extent: Low due to single location for site accesses to the N14.

Duration: Low due to decommissioning period less than 5 years.

Intensity: High due to risk of fatal and / or serious injury crashes.

6.6.1.4 WEF Cumulative Impacts

In the absence of definite information regarding other similar development initiatives in the area, it is assumed that the potential similar projects in the area, within 35 km radius of the Paulputs WEF, would be of similar magnitude as ascertained for other similar studies. Consequently, additional possible wind energy sites total some 300MW and solar Photo Voltaic (PV) sites some 2325 MW are considered in this report.

It is likely that some of the already approved projects will be completed before the Paulputs WEF development is approved and constructed.

However, as a worst case scenario, it is assumed that all these developments could coincide with the Paulputs WEF and that vehicle trips to site will follow the same inland (N7) route as proposed for the Paulputs WEF.

The estimated trip generation for the Paulputs WEF and other assumed renewable energy developments within 35 km of the subject site are shown in the Table below.

Vehicle Trips to Sites per day - Cumulative						
Trip Destinations	Technology	MW	WEF/Solar		GRID	
			Construction related Trips per day to site	Staff Peak Hr Trips	Construction related Trips per day to site	Staff Peak Hr Trips
Paulputs Site	Wind Energy	300	58	18	0.22	4
Other Similar Developments within 35 km from Paulputs Site	Solar PV	2325	89	126	1.7	31
Cumulative	**Total**	**2625**	**147**	**144**	**2**	**35**

Note: *Wind energy turbines differ resulting in variance in trip generation.*

Assuming that all developments are built simultaneously, to similar project programmes, the cumulative sites could generate on average 144 construction vehicle trips to the various sites per day.

This includes approximately 89 super-link (ISO trucks) trips to site per day (from Saldanha Port) for approximately 18 months for approved solar PV developments in the area.

Included in the above are 11 super-load vehicle trips from Saldanha Port to site, along the inland (N7) route, over a period of some 75 days for the Paulputs WEF. Approximately 30 abnormal load trips are anticipated over the construction period, transporting transformers to the various solar PV sites.

Staff peak hour trips to the various sites increase from 18 to 144 trips, emanating from nearby towns such as Pofadder and Keimoes. This translates to some 90 private vehicle trips, 22 mini-bus taxi trips and 11 bus trips to the various sites each day.

The cumulative development impact assessment is shown in the Tables below.

WEF Impact Table – Cumulative – Route Constraints

Impact Phase: Construction							
Potential impact description: Cumulative development impact with increased impact due to constraints for abnormal load and super-load vehicles en-route to site that could result in unacceptable traffic impact (compromised road safety and increased traffic congestion). Super-load (extra-long, low or tall vehicles exceeding abnormal load vehicle dimensional and mass limitations as defined in TRH11) will experience constraints along the chosen route, i.e. inadequate space to accommodate vehicle turning movements at R27 interchange under construction, spatial constraints at various intersections due to intersection geometry and street furniture (i.e. R27 / R399 intersection, R399 / N7 intersection, N7 traffic roundabout at Piketberg, N7/R355 and R355/N14 and N14 Voortrekker Road (N14) intersections), tight horizontal curves on R399 and on N7 in Piekenierskloof Pass might be inadequate for very long vehicles (transporting turbine blades and other) resulting in abnormal long vehicles centre-line tracking (encroaching into the opposing lane), no suitable roads exist on-site to access Wind Turbine locations.							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	High	Low	Negative	High	High	High
With Mitigation	Low	High	Low	Negative	Low	Low	High
Can the impact be reversed?			Yes				
Will the impact cause irreplaceable loss of resources?			No				
Can the impact be avoided, managed or mitigated?			Yes, impacts can be managed and mitigated				
Mitigation measures to reduce risk or enhance opportunities: Implement approved Transportation Plan to ensure safe transport of materials and equipment to site.							

Rationale for scoring as shown in the table above.

Extent: High due to vehicle travel on National and Regional Routes/Main Roads in the Western Cape and Northern Cape Provinces.

Duration: Low due to build period less than 5 years.

Intensity: High due to risk of fatal crashes. Low due to risk of minor damage crashes.

6.6.2 Grid Impacts

The following impacts are identified for the grid project lifecycle:

- **Construction:**
  - Safety on Site
  - N14 Safety
  - Intersection Safety
- **Operations:**
  - Negligible Impacts
- **Decommissioning:**
  - Intersection Safety
- **Cumulative:**
  - Negligible Impacts

The impact assessment ratings for the proposed grid are shown in the Tables below.

6.6.2.1 Construction

Grid Impact Table – Construction – Safety on Site

Impact Phase: Construction							
Potential impact description: Vehicle Conflict on-project site. Whether laying cables underground or installing pylons and overhead lines, where the grid construction activities overlap with the WEF construction activities/work zones on-site, there is risk of vehicle crashes with workers in the work zone.							
GRID OPTION 1							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Low	Low	Negative	Medium	Medium	Medium
With Mitigation	High	Low	Low	Negative	Low	Low	Medium
Can the impact be reversed?			Yes				
Will the impact cause irreplaceable loss of resources?			No				
Can the impact be avoided, managed or mitigated?			Managed				
Mitigation measures to reduce risk or enhance opportunities: • Implement approved Traffic Management Plan.							

Rationale for scoring as shown in the table above.

Extent: Low due to grid and WEF work zone conflicts being restricted to WEF site.

Duration: Low due to build period less than 5 years.

Intensity: High due to possible serious damage or fatal injury with risk of vehicles crashing into people in the work zone where work streams overlap.

Grid Impact Table – Construction – N14 Safety

Impact Phase: Construction							
Potential impact description: Grid build on WEF site south of the N14 will entail the grid crossing the N14 with potential risk of vehicle crashes during installation. Where installing pylons and overhead lines, there is risk of vehicles crashing into equipment or people in the work zone where the grid construction activities extend into the N14 road reserve.							
GRID OPTION 1							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Low	Low	Negative	Medium	Medium	Medium
With Mitigation	High	Low	Low	Negative	Low	Low	Medium
Can the impact be reversed?			Yes				
Will the impact cause irreplaceable loss of resources?			No				
Can the impact be avoided, managed or mitigated?			Managed				
Mitigation measures to reduce risk or enhance opportunities: • Obtain wayleaves and adhere to safety requirements when working in the N14 road reserve, (i.e. temporarily close road to traffic, ideally when traffic flow is low (i.e. weekend, off-peak) with approval of road authorities and with assistance of traffic law enforcement)							

Rationale for scoring as shown in the table above.

Extent: Low due to grid crossing and vehicle travel at single location on N14 (i.e. crossing from WEF site south of the N14.

Duration: Low due to grid crossing road taking a few hours.

Intensity: High due to possible serious damage or fatal injury with risk of vehicles crashing into people or equipment in the work zone if not properly managed.

Grid Impact Table – Construction – Intersection Safety

Impact Phase: Construction							
Potential impact description: The additional traffic to the site increases the risk of crashes at the site accesses to the N14, the north western site access to MR759 and at the N14/MR759 intersection.							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Low	Low	Negative	Medium	Medium	Medium
With Mitigation	High	Low	Low	Negative	Low	Low	Medium
Can the impact be reversed?			Yes				
Will the impact cause irreplaceable loss of resources?			No				
Can the impact be avoided, managed or mitigated?			Yes, impacts can be managed and mitigated				
Mitigation measures to reduce risk or enhance opportunities: • Implement approved Traffic Management Plan to ensure safe access to site from the N14.							

Rationale for scoring as shown in the table above.

Extent: Low due to single location for site accesses to the N14.

Duration: Low due to build period less than 5 years.

Intensity: High due to risk of fatal and serious injury crashes.

6.6.2.2 **Operations**

Grid Impact Table – Operations – Negligible Impacts

Impact Phase: Operations							
Potential impact description: Very low vehicle trip generation with Negligible Impacts							
GRID OPTION 1							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Low	Low	Negative	Low	Low	Medium
With Mitigation	NA	NA	NA	Negative	NA	NA	NA
Can the impact be reversed?			Yes				
Will the impact cause irreplaceable loss of resources?			No				
Can the impact be avoided, managed or mitigated?			No Impacts				
Mitigation measures to reduce risk or enhance opportunities: There are no impacts requiring mitigation.							

Rationale for scoring as shown in the table above.

Extent: Low due to local area of impact.

Duration: Low due to build period less than 5 years.

Intensity: High due to risk of injury or fatal crashes.

6.6.2.3 **Decommissioning**

Grid Impact Table - Decommissioning – Intersection Safety

Impact Phase: Construction							
Potential impact description: Additional traffic to the site increases the risk of vehicle crashes at the WEF sites accesses to the N14.							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Low	Low	Negative	Medium	Medium	Medium
With Mitigation	High	Low	Low	Negative	Low	Low	Medium
Can the impact be reversed?			Yes				
Will the impact cause irreplaceable loss of resources?			No				
Can the impact be avoided, managed or mitigated?			Yes, impacts can be managed and mitigated				
Mitigation measures to reduce risk or enhance opportunities: • Implement approved Traffic Management Plan to ensure safe access to site from the N14.							

Rationale for scoring as shown in the table above.

Extent: Low due to single location for site accesses to the N14.

Duration: Low due to decommissioning period less than 5 years.

Intensity: High due to risk of fatal and / or serious injury crashes.

6.6.2.4 Grid Cumulative Impacts

In the absence of definite information regarding other similar development initiatives in the area, it is assumed that other potential renewable energy projects in the area, within 35 km radius of the Paulputs WEF, could be similar to cumulative developments in a recent Traffic Assessment that shows fairly substantial new projects. Consequently, additional possible wind energy sites total some 300 MW and solar Photo Voltaic (PV) sites totalling some 2325 MW are considered in this report.

It is likely that some of the already approved projects will be completed before the Paulputs WEF development is approved and constructed.

However, as a worst case scenario, it is assumed that all these developments could coincide with the Paulputs WEF and that vehicle trips to site will follow the same inland (N7) route as proposed for the Paulputs WEF.

The estimated trip generation for the Paulputs WEF and other assumed renewable energy developments within 35 km of the subject site are shown in the Table below.

Vehicle Trips to Sites per day - Cumulative						
Trip Destinations	Technology	MW	WEF/Solar		GRID	
			Construction related Trips per day to site	Staff Peak Hr Trips	Construction related Trips per day to site	Staff Peak Hr Trips
Paulputs Site	Wind Energy	300	58	18	0.22	4
Other Similar Developments within 35 km from Paulputs Site	Solar PV	2325	89	126	1.7	31
Cumulative	**Total**	**2625**	**147**	**144**	**2**	**35**

Assuming that all projects grids are built simultaneously, to similar project programmes, the grid construction related vehicle trips to various sites in the Paulputs area will on average increase from some 0.2 to 2.0 vehicle trips per day (see Table above).

The cumulative grid staff related vehicle trips, to and from the various sites from nearby towns such as Pofadder, Kakamas and Keimoes, would increase from 4 to 35 peak hour trips.

The trip generation for the grid is negligible.

The cumulative development impact assessment is shown in the Tables below.

Grid Impact Table – Cumulative – Negligible Impacts

Impact Phase: Construction							
Potential impact description: Very low vehicle trip generation with negligible impacts.							
GRID OPTION 1							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Low	Low	Negative	Low	Low	Medium
With Mitigation	NA	NA	NA	Negative	NA	NA	NA
Can the impact be reversed?			Yes				
Will the impact cause irreplaceable loss of resources?			No				
Can the impact be avoided, managed or mitigated?			No				
Mitigation measures to reduce risk or enhance opportunities: Cumulative Impacts are negligible. No mitigation measures are required.							

Rationale for scoring as shown in the table above.

Extent: Low due to grids being within 35 km of site with negligible traffic generation.

Duration: Low due to build period less than 5 years.

Intensity: High due to risk of fatal and / or serious injury crashes.

7. TRAFFIC MANAGEMENT PLAN

Note that the Transportation Plan will be compiled after preferred bidder status is awarded.

The objective of the Traffic Management Plan is the prevention of incidents (crashes and traffic congestion) during the construction phase, operations and maintenance phase and decommissioning phase of the proposed WEF. Traffic volumes will increase during the construction phase. Operations, maintenance and decommissioning phase traffic is expected to be insignificant, except where a major WEF component (i.e. replace damaged turbine blade) could be required.

The **Traffic Management Plan** should include the following:

TRANSPORT OF EQUIPMENT AND MATERIALS

- A comprehensive assessment of the entire route is recommended on award of the project. (The recommended access route is from Saldanha Port towards the N7 near Clanwilliam, and then along the N7 to Springbok where the route follows the N14 through Pofadder to the site)
- Prohibit WEF equipment and materials transportation at night, during the school December holiday period, on public holidays, during festivals or other special events
- Avoid Abnormal Load vehicle transportation in the towns of Saldanha and Springbok during peak traffic hours, as far as possible

SITE ACCESS

- It is proposed to take direct access from the N14 via existing farm accesses. The access design must be submitted to SANRAL for approval
- The construction access points must be stop controlled and widened to allow for exclusive right-turn and left-turn lanes off the N14, which must accommodate the abnormal vehicle turning circles
- Clear and visible signage must be placed on the N14 and around site, clearly demarcating site entry and exit points
- Flagmen, speed reduction and stop control on the N14 will be required to accommodate (super-load) abnormal load vehicles entering and leaving the site (in addition to vehicle escort of super-load vehicles)
- Ensure that access is controlled and that access control staff are trained to avoid tailbacks / delay for vehicles entering the site

STAFF AND WORKER TRANSPORT

- Limit use of private cars by arranging bus transport service for workers
- Provision must be made on-site on either side of the N14, for public transport/bus parking
- Where necessary public transport vehicles should allow boarding and alighting, on-site, on both sides of the N14, to prevent staff/workers crossing the N14 to access public transport

- Provide staff private vehicle parking on-site, on both sides of the N14
- By design, limit pedestrian/vehicle conflict on-site (i.e. vehicle travelled path and pedestrian walkways)

ABNORMAL LOAD CLEARANCE/PERMITS

- Clearances will be required for the transport of the Wind Turbine components
- Applications for Abnormal Load Permits must be submitted to the Department of Transport and Public Works, Eskom and Telkom for approval
- A WEF Site-specific Traffic Management Plan must be developed and implemented during the detailed design phase prior to construction

VEHICLE AND DRIVER STANDARDS

- Monitor for overloading of vehicles
- All vehicles must be roadworthy and serviced regularly
- Use only well trained, suitably qualified and experienced drivers in possession of an appropriate and valid driver's license
- Require all drivers to abide by standard road and safety procedures on-site
- Require all drivers to adhere to the speed limits and rules of the road when travelling on public roads

SITE MANAGEMENT

- Avoid overlapping active work zones (i.e. WEF and grid construction)
- Limit dust generation by applying dust suppressants and postponing dust generating activities during period of strong winds and enforcing a strict speed limit of 40 km/h on unpaved roads on site. Monitoring actions to be conducted by the Environmental Control Officer (ECO)
- Maintain incidents / complaints register for community complaints
- Monitor dust generation and implementation of management actions detailed above

8. TRANSPORTATION PLAN

Note that the Transportation Plan will be compiled after preferred bidder status is awarded.

The National Road Traffic Act (NRTA) 93 of 1996 and associated regulations prescribe the permissible vehicle dimensions and masses of vehicles travelling on public roads. Where vehicles will exceed these requirements and where the load cannot be dismantled without significant cost / effort, it must be classified as an abnormal load and an exemption must be obtained in terms of section 81 of the NRTA.

Due to the nature and scale of the proposed development, a Transportation Plan is required to effectively manage the transport of the various Wind Turbine Components (abnormal load) on the public road network.

The Transportation Plan aims to ensure the safe transportation of all components required for the construction of the proposed WEF from point of origin to the construction site. This includes the turbines, substation transformers, electrical cables and pylon structures.

WEF COMPONENTS

The heaviest component of a wind turbine is the nacelle (approximately 85 tons – depending on manufacturer and design of the unit). Combined with road-based transport, it has a total vehicle mass of approximately 130 ton (for the 85 ton unit). Thus route clearances and permits will be required for transporting the nacelle by road based transport.

The 90 m long blades are the longest component and need to be transported on a specially imported extendible blade transport trailer or in a rigid container with rear steerable dollies. The blades can be transported individually or in pairs, depending on manufacturers transport requirements.

The various Wind Turbine components are considered to be abnormal loads, either by length, weight or height, usually comprising of 3 tower sections, 1 hub, 1 nacelle and 3 blades. These require different truck / trailer combinations and configurations to be transported.

ABNORMAL LOAD CLASSIFICATION AND PERMIT

During the WEF construction phase, the project will require the use of abnormal load vehicles as is stipulated in the TRH 11, for the transportation of turbine components to site. Consequently, an exemption permit for each province that the load has to transit is required. Post-construction, standard transport will be used, except where a significant component might need to be replaced (i.e. damaged blade).

Provision for transport of abnormal loads, such as are required for the WEF, is contained in the National Road Transport Act (NRTA), and specifically in Section 81 of the NRTA, which reads as follows:

"Vehicle and load may be exempted from provisions of Act.

An MEC may, subject to such conditions an upon payment of such fees or charges as he or she may determine, authorise in writing, either generally or specifically, the operation on a public road of a vehicle which does not comply with the provisions of this Act or the conveyance on a public road of passengers or any load otherwise that in accordance with the provisions of this Act."

When the movement of an abnormal load is considered to be in the economic and/or social interest of the country, an exemption permit may be issued to allow a vehicle(s) transporting such an abnormal load to operate on a public road for a limited period. The basic principles guiding this process are:

- An exemption permit for an abnormal load will only be considered for an indivisible load, abnormal in dimension and/or mass, where there is no possibility of transporting the load in a legal manner

- The damage to the road infrastructure by an abnormal vehicle has to be recovered from the carrier
- The risks to other users must be reduced to a level equivalent to what it would be without the presence of the abnormal vehicle on the road
- The conditions imposed must take the economic and/or social interest of the country and public at large into account

The WEF is anticipated to carry loads that are considered to be indivisible and are abnormal either dimensionally or in mass (or in both dimension and mass).

The WEF components are classified as an Abnormal Load and requires application to the Department of Transport and Public Works for a permit authorising the transport of the load.

ABNORMAL LOAD TRANSPORT

The following escort vehicles (whether it is the clients own escort vehicles or provincial traffic officer) will be necessary to escort the transportation of abnormal loads.

- For loads with a height of 4.70m measured from the ground requires 1 x Own Escort vehicle
- For loads of 5.50m + high Telkom Clearances are required for the lifting of overhead lines
- For loads of 5.80m + high Eskom Clearances are required for the lifting of overhead lines
- The "super-load" abnormal load vehicles transporting wind turbine components will require either 2 x Provincial Traffic Escorts or 1 x Provincial Traffic Officer Escort and 1 x Own Escort

While the N7 and N14 (proposed "N7" access route is generally of high standard and many of the structures have been assessed for load bearing capacity and height clearance in the past, the proposed WEF design (90 m blades) is particularly large and the route clearances will need due assessment. Where required, existing public roads may need to be upgraded and street furniture possible will need to be temporarily moved along the proposed equipment transport route to allow for the transportation and delivery of wind turbine components and other associated infrastructure components.

The turbine supplier/s or the contractor selected for implementation would be responsible for the transportation of wind turbine components to site.

A comprehensive Transportation Plan must be undertaken prior to construction.

The **Transportation Plan** should include the following:

- Detailed assessment of the preferred "N7" route for transportation of WEF components from Saldanha Port to Site, and identification of alternative routes where necessary
- Identification of all load clearance issues and determine measures to address such (i.e. determine area for hardstands, temporary relocation of street furniture, impact on

trees in vehicle turning circle, temporary closure of kerbside parking, temporary removal of median islands, etc.)

- Determine an effective transport strategy to minimise transportation impact on the road network (i.e. hold super-load / abnormal load vehicles transporting wind turbine blades ahead of a mountain pass, close the mountain pass for a limited period of time to allow abnormal load vehicles to travel in convoy through the mountain pass)
- Submit application for all relevant permits for abnormal loads and route clearances to the relevant authorities prior to construction
- Appoint a qualified specialist to conduct a detailed site-specific Transport Risk Assessment during the detailed design phase and prior to construction
- Determine the pre-construction condition of the route immediately prior to WEF construction by carrying out a condition assessment or from recent pavement management system condition assessments, where available from the Provincial Authorities
- Place public notices regarding any planned abnormal load transports at the construction site to inform affected parties
- Ensure adequate escort of abnormal load transportation vehicles (this may exceed the TRH11 requirements of 2 x traffic officers)
- Ensure vehicles carrying abnormal loads display sufficient signage
- Any roads damaged during the transportation of components, or from other construction vehicles must be rehabilitated and returned to pre-construction conditions
- Develop emergency procedures for possible transport incidents en-route to and on-site.
- Do a dry run of the Transportation Plan prior to implementation
- Create a monitoring / reporting system to ensure compliance with the Transportation Plan and to identify possible issues or incidents in order to facilitate improvements to the TMP

It is pointed out that the wind turbine specifications and particular transport requirements as well as the proposed site access on the N14 should be addressed in detail in the respective Transportation Plan and Traffic Management Plan.

9. CONCLUSIONS

It is concluded that:

1. The proposed Paulputs WEF is expected to be built over a period of 24 months (and the grid is also expected to be built over a period of 24 months);
2. The WEF and grid builds would run concurrently;
3. The expected WEF (and grid) builds will not generate significant traffic volumes on the road network;
4. Some vehicles associated with the WEF build are particularly large and these super-load vehicles would be affected by constraints as identified (and possibly other constraints not identified) en-route from Saldanha Port to site;
5. A Traffic Management Plan must be prepared to reduce limit traffic congestion and to enhance road safety, in light of the additional traffic due to the associated WEF; and to ensure safe site access;
6. A Transportation Plan must be prepared to address transport of abnormal super-load and abnormal load vehicles to site;
7. Grid crossing the N14 requires wayleave approval and road closure, assisted by Traffic Law Enforcement to enhance road safety;
8. There is a possibility that the WEF and grid construction work-zone activities could overlap on-site, which increases risk of vehicles crashing into workers. This could be mitigated by proper planning/project management, that should be dealt with in the Traffic Management Plan;
9. The WEF operations could on occasion require abnormal load vehicles (replacement parts) from Saldanha Port, which impact could be mitigated by reference to the Transportation Plan;
10. During the decommissioning phase additional traffic to the site increases the risk of vehicle crashes at the WEF sites accesses to the N14. This should be mitigated in the Traffic Management Plan;
11. The construction of the Paulputs Wind Energy Project and various other solar PV energy projects planned within 35 km from the site could coincide with the Paulputs WEF and grid construction. The cumulative traffic is not significant considering the road network capacity in the vicinity of the site, but abnormal load and particularly super-load transportation from Saldanha Port should preferably be co-ordinated to limit impact (delay of traffic) on the road network where possible.

10. RECOMMENDATIONS

It is recommended that:

1. The traffic and transport related impacts of the proposed Paulputs WEF and grid construction, operations and decommissioning be mitigated as set out in this report.

11. SPECIALIST STATEMENT

Taking the above findings into consideration it can be concluded that the development of the Paulputs WEF and grid and associated infrastructure will not have undue detrimental impact on traffic and that identified impacts can be suitable mitigated.

It is the reasoned opinion of the specialist that the development of the Paulputs WEF (and grid) can be approved, from a traffic and transport engineering perspective, subject to the specific requirements / mitigation measures included within this report.

12. REFERENCES

1. TMH 16 Vol 1 & 2 South African Traffic Impact and Site Traffic Assessment Manual, August 2012, compiled by the Committee of Transport Officials (COTO)
2. South African Trip Generation Rates, Second Edition, Department of Transport – June 1995
3. Institute of Transport Engineers Trip Generation Manual 8th Edition
4. 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
5. Proposed Inyanda Roodeplaat 140 MW Wind Farm: Report No. R1011-TR/01 March 2016 by Africoast
6. An Innovative Approach to Structuring Environmental Impact Assessment Reports Part 2: Ranking the Significance of Environmental Aspects and Impacts By: T. Hacking Anglo American plc (Currently Environmental Manager at Konkola Copper Mines plc, Zambia)
7. Traffic Assessment for Strandfontein WEF Basic Assessment, September 2018, Techso (Pty) Ltd

ANNEXURE A – Curriculum Vitae

S Fautley
Abbreviated Curriculum Vitae

Profession
Traffic & Transportation Engineer

Current Position
Western Cape
Senior Transportation Engineer

Date and Place of Birth:
15 July 1961, Cape Town

Joined Techso:
2008

Nationality
South African

Academic Qualifications
NHD in Civil Engineering, Cape Technikon 1989

Professional Associations
The Engineering Council of South African (ECSA)

Specialisation
Traffic Engineering and Transportation Planning

Languages
Afrikaans, English

Appointments
- 1986– 1992: Principal Industrial and (1986 - 1991) Industrial Technician: Geometric Design: Provincial Administration: Western Cape
- 1993– 1994: Chief Industrial Technician: Mapping and Proclamations: Provincial Government: Western Cape
- 1994 – 1995: Chief Industrial Technician Regional Services: Provincial Government: Western Cape
- 1995 - 1996: Chief Industrial Technician, Urban Transportation: Provincial Government: Western Cape
- 1997 – 1998: Senior Technician, Kantey and Templer
- 1998 - 2006: Principal Technician: Traffic Engineering, City of Cape Town
- 2006 – 2008: Regional Head, Traffic Impact Assessments and Development Control, City of Cape Town
- 2008 - Senior Transportation Engineer, Techso

Contact Details
Phone: +27 (0) 21 5577730
Mobile: +27 (0) 84 300 7722
E-mail: steve@techso.co.za

Key Experience

Stephen is a traffic engineering technologist with 30 years of experience in traffic and transportation engineering. He has completed the Transportation Planning and Study Methodology course and the Highway Capacity course at the University of Stellenbosch. Stephen has been involved with civil, traffic and transportation engineering for ten (10) years at Provincial Government of the Western Cape, 1,5 years with Kantey and Templer Consulting Engineers and 10 yrs at local authority/city level and joined Techso in August 2008.

Traffic & Transportation:
- Transportation Planning
- Traffic Engineering
- Road Safety Audits

Projects:
- Local Traffic Engineering and Transportation Plans, such as Traffic Signal Design, Traffic Calming, Parking, Road Safety Audits, Road Design, Road Signs and Lane Marking for City of Cape Town.
- Developed Structure Parking Ramp Design Guidelines for the City of Cape Town.
- Project Management: Blaauwberg Road and Diep River Bridge Design, Milnerton
- Transport Systems Management Project Design and Implementation (City of Tygerberg & City of Cape Town)
- Technical Input to the City of Cape Town Kerbside Adjudication Bid Evaluation Committee.
- Project Management sub-consultant: City of Cape Town - Integrated Rapid Transport intersection and traffic signal design.
- Traffic Engineer sub-consultant: City of Cape Town - Conceptual design of Eastern Region non-motorised transport project
- Transport Impact Assessments – Commercial and Residential Developments, Schools, Gym, Hospital, Service Stations, Building lines, Sand-mines, Road Closures, Extensive housing development and road improvements
- Transportation Modelling – TIA for Windhoek Prime Ministers Offices
- Rustenburg Municipality – Integrated Rapid Transport System – AFC
- Ekhurleni Municipality – Integrated Rapid Public Transport Network – AFC and APTMS
- Nelson Mandela Bay Municipality – Integrated Public Transport System – AFC and APTMS
- Assessment of Road Safety Risk and Enforcement Measures -Various Municipal Area
- Traffic Management Plans - R21/2 in Gauteng – SANRAL
- Road Safety Audits – City of Cape Town - Integrated Rapid Transit Phase 1B, and R27 Reversible Bus lane, SANRAL- N1 in Polokwane
- Transport Studies – Input to Various Environmental Impact Assessment and Land Use Applications (residential developments, renewable energy plants, power stations, mines, industrial sites)
- **RESIDENTIAL / HOUSING:**
  - TIA – Erf 2900 Lotus River (58 Unit housing development - flats)
  - TIA – Rhodes square student accommodation Erf 31990 in Mowbray (600 units – for UCT students)
  - TIA – Campuskey Student Residence Erf 41665 in Rondebosch (536 units - for UCT students)
  - TIA – The Nest Student Residence and commercial development Erf 31993 in Rondebosch (for 610 units - for UCT students)
  - TIS Erf 309 – 44 Units flats Milnerton
  - TIS Paarl Upgrading Informal Settlement Programme – 654 units
  - TIA – Symphony Way UISP Housing – 3000 units

ANNEXURE B – Specialist Declaration of Interest

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Paulputs Wind Energy Facility near Pofadder, Northern Cape

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

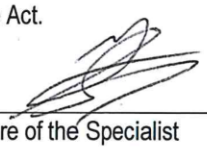
1. SPECIALIST INFORMATION

Specialist Company Name:	Techso (Pty) Ltd			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	2	Percentage Procurement recognition	18
Specialist name:	Stephen Mark Fautley			
Specialist Qualifications:	National Higher Diploma (Civil Engineering)			
Professional affiliation/registration:	ECSA Prof Reg. # 200270171			
Physical address:	Unit 1B4, The Avenues, Village Walk, Parklands, 7441			
Postal address:	Postnet Suite #31, Bloubergrant, , South Africa			
Postal code:	7443	Cell:	0843007722	
Telephone:	0215577730	Fax:	0215571772	
E-mail:	steve@techso.co.za			

2. DECLARATION BY THE SPECIALIST

I, _____ Stephen Mark Fautley _____, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the Specialist

Techso (PTY) Ltd

Name of Company:

2019/07/09

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, _ Stephen Mark Fautley _, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Techso (Pty) Ltd

Name of Company

2019/07/09

Date

Signature of the Commissioner of Oaths

9/7/2019

Date

Pauline Fautley
Commissioner of Oaths (RSA)
Accounting Officer A0651439
Ad: 13 Riverside Drive, Milnerton, 7441
Tel: 021 555 2077

ANNEXURE C – Contents of Specialist Report - Checklist

CONTENTS OF THE SPECIALIST REPORT – CHECKLIST

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	**Section of Report**
(a) details of the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a *curriculum vitae*;	**Section 4 & Annexure A**
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	**Annexure B**
(c) an indication of the scope of, and the purpose for which, the report was prepared;	**Sections 2 & 3**
(cA) an indication of the quality and age of base data used for the specialist report;	**Section 6.2**
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	**Sections 2, 6.2, 6.4 & 6.5**
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	**Section 2 and Section 5**
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	**Section 5**
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	**Section 5**
(g) an identification of any areas to be avoided, including buffers;	**NONE**
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	**Section 2 Fig 1 & Fig 2**
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	**Sections 6.3 & 6.6.1.4**
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment, or activities;	**Sections 6.4 & 6.5**
(k) any mitigation measures for inclusion in the EMPr;	**Sections 6.6**
(l) any conditions for inclusion in the environmental authorisation;	**Section 6.6 and Sections 7 and 8**
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	**NA**
(n) a reasoned opinion— i. as to whether the proposed activity, activities or portions thereof should be authorised; iA. Regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr or Environmental Authorization, and where applicable, the closure plan;	**Section 11**
(o) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	**NA**
(p) any other information requested by the competent authority	**NA**
Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	**NA**