DOCUMENT CONTROL SHEET			
Document Title	**Traffic Assessment for Proposed Construction of the Highlands Wind Energy Facility and associated infrastructure within the Cookhouse REDZ, near the town of Somerset East, Eastern Cape Province**		
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Short Description	This report document is a traffic assessment as input to the Basic Assessment and assesses the traffic impact of the construction, operations and decommissioning of the proposed Highlands WEF.		
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CONTENTS Page

1. Project Description

Highlands WEF Project Description

WKN Windcurrent South Africa (Ltd) Pty ('WKN-WC') are proposing the Highlands Wind Energy Facilities (WEF), and associated infrastructure including grid connection infrastructure (the Proposed Development), located near the town of Somerset East in the Eastern Cape Province. The Proposed Development Site is situated within the Cookhouse REDZ (Figure 1) and the affected land parcels cover an area of approximately 11 180 hectares. The area of interest for development within these land parcels is approximately 9000 hectares.

There are two existing Eskom Transmission lines located within the Proposed Development Site boundary, one a 66 kV and the other a 132 kV. Both have a limited available capacity, and both will be required to connect the Highlands WEF to the national grid. In order to comply with the Department of Energy's Renewable Energy Independent Power Producers Programme (REIPPP), a Project can only submit a bid with one grid connection (in this case either the 66kV or 132kV Transmission lines). Therefore, should the Highlands project be bid in the REIPPP, it will be split into two bid submissions, each requiring its own Environmental Authorisation. Based on uncertainty surrounding the available capacities on each line and the downstream constraints (for example the Eskom main transmission system (MTS) substations), it is unknown at this stage how many turbines can connect to which line. The technical and financial feasibility for the optimum Project split can only be determined on finalising the ongoing analysis of meteorological data – this will ultimately determine whether the larger of the two projects connecting to the 132 kV line will be located to the north or the south of the smaller project connecting to the 66 kV line.

Therefore, for the purpose of obtaining Environmental Authorisation, the project has been split into three phases: North, Central and South. If the projects are successful in obtaining Environmental Authorisation the Highlands Central WEF (Phase 2) will be combined with either Highlands North (Phase 1) or Highlands South (Phase 3), depending on meteorological data, for bidding in the REIPPP.

There are six components to the Proposed Development, representing three development phases:

- Highlands North WEF: Phase 1;
- Electrical Grid Connection and Associated Infrastructure for Highlands North WEF Phase 1;
- Highlands Central WEF: Phase 2;
- Electrical Grid Connection and Associated Infrastructure for Highlands Central WEF Phase 2;
- Highlands South WEF: Phase 3; and
- Electrical Grid Connection and Associated Infrastructure for Highlands South WEF Phase 3.

2. Baseline Conditions

The location of the six components within the Proposed Development Site are presented in Figure 1 below.

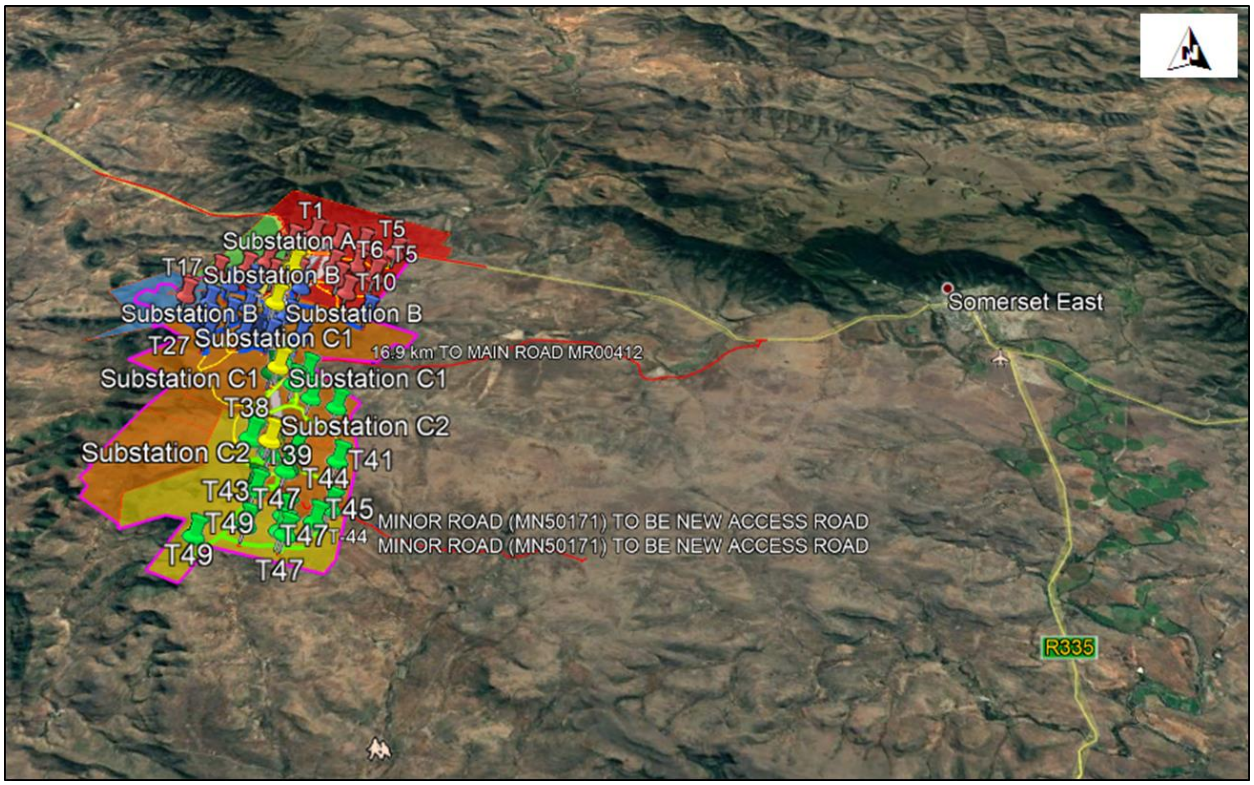


Figure 1: Site Location

The existing sites are farmlands with low trip generation, evidenced by the gravel roads serving the farms and low traffic volumes observed during a site visit in July 2018.

It should be noted that this site boundary includes the total area within which all components of the Proposed Development may be developed. The footprint of the combined six development components will only occupy a small portion (approximately 2%) of the land within this boundary, and fall entirely within the REDZ.

The changes from the **Proposed (Assessed) Layout** (dated 20180525) are noted and are acceptable.

Each WEF development phase will comprise of the following:

Highlands North WEF: Phase 1

The proposed Highlands North WEF will comprise of 17 turbines with a maximum generation capacity of 5 MW per turbine. Internal roads will connect the turbines. On-site cabling will largely follow the road infrastructure where possible, and will be either overhead, or underground. One on-site substation location (Substation A) will form part of this application.

Highlands Central WEF: Phase 2

The proposed Highlands Central WEF will comprise of 14 wind turbines, with each turbine having an installed maximum generation capacity of 5 MW per turbine. Internal roads will connect the turbines. On-site cabling will largely follow the road infrastructure where possible, and will be either overhead, or underground. One on-site substation location (Substation B) will form part of this application. An existing access road may require upgrading as part of this application.

Highlands South WEF: Phase 3

The proposed Highlands South WEF will comprise of 18 wind turbines, with each turbine having an installed maximum generation capacity of 5 MW per turbine. Internal roads will connect the turbines. On-site cabling will largely follow the road infrastructure where possible, and will be either overhead, or underground. Two on-site substation locations (Substation C1 and C2) will form part of this application. An existing access road may require upgrading as part of this application.

It is important to note that while Environmental Authorisation will be sought for four substation locations, only a maximum of two substation locations will be used for the actual construction, to connect the two windfarms to the two Eskom transmission line tie-ins.

For all three phases turbines with a maximum height to blade tip of 200 m will be considered (a hub height of up to 135 m, and a rotor diameter of up to 150 m).
In addition to the Highlands WEF, WKN-WC also proposes obtaining Environmental Authorisation from the Department of Environmental Affairs (DEA) for Eskom Transmission and Eskom Distribution Grid Connection to connect the WEFs to the national grid. If Environmental Authorisation is granted, and the project receives preferred bidder status this will be entirely or partially transferred from the Project(s) to Eskom Holdings SOC Limited (Eskom) as applicable in advance of construction. The grid connection infrastructure will be routed from a start location within the WEF Site Boundary to the existing National Grid, which is also within the WEF site boundary (Figure 2).

Electrical Grid Connection and Associated Infrastructure for Highlands North WEF Phase 1:

The proposed Grid Connection will connect Substation A to the Eskom transmission line. Two route alternatives are proposed. The maximum length will be 5 km with a 31 m wide servitude. A 300 m corridor surrounding the proposed line alternatives is to be assessed (150 m each side). The line will either be a 66 kV line, or a 132 kV line.

Electrical Grid Connection and Associated Infrastructure for Highlands Central WEF Phase 2:

The proposed Grid Connection will be a 132 kV line. It will connect Substation B to the Eskom transmission line. Two route alternatives are proposed. The maximum

length will be 8 km with a 31 m wide servitude. A 300 m corridor surrounding the proposed line alternatives is to be assessed (150 m each side).

Electrical Grid Connection and Associated Infrastructure for Highlands South WEF Phase 3:

The proposed Grid Connection will connect Substation C1 and C2 to the Eskom transmission line. Two route alternatives are proposed. It will be either a 66 kV line, and /or a 132 kV line. The maximum length of the line will be 20 km with a 31 m wide servitude. A 300 m corridor surrounding the proposed line alternatives is to be assessed (150 m each side).

3. Purpose of Report

This report assesses the expected traffic and transport impact during the Construction Phase, Operation Phase and Decommissioning Phase.

4. Traffic Specialist Credentials

This Site Assessment is undertaken by Mr. S Fautley, who is a Professional Engineering Technologist registered with the Engineering Council of South Africa (ECSA) and a member of 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 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 Highlands 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 of 18 to 24 months. For this assessment it is assumed that the build will be completed in 18 months, as a worst case scenario.

A site visit was conducted on 26 July 2018 to gain insight to possible issues and constraints along the route, from point of origin to the 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 development, and understanding of their cumulative impact on the subject WEF.

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 deteriora tion. Nuisance or minor irritation.	Minor improve ment.	Moderate improvemen t.	Substantial improvement.
Quantitative	Measurable deterioration.		Change not measurable i.e. will		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.	Favourable 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

SEVETY = 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

PROBABILI	Definite Continuo	**H**	**MEDIUM**		**HIGH**
	Possibl e	**M**		**MEDIUM**	
	Unlikel y	**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 Significanc e Ranking	Nature of Impact	Decision Guideline
High	Unacceptable impacts.	Likely to be a fatal flaw.
Moderate	Noticeable impact.	These are unavoidable consequence, which will need to be accepted if the project is allowed to
Low	Minor impacts.	These impacts are not likely to affect the project decision.

6. Traffic Assessment

6.1 Route to site

Considering the sites location, Ngqura Port is the preferred port for particularly large equipment and machinery for with the WEF development.

Starting from Ngqura Harbour the route travels north along Neptune Road, east along the R102 (Daniel Pienaar Street).

Some abnormal load vehicles may be able to use the cloverleaf on-ramp to gain access to the N2, but abnormally long vehicles (carrying wind turbine blades) would need to pass through the interchange and turn right at the T-intersection at the end of Daniel Pienaar St and travel south to the end of Daniel Pienaar Street and turn south towards the interchange on the N2 and take the N2 eastbound On-Ramp. The route continues east along the N2 and takes the N10 northbound on-ramp towards Cookhouse. At Cookhouse the route follows the R63 westbound towards and through Somerset East to the site to the west of Somerset East. (See Figure 2a below).

Figure 2a: Route to site

An alternative route that is preferable in that it avoids Cookhouse low Rail over Road bridge, is shown in Figure 2b below.

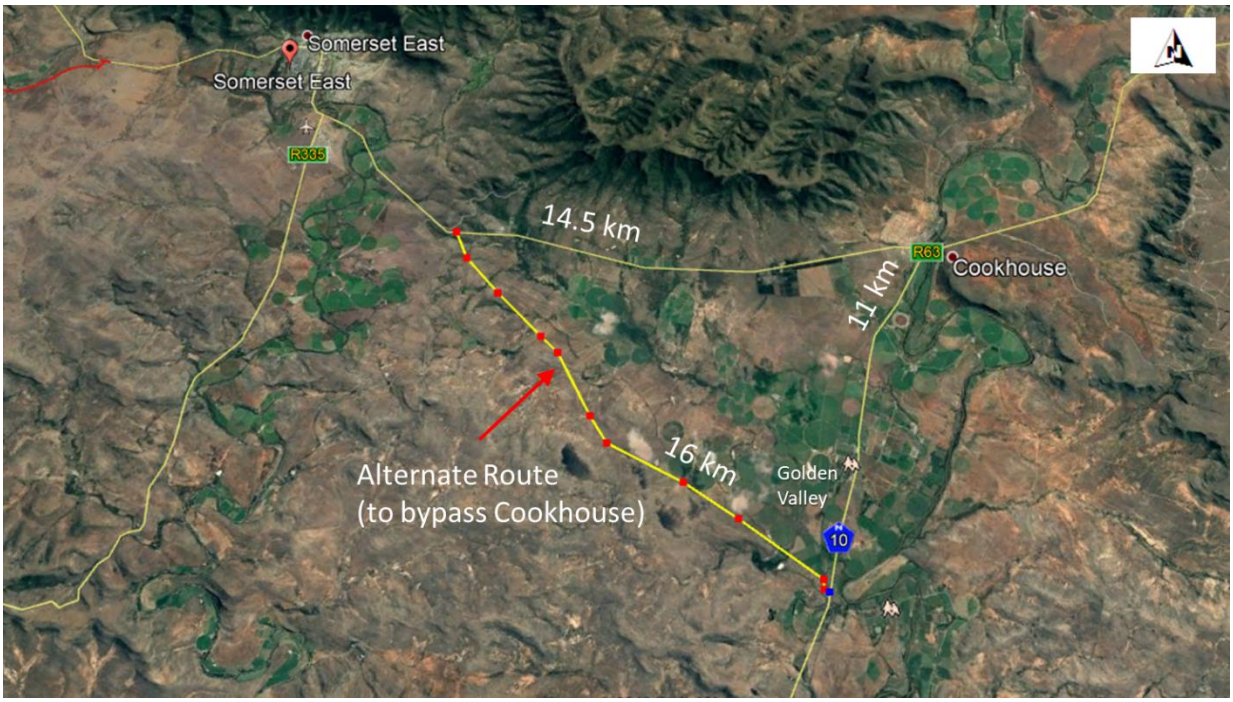


Figure 3b: Alternate route to bypass Cookhouse (low Rail over Road bridge)

6.2 Route Characteristics

Apart from the N2 which is a divided carriageway with two lanes per direction in the vicinity of the N10, the N10 and R63 are two-lane undivided roads. The N10 has a number of passing lanes, but its narrow road reserve and tight horizontal curves through Olifantskop Pass requires special attention for particularly long abnormal load vehicles.

The tarred route from Ngqura Port at Koega to the WEF site west of Somerset East (Figure 2a and Figure 2b) is in a good condition.

During the site visit 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 (solar) energy projects in the area. Traffic counts data on the N2 and N10 are shown in the Table below.

EXTRACT FROM SANRAL TRAFFIC COUNT DATA								
Count Station ID	Year	Road	Section	Location	ADT	Highest Volume per Direction		% Heavy Vehicles
						To Cookhouse	To PE	
12171	2017	N10	Cookhouse to Paterson	South of R400	2135	124	132	34%
12174	2017	N10	Cookhouse to Paterson	North of R400	1127	61	81	28%
Count Station ID	Year	Road	Section	Location	ADT	Highest Volume per Direction		% Heavy Vehicles
						To Grahamstown	To PE	
12073	2017	N2	PE to Grahamstown	South of N10	2104	613	576	21%

The above data shows the N2 and the N10 to be operating well below its capacity of 2400 passenger cars per hour per lane.

The gravel Minor Roads (MN00412 from R63 to the WEF sites and MN50171 leading from MN00412) are lightly trafficked roads (as observed on-site) and are in reasonable condition. Their vertical alignment, local dips and bumps, would need to be flattened to accommodate particularly low abnormal load vehicles.

Judging the condition of the above roads, and SANRAL prioritised projects, it seems unlikely that these roads will be upgraded in the near future.

The gravel roads on the WEF sites are not suited for the WEF and the site will require an extensive new road network to enable access to each wind turbine site.

6.3 Construction Period and Trip Generation

The construction period is expected to last approximately 6 months for each consecutive phase, requiring a total of 18 months for all 3 phases to be completed (WEF including GRID substations and connections). The construction period will generate the most traffic, both on public roads and on-site.

The trip generation and average trips to site, for each Phase, is as follows:

WEF Build:

- Phase 1 – 5687 trips to site = 14 trips to site per day over 18 month build period.
- Phase 1 - 4683 trips to site = 12 trips to site per day over 18 month build period.
- Phase 3 - 6021 trips to site = 15 trips to site per day over 18 month build period.

Assuming a worst case scenario, that the project incorporates the WEF Phase 1 to Phase 3, the total number of trips to site is 16391, at an average of 41 trips to site per day. This is determined from the Table below.

Expected Traffic Volumes for Highlands WEF - Phase 1, 2 + 3								
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	49	8	6	No / Minimal Impact
2	Turbine Tower Sections	Transport Stage	Special Abnormal Vehicles	5	245	5	49	Selected Transport Routes: Road and intersection upgrades and Road Closure - N10 Olifantskop Pass
3	Turbine Blades	Transport Stage	Special Abnormal Vehicles	3	147	3	49	Selected Transport Routes: Road and intersection upgrades and Road Closure - N10 Olifantskop Pass
4	Turbine Nacelle, Hub and Rotor	Transport Stage	Special Abnormal Vehicles	3	147	3	49	Selected Transport Routes: Road and intersection upgrades and road closure - N10 Olifantskop Pass
5	Turbine Tools and Installation Material	Transport Stage	Std Container Trucks	1	49	8	6	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	10780	20	539	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	75	3675	15	245	Mainly from Concrete Batching Plant (near WEF) to site. Minimal Impact
10	Deliveries of Aggregate, Cement, etc	Construction Stage	Large Tipper Trucks	25	1225	5	245	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	49	1	49	No / Minimal Impact
* Based on 49 Wind Turbine Generators (Some numbers rounded).					**16391**		**1245**	**TOTALS**
SUMMARY:								
18	**Months build**	**Days for build**	**396**		**41**	**Average number of trips per day over build period**		

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

Approximately 200 persons will be employed for the WEF build, which will generate some 18 AM and PM peak hour trips to site, of which 2 trips will be 60 seater buses, as shown in the Table below. This traffic will be from nearby towns and will have a negligible traffic impact.

Expected Staff daily traffic volumes for Highlands 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**

GRID Build:

- » Phase 1 – Negligible trips to site
- » Phase 2 – Negligible trips to site
- » Phase 3 – Negligible trips to site

The Trip generation for equipment, machinery and materials for the GRID build (Phases 1, 2 and 3) are negligible, as shown in the Table below, with the work being carried out on-site and not on public roads.

Expected Traffic Volumes for Highlands GRID (Phase 1 to Phase 3)								
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	Substation and Switch-gear Foundations	Construction Stage	Ready Mix Concrete Trucks	4	8	8	1	No / Minimal Impact
3	Pylons Foundations	Construction Stage	Ready Mix Concrete Trucks	884	111	26	4	Low Impact
4	Pylon Assembly	Construction Stage	Crane lorries (8 and 20 Ton)	221	2	2	1	No / Minimal Impact
5	Sub-Station Transformers	Transport Stage	Special Abnormal Vehicles	3	3	1	3	Abnormal load vehicle transport on Selected Transport Routes
6	Pylons	Transport Stage	Lowbed	221	3	1	3	No / Minimal Impact
7	Electricity cable coils	Transport Stage	8 Ton trucks	198	33	1	33	No / Minimal Impact
* Based on 33 km GRID connections					163		46	TOTALS
SUMMARY:								
18 Months build			396 Days for build			0.41 Average number of trips per day over build period		

Approximately 20 persons will be employed for the GRID build, which will generate approximately 4 AM and PM peak hour trips to site, as shown in the Table below. This traffic will be from nearby towns and will have a negligible traffic impact.

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

6.4 Potential Impacts

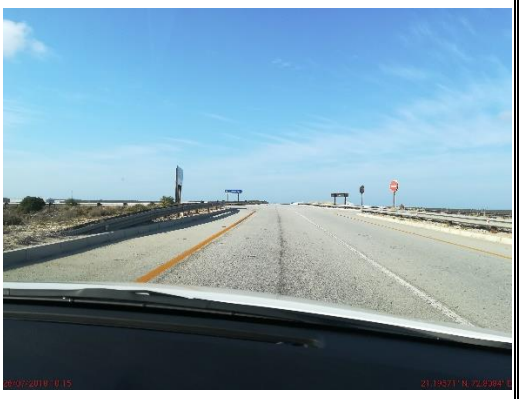
6.4.1 Construction Period

» **Increased traffic flow** on route to site, with abnormal load vehicles, some being very large, resulting in slow speeds, impedance to other traffic on local, national, regional and minor roads.

This can be mitigated with a Transport Management Plan that should indicate preferable times for abnormally large vehicles to travel on the road network, when background traffic is lower.

» **Restrictions on route**. The route poses a few restrictions for abnormally long, low vehicles as are noted as below:

* The Neptune Road N2 cloverleaf interchange on-ramps are too tight for abnormally long vehicles, (i.e. transport wind turbine blade). Vehicles not able to negotiate the cloverleaf on-ramp would need to continue to the end of Neptune Road and turn east onto the R367, continue onto the R334 and R102 and take the interchange N2 eastbound on-ramp towards the N10.

 N2 Cloverleaf eastbound on-ramp	 Turn left onto N2 eastbound

Olifantskop Pass, north of Paterson, has a number of very tight horizontal curves where abnormally long vehicles will track across the opposing lane. It would be necessary to close the pass to the public to allow abnormally long vehicles passage. It is suggested that abnormally long vehicles should travel in convey through the pass to limit its impact. Consideration should also be given to travelling during off-peak periods and on days when traffic flow is lower (i.e. Tuesday to Wednesday).

 Tight horizontal curve on Olifantskop Pass	 Tight horizontal curve on Olifantskop Pass

* The low 4.85 m Rail over Road bridge at Cookhouse is a major height restriction. The road sag curve vertical alignment under the bridge further restricts available height to bridge soffit for long vehicles. An alternate route might be

required to bypass this low structure in Cookhouse (see Figure 2b). This alternate route is shorter distance, carries less traffic, has a Road over Rail structure and is preferred over the route through Cookhouse. The southernmost portion of this route has some very tight bends and accommodating long vehicle turning radii will need to be resolved.

Low Rail over Road bridge entering Cookhouse from south approach

4.85 m "Height Restriction" sign at Cookhouse Rail over Road bridge

* The R63 makes a 90 degree turn in Somerset East CBD. Vehicle body tracks will need to be applied to this intersection to determine vehicle turning space required. It appears that street furniture would need to be temporarily removed and vehicle parking prohibited to enable long vehicles to make the turn (utilising the full road reserve width). Traffic law-enforcement would need to be on duty to enforce one-way travel through this intersection.

90 degree turn in R63 in Somerset East

90 degree turn in R63 in Somerset East

* The gravel surfaced Minor Roads (MR00412 from R63 to the sites and MR50171 leading from MR00412) are in reasonable condition, but their vertical alignment, local dips and bumps, could need flattening to accommodate particularly low abnormal load vehicles.

<table>
<tr>
<td> 
Minor Road MN00412</td>
<td> 
Site access closest to R63</td>
</tr>
<tr>
<td> 
MN50171</td>
<td> 
Typical narrow gravel roads on site accessed via Minor Road MN50171</td>
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These and other related issues would need to be mitigated by a Transport Management Plan that will confirm the best route to site and resolve issues in relation to the machinery and equipment transport to site.

» **Degradation of gravel minor road pavement** that has potential for vehicle damage or crashes.

This can be mitigated by regular maintenance of the minor roads.

» **Dust on Minor Roads**: This has potential to cause accidents due to reduced visibility for motorists.

This can be mitigated by reduced travel speed for construction vehicles on the Minor Roads.

» **Potential crashes at R63/M00142 intersection** with motorists not expecting construction vehicles using intersection, over an extended period of time.

This can be mitigated by ensuring construction vehicles are roadworthy, construction vehicle drivers are licensed, and by installation temporary roadworks "crossing vehicles" warning signage on the R63 approaches to Minor Road MN00412.

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

This can be mitigated by a Transport Management Plan with roads on-site designed according to vehicle requirements. To save costs, the on-site roads providing access to the Turbine locations will be narrow. This poses potential conflict for two-way traffic movement by large vehicles. It is likely that a one-way route will be considered to overcome this potential issue.

» **Accident 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..

6.4.2 Operations Period

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 is anticipated during the operation phase of the project, with possibly technicians/maintenance and security personnel on site as required.

Maintenance vehicle traffic flow on route to site, could possibly include abnormal load vehicles, resulting in slow speeds, impedance to other traffic on local, national, regional and minor roads.

This can be mitigated in a Transport Management Plan that should indicate preferable times for abnormally large vehicles to travel on the road network when background traffic is lower and requisite procedures for safe passage.

In general, operations (including maintenance) will have very low traffic flow, as shown in the Table below. This traffic will be from nearby towns and will have a negligible traffic impact.

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

6.4.3 Decommissioning Period

The WEF is expected to be operational for 20 years with possibility of extending to a further 20 years.

Trip generation at the decommissioning stage 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 if items have salvage value.

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

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

Minor road condition and dust is a potential issue requiring mitigation to prevent crashes and possible injury.

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 Impact Assessment

The proposed impact assessment ratings, for the WEF Phase 1, Phase 2 and Phase 3, are shown in the Tables below. These ratings are identical for each Phase.

6.5.1 WEF - Phase 1, 2 and 3

The following impacts are identified for the project lifecycle, and are identical for WEF phases 1, 2 and 3.

- Construction:
  - Traffic Flow
  - Route Constraints
  - Minor Road Degradation
  - Minor Road Dust
  - Intersection Safety
- Operations
  - Route Constraints
- Decommissioning:
  - Minor Road Degradation
  - Minor Road Dust
- Cumulative:
  - Route Constraints

6.5.1.1 Construction

WEF Phase 1,2 and 3 Table – Construction – Traffic Flow

Impact Phase: Construction							
Potential impact description: Traffic congestion, impedance to traffic flow due to increase in traffic volumes.							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	Medium	Medium	Low	Negative	Medium	Medium	Medium
With Mitigation	Medium	Medium	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: Obtain and adhere to a Transport Management Plan to: • Ensure safe transport of materials, equipment, etc. to site; • Optimise route selection and time of travel; • Co-ordinate traffic law-enforcement and transport to site.							

Rationale for scoring as shown in the table above.

Extent: Medium due to vehicle travel on National and Regional Routes in the Eastern Cape only.

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

Intensity: Medium due to risk of serious crashes.

WEF Phase 1, 2 and 3 Table – Construction – Route Constraints

Impact Phase: Construction							
Potential impact description: Constraints for large vehicles en-route to site could result in unacceptable traffic impact (safety and congestion). Abnormally long, low or high vehicles will experience constraints along the chosen route, i.e. inadequate space to accommodate turning movements at some intersection and interchange ramps, N10 Olifantskop Pass horizontal alignment inadequate for very long vehicles (transporting turbine blades), low rail over road bridge at Cookhouse with road in a vertical dip, restricted turning space on R63 in Somerset East, low speed road design on minor roads could be problematic for very low vehicles, no suitable roads on-site to access Wind Turbine locations.							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Medium	Low	Negative	High	Medium	High
With Mitigation	Low	Medium	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: Prepare a Transport Management Plan to: • Ensure safe transport of materials, equipment, etc. to site; • Optimise route selection and time of travel; • Co-ordinate traffic law-enforcement and transport to site; • Design on-site roads to facilitate access to laydown areas, substations and wind turbines; • Conduct a dry-run priori to implementation of the Transport Management Plan.							

Rationale for scoring as shown in the table above.

Extent: Medium due to vehicle travel on National and Regional Routes in the Eastern Cape only.

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 Phase 1, 2 and 3 Table – Construction – Minor Road Degradation

Impact Phase: Construction							
Potential impact description: Deterioration of gravel Minor Roads. Additional heavy traffic on Minor roads could degrade the existing road pavement.							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	Medium	Low	Low	Negative	Medium	Medium	Medium
With Mitigation	Low	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: Carry out regular maintenance of the road to ensure that its condition is maintained or improved: • Document condition of gravel roads prior to construction. • Upgrade gravel roads to suitable condition for proposed construction vehicles. • Ensure that the minor road is left in a better condition post-construction.							

Rationale for scoring as shown in the table above.

Extent: Low due to vehicle travel on two Minor Roads only.

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

Intensity: Medium due to risk of serious damage and injury crashes. Low due to risk of minor damage crashes.

WEF Phase 1,2 and 3 Table – Construction – Minor Road Dust

Impact Phase: Construction							
Potential impact description: Additional traffic on gravel Minor Roads will result in more dust that reduces visibility and increases potential for crashes on the Minor Roads.							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Low	Low	Negative	Medium	Medium	Medium
With Mitigation	Low	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: Reduce travel speed on gravel road to reduce dust: • Post speed restriction signage for construction vehicles on minor roads.							

Rationale for scoring as shown in the table above.

Extent: Low due to dust risk only on Minor Roads.

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 Phase 1, 2 and 3 Table – Construction – Intersection Road Safety

Impact Phase: Construction							
Potential impact description: Additional traffic at the Minor Road M00412 intersection with the R63 increases chances of vehicle crashes.							
	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: Alert motorists to construction traffic at the access: • Place warning construction vehicle signage on the R63 on each approach to Minor Road M00412. • Ensure that all construction vehicles are roadworthy • Ensure that all construction vehicles have appropriate drivers licence.							

Rationale for scoring as shown in the table above.

Extent: Low due to single site location at intersection of R63 and Minor Road MN00412

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

Intensity: High due to risk of fatal crashes.

6.5.1.2 Operations

WEF Phase 1, 2 and 3 Table – Operations – Route Constraints

Impact Phase: Operations							
Potential impact description: Constraints for large maintenance related vehicles en-route to site could result in unacceptable traffic impact (safety and congestion). Abnormally long, low or high vehicles will experience constraints along the chosen route, i.e. inadequate space to accommodate turning movements at some intersection and interchange ramps, Olifantskop pass horizontal alignment inadequate for very long vehicles (transporting turbine blades), restricted turning space on R63 in Somerset East, low rail over road bridge at Cookhouse with road in a vertical dip, low speed road design on minor roads could be problematic for very low vehicles.							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Medium	Low	Negative	Medium	Medium	High
With Mitigation	Low	Medium	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: Refer to Transport Management Plan to: • Ensure safe transport of materials, equipment, etc. to site; • Optimise route selection and time of travel; • Co-ordinate traffic law-enforcement and transport to site.							

Rationale for scoring as shown in the table above.

Extent: Medium due to vehicle travel on National and Regional Routes in the Eastern Cape only.

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.

6.5.1.3 Decommissioning

WEF Phase 1, 2 and 3 Table – Decommissioning – Minor Road Degradation

Impact Phase: Decommissioning							
Potential impact description: Deterioration of gravel Minor Roads. Additional heavy traffic on Minor roads could degrade the existing road pavement.							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	Medium	Low	Low	Negative	Medium	Medium	Medium
With Mitigation	Low	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: Carry out regular maintenance of the road to ensure that its condition is maintained or improved: • Document condition of gravel roads prior to construction. • Upgrade gravel roads to suitable condition for proposed construction vehicles. • Ensure that the minor road is left in a better condition post-construction.							

Rationale for scoring as shown in the table above.

Extent: Low due to vehicle travel on two Minor Roads only.

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

Intensity: Medium due to risk of serious crashes. Low due to risk of minor damage crashes.

WEF Phase 1, 2 and 3 Table – Decommissioning – Minor Road Dust

Impact Phase: Decommissioning							
Potential impact description: Additional traffic on gravel Minor Roads will result in more dust, that reduces visibility and increases potential for crashes on the Minor Roads.							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Low	Low	Negative	Medium	Medium	Medium
With Mitigation	Low	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: Reduce travel speed on gravel road to reduce dust: • Post speed restriction signage for construction vehicles on minor roads.							

Rationale for scoring as shown in the table above.

Extent: Low due to dust risk only on Minor Roads.

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.

6.5.1.4 Cumulative Impacts

The Table below shows a list of similar projects within 35 km radius of the Highlands WEF.

DEA_REF	PROJ_TITLE	APP_RECEIV	TECHNOLOGY	MEGAWATT	PROJ_STATU
12/12/20/2361	Proposed Construction Of A 10mw Photovoltaic (Pv) Solar Farm In Pearston, Blue Crane Route Municipality, Eastern Cape Province	2011/07/21	Solar PV	10	Approved
12/12/20/2635	The Construction Of A Second 10 Mw Photovoltaic Solar Farm In Pearston In The Blue Crane Route Municipality, Erf 468-Portion Of The Pearson Municipal Commonage, Eastern Cape Province	2011/11/01	Solar PV	55	Approved
12/12/20/2657	Proposed Construction And Operation Of A 55MW Photovolytaic Solar Farm And Associated Infrastructure On Portion 2 Of The Farm Kraan Vogel Kuil No.50, Pearston, Eastern Cape Province	2013/07/16	Solar PV	55	Approved
14/12/16/3/3/2/372	Proposed Middleton wind energyproject Blue Crane Route Municipality Eastern Cape province	2013/01/25	Onshore Wind	140	In process
12/12/20/2657/AM1	Proposed Construction And Operation Of A 55MW Photovolytaic Solar Farm And Associated Infrastructure On Portion 2 Of The Farm Kraan Vogel Kuil No.50, Pearston, Eastern Cape Province	2013/07/16	No Technology	55	Approved
12/12/20/2657/AM2	Proposed Construction And Operation Of A 55MW Photovolytaic Solar Farm And Associated Infrastructure On Portion 2 Of The Farm Kraan Vogel Kuil No.50, Pearston, Eastern Cape Province	2016/03/29	No Technology	55	Approved

From the table above, all approved projects are in the Pearston Area. It could be assumed that these projects might be completed before the Highlands WEF is approved and constructed, judging by the approvals process timelines.

The 140 MW power project in Middleton (approximately 35 km from Highlands WEF) is still in process and possibly that construction could coincide with the Highlands WEF and GRID project construction.

It is estimated that the Middleton (wind energy facility) project would generate on average around 41 trips to site per day assuming the project is built in just under a year. It is estimated that this would include 3 to 4 abnormal vehicle trips (from Ngqura Port) to site per day for 87 days. Apart from a few ISO truck container deliveries, other vehicle trips are more local in nature.

The 5 solar plants in Pearston area, totalling 230 MW, is expected to generate some 10 heavy vehicle trips to site per day (from Port Elizabeth or Koega) and some 6 buses and some 80 light vehicle trips (mostly staff and workers arriving in the AM and departing in the PM, from nearby towns such as Pearston and Somerset East).

As a worst case scenario it is assumed that all these developments. It is possible that this could coincide with the Highlands WEF abnormal load trips to site, along the N2 and N10.

These cumulative impacts are considered below.

WEF Phase 1, 2 and 3 Table – Cumulative – Route Constraints

Impact Phase: Construction							
Potential impact description: Constraints for large vehicles en-route to site could result in unacceptable traffic impact (safety and congestion). Abnormally long, low or high vehicles will experience constraints along the chosen route, i.e. inadequate space to accommodate turning movements at some intersection and interchange ramps, N10 Olifantskop Pass horizontal alignment inadequate for very long vehicles (transporting turbine blades).							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Medium	Low	Negative	High	Medium	High
With Mitigation	Low	Medium	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: Prepare a Transport Management Plan to: • Where possible co-ordinate safe transport of materials, equipment, etc. to site, most particularly through the N10 Olifantskop Pass; • Co-ordinate traffic law-enforcement and transport to site.							

Rationale for scoring as shown in the table above.

Extent: Medium due to vehicle travel on National and Regional Routes in the Eastern Cape only.

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.

6.5.2 GRID - Phase 1, 2 and 3

The following impacts are identified for the project lifecycle:

- Construction:
  - Vehicle Worker Crashes
  - Minor Road Degradation
  - Minor Road Dust
  - Intersection Safety
- Operations
  - Negligible Impacts
- Decommissioning:
  - Minor Road Degradation
  - Minor Road Dust
- Cumulative:
  - Negligible Impacts

The identified impacts are detailed as in the Tables below:

6.5.2.1 Construction

GRID Phase 1, 2 and 3 Impact Table – Construction - Vehicle Worker Crashes

Impact Phase: Construction							
Potential impact description: Vehicle Conflict on-project site Where either laying cables underground or installing pylons and overhead lines, there is risk of vehicles crashing into people in the work zone where the WEF construction activities overlap with the GRID construction activities on-site.							
GRID ALTERNATIVE 1							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Low	Low	Negative	Low	Medium	Medium
With Mitigation	Low	Low	Low	Negative	Low	Low	Medium
GRID ALTERNATIVE 2							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Low	Low	Negative	Low	Medium	Medium
With Mitigation	Low	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: Co-ordinate WEF and GRID build to avoid unnecessary overlapping of construction activities.							

Rationale for scoring as shown in the table above.

Extent: Low due to vehicle travel on-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. Low due to negligible risk of damage where work streams do not overlap.

GRID Phase 1, 2 and 3 Impact Table – Construction - Minor Road Degradation

Impact Phase: Construction							
Potential impact description: Deterioration of gravel Minor Roads. Additional heavy traffic on Minor roads could degrade the existing road pavement.							
GRID ALTERNATIVE 1							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	Medium	Low	Low	Negative	Medium	Medium	Medium
With Mitigation	Low	Low	Low	Negative	Low	Low	Medium
GRID ALTERNATIVE 2							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	Medium	Low	Low	Negative	Medium	Medium	Medium
With Mitigation	Low	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: Carry out regular maintenance of the road to ensure that its condition is maintained or improved: • Document condition of gravel roads prior to construction. • Upgrade gravel roads to suitable condition for proposed construction vehicles. • Ensure that the minor road is left in a better condition post-construction.							

Rationale for scoring as shown in the table above.

Extent: Low due to vehicle travel on two Minor Roads only.

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

Intensity: Medium due to risk of serious crashes. Low due to risk of minor damage crashes.

GRID Phase 1, 2 and 3 Impact Table – Construction - Minor Road Dust

Impact Phase: Construction							
Potential impact description: Additional traffic on gravel Minor Roads will result in more dust, that reduces visibility and increases potential for crashes on the Minor Roads.							
GRID ALTERNATIVE 1							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Low	Low	Negative	Medium	Medium	Medium
With Mitigation	Low	Low	Low	Negative	Low	Low	Medium
GRID ALTERNATIVE 2							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Low	Low	Negative	Medium	Medium	Medium
With Mitigation	Low	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: Reduce travel speed on gravel road to reduce dust: Post speed restriction signage for construction vehicles on minor roads.							

Rationale for scoring as shown in the table above.

Extent: Low due to dust risk only on Minor Roads.

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.

GRID Phase 1, 2 and 3 Table – Construction – Intersection Road Safety

Impact Phase: Construction							
Potential impact description: Additional traffic at the Minor Road M00412 intersection with the R63 increases chances of vehicle crashes.							
GRID ALTERNATIVE 1							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Low	Low	Negative	Medium	Medium	Medium
With Mitigation	High	Low	Low	Negative	Low	Medium	Medium
GRID ALTERNATIVE 2							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Low	Low	Negative	Medium	Medium	Medium
With Mitigation	High	Low	Low	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: Alert motorists to construction traffic at the access: Place warning construction vehicle signage on the R63 on each approach to Minor Road M00412. Ensure that all construction vehicles are roadworthy Ensure that all construction vehicles have appropriate drivers licence.							

Rationale for scoring as shown in the table above.

Extent: Low due to single location at intersection of R63 and Minor Road 00412

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

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

6.5.2.2 **Operations**

GRID Phase 1, 2 and 3 Table – Operations – NEGLIGABLE IMPACTS

Impact Phase: Operations							
Potential impact description: NEGLIGIBLE IMPACTS							
GRID ALTERNATIVE 1							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	Low	Low	Low	Negative	Low	Low	Medium
With Mitigation	NA	NA	NA	Negative	NA	NA	NA
GRID ALTERNATIVE 2							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	Low	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 no impacts.

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

Intensity: Low due to negligible risk of damage crashes.

6.5.2.3 **Decommissioning**

GRID Phase 1, 2 and 3 Table – Decommissioning – Minor Road Degradation

Impact Phase: Decommissioning							
Potential impact description: Deterioration of gravel Minor Roads. Additional heavy traffic on Minor roads could degrade the existing road pavement.							
GRID ALTERNATIVE 1							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	Medium	Low	Low	Negative	Medium	Medium	Medium
With Mitigation	Low	Low	Low	Negative	Low	Low	Medium
GRID ALTERNATIVE 2							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	Medium	Low	Low	Negative	Medium	Medium	Medium
With Mitigation	Low	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: Carry out regular maintenance of the road to ensure that its condition is maintained or improved: Document condition of gravel roads prior to construction. Upgrade gravel roads to suitable condition for proposed construction vehicles. Ensure that the minor road is left in a better condition post-construction.							

Rationale for scoring as shown in the table above.

Extent: Low due to vehicle travel on two Minor Roads only.

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

Intensity: Medium due to risk of serious crashes. Low due to risk of minor damage crashes.

GRID Phase 1, 2 and 3 Table – Decommissioning – Minor Road Dust

Impact Phase: Decommissioning							
Potential impact description: Additional traffic on gravel Minor Roads will result in more dust, that reduces visibility and increases potential for crashes on the Minor Roads.							
GRID ALTERNATIVE 1							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Low	Low	Negative	Medium	Medium	Medium
With Mitigation	Low	Low	Low	Negative	Low	Low	Medium
GRID ALTERNATIVE 2							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Low	Low	Negative	Medium	Medium	Medium
With Mitigation	Low	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: Reduce travel speed on gravel road to reduce dust: Post speed restriction signage for construction vehicles on minor roads.							

Rationale for scoring as shown in the table above.

Extent: Low due to dust risk only on Minor Roads.

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.

6.5.2.4 **Cumulative Impacts**

The Table below shows a list of similar projects within 35 km radius of the Highlands WEF.

DEA_REF	PROJ_TITLE	APP_RECEIV	TECHNOLOGY	MEGAWATT	PROJ_STATU
12/12/20/2361	Proposed Construction Of A 10mw Photovoltaic (Pv) Solar Farm In Pearston, Blue Crane Route Municipality, Eastern Cape Province	2011/07/21	Solar PV	10	Approved
12/12/20/2635	The Construction Of A Second 10 Mw Photovoltaic Solar Farm In Pearston In The Blue Crane Route Municipality, Erf 468-Portion Of The Pearson Municipal Commonage, Eastern Cape Province	2011/11/01	Solar PV	55	Approved
12/12/20/2657	Proposed Construction And Operation Of A 55MW Photovolytaic Solar Farm And Associated Infrastructure On Portion 2 Of The Farm Kraan Vogel Kuil No.50, Pearston, Eastern Cape Province	2013/07/16	Solar PV	55	Approved
14/12/16/3/3/2/372	Proposed Middleton wind energyproject Blue Crane Route Municipality Eastern Cape province	2013/01/25	Onshore Wind	140	In process
12/12/20/2657/AM1	Proposed Construction And Operation Of A 55MW Photovolytaic Solar Farm And Associated Infrastructure On Portion 2 Of The Farm Kraan Vogel Kuil No.50, Pearston, Eastern Cape Province	2013/07/16	No Technology	55	Approved
12/12/20/2657/AM2	Proposed Construction And Operation Of A 55MW Photovolytaic Solar Farm And Associated Infrastructure On Portion 2 Of The Farm Kraan Vogel Kuil No.50, Pearston, Eastern Cape Province	2016/03/29	No Technology	55	Approved

From the table above, all approved projects are in the Pearston Area. It could be assumed that these projects will be completed before the Highlands WEF is approved and constructed, judging by the approvals process timelines.

The 140 MW power project in Middleton (approximately 35 km from Highlands WEF) is still in process and possibly that construction could coincide with the Highlands WEF and GRID project construction.

It is estimated that the Middleton (wind energy) project would generate on average around 41 trips to site per day assuming the project is built in just under a year. It is estimated that this would include 3 to 4 abnormal vehicle trips (from Ngqura Port) to site per day for 87 days. Apart from a few ISO truck container deliveries, other vehicle trips are more local in nature.

The 5 solar plants in Pearston area, totalling 230 MW, is expected to generate some 10 heavy vehicle trips to site per day (from Port Elizabeth or Koega) and some 6 buses and

some 80 light vehicle trips (mostly staff and workers arriving in the AM and departing in the PM, from nearby towns such as Pearston and Somerset East).

As a worst case scenario it is assumed that all these developments ~~. It is possible that this~~ could coincide with the Highlands WEF abnormal load trips to site, along the N2 and N10.

These cumulative impacts are considered below.

GRID Phase 1, 2 and 3 Table – Cumulative – Negligible Impacts

Impact Phase: Construction							
Potential impact description: Negligible Impacts							
GRID ALTERNATIVE 1							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	Low	Low	Low	Negative	Low	Low	Medium
With Mitigation	NA	NA	NA	Negative	NA	NA	NA
GRID ALTERNATIVE 2							
	Intensity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	Low	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 GRID being on development site and negligible traffic generation.

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

Intensity: Low due to negligible risk of damage crashes.

7. CONCLUSIONS

It is concluded that:

1. The proposed Highlands WEF Phases 1, 2 and 3 and GRID Phases 1, 2 and 3 are expected to be built concurrently, over a period of 18 to 24 months. It is anticipated that the GRID build would be aligned to coincide with WEF build;
2. The expected WEF and GRID build will not generate significant traffic volumes on the road network;
3. Some abnormal load vehicles associated with the WEF build are particularly large or very low and could be affected by constraints as identified on the route (and possibly other constraints not identified) from Ngqura Port to site;
4. A Transport Management Plan must be prepared to address transport of abnormal load vehicles to and on-site.
5. On Minor Roads MN00412 and MN50171 dust due to increased construction related traffic poses visibility issues for drivers, that could lead to crashes, and travel speeds should be restricted for construction vehicles;
6. Increased vehicles / construction vehicles on Minor Roads MN00412 and MN50171 could lead to deterioration of the road pavement, and this requires monitoring and regular road maintenance;
7. Increased traffic / construction traffic at the R63 / MN00412 intersection could lead to vehicle crashes, and advance warning "truck crossing" signage should be erected on the R63 approaches to MN00412;
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.
9. The WEF operations could on occasion require abnormal load vehicles (replacement part) from Ngqura Port, which impact could be mitigated by reference to the Transport Management Plan and co-ordination with traffic law-enforcement where necessary;
10. The decommissioning phase will generate heavy vehicle trips (low-bed and tipper trucks) along Minor Roads MN00412 and MN50171. This increases risk of crashes where visibility is obscured by dust. Travel speed should be restricted to reduce dust.
11. During the decommissioning phase increased number of heavy vehicles on the minor roads, MN00412 and MN50171, could lead to deterioration of the pavement, which poses a traffic safety issues. The condition of the minor roads should be monitored and regular maintenance carried out.
12. The construction of the Middleton Wind Energy Project and various solar energy projects planned around Pearston could coincide with the Highlands WEF and GRID construction. The cumulative traffic is not significant, but abnormal load transport from Ngqura Port should preferably be co-ordinated to limit impact (delay of traffic) on the road network where possible.

8. RECOMMENDATIONS

It is recommended that:

1. The traffic and transport related impacts of the proposed Highlands WEF Phases 1, 2 and 3 and GRID Phases 1, 2 and 3 build, operations and decommissioning be mitigated as set out in this report.

9. SPECIALIST STATEMENT

Taking the above findings into consideration it can be concluded that the development of the Highlands 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 Highlands WEF and GRID can be approved, from a traffic and transport engineering perspective, subject to the specific requirements/mitigation measures included within this report.

10. 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. SANRAL Road Infrastructure Plan for the Eastern Cape and NMBM – presentation in Port Elizabeth - Feb 2016
8. Highway Capacity Manual, Transportation Board Research Council, HMC 2000
9. SANRAL YB2017 - Summary Traffic Information

ANNEXURE A – Curriculum Vitae

TECHSO
smart solutions

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

ANNEXURE B – Specialist Declaration of Interest

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/ or 12/9/11/L
NEAS Reference Number:	DEA/EIA
Date Received:	

Application for integrated environmental authorisation and waste management licence in terms of the-

(1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and

(2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

PROJECT TITLE

Highlands Wind Energy Facilities and associated grid connection infrastructure

Specialist:	Traffic Engineering		
Contact person:	Stephen Mark Fautley		
Postal address:	Unit 1B4, the Avenues, Parklands		
Postal code:	7441	Cell:	084 3007722
Telephone:	021 557 7730	Fax:	021 557 1772
E-mail:	steve@techso.co.za		
Professional affiliation(s) (if any)	ECSA 200270171	SAICE 2015 00599	

Project Consultant:	Arus Consukltancy Services South Africa (Pty) Ltd		
Contact person:	Anja Albertyn		
Postal address:	Office 220, Cube Workspace, Long Street cnr Hans Strijdom Avenue, Cape Town		
Postal code:	8001	Cell:	0762658933
Telephone:	0214121529	Fax:	
E-mail:	highlands@arcusconsulting.co.za		

4.2 The specialist appointed in terms of the Regulations_

I, Stephen Mark Faulkey , declare that --

General declaration:

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 (if applicable):

10 August 2018

Date:

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 5 (site visit 2018)**
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	**Section 2**
(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**
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	**Section 6.5.1.4**
(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;	**Section 6.5**
(k) any mitigation measures for inclusion in the EMPr;	**Sections 6.5**
(l) any conditions for inclusion in the environmental authorisation;	**Section 6.5 and Section 7**
(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 9**
(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**