SOUTH AFRICA MAINSTREAM RENEWABLE POWER DEVELOPMENTS (PTY) LTD

KAREE WIND ENERGY FACILITY, BATTERY ENERGY STORAGE SYSTEM (BESS) AND ASSOCIATED GRID INFRASTRUCTURE

Transportation Study

DFFE Ref: TBA
Issue Date: 18 November 2022
Revision No: 2
Project No: 16168

Date:	18 November 2022	
Document Title:	**Karee Wind Energy Facility and Associated Grid Infrastructure** Transportation Study	
Revision Number:	2	
Drafted:	Merchandt Le Maitre (Pr. Tech Eng.)	
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Signature:	 Pr. No: 202202263	Date: 18 November 2022
Reviewed:	Richard Hirst (Pr Tech Eng.)	
Signature:	 Pr. No: 2018300110	Date: 18 November 2022
For:	SOUTH AFRICA MAINSTREAM RENEWABLE POWER DEVELOPMENTS (PTY) LTD	

Confidentiality Statement

EXECUTIVE SUMMARY

Objective

South African Mainstream Renewable Power Developments (Pty) Ltd (Mainstream) proposes to construct and operate the Karee Wind Energy Facility (WEF) and associated grid infrastructure approximately 12-20km north of the town Touws Rivier, Western Cape. The proposed facilities will have a combined maximum generating capacity of 200MW. The overall objective is to generate electricity by means of renewable energy technology capturing wind energy to feed into the national grid.

The main objective of the 'Transportation Study' is to determine the impact/s of the proposed development on the immediate and greater area with respect to transportation and include these findings in the Basic Assessment (BA). The assessment will comprise of a desktop assessment and will include preliminary transportation related matters arising during the construction phase, through the Operation & Maintenance Phase, up to and including the decommissioning phase of the development. The assessment of these phases, will take into account the transportation of normal and abnormal vehicles, which are made up of *inter alia*; - WEF components, construction materials, equipment, construction workers and employees.

Key Findings

We don't foresee any major risks with respect to the proposed development and therefore include our recommendations below, to take note of prior to and during the detailed design and construction stages. It should however be noted that a number of recommendations were highlighted and therefore noted as important.

The development is located in close proximity to the existing road network. A number of existing access points are located along Road DR01475 and in order to accommodate the adjusted land use, the access position will be relocated in order to obtain the recommended sight distances and remove it from its current location. An approval and a wayleave application will be required from the Western Cape Department of Transport & Public Works prior to work commencing. Minor upgrades to the external access road could be required on Road DR01475 in order to accommodate the larger Wind Turbine Generators (WTG's) planned for these facilities.

The construction / Balance of Plant (BoP) phase of this development will typically generate the highest number of additional vehicles. It will however be temporary and impacts are considered to be nominal.

A number of mitigation measures are proposed to accommodate the development and to reduce the impact to the surrounding road network.

Recommendation

With reference to this report, associated assessment and the findings made within, it is SiVEST's opinion that the Karee WEF and associated infrastructure will have a nominal impact on the existing traffic network. The project is therefore deemed acceptable from a transport perspective, provided the recommendations and mitigations measures in this report are implemented, and hence the Environmental Authorisation (EA) should be granted for the BA application.

DECLARATION BY SPECIALIST

I, NTUTHUKO HLANGUZA, 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 Specialist: 

Name of Company: SiVEST SA (PTY) Ltd

Date: 18 November 2022

NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) AND ENVIRONMENTAL IMPACT REGULATIONS, 2014 (AS AMENDED) - REQUIREMENTS FOR SPECIALIST REPORTS (APPENDIX 6)

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of Report
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Refer Section 4 and Appendix A
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Refer above
c) an indication of the scope of, and the purpose for which, the report was prepared;	Refer Section 3
(cA) an indication of the quality and age of base data used for the specialist report;	Refer Section 7.1
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Refer Section 10 Refer Section 11
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Refer Section 3
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Refer Section 3
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;	Refer Section 12
g) an identification of any areas to be avoided, including buffers;	N/A
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;	Refer Figure 6.2
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Refer Section 5
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;	Refer Section 7 Refer Section 12
k) any mitigation measures for inclusion in the EMPr;	Refer Section 10
l) any conditions for inclusion in the environmental authorisation;	Refer Section 13
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Refer Section 10
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,	Refer Section 13

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of Report
management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Refer Section 7.5
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
q) any other information requested by the competent authority.	N/A
2) 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.	N/A

SOUTH AFRICA MAINSTREAM RENEWABLE POWER DEVELOPMENTS (PTY) LTD

KAREE WIND ENERGY FACILITY

TRANSPORTATION STUDY

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1. INTRODUCTION

SiVEST Civil Engineering Division was appointed by South Africa Mainstream Renewable Power Developments (Pty) Ltd (hereafter referred to as “Mainstream") to complete a Transportation Study for the proposed 200MW Karee Wind Energy Facility (WEF) and associated grid infrastructure (hereafter the “proposed facility / facilities”) situated approximately 12-20km north of Touws River in the Western Cape Province and is within the Witzenberg Local Municipality and the Cape Winelands District Municipality.

The proposed WEF and associated grid infrastructure is located within the Komsberg Renewable Energy Development Zone (REDZ 2), as published in terms of Section 24(5) of the National Environmental Management Act, 1998 (NEMA) in GN R114 of 16 February 2018. Accordingly, a Basic Assessment (BA) process as contemplated in terms of regulation 19 and 20 of the Environmental Impact Assessment (EIA) Regulations, 2014, is required for the authorisation of this large scale WEF. Accordingly, a BA process as contemplated in terms of the EIA Regulations (2014, as amended) is being undertaken in respect of the proposed WEF project.

Grid connection infrastructure for the WEF will be subject to a separate BA Process as contemplated in terms of regulation 19 and 20 of the EIA Regulations, 2014, which is currently being undertaken in parallel to the WEF BA process

The competent authority for the BA processes is the National Department of Forestry, Fisheries and Environment, (DFFE).

2. WIND ENERGY FACILITY COMPONENTS

The WEF will consist of the following:

2.1 Wind Farm Components

At this stage it is anticipated that the proposed Karee WEF will comprise up to thirty-five (35) wind turbines with a maximum total energy generation capacity of up to approximately 200MWac. The electricity generated by the proposed WEF development will be fed into the national grid via a 132kV overhead power line. In summary, the proposed Karee WEF will include the following components:

- Up to 35 wind turbines, with a maximum export capacity of approximately 200MWac. This will be subject to allowable limits in terms of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP);
- Each wind turbine will have a hub height of between 120m and 200m and rotor diameter of up to approximately 200m;
- Permanent compacted hardstanding areas / platforms (also known as crane pads) of approximately 100m x 100m (total footprint of approx. 10000m2) per turbine during construction and for on-going maintenance purposes for the lifetime of the proposed development;
- Each wind turbine will consist of a foundation of up to approximately 30m in diameter. In addition, the foundations will be up to approximately 3m in depth;
- Electrical transformers (690V/33kV) adjacent to each wind turbine (typical footprint of up to approximately 2m x 2m) to step up the voltage to between 11kV and 33kV;
- One (1) new 11kV - 33/132kV on-site substation consisting of two (2) portions: IPP portion / yard (33kv portion of the shared 33kv/132kv portion) and an Eskom portion (132kv portion of the shared 33kv/132kv portion) including associated equipment and infrastructure, occupying a total area of approximately 25ha (i.e. 250 000m2) i.e. 15.5 ha for the IPP Portion and 15.5 ha for the Eskom

Portion. The Eskom portion will be ceded over to Eskom once the IPP has constructed the onsite substation. The necessary Transfer of Rights will be lodged with DFFE when required;

- A Battery Energy Storage System (BESS) will be located next to the IPP portion / yard of the shared onsite 33/132kV substation and will be included as part of the 15.5ha. The storage capacity and type of technology would be determined at a later stage during the development phase, but most likely comprise an array of containers, outdoor cabinets and/or storage tanks;
- The wind turbines will be connected to the proposed substation via 11 to 33kV underground cabling and overhead power lines.
- Road servitude of 8m and a 20m underground cable or overhead line servitude.
- Internal roads with a width of up to approximately 5m wide will provide access to each wind turbine. Existing site roads will be used wherever possible, although new site roads will be constructed where necessary. Turns will have a radius of up to 50m for abnormal loads (especially turbine blades) to access the various wind turbine positions. It should be noted that the proposed application site will be accessed via the DR1475 District Road and DR1475, MR316 and MR319 WCG provincial Roads;
- One (1) construction laydown / staging area of up to approximately 3ha to be located on the site identified for the substation. It should be noted that no construction camps will be required in order to house workers overnight as all workers will be accommodated in the nearby town;
- Operation and Maintenance (O&M) buildings, including offices, a guard house, operational control centre, O&M area / warehouse / workshop and ablution facilities to be located on the site identified for the substation. This will be included in the 33kv portion/yard of the substation area i.e.15.5 ha of the IPP portion of the onsite substation
- A wind measuring lattice (approximately 120m in height) mast has already been strategically placed within the wind farm application site in order to collect data on wind conditions;
- No new fencing is envisaged at this stage. Current fencing is standard farm fence approximately 1-1.5m in height. Fencing might be upgraded (if required) to be up to approximately 2m in height; and
- Water will either be sourced from existing boreholes located within the application site or will be trucked in, should the boreholes located within the application site be limited.
- Optic fibre overhead or underground line from the Kappa Substation to the proposed on-site substation.

2.2 Grid Connection Components

Two (2) options have been identified for the 33kv portion/yard of the shared 33/132kV onsite substation:

- Option 1: The location of the 33kv portion/yard of the shared 33/132kV onsite substation is located near an existing gravel road, making access to the onsite substation easier. (Preferred).
- Option 2: The location of the 33kv portion/yard of the shared 33/132kV onsite substation is located central to the land parcel, thereby reducing the energy loss associated with the wind turbines.

Two (2) grid corridors have been identified for the 132kv overhead line and 132kv portion/yard of the shared 33kv/132kv onsite substation – these applications will be prepared and assessed under separate BA application processes.

- **Option 1:** The line from the 132kv portion/yard of the 33/132kv onsite substation moves in a north easterly direction for about 7.5 km, then turns sharply in a north north westerly directly for about

0.5km and then turns left for about 0.5km in a west north westerly direction before terminating at the Kappa MTS. The associated grid connection route to the Kappa Main Transmission Substation is shorter i.e. approximately 8.5km – 10.5km in length (Preferred).

- **Option 2:** The line from the 132kv portion/yard of the 33/132kv onsite substation moves in a northerly direction for about 3.2km, turning right in a north easterly direction for about 6.7 km and then left for about 0.5km in a northerly direction before terminating at the Kappa MTS. The associated grid connection route to the Kappa Main Transmission Substation is slightly longer i.e. approximately 10.4km to 11.4km in length.

3. OBJECTIVES AND SCOPE OF WORK

The main objective of the 'Transportation Study' is to determine the impact/s of the proposed development on the immediate and greater area with respect to transportation. The assessment will comprise of a site assessment and will include preliminary transportation related matters arising during the construction phase, through the operation & maintenance phase, up to and including the decommissioning phase of the development. The assessment of these phases, will take into account the transportation of normal and abnormal vehicles, which are made up of *inter alia*; - WEF components, construction materials, equipment, construction workers and employees.

The scope of works consists of the following:

a) A site investigation which was completed on the 23rd July 2021.

b) Consultations with the relevant authorities and / or stakeholders which includes the collection of traffic data and information.

c) Desktop analysis of traffic data and information from the various authorities and / or stakeholders. Analysis to include the evaluation of the capacity of the road network (if required).

d) Evaluate the impact of the proposed development on the existing road network / traffic volumes and populating of a suitable 'Impact Rating System'.

e) Determine specific traffic needs during the different phases of implementation.

f) Conclude & propose possible mitigation measures.

g) Identify the position and suitability of the preferred access road alternatives.

h) Confirm the associated clearances required for the necessary equipment to be transported from the point of delivery to the various sites.

i) Confirm freight and transport requirements during construction, operation and maintenance period.

j) Propose origins and destinations of equipment.

k) Determine Abnormal load requirements (if any).

l) Seasonal impacts do not affect the assessment.

3.1 Legal Requirement & Guidelines

Key legal requirements and guidelines to the proposed facilities are as follows:

- Government Notice 509 (GN509) as published in Government Gazette 40229 of 2016 and refers to the National Water Act, 1998 (Act No. 36 of 1998)

- National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA)
- National Water Act, 1998 (Act No 36 of 1998) (NWA)
- Road Safety Act (Act No 93 of 1996)
- National Road Traffic Regulations, 2000

4. SPECIALIST CREDENTIALS

This Transportation Study is undertaken by Ntuthuko Hlanguza of the civil engineering division of SiVEST SA (Pty) Ltd. Ntuthuko is a professionally registered civil engineer with a BSc.Eng (Civil) qualification and post-graduate certificate in Energy Efficiency and Sustainability. He has over 7 years of experience in a wide range of civil engineering applications including specialist studies in the renewable energy sector. His experience in the different facets of Civil Engineering means he can advise clients in the renewable energy sector on transportation studies, access and internal road layouts and designs, glint and glare assessments, water demand and stormwater management. A full Curriculum Vitae is included in 'Appendix A.'

Table 4.1 Specialist Credentials & Experience

Company	SiVEST (Pty) Ltd
Contact Details	ntuthukoh@sivest.co.za
Qualifications	BSc.Eng (Civil) (UKZN) Cert. Energy Efficiency & Sustainability (UCT)
Professional Registrations & Memberships	• Pr. Eng – Engineering Council of South Africa • MSAICE – Member of South African Institute of Civil Engineers
Expertise to carry out the Transportation Study	• Heuweltjies WEF • Droogfontein 3 PV • Mierdam PV • Kraaltjies WEF • Platsjambok West PV • Platsjambok East PV • Lesaka PV Cluster

5. ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations are to be noted:

- The analysis is based on the information provided at the time by Mainstream and their representatives.
- Digital Terrain Model: 25m DEM from NGI (2014) & 2m DEM from GeoSmart (2016:3222DA)
- Technical Specifications for the facility:

Technical Component	Dimensions
Number of Turbines	Maximum of 35
Capacity	200MW Max
Hub Height (subject to confirmation)	between 120m and 200m
Rotor Diameter	up to ± 200m
Construction Period (assumed)	± 20 months (TBC)

Expected Lifespan	20 - 25 years (TBC)
Road Width	Up to 5m

- Traffic Station Data / Counts and trip generation calculations are for one direction only and do not include return trips, unless indicated.
- This assessment is limited to the impact the development traffic will have on the network and not on the wider impacts known as background traffic. Such impacts can only be addressed in a detailed Traffic Impact Study which takes into account actual traffic counts undertaken during the peak periods.
- The information provided in this report is an informed estimate. Construction related traffic may however vary and be different to the information provided during construction phases as a result of supplier delivery schedule changes.
- Some of the figures provided are indicative figures as many of the components are still at design stage and will only be confirmed closer to time of construction.

6. PROJECT DESCRIPTION

6.1 Locality

Mainstream proposes to construct and operate the Karee WEF and associated infrastructure approximately 12 km and 20km north of the town Touws River, Western Cape. The proposed facilities will have a combined maximum generating capacity of 200MW. The overall objective is to generate electricity by means of renewable energy technology capturing wind energy to feed into the national grid.

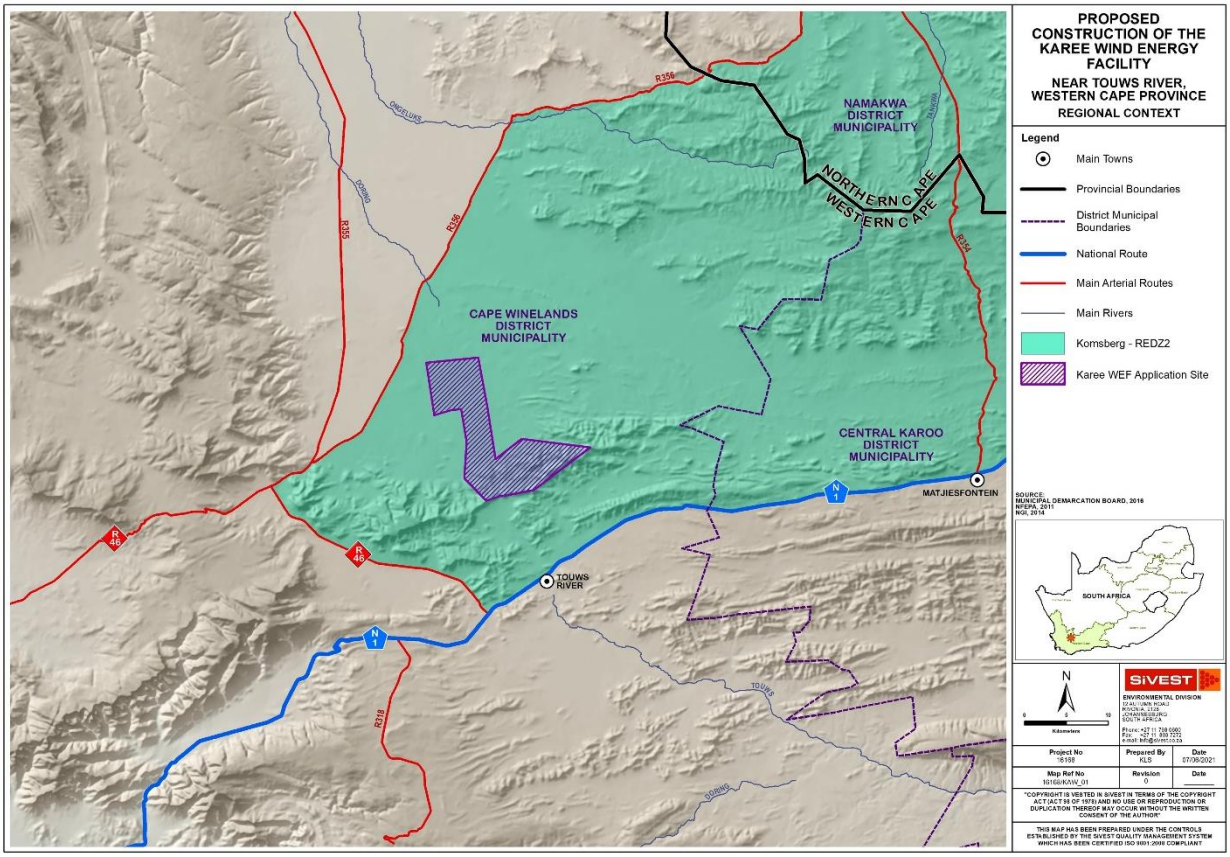


Figure 6.1 Karee WEF - Regional Context

The proposed WEF will be located on the following properties (Refer **Figure 6.3**):

- Farm Sadawa No 239[1]
- Farm Tierberg Kloof No 258; and
- Farm Voetpads Kloof No 253.

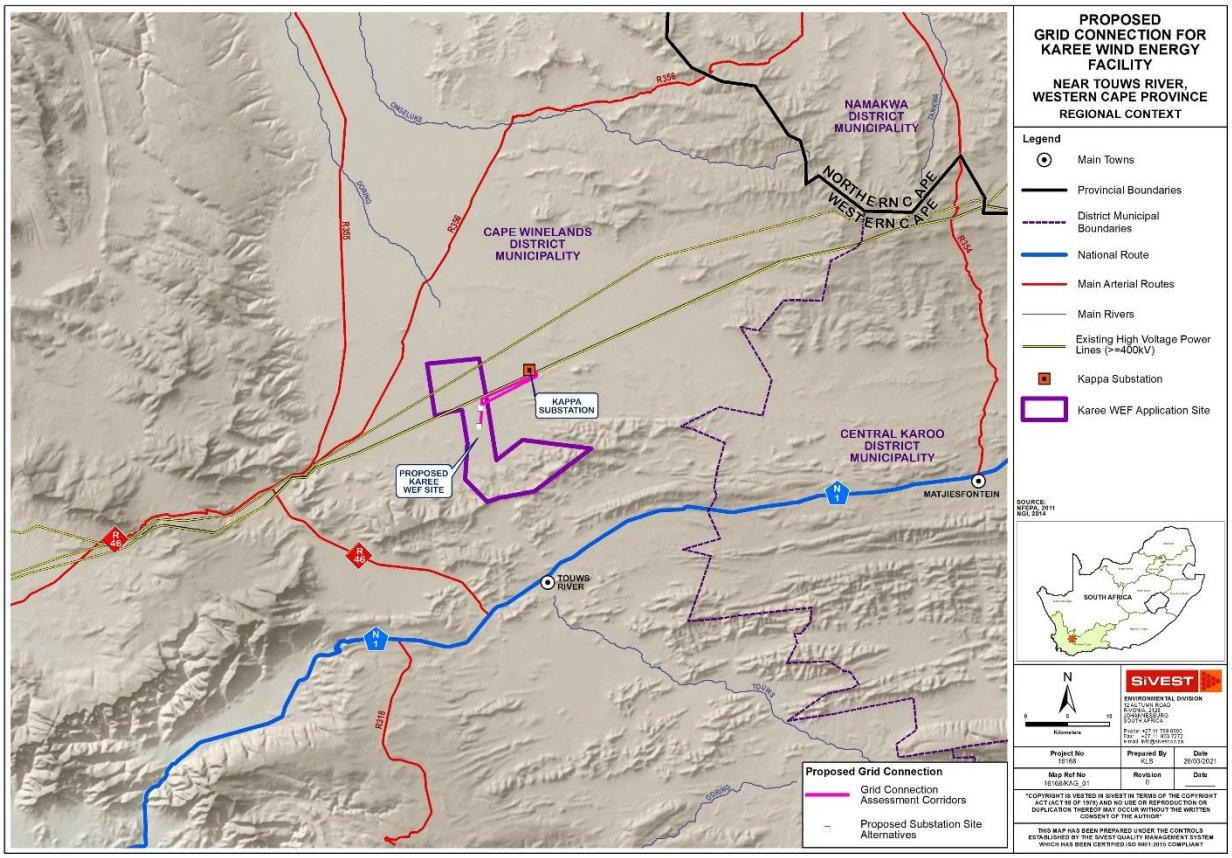


Figure 6.2 Karee WEF Grid Connection – Regional Context

As shown in **Figure 6.3** below, the proposed Karee WEF is located in the Witzenberg Local Municipality and greater Cape Winelands District Municipality with a facility area of 11 841 hectares (ha). A smaller buildable area (1753 ha) has however been identified as a result of a preliminary suitability assessment undertaken by Mainstream and this area is likely to be further refined with the exclusion of sensitive areas determined through various specialist studies being conducted as part of the EA process.

[1] *Note whilst Mainstream will no longer be proceeding with turbines on Sadawa 239 (northernmost land parcel), it will remain part of the Development Area / Envelop but not the Development Footprint.*

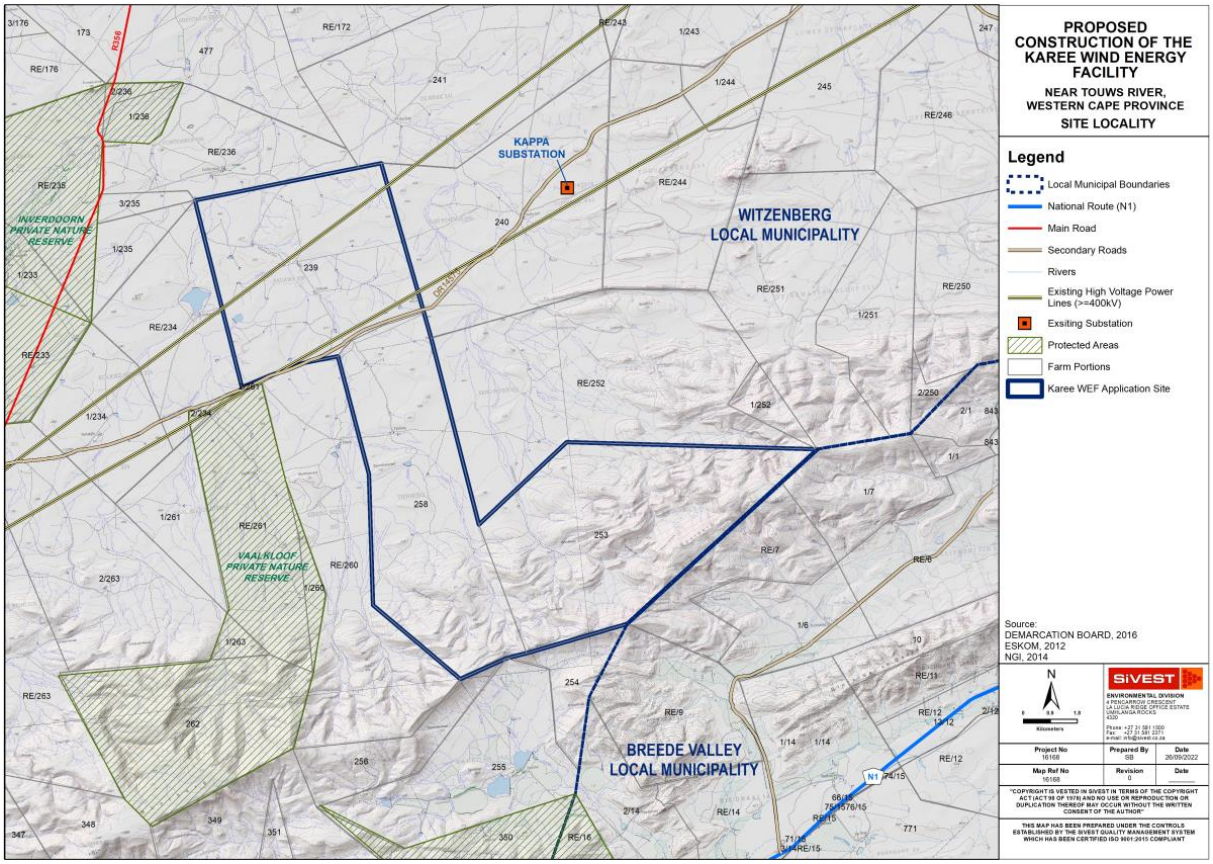


Figure 6.3 Karee WEF - Site Locality[2]

7. TRANSPORTATION

The Karee WEF development is partially bisected by a provincial road and existing access points already exists in the form of farm access points, however, the access for the future facility expansions, will need to be upgraded or moved to new positions in order to accommodate the proposed adjusted land use.

The road bisecting the Karee WEF is Road DR01475 - Local Access Road and is a proclaimed gravel road which falls under the jurisdiction of the Western Cape Provincial Administration.

The site and their respective access points and internal layouts will be discussed in more detail in the sections below.

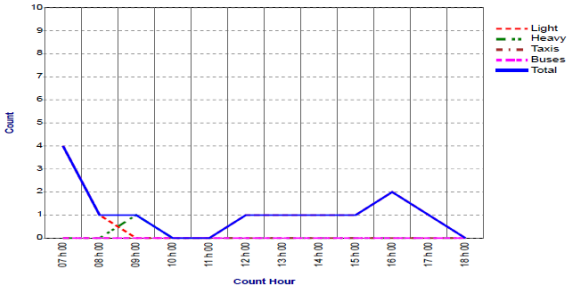
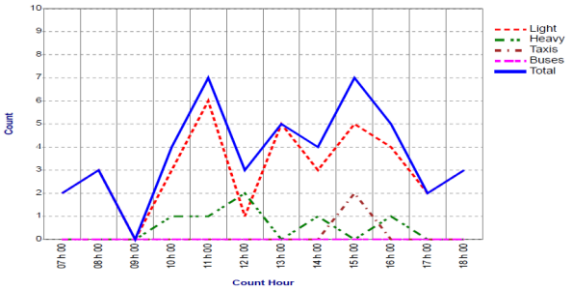
[2] *Note whilst Mainstream will no longer be proceeding with turbines on Sadawa 239 (northernmost land parcel), it will remain part of the Development Area / Envelop but not the Development Footprint.*

7.1 Existing Traffic Conditions

The Western Cape Provincial Government makes use of a Traffic Counting System (TCS) and has served the Western Cape Provincial Network since 1999. The main emphasis of the system is on Trunk, Main and Divisional roads and at the present time only Minor roads that intersect with more important roads are on the system.

The data indicated below are from two stations on the DR01475 - Residential Access Collector immediately east and west of the proposed development at Km 46.60 and Km 86.65 respectively.

Table 7.1 Traffic Data / Counts

	Light Vehicles	Heavy Vehicles	Total Vehicles	Station Count Chart
DR01475 @ OP06121 JUNCTION **Km 46.60** **Station No: 4988C** **Date: 20/08/2018**				
Morning 7:00-8:00	1	0	1	
Weekday Midday 10:00-15:00	4	0	4	
Afternoon 16:00-17:00	1	0	1	
Average Annual Daily Trips	19	2	21	
DR01475 @ MR00319 JUNCTION **Km 86.65** **Station No: 4474B** **Date: 20/08/2018**				
Morning 7:00-8:00	3	0	3	
Weekday Midday 10:00-15:00	26	5	31	
Afternoon 16:00-17:00	2	0	0	

Average Annual Daily Trips	61	9	70	

Based on the table above, it can be concluded that a 'Weekday Midday' peak exists on Road DR01475 between 10:00 – 16:00

7.2 .Additional Traffic Generation

The construction / BoP phase will typically generate the highest number of trips for the proposed facility. Construction will typically involve access roads, foundations, Wind Turbine Generators (WTG), electrical cables / transformers / switch gears / substations / BESS installations and the delivery of these materials / equipment / abnormal loads on the public road network.

It is assumed that no staff or labour will reside on the construction site, other than security, and therefore all will reside in nearby towns of Touws River / Matjiesfontein or alternatively be accommodated in nearby hostels.

7.2.1 Construction Phase

Calculations and our experience from previous WEF's, confirm the BoP construction phase will generate the greatest additional traffic to the surrounding road network. The resultant impact will be on the surrounding road network, increasing dust generation, noise and road maintenance.

The BoP period on WEF developments typically take place between month 2 – 16 on a WEF of this size. This development of 35 WTG will generate a maximum of ±92 additional vehicle trips per day on the surrounding road network and will only occur for a period of 1 – 3 months during this period. Of these vehicle trips, ±57 vehicle trips will occur at the peak of the construction phase transporting staff and labour. Typically, these trips will be in the morning between 6:00 – 7:00 and in the afternoons between 16:00 – 17:00.

The remaining ±35 vehicle trips will occur during the 'weekday midday' period for the delivery of construction material and abnormal loads. The abnormal loads however only account for ±4 trips of the construction phase and is elaborated further in **Section o** below. Assuming a 9hr workday, the ±35 vehicles during 'weekday midday' will equate to ±4 vehicle trips / hour. The resultant impact of this development to the surrounding road network during the construction period, is therefore seen as nominal.

The specific traffic needs for this phase of the development;

- Reduction in vehicle speed
- Reduction in dust generation
- Adequate law enforcement
- Appropriate, timely and high quality maintenance of gravel roads
- Implementation of pedestrian safety initiatives
- Regular maintenance of farm fences and access cattle grids
- Continuous engagement with the Western Cape Department of Transport & Public Works (WCDTPW).

7.2.1.1 *Abnormal Loads*

The transportation of abnormal loads from its origin to the proposed facility has been assumed to be primarily from the Port of Saldanha. This assumption is based on the adjacent Perdekraal East & West development where a *Route Improvement Report* was completed by Messrs. Abnormal Solutions which recommends the route between the Port of Saldanha and the Perdekraal East & West WEF as the preferred option. Examples of the transportation methods for the Tower Sections **(Figure 7.1Error! Reference source not found.**), Nacelle (**Figure 7.1**), Hub (**Figure 7.2**) and Rotor Blades (**Figure 7.3**) have been included below.

The Geometric clearance requirements, associated with these abnormal loads transporting the equipment types is shown in **Table 7.2**. We should however note that the figures indicated are indicative figures as many of the components are still at design stage and will only be confirmed closer to time of construction.

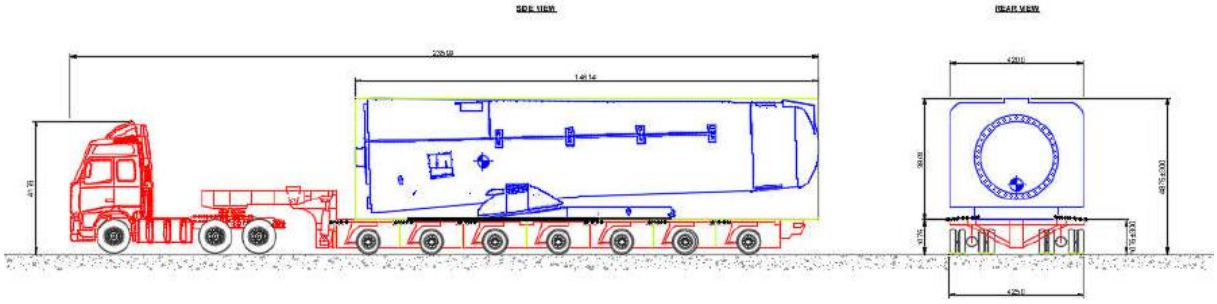


Figure 7.1 Example of Nacelle & Tower

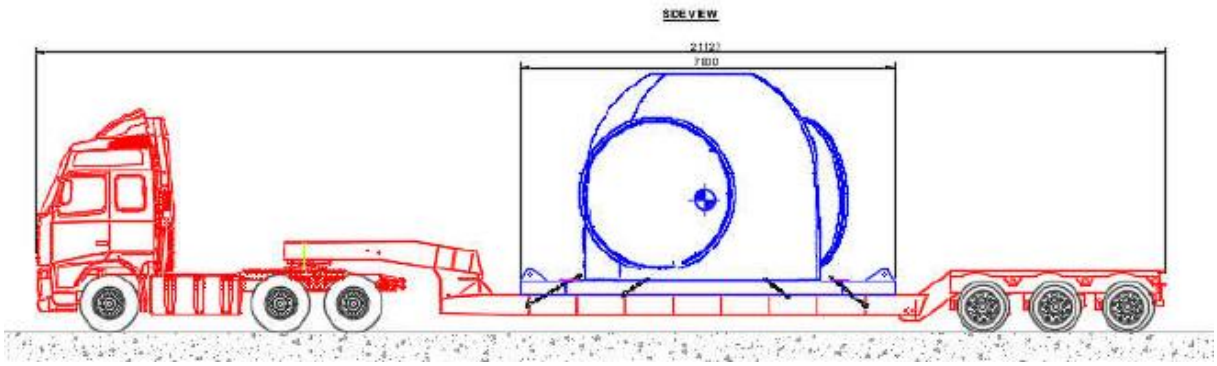


Figure 7.2 Example of Hub

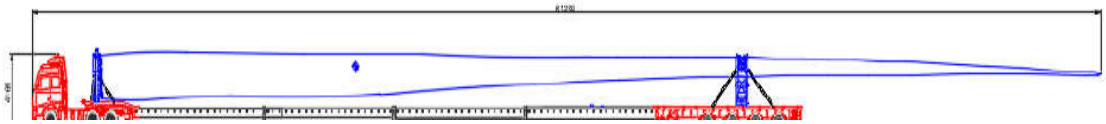


Figure 7.3 Example of Rotor Blades

Table 7.2 Abnormal Load Dimensions

Abnormal Load Dimensions			
Load to be Transported	**Typical Dimensions**		
	Length (m)	**Width (m)**	**Height (m)**
Tower Sections (±8 Loads of 13-29m long each dependant on the mass)	29	4.5	4.5
Nacelle (1 per Turbine, transported individually)	12.8	4.2	3.8
Blades (3 per Turbine, transported separately)	100	4	4
Rotor Hub (1 per Turbine, transported individually)	5.5	4.4	4.1

Table 7.3 Abnormal Load Trips

Abnormal Load Trips				
	Month (Period)			**Origin**
Proposed WTG Delivery Schedule	**1-15**	**15-22**	**22-24**	
Tower Sections	0	4	0	Saldanha
Nacelle				Saldanha
Blades				Saldanha
Rotor Hub				Saldanha
Trips/Day for period	**0**	**4**	**0**	

From the table above it was assumed that 16 trips per WTG or two sets / teams of 3 abnormal loads will transport sections of the WTG to each facility in a four-day period. This equates to a total of 640 trips in a 28-week period (7 months). Even though each set / team of 3 vehicles will deliver simultaneously, ±4 trips per abnormal load will be experienced each day.

Prior to any Abnormal Loads conveying equipment to the facility, approval needs to be obtained in the form of a permit from the Department of Transport (DoT). The permit application will be completed by specialists in the transportation of Abnormal loads and will conform to 'The Road Traffic Act, 1996 (Act No 93 of 1996)'. The application includes route clearances from Telkom and Eskom after which the

application is submitted to DoT who intern consults with the SANRAL, Local Municipalities and Provincial Authorities prior to issuing a permit.

7.2.1.2 *Permitting for Abnormal Loads– General Rules*

The limits recommended in *TRH 11 - Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads* are intended to serve as a guide to the Permit Issuing Authorities. It must be noted that each Administration has the right to refuse a permit application or to modify the conditions under which a permit is granted. It is understood that:

- A permit is issued at the sole discretion of the Issuing Authority. The permit may be refused because of the condition of the road, the culverts and bridges, the nature of other traffic on the road, abnormally heavy traffic during certain periods or for any other reason.
- A permit can be withdrawn if the vehicle upon inspection is found in any way not fit to be operated.
- During certain periods, such as school holidays or long weekends an embargo may be placed on the issuing or permits. Embargo lists are compiled annually and are obtainable from the Issuing Authorities.

7.2.1.3 *Proposed Abnormal Load Routes*

The transportation of Abnormal goods has been indicated in **Figure 7.4** below and will be primarily from the Port of Saldanha. Based on the route study completed previously, Saldanha is the preferred point of entry for delivery and transport of Abnormal goods to the Karee WEF Development.

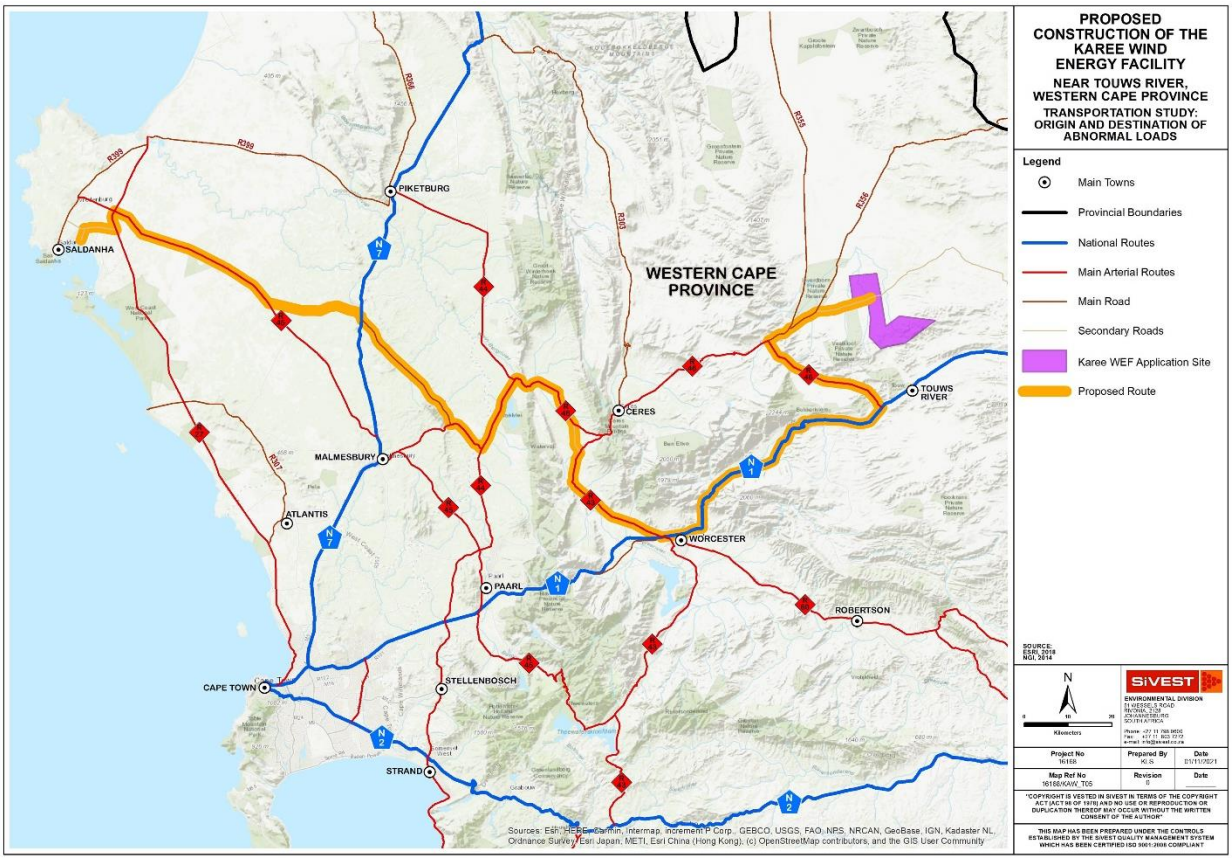


Figure 7.4 Abnormal Load Transport Route

We recommend that a more comprehensive route analysis be completed prior to construction in order to get a better understanding of the works required and the potential risks.

7.2.2 Operation & Maintenance (O&M)

The Karee WEF has been designed with a 20 – 25 year lifespan and could possibly be increased if financially viable. The O&M during the 20 - 25 year period will typically be in the form of a small general maintenance team during the O&M period. Any maintenance required include inter alia a new nacelle, blade or generator, which will classify as an abnormal load and the traffic generated by this will be negligible in the greater scheme of the development. The largest contributor of traffic in this phase will therefore only comprise of employees commuting to and from the site.

We assume, a maximum number of ±30 employees will be employed during the 20 – 25 year life span of the project. It is therefore assumed that the employees will commute together and hence a total of ±10 additional trips will be added onto the existing road network during the morning and afternoon period. In addition to the staff commuting will be the collection of waste and sanitation. These are assumed to generate an additional ±2 vehicles / week onto the existing road network and therefore the sum of this phase will have a low to negligible impact.

The specific traffic needs for this phase of the development;

- Reduction in vehicle speed;
- Reduction in dust generated;
- Adequate law enforcement;
- Appropriate, timely and high quality maintenance of gravel roads;
- Implementation of pedestrian safety initiatives;
- Regular maintenance of farm fences and access cattle grids; and
- Continuous engagement with the Western Cape Department of Transport & Public Works.

7.2.3 Decommissioning Phase

Decommissioning of the Karee WEF and grid infrastructure will generate considerably less trips than the construction phase. It is estimated that the decommissioning phase will generate an additional ± 10 vehicles / day over a period of 12 – 18 months. The material removed will be transported back to a suitable recycling depot. The impact of this phase will therefore be low.

The specific traffic needs for this phase of the development;

- Reduction in vehicle speed;
- Reduction in dust generated;
- Adequate law enforcement;
- Appropriate, timely and high quality maintenance of gravel roads;
- Implementation of pedestrian safety initiatives;
- Regular maintenance of farm fences and access cattle grids; and
- Continuous engagement with the Western Cape Department of Transport & Public Works.

7.3 Karee WEF - Access

The Karee WEF will be made up of three farms; Sadawa No. 239 to the north, Tierberg Kloof No. 258 in the centre and Voetpads Kloof No. 253 to the south. Road DR01475 bisects a portion of the Sadawa farm while running adjacent to the northern boundary of the Tierberg Kloof farm with existing access points emanating from Road DR01475.

Road DR01475 is classified as a Class R4a in terms of the RCAM Classification – Residential Access Collectors with an average road reserve width of 20m and has a gravel surface of 5.0m wide with a design speed of 80km/h.

Existing access points are located along Road DR01475 and have been indicated in the images below. The existing access positions are however located in positions where the recommended sight distance of 240m cannot be obtained. We therefore recommend that the development access be moved to Km 72.80 as shown in **Figure 7.5 - Figure 7.7** below. It is intended that this access point be a priority controlled intersection with Road DR01475 being free flowing and access points to the north and south of the facility being controlled.

Upgrades to the access @ Km 72.80 will be required and approval will need to be obtained from the WCDTPW.

Figure 7.5 Existing Road OP06121 – West Approaching

Figure 7.6 Existing Road OP06121 –East Approaching

Figure 7.7 Proposed Access from Road DR01475

7.4 External Road Upgrades

A large majority of the additional traffic generated from the Karee WEF and associated grid infrastructure can be accommodated on the existing road network and include both normal and abnormal vehicles. Minor modifications are however required based on the larger WTG's planned for these facilities and will need to be simulated once additional information becomes available.

7.5 Design Considerations

Based on our recent discussions with the WCDTPW, new Land Use applications must be sent for approval to their department with the proposed new / upgraded access positions. As part of the application, the expected traffic during construction and the O&M phase, available sight distances including photographs and the affected stormwater structures are to be included in the application. Both the OEM's and the WCDTPW minimum requirements will need to be taken into account during this stage.

Standard access requirements from the WCDTPW has been included in **Figure 7.8** and **Figure 7.9** below.

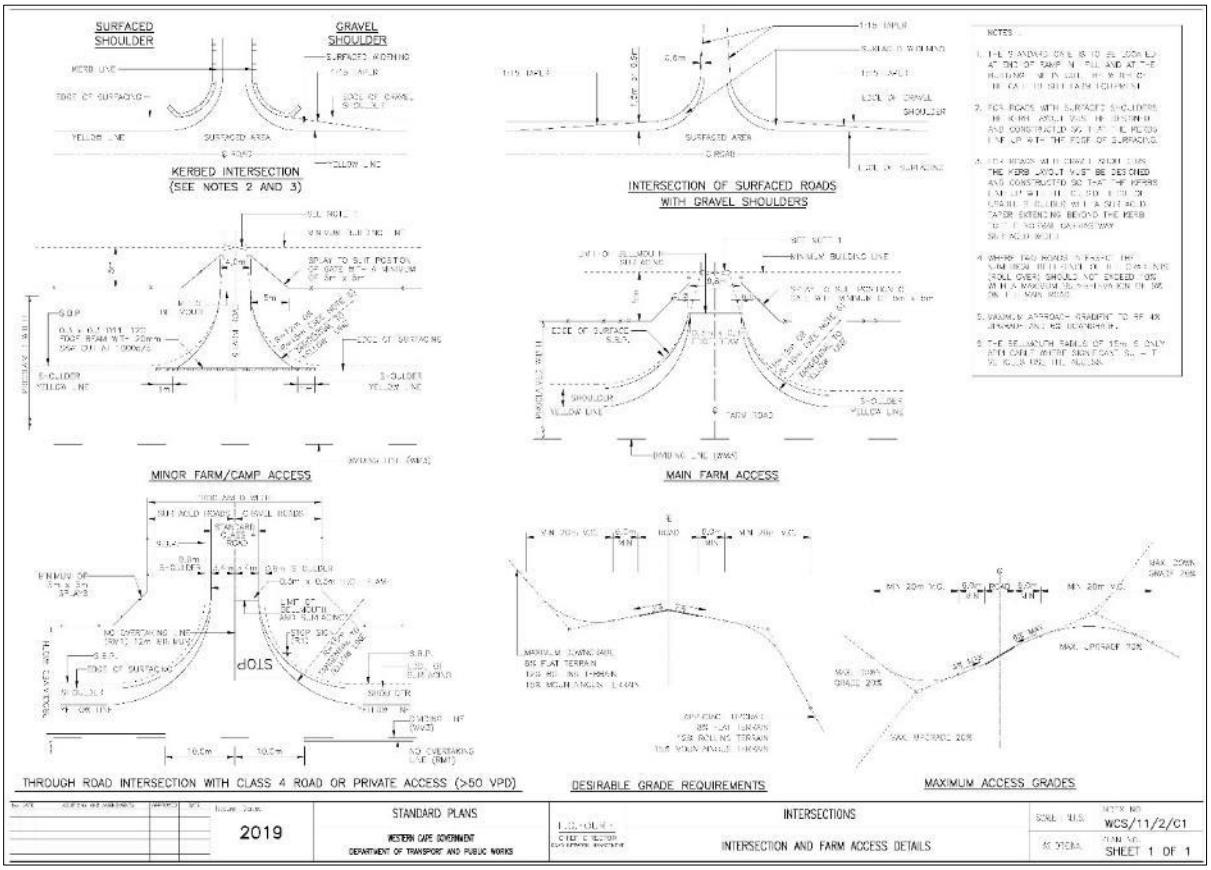


Figure 7.8 Typical Intersection and Farm Access Detail

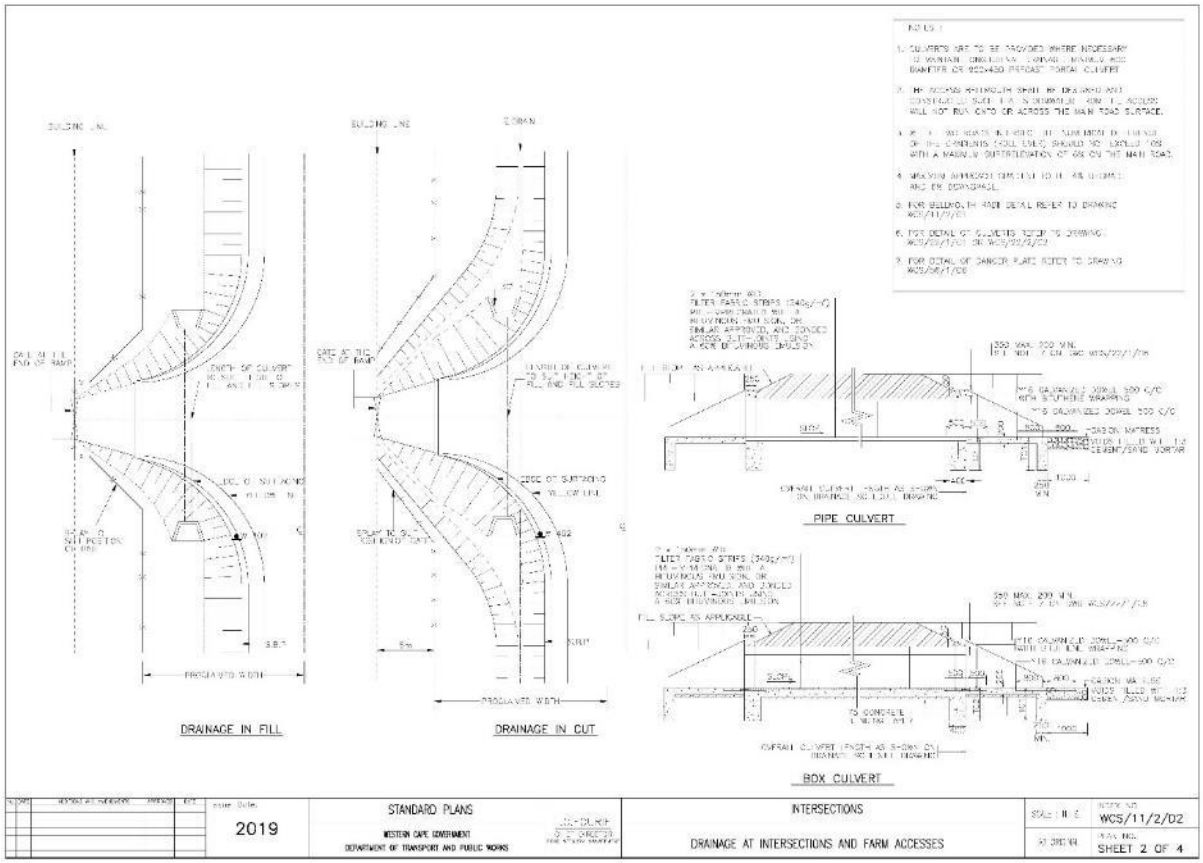


Figure 7.9 Typical Drainage at Intersections and Farm Access

Typical cross sections for provincial gravel roads have been indicated in **Figure 7.10** below and need to take into account the minimum requirements from OEM's.

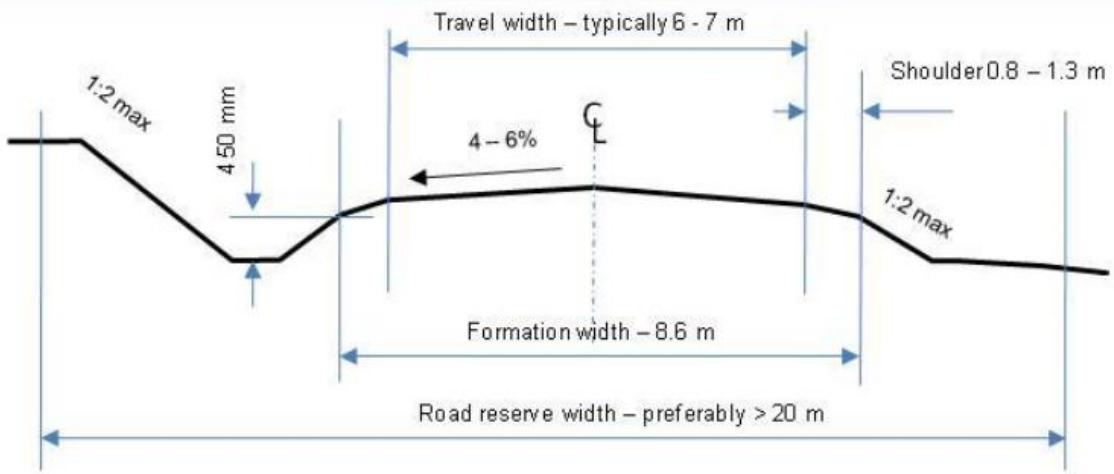


Figure 7.10 Typical Provincial Gravel Road Cross Section

The specific design considerations for this development are:

- Reduction in vehicle speed;
- Adequate law enforcement;
- Implementation of pedestrian safety initiatives;

- Regular maintenance of farm fence, access cattle grids;
- Adequate road signage as per the South African Road Traffic Sign Manual (SARTSM) latest edition;
- Possible use of an approved dust suppressant techniques;
- Appropriate, timely and high quality maintenance of existing gravel roads in terms of TRH20;
- Design and construction of new gravel roads in terms of TRH20;
- Continuous engagement with OEM and Abnormal Load specialist; and
- Continuous engagement with the Western Cape Department of Transport & Public Works.

We should however note that the figures indicated above are indicative figures as many of the components are still at design stage and will only be confirmed closer to time of construction.

8. INTERNAL LAYOUTS

The layout of internal infratructure is such that the impact to the environment is kept to a minimum. We therefore propose that a central access to the facility be considered and that all other temporary and permanent builings and construction infrastructure be located close to the access point. Refer **Figure 8.1** for the proposed layout.

All internal access roads should be designed to have a minimum impact to the environment and thus are in most cases parallel to the contours and keep drainage line crossings to a minimum. The use of roads perpendicular to the contours for long sections should be avoided, as the risk of possible erosion is increased. Existing gravel roads should also be used to reduce the overall impact on the environment.

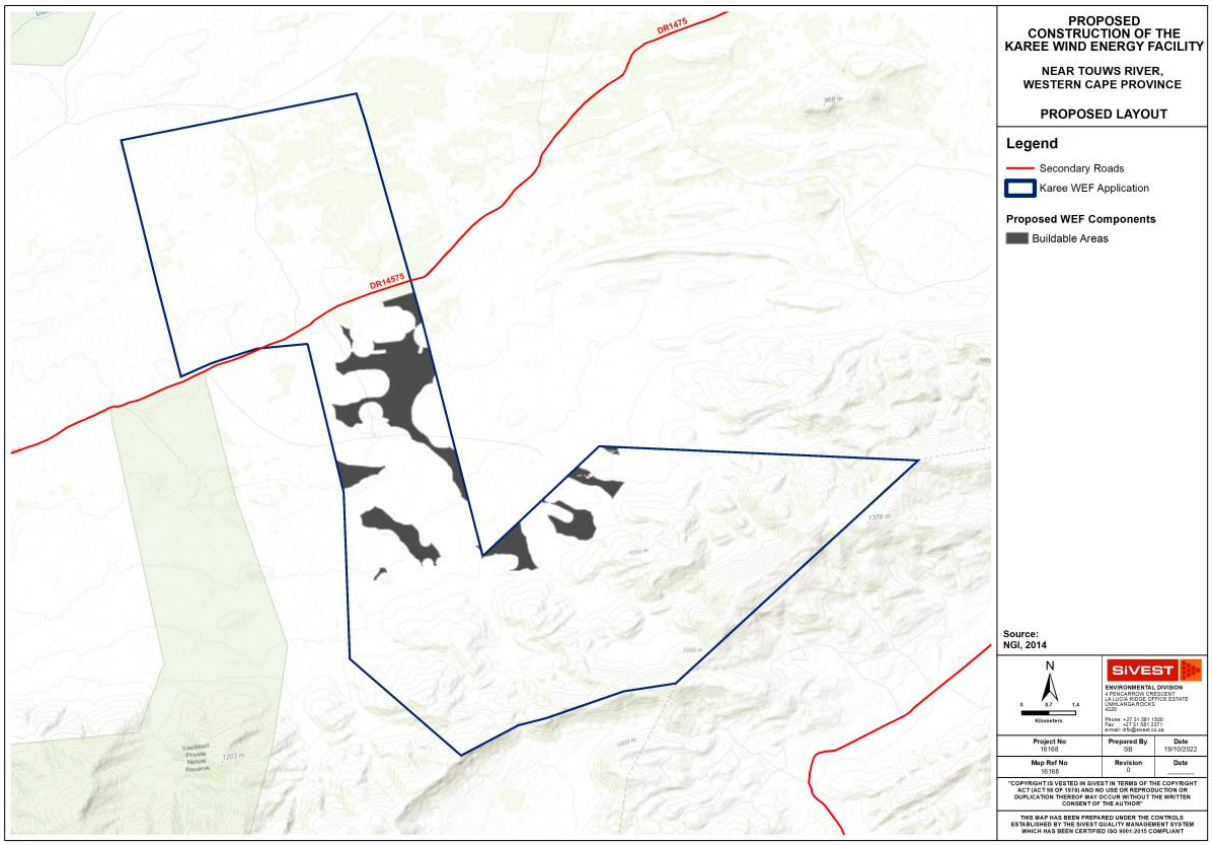


Figure 8.1 Karee WEF – Proposed Layout

An internal network of minimum 5m wide gravel roads will connect all the WTG and ancillary equipment to each other. The roads will have a horizontal and vertical alignment to accommodate vehicles and more specifically abnormal vehicles intended to use these roads for the delivery of the WTG equipment. A typical intersection and horizontal alignment would consist of radii and clearances similar to the requirements in **Figure 8.2Error! Reference source not found.**. We note that the larger WTG's are planned for these facilities and will need to be simulated once additional information becomes available.

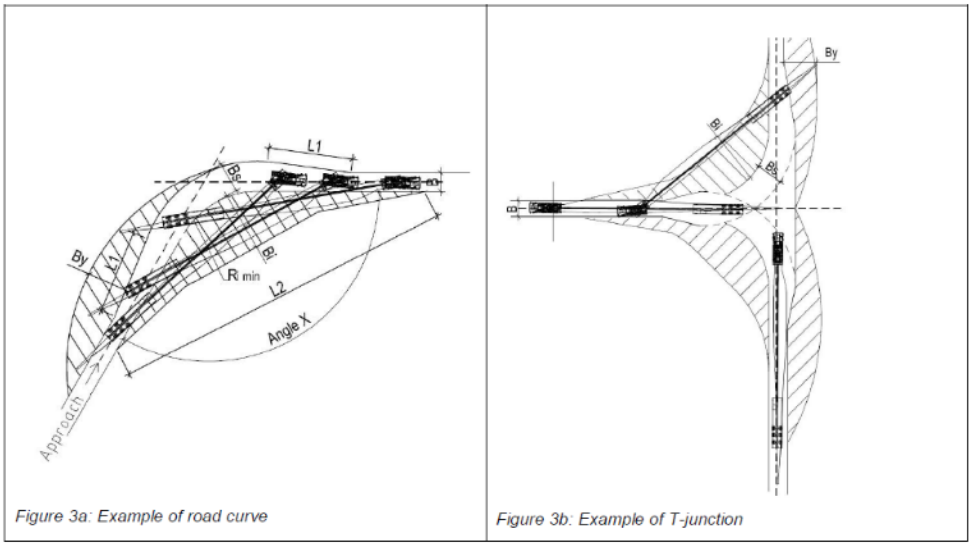


Figure 3a: Example of road curve

Figure 3b: Example of T-junction

The hatched areas on the figure are areas that the Employer shall clear of obstacles and level to allow overhang.

Angle X	$R_{i\,min}$	B_y	B_s	B_i	L_1	L_2
160°	14 m	4 m	4,5 m	3 m	10 m	35 m
120°	28 m	6 m	5 m	5 m	12 m	40 m
90°	38 m	7 m	7 m	6 m	18 m	52 m

Figure 8.2 Typical Horizontal Design Standards for a 101m Rotor Diameter

9. GRID CONNECTION

Two alternative locations are being suggested for the onsite substation as well as two alternative grid line routings. The proposed grid connection infrastructure (**Figure 9.1**) to serve the Karee WEF will include the following components:

- One (1) new 11-33/132kV on-site substation, situated on a site of occupying an area of up to approximately 25ha. The proposed substation will be a step-up substation and will include an Eskom portion and an IPP portion, hence the substation has been included in both the BA for the WEF and in the BA for the grid infrastructure to allow for handover to Eskom. The applicant will remain in control of the low voltage components (i.e. 33kV components) of the substation, while the high voltage components (i.e. 132kV components) of this substation will likely be ceded to Eskom shortly after the completion of construction; and
- One (1) new 132kV overhead power line connecting the on-site substation to Kappa Substation and thereby feeding the electricity into the national grid. Power line towers being considered for this development include self-supporting suspension monopole structures for relatively straight sections of the line and angle strain towers where the route alignment bends to a significant degree. Maximum tower height is expected to be approximately 25m.

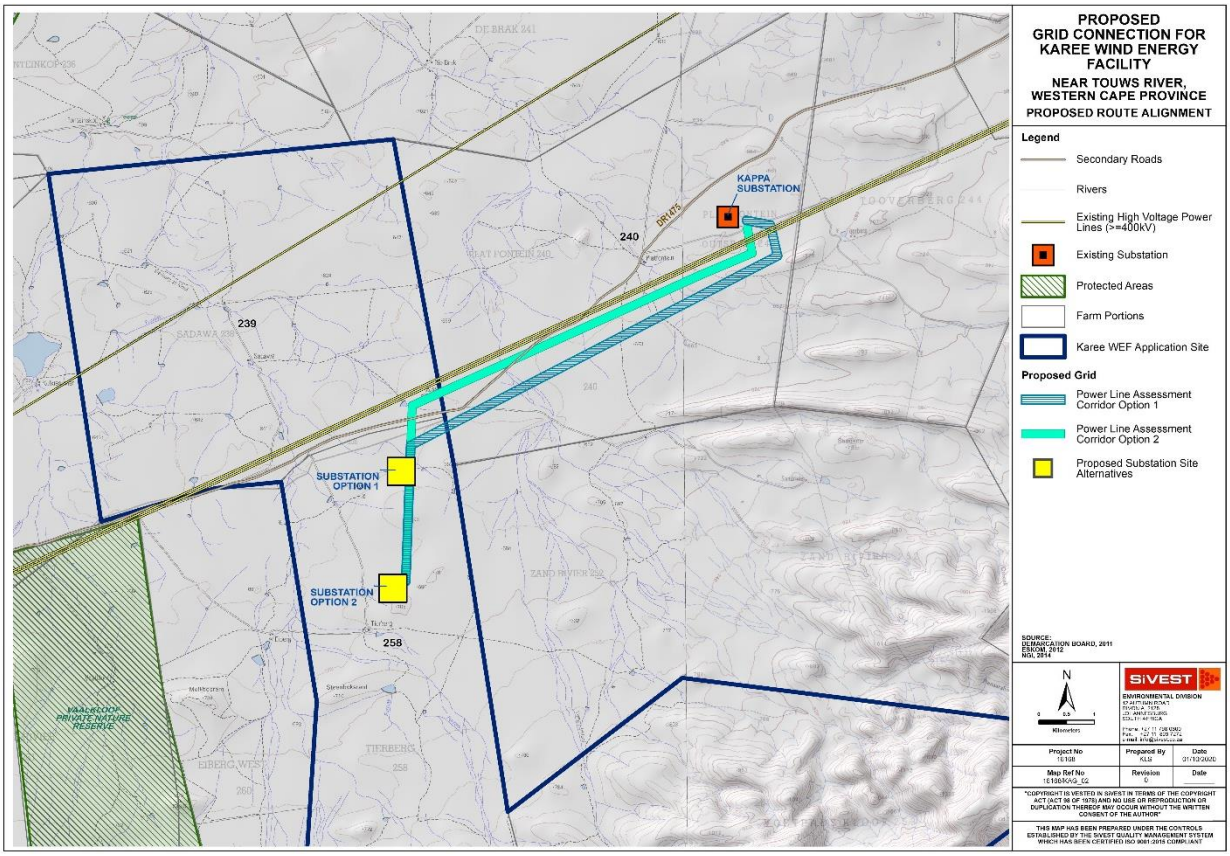


Figure 9.1 Proposed 132kV Grid Connection Alignment

10. IMPACT RATING ASSESSMENT

The 'Impact Rating System' takes into account the nature, scale and duration of the effects on the environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages:

- Planning
- Construction
- Operation
- Decommissioning

A rating points-based system is applied to the potential impacts on the environment and includes objective evaluations of the mitigation of the impact. These impacts can be found in **Table 10.1** below.

In summary, all impacts were classified as 'Medium to Low' impacts with a large majority of the impacts changing to 'Low' after the implementation of suitable mitigation measures. This rating is applicable to all alternatives considered.

Table 10.1 Karee WEF & Grid Connection – Impact Rating Table

KAREE WIND ENERGY FACILITY																				
ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMEND`ED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Construction Phase																				
Additional Traffic Generation	Increase in Traffic	2	4	1	2	1	3	30	-	Medium	• Ensure staff transport is done in the 'off peak' periods and by bus. • Stagger material, component and abnormal loads delivery •Construction of an on-site batching plant and tower construction to reduce trips.	2	4	1	2	1	2	20	-	Low
	Increase of Incidents with pedestrians and livestock	2	4	2	4	1	2	26	-	Medium	• Upgrade of existing / new access points • Reduction in speed of vehicles • Adequate enforcement of the law • Implementation of pedestrian safety initiatives • Regular maintenance of farm fences & access cattle grids • Construction of an on-site batching plant and tower construction to reduce trips.	2	3	2	4	1	1	12	-	Low
	Increase in Dust from gravel roads	2	3	2	2	1	2	20	-	Low	• Upgrade of existing / new access point • Reduction in speed of the vehicles • Construction of gravel roads in terms of TRH20 • Implement a road maintenance program under the auspices of the respective transport department. • Possible use of an approved dust suppressant techniques • Construction of an on-site batching plant and tower construction to reduce trips.	2	3	2	2	1	2	20	-	Low
	Increase in Road Maintenance	2	3	2	2	2	2	22	-	Low	• Implement a road maintenance program under the auspices of the respective transport department. • Construction of an on-site batching plant to reduce trips.	2	3	2	2	1	2	20	-	Low
Abnormal Loads	Additional Abnormal Loads	3	2	1	2	1	1	9	-	Low	• Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods or stagger delivery. • Adequate enforcement of the law	3	2	1	2	1	1	9	-	Low
Internal Access Roads	Increase in Dust from gravel roads	1	4	1	1	1	2	16	-	Low	• Enforce a maximum speed limit on the development • Appropriate, timely and high quality maintenance required in terms of TRH20 • Possible use of an approved dust suppressant techniques	1	3	1	1	1	2	14	-	Low
	New / Larger Access points	1	4	1	2	1	1	9	-	Low	• Adequate road signage according to the SARTSM • Approval from the respective roads department	1	4	1	2	1	1	9	-	Low
Operational Phase																				

Additional Traffic Generation	Increase in Traffic	2	1	1	2	3	1	9	-	Low	• The increase in traffic for this phase of the development is negligible and will not have a significant impact	2	1	1	2	3	1	9	-	Low
	Increase of Incidents with pedestrians and livestock	2	1	1	2	3	1	9	-	Low	• The increase in traffic for this phase of the development is negligible and will not have a significant impact	2	1	1	2	3	1	9	-	Low
	Increase in Dust from gravel roads	2	1	1	2	3	1	9	-	Low	• The increase in traffic for this phase of the development is negligible and will not have a significant impact	2	1	1	2	3	1	9	-	Low
	Increase in Road Maintenance	2	1	1	2	3	1	9	-	Low	• The increase in traffic for this phase of the development is negligible and will not have a significant impact	2	1	1	2	3	1	9	-	Low
Abnormal Loads	Additional Abnormal Loads	3	1	1	2	3	1	10	-	Low	• The increase in traffic for this phase of the development is negligible and will not have a significant impact	3	1	1	2	3	1	10	-	Low
Internal Access Roads	New / Larger Access points	1	1	1	2	3	1	8	-	Low	• Adequate road signage according to the SARTSM	1	1	1	2	3	1	8	-	Low
Decommissioning Phase																				
Additional Traffic Generation	Increase in Traffic	2	4	1	2	1	3	30	-	Medium	• Ensure staff transport is done in the 'off peak' periods and by bus. • Stagger material, component and abnormal loads delivery	2	4	1	2	1	2	20	-	Low
	Increase of Incidents with pedestrians and livestock	2	4	2	4	1	2	26	-	Medium	• Reduction in speed of vehicles • Adequate enforcement of the law • Implementation of pedestrian safety initiatives • Regular maintenance of farm fences & access cattle grids	2	3	2	4	1	1	12	-	Low
	Increase in Dust from gravel roads	2	3	2	2	1	2	20	-	Low	• Reduction in speed of the vehicles • Appropriate, timely and high quality maintenance required in terms of TRH20 • Possible use of an approved dust suppressant techniques • Implement a road maintenance program under the auspices of the respective transport department. • Construction of an on-site batching plant and tower construction to reduce trips.	2	3	2	2	1	2	20	-	Low
	Increase in Road Maintenance	2	3	2	2	2	2	22	-	Low	• Implement a road maintenance program under the auspices of the respective transport department.	2	3	2	2	1	2	20	-	Low
Abnormal Loads	Additional Abnormal Loads	3	2	1	2	1	1	9	-	Low	• Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods or stagger delivery. • Adequate enforcement of the law	3	2	1	2	1	1	9	-	Low
Internal Access Roads	Increase in Dust from gravel roads	1	4	1	1	1	1	8	-	Low	• Enforce a maximum speed limit on the development• Appropriate, timely and high quality maintenance required in terms of TRH20• Possible use of an approved dust suppressant techniques	1	3	1	1	1	2	14	-	Low
	New / Larger Access points	1	4	1	2	1	1	9	-	Low	• Adequate road signage according to the SARTSM • Approval from the respective roads department	1	4	1	2	1	1	9	-	Low
Cumulative																				

Additional Traffic Generation	Increase in Traffic	2	4	1	2	1	4	40	-	Medium	• Ensure a large portion of vehicles traveling to and from the proposed development travels in the 'off peak' periods or by bus. • Construction of an on-site batching plant and tower construction to reduce trips. • Coordination between all developers in the area	2	4	1	2	1	3	30	-	Medium
	Increase of Incidents with pedestrians and livestock	2	4	2	4	1	3	39	-	Medium	• Reduction in speed of vehicles • Adequate enforcement of the law • Implementation of pedestrian safety initiatives • Regular maintenance of farm fences, access cattle grids • Construction of an on-site batching plant and tower construction to reduce trips. • Coordination between all developers in the area	2	3	2	4	1	2	24	-	Medium
	Increase in Dust from gravel roads	2	3	2	2	1	4	40	-	Medium	• Reduction in speed of the vehicles • Construction of gravel roads in terms of TRH20 • Implement a road maintenance program under the auspices of the respective transport department. • Possible use of an approved dust suppressant techniques • Construction of an on-site batching plant and tower construction to reduce trips. • Coordination between all developers in the area	2	3	2	2	1	2	20	-	Low
	Increase in Road Maintenance	2	3	2	2	2	2	22	-	Low	• Implement a road maintenance program under the auspices of the respective transport department. • Construction of an on-site batching plant and tower construction to reduce trips. • Coordination between all developers in the area	2	3	2	2	2	2	22	-	Low
Abnormal Loads	Additional Abnormal Loads	3	2	1	2	1	4	36	-	Medium	• Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods. • Adequate enforcement of the law • Coordination between all developers in the area	3	2	1	2	1	2	18	-	Low
Internal Access Roads	Increase in Dust from gravel roads	1	4	1	1	1	3	24	-	Medium	• Enforce a maximum speed limit on the development • Appropriate, timely and high quality maintenance required in terms of TRH20 • Possible use of an approved dust suppressant techniques	1	3	1	1	1	2	14	-	Low
	New / Larger Access points	1	4	1	2	1	2	18	-	Low	• Adequate road signage according to the SARTSM • Approval from the respective roads department	1	4	1	2	1	1	9	-	Low

11. CUMULATIVE IMPACT ASSESSMENT

SiVEST undertook every effort to obtain the information (including specialist studies, BA / EIA / Scoping and EMPr Reports) for the surrounding developments within 35 km of the proposed WEF facility and associated grid infrastructure, however many of the documents are not currently, publicly available. To this extent, the information that could be obtained from the surrounding, planned renewable energy developments was taken into account as part of the cumulative impact assessment. Eleven (11) renewable energy projects were identified within a 35 km radius of the proposed development as shown in **Table 11.1** below. The renewable energy developments considered as part of this Transportation Study are as follows:

Table 11.1 Proposed Renewable Energy developments within a 35km radius.

Applicant	Project	Technology	Capacity	Status of Application / Development
Oya Energy (Pty) Ltd	Oya Energy Facility	Hybrid (Solar / Fuel-Based)	305MW	EIA Process underway
Brandvalley Wind Farm (Pty) Ltd	Brandvalley WEF	Wind	140MW	Approved
Kudusberg Wind Farm (Pty) Ltd	Kudusberg WEF	Wind	325W	Approved
South Africa Mainstream Renewable Power Perdekraal West (Pty) Ltd	Perdekraal West WEF & Associated Grid Connection Infrastructure	Wind	150M	Approved
South Africa Mainstream Renewable Power Perdekraal East (Pty) Ltd	Perdekraal East WEF & Associated Grid Connection Infrastructure	Wind	110MW	Operational
South Africa Mainstream Renewable Power Developments (Pty) Ltd	Patatskloof WEF	Wind	200MW	EIA Process underway
Rietkloof Wind Farm (Pty) Ltd	Rietkloof WEF	Wind	186MW	Approved
ENERTRAG SA (Pty) Ltd	Tooverberg WEF & Associated Grid Connection Infrastructure	Wind	140MW	Approved
Witberg Wind Power (Pty) Ltd	Witberg WEF	Wind	120MW	Approved
Montgue Road Solar (Pty) Ltd	Montgue Road Solar	Solar PV	75MW	Approved
Touwsrivier Solar	Touwsrivier Solar	Solar PV	36MW	Approved

The information obtained for other planned renewable energy developments in the surrounds is indicated in **Figure 11.1** below.

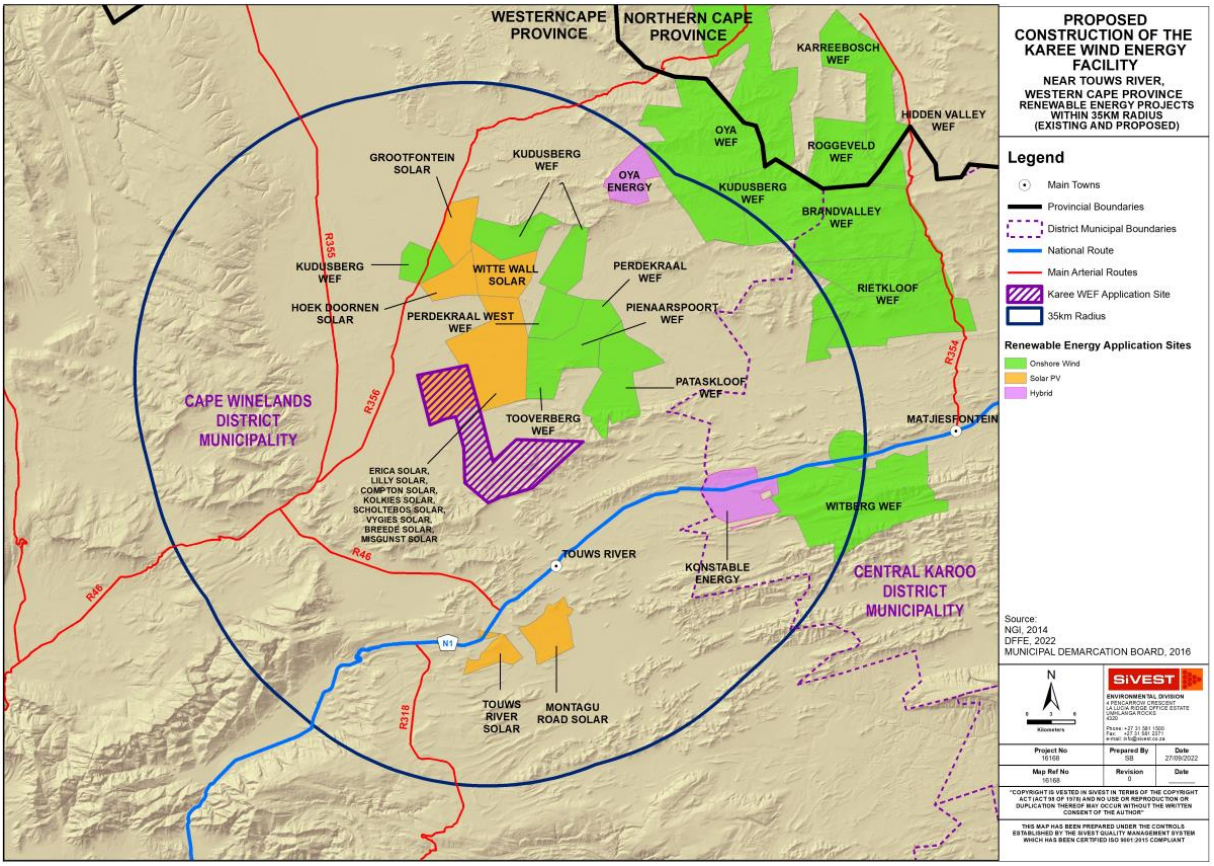


Figure 11.1 Proposed Renewable Energy Developments within a 35km radius

Based on the above this Transportation Study has taken the cumulative impacts into consideration and the impacts were further assessed in **Section 10** above.

12. COMPARITIVE ASSESSMENT OF ALTERNATIVES

Design and layout alternatives were considered and assessed as part of the Transportation Study. These include alternatives for the Construction Laydown areas, Substation locations and grid alignments. The various alternatives, as shown in **Figure 8.1** and **Figure 9.1** are described below.

Table 12.1 Comparative Assessment Key

PREFERRED	The alternative will result in a low impact / reduce the impact / result in a positive impact
FAVOURABLE	The impact will be relatively insignificant
LEAST PREFERRED	The alternative will result in a high impact / increase the impact
NO PREFERENCE	The alternative will result in equal impacts

Table 12.2 Comparative Assessment of Alternatives: WEF Infrastructure

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION SITE ALTERNATIVES		
Substation Option 1 Substation Option 2	No Preference	Will not have an effect on the transportation study
CONSTRUCTION LAYDOWN AREA SITE ALTERNATIVES		

Alternative	Preference	Reasons (incl. potential issues)
Construction Laydown Area Option 1	No Preference	Will not have an effect on the transportation study
Construction Laydown Area Option 2		
GRID CONNECTION ROUTE ALIGNMENT ALTERNATIVES		
Power Line Route Alternative Option 1	No Preference	Will not have an effect on the transportation study
Power Line Route Alternative Option 2		

12.1 Wind Energy Facility Alternatives

Design and layout alternatives will be considered and assessed as part of the BA. These include alternatives for the Substation locations and also for the construction / laydown area. The proposed site alternatives are shown in **Figure 8.1.**

12.1.1 Location Alternatives

Several key aspects played a role in determining the location of the proposed Karee WEF, Battery Energy Storage System (BESS) and shared 33/132kV on-site substation (this application) and associated 132kV Power Line development. These include resource, grid availability and capacity, environmental, competition, topography and access.

The Project Sites are micro-sited in terms of environmental sensitivities and a suitable development area identified. Thus, the development area proposed avoids sensitive environmental areas ensuring the development has the least possible impact on the land on which it will be built.

Only one Project Site was identified, however, within the development area itself, two (2) locations of the proposed 33/132kv shared on-site substation are considered. The on-site substation will be a step-up substation and will include an Independent Power Producer (IPP) portion (33kv portion/yard of the shared 33/132kv onsite substation) and an Eskom portion (132kv portion/yard of the shared 33kv/132kv onsite substation – this portion will be ceded to Eskom once the onsite substation is constructed and the necessary transfer of rights undertaken), hence the IPP portion (33kv portion/yard of the shared 33/132kv onsite substation) has been included in the WEF BA process (i.e. this application) and the Eskom portion (132kv portion/yard of the shared 33kv/132kv onsite substation) and associated 132kv overhead line, included in grid connection infrastructure BA process. This will facilitate an ease of transfer over to Eskom once the onsite substation is constructed.

12.1.2 Technology Alternatives

The choice of technology selected for the Karee WEF is based on environmental constraints and technical and economic considerations. No other technology alternatives are being considered as wind energy facilities are more suitable for the site than other forms of renewable energy due to the high wind resource.

The size of the wind turbines will depend on the development area and the total generation capacity that can be produced as a result. The choice of turbine to be used will ultimately be determined by technological and economic factors at a later stage.

12.1.3 Layout Alternatives

Layout alternatives have been considered and assessed as part of the BA process. The alternatives which have been considered and assessed as part of the grid connection infrastructure application include two (2) substation site alternatives (as discussed above) and two (2) power line corridor route

alignment alternatives. All alternatives have been comparatively assessed by the respective specialists and assessed against the 'no-go' alternative (i.e. status quo).

12.1.4 No-Go Alternative

The 'no-go' alternative is the option of not undertaking the proposed WEF infrastructure project. Hence, if the 'no-go' option is implemented, there would be no development. This alternative would result in no environmental impacts from the proposed project on the site or surrounding local area. It provides the baseline against which other alternatives are compared and will be considered throughout the report.

12.2 Grid Alternatives

The grid connection infrastructure proposals include two (2) substation site alternatives, each of which are 25 hectares in extent, and two (2) power line route alignment alternatives (**Figure 9.1**). These alternatives will be considered and assessed as part of the BA process and will be amended or refined to avoid identified environmental sensitivities.

12.2.1 Route Alternatives

All power line route alignments will be assessed within a 150m wide assessment corridor (75m on either side of power line).

Two (2) grid corridors have been identified for the 132kv overhead line and 132kv portion/yard of the shared 33kv/132kv onsite substation. These are being assessed in a separate Grid Infrastructure BA Process:

- Option 1: The line from the 132kv portion/yard of the 33/132kv onsite substation moves in a north easterly direction for about 7.5 km, then turns sharply in a north north westerly directly for about 0.5km and then turns left for about 0.5km in a west north westerly direction before terminating at the Kappa MTS. The associated grid connection route to the Kappa Main Transmission Substation is shorter i.e. approximately 8.5km – 10.5km in length (Preferred).
- Option 2: The line from the 132kv portion/yard of the 33/132kv onsite substation moves in a northerly direction for about 3.2km, turning right in a north easterly direction for about 6.7 km and then left for about 0.5km in a northerly direction before terminating at the Kappa MTS. The associated grid connection route to the Kappa Main Transmission Substation is slightly longer i.e. approximately 10.4km to 11.4km in length.

Power line corridors are being assessed to allow flexibility when determining the final route alignment. As mentioned, the power line corridors which are being assessed are up to approximately 300m wide (150m on either side of power line) to allow for flexibility to route the power line within the assessed corridor. Based on the specialist assessments, a few potentially sensitive and/or 'no-go' areas have been identified within the application site. These areas were used to inform the development area for the substation within the application site as well as the routing of the power line corridors. The identified sensitive / 'no-go' areas were also used to perform a comparison of substation site alternatives and the route alternatives. The substation site alternatives and power line route alternatives and results of the comparative assessment of alternatives have been discussed in more detail below.

12.2.2 No-Go Alternative

The 'no-go' alternative is the option of not undertaking the proposed WEF and / or grid connection infrastructure projects. Hence, if the 'no-go' option is implemented, there would be no development. This

alternative would result in no environmental impacts from the proposed project on the site or surrounding local area. It provides the baseline against which other alternatives are compared and will be considered throughout the report.

13. CONCLUSIONS AND IMPACT STATEMENT

The main objective of the 'Transportation Study' is to determine the impact/s the proposed Karee WEF development and associated grid infrastructure will have on the immediate and greater area with respect to transportation. The development, is located in a rural part of the Western Cape Province, with the existing road network able to provide access to the development. A number of other renewable energy developments have already been completed or are in the process of being completed in the immediate area.

The construction phase or Balance of Plant (BoP) phase of this development will typically generate the highest number of additional vehicles. Of these additional vehicles, ±57 trips / hour will occur in the morning and afternoon outside of the peak period, while ±4 trips / hour will occur during the midday peak for construction material and abnormal loads. The impact will however be temporary and are considered to be nominal if adequately mitigated. During the operation phase, it is expected that the facility will accommodate ±30 employees and generate an additional ±10 trips / day in the morning and afternoon peak period. This impact is considered to be nominal.

- In conclusion;
    - The Karee Wind Energy Farm consists of one BA application while the Grid connection infrastructure will be undertaken as a separate BA application.
    - A new access position on Road DR01475 is proposed @ Km 72.80.
    - All external road upgrades require approval and a wayleave application from the Western Cape Department of Transport & Public Works prior to work commencing.
    - Mitigation measures to be included in the construction / BoP phase:
        - Ensure staff transport is done in the 'Off Peak' period and by bus to reduce impact in the peak periods;
        - Stagger material, component and abnormal loads deliveries;
        - Adequate road signage on all external roads carrying development traffic according to the South African Road Traffic Sign Manual (SARTSM);
        - Reduction in speed of vehicles;
        - Adequate enforcement of the law;
        - Implementation of pedestrian safety initiatives;
        - Regular maintenance of farm fences & access cattle grids;
        - Construction of gravel roads in terms of Technical Recommendations for Highways (TRH20);
        - Implement a road maintenance program under the auspices of the respective transport department; and
        - Possible use of an approved dust suppressant techniques.
    - A more comprehensive route analysis be completed prior to construction in order to get a better understanding of the works required and the potential risks.
    - The 'No Go' alternative would result in there being no transportation impacts.
    - No fatal flaws or preferences were identified for any of the proposed site alternatives, construction laydown areas, substation locations or Power line routes.
    - No environmentally sensitive areas have been identified and therefore no areas are to be avoided from a Transportation perspective.

- Impact Statement;

- With reference to this report, associated assessment and the findings made within, it is SiVEST's opinion that the Karee Wind Energy Facility and associated grid infrastructure will have a nominal impact on the existing traffic network. The project is therefore deemed acceptable from a transport perspective, provided the recommendations and mitigations measures in this report are implemented, and hence the Environmental Authorisations (EAs) should be granted for the BA applications.

14. REFERENCES

KZN Transport – *Concrete Causeway Details (1996)*

South African National Roads Agency Limited – *Drainage Manual (5th Edition)*

American Association of State Highway Transportation Officials - *Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400) (2001)*

Technical Recommendations for Highways (TRH11) – *Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads (7th Edition - 2000)*

Technical Recommendations for Highways (TRH17) – *Geometric Design of Rural Roads (1988)*

Technical Recommendations for Highways (DRAFT-TRH20) – *Unsealed Roads: Design, Construction and Maintenance (2013)*

Technical Recommendations for Highways (TRH26) – *South African Road Classification and Access Management Manual (2012)*

Western Cape Government Department Transport and Public Works – *Road Network Information System*

Western Cape Government Department Transport and Public Works – *Gravel Roads Manual*

APPENDIX A: SPECIALIST CURRICULUM VITAE

APPENDIX A: CURRICULUM VITAE

Name	Ntuthuko Hlanguza
Profession	Civil Engineer
Name of Firm	SiVEST SA (Pty) Ltd
Present Appointment	Professional Civil Engineer SiVEST Civil Engineering Division
Years with Firm	7 years
Nationality	South African

Education

- Maritzburg College (2004): Grade 12 with Distinction

Professional Qualifications

- BSc.Eng (Civil) - University of KwaZulu-Natal (2014)
- Post Graduate Certificate in Energy Efficiency and Sustainability – University of Cape Town (2020)
- Professional Engineer (ECSA) – Registration No. 202202263

Membership in Professional Societies

- Engineering Council of South Africa (ECSA) – Pr Eng (Reg No. 202202263)
- South African Institution of Civil Engineering (SAICE)

Employment Record

Feb 2015 – current	SiVEST SA (Pty) Ltd – Civil Engineer
Dec 2013 – Jan 2014	Naidu Consulting, Durban – Student Engineer

Experience Overview

Ntuthuko is a Professional Civil Engineer with key experience in roads and transportation, water, sanitation, earthworks and construction monitoring. His achievements include SI instructor to junior students at UKZN and chairperson of UKZN's student chapter of the South African Institution for Civil Engineering (SAICE-UKZN).

Fields of Specialisation

- Engineering Feasibility Studies
- Road Geometrics and Pavement Design
- Stormwater Management
- Water Supply and Reticulation
- Sewer Reticulation
- Bulk Earthworks
- Construction Monitoring and Administration

Project Experience (by Sector)

<u>RENEWABLE ENERGY</u>

- Transportation Studies for Proposed Solar and Wind Energy Facilities
- Traffic Impact Assessments for Proposed Solar and Wind Energy Facilities
- Glint & Glare Assessments for Proposed Solar and Wind Energy Facilities

- Stormwater Management Plans for Proposed Solar and Wind Energy Facilities

ROADS AND STORMWATER

- Traffic Planning, Design and Contract Administration of Urban Roads (Class 3-5 roads)
- Traffic Planning, Design and Contract Administration of Internal Roads, Access Roads and Intersections of Large-Scale Residential Developments
- Design and Construction Monitoring of Bulk Stormwater Infrastructure
- Planning and Design of Storm Attenuation Features
- Undertaking of Flood Risk Assessments and Stormwater Management Plans

WATER AND SANITATION

- Feasibility Studies, Planning and Design of Community Water Supply Schemes
- Feasibility Studies, Planning and Design of Bulk Water Transfer Schemes
- Design of Water and Sanitation Services for Education Facilities
- Design of Water and Sanitation Services for Provincial Hospitals
- Design of Water and Sanitation Services for Residential, Commercial and Industrial Developments

APPENDIX B: SPECIALIST DECLARATION

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