Appendix G.9

TRAFFIC ASSESSMENT

iWink Consulting
Traffic & Transport Engineering
Road Safety

PROPOSED VERKYKERSDORP WIND ENERGY FACILITY CLUSTER

GROOTHOEK WIND ENERGY FACILITY

FREE STATE PROVINCE

Scoping Phase: Traffic Impact Assessment

September 2024
Issue 01

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EXECUTIVE SUMMARY

This report serves as the Traffic Impact Assessment (TIA) aimed at determining the traffic impact at Scoping Phase level of the proposed Groothoek Wind Energy Facility (WEF) to be located approximately 40 km south-west of Harrismith in the Free State Province of South Africa. The site will accommodate up to 55 wind turbines including associated support structures and facilities to allow for the generation and evacuation of electricity.

Feasible accessibility of the site was assessed in line with required sight lines, access spacing and any landownership limitations. To ensure sight line are kept, it is advised allow for a setback distance of any obstructions (i.e., cutting back of vegetation/trees).

It is expected that non-motorised transportation (NMT) is a dominant mode of transportation in the in the environment of the site, with private cars and minibus/taxis being the second-most used mode of transport, followed by buses. Currently, there are no known future planned public transport facilities in the vicinity of the site. However, generally the developer of a renewable energy project will provide shuttle buses for workers during the construction phase.

The highest trip generator for the site is expected to be the construction phase. The actual construction stage peak hour trips are dependent on the construction period, construction programming, material availability, component delivery, abnormal load permitting, etc. The decommissioning phase is expected to generate similar trips as the construction phase. The traffic impact during the operational phase is considered low.

For the construction and decommissioning phases, the impact expected to be generated by the vehicle trips is an increase in traffic and the associated noise and dust pollution. Based on the high-level screening of impacts and mitigation, the site is expected to have manageable impact.

GROOTHOEK WIND ENERGY FACILITY

1 INTRODUCTION

1.1 Project Description

Groothoek Wind Power (Pty) Ltd. is proposing the development of a commercial Wind Energy Facility (WEF) and associated infrastructure on sites located approximately 40 km south-west of the town of Harrismith in the Free State Province (see **Figure 1-1**).

The Groothoek WEF project site is located within the Phumelela Local Municipality of the Thabo Mofutsanyana District Municipality.

The project area comprises the following affected farm portions:

- Farm Schoonzicht No. 80;
- Farm Groothoek No. 89;
- Farm Kromdraai No. 273;
- Farm Kransbank No. 288;
- Farm Kranspunt No. 459; and
- Farm Van Kope No. 1319.

The Groothoek WEF is proposed to have a contracted capacity of up to 300 MW and comprise up to 55 turbines.

The site extent for Groothoek WEF is approximately 6 170 ha (see **Figure 1-1** and **Figure 1-2)**).

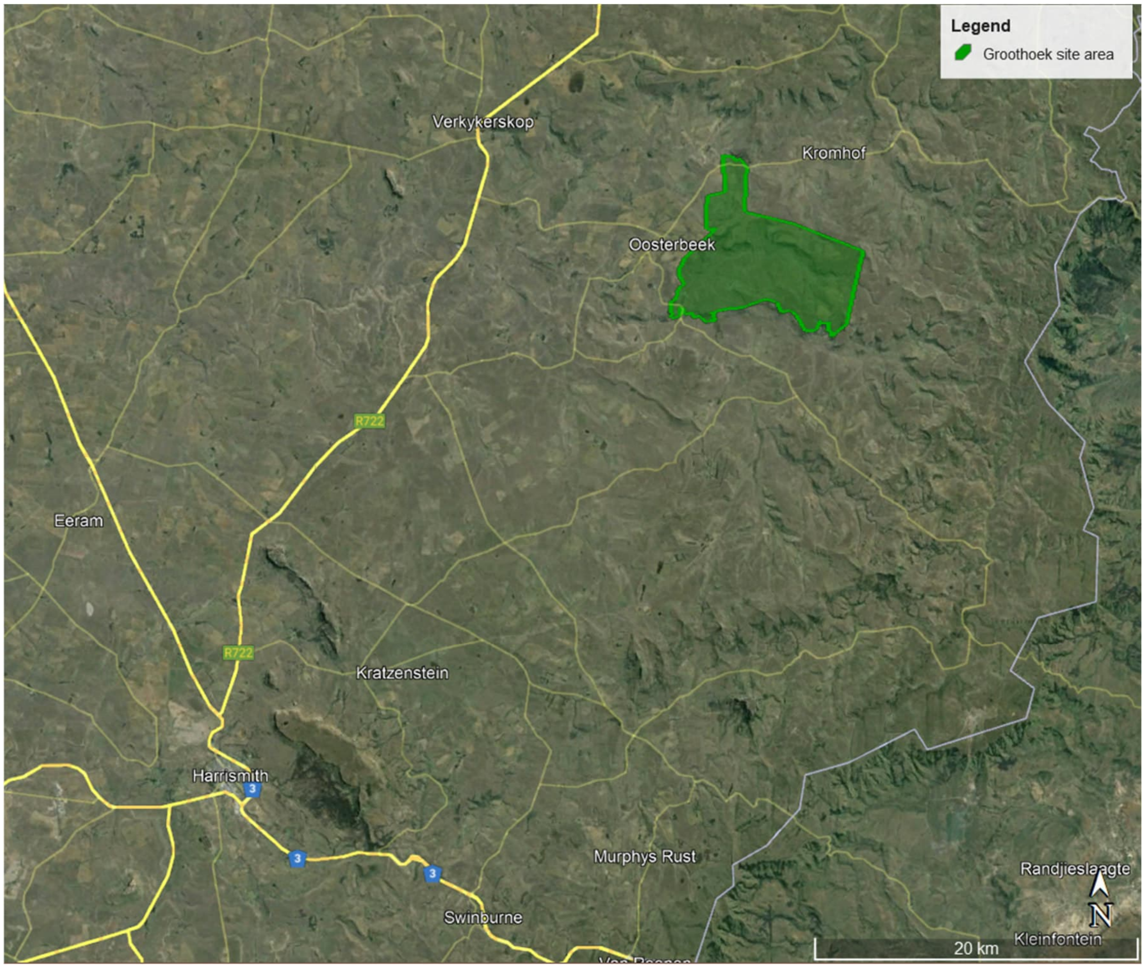

Figure 1-1: Aerial View of Groothoek WEF site location

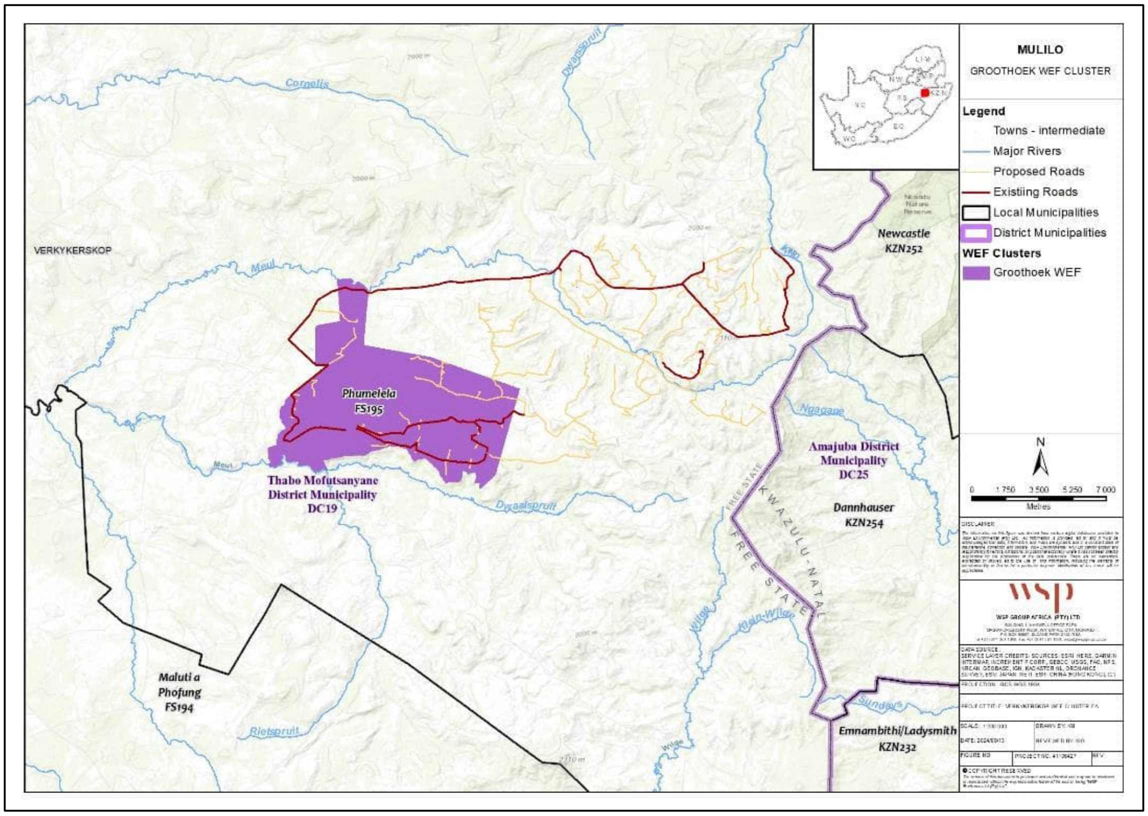

Figure 1-2: Overview of proposed Groothoek WEF development

The project details for Groothoek WEF and associated infrastructure are summarized in **Table 1-1.**

Table 1-1:Project information

Facility Name:	Groothoek Wind Energy Facility
Applicant:	Groothoek Wind Power (Pty) Ltd.
Location:	Appr. 40 km south-west of Harrismith in the Free State Province
Affected Farms:	Farm Schoonzicht No. 80; Farm Groothoek No. 89; Farm Kromdraai No. 273; Farm Kransbank No. 288; Farm Kranspunt No. 459; and Farm Van Kope No. 13193.
Extent:	~6 170 ha
Total Capacity:	Up to 300 MW
Number of turbines:	Up to 55 turbines
Turbine hub height:	Up to 140 m
Blade length:	Up to 100 m
Tower height:	~100 m
Rotor diameter:	Up to 200 m
Transformer:	One transformer to be located at the base of each turbine.
Battery Energy Storage:	Storage Capacity: 200MW (6-8 hours) Export capacity: 800MWh Lithium-ion solid state batteries The BESS will be housed in containers covering a total approximate footprint of up to 7ha.
Turbine Foundation:	Reinforced concrete to support the mounting Footprint: 700m² per turbine / 500m² for crane platform Excavation: ~4 m deep
Operations&Management:	Area of up to 1 ha.
Construction camp / laydown:	A construction camp and temporary concrete batching plant will be provided. A concrete batching plant includes silos, stockpile areas, parking and turning areas, quality test area and the batch plant itself of ~1 ha. Site office: ~4 ha / Laydown area: ~8 ha. Rehabilitation to be considered after construction.
Temporary laydown or staging area:	Temporary laydown areas, which accommodates crane hard stand area, boom erection, storage, and assembly area.
Internal Roads:	Access roads to the site and between project components inclusive of stormwater infrastructure.

	Road width of internal site roads to be an 8 m. Road length: tbc.
Powerlines:	Medium voltage (33 kV) cables/powerlines running from wind turbines to the on-site collector substation. The routing will follow existing/proposed access roads and will be buried where possible. Cabling between turbines will be underground where possible.
Grid infrastructure:	Preferably, on-site MTS. Alternatively, 20 km 132kV line off-site MTS. Tower options: double circuit. Width of corridor: 400 m wide in total.
Substation:	One 132/33kV on-site collector substation per Verkykerskop WEF facility (i.e., four substations in total) to facilitate the connection between the respective wind farm and the electricity grid. Footprint: each up to 2 ha.
Water / Electricity:	Construction period water requirement is normally around 30 kℓ per day used for road construction, hardstand compaction, concrete tower production, concrete foundations, cleaning equipment and dust suppression. It is further assumed that potable water will be sourced from the property, or from the municipality as far as possible. Water tanks can be used to provide potable water. Sanitation on site during the construction and operational phases comprises usually of: ▪ Portable toilets and conservancy/septic tanks. ▪ Wastewater to be collected at regular intervals. ▪ Transported to Municipal Wastewater Treatment Works; or ▪ Treated on site and with produce water used for dust suppression and roadworks. Electricity for construction could be obtained from temporary diesel generators and possibly small scale mobile photovoltaic units.
Site access:	via R722

1.2 Scope, Purpose, and Objectives of Specialist Report

The TIA is aimed at determining the traffic impact of the proposed land development proposal and whether such development can be accommodated by the external transportation system. The report deals with the items listed below and focuses on the surrounding road network in the vicinity of the site:

- The proposed development(s),
- The existing road network,

- Trip generation for the proposed development during the construction, operation, and decommissioning phases of the facility,
- Traffic impact of the proposed development,
- Access requirements and feasibility of access points,
- Determine a main route for the transportation of components to the proposed site,
- Determine a preliminary transportation route for the transportation of materials, equipment, and workers to site,
- Recommend alternative or secondary routes if necessary,
- Mention of existing Public Transport and Non-motorised Transport facilities, and
- Road Safety Principles.

1.3 Details of Specialist

Iris Sigrid Wink of iWink Consulting (Pty) Ltd. is the Traffic & Transportation Engineering specialist appointed to provide a TIA report for the Verkykerskop WEF Cluster. Iris Wink is registered with the Engineering Council of South Africa (ECSA), with Registration Number 20110156. A curriculum vitae is included in Appendix A of this specialist assessment.

In addition, a signed specialist statement of independence is included in Appendix B of this specialist assessment.

1.4 Terms of Reference

A specialist report prepared in terms of the Regulations (*published In Government Notice No. 320 Government Gazette 43110 20 March 2020, gazetted for implementation Site Sensitivity Verification requirements where a Specialist Assessment is required but no Specific Assessment Protocol has been prescribed*) must contain the following:

(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;

(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;

(c) an indication of the scope of, and the purpose for which, the report was prepared;
  - (cA) an indication of the quality and age of base data used for the specialist report
  - (cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;

(d) the duration date and season of the site investigation and the relevance of the season to the outcome of the assessment;

(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;

(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;

(g) an identification of any areas to be avoided, including buffers;

(h) a description of any assumptions made and any uncertainties or gaps in knowledge;

(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;
(k) any mitigation measures for inclusion in the EMPr;
(l) any conditions for inclusion in the environmental authorisation;
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;
(n) a reasoned opinion-
  (i) whether the proposed activity, activities or portions thereof should be authorised; and (considering impacts and expected cumulative impacts).
  (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, and where applicable, the closure plan;
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
(q) any other information requested by the competent authority.

Specific:

- Extent of the transport study and study area;
- The proposed development;
- Trip generation for the facility during construction and operation;
- Traffic impact on external road network;
- Accessibility and turning requirements;
- National and local haulage routes;
- Assessment of internal roads and site access;
- Assessment of freight requirements and permitting needed for abnormal loads; and
- Impact methodology as provided by the appointed Environmentalist.

2 APPROACH AND METHODOLOGY

The report deals with the traffic impact on the surrounding road network in the vicinity of the site during the:

- Construction phase;
- Operational phase; and
- Decommissioning phase.

This transport study includes the following tasks:

<u>Project Assessment</u>

- Communication with the project team to gain sound understanding of the project.
- Overview of available project background information including, but not limited to, location maps, site development plans, anticipated vehicles to the site (vehicle type and volume), components to be transported and any resulting abnormal loads.
- Research of all available documentation and information relevant to the proposed facility.

<u>Access and Internal Roads Assessment</u>

- Assessment of the proposed access points including:
  - Feasible location of access points
  - Motorised and non-motorised access requirements
  - Stacking distances, if required
  - Sight distances and required access spacing
  - Comments on internal circulation requirements and observations

<u>Haulage Route Assessment</u>

- Determination of possible haulage routes to site regarding:
  - National routes
  - Local routes
  - Site access points
  - Road limitations due to abnormal loads

<u>Traffic Estimation and Impact</u>

- Construction, operational, and decommissioning phase vehicle trips
  - Generated vehicles trips
  - Abnormal load trips
  - Access requirements
- Investigation of the impact of the development traffic generated during construction, operation, and decommissioning.

<u>Report (Documentation)</u>

- Reporting on all findings and preparation of the report.

2.1 Information Sources

The following guidelines have been used to determine the extent of the traffic study:

- Manual for Traffic Impact Studies, Department of Transport, 1995;
- TRH26 South African Road Classification and Access Management Manual, COTO;
- TMH16 South African Traffic Impact and Site Traffic Assessment Manual (Vol 1), COTO, August 2012;
- TMH16 South African Traffic Impact and Site Traffic Assessment Manual (Vol 2), COTO, February 2014;
- Google Earth Pro;
- Transnet Port terminals website ;
- DFFE Online Database.

2.2 Assumptions, Knowledge Gaps and Limitations

The following assumptions and limitations apply:

- This study is based on the project information provided by the client.
- According to the Eskom Specifications for Power Transformers (Eskom Power Series, Volume 5: Theory, Design, Maintenance and Life Management of Power Transformers), the following dimensional limitations need to be kept when transporting the transformer – total maximum height 5 000 mm, total maximum width 4 300 mm and total maximum length 10 500 mm.
  It is envisaged that for this project, the inverter, transformer, and switchgear will be transported to site in containers on a low bed truck and trailer. A mobile crane and the transformer transport are the only abnormal load envisaged for the site. The crane will be utilised for offloading equipment, such as the transformers.
- Maximum vertical height clearances along the haulage route are 5.2 m for abnormal loads.
- If any elements are manufactured within South Africa but not on-site, these will be transported from their respective manufacturing centres, which would be either in the greater Cape Town area, Johannesburg, or possibly Pinetown/Durban and Port Elizabeth.
- All haulage trips will occur on either surfaced national and provincial roads or existing gravel roads.
- Material for the construction of internal access roads will be sourced locally as far as possible.
- The total number of turbines to be constructed for the WEF is estimated to be up to 55.
- The final access points are to be determined during the detailed design stage. Only recommended access points at conceptual level can be given at this stage.
- A 18–24-month construction period is assumed with 48% of the construction period dedicated to site prep and civil works.

2.3 Consultation Processes Undertaken

The Traffic Impact Assessment is based on available project information and consultation with the developer.

3 LEGISLATIVE AND PERMIT REQUIREMENTS

Key legal requirements pertaining to the transport requirements for the proposed development are:

- Abnormal load permits, (Section 81 of the National Road Traffic Act 93 of 1996 and National Road Traffic Regulations, 2000),
- Port permit (Guidelines for Agreements, Licenses and Permits in terms of the National Ports Act No. 12 of 2005), and
- Authorisation from Road Authorities to modify the road reserve to accommodate turning movements of abnormal loads at intersections.

4 DESCRIPTION OF PROJECT ASPECTS RELEVANT TO THE TIA

4.1 Port of Entry

As the proposed Groothoek WEF site is located in fairly similar distances to the ports of Richards Bay and Durban (see **Figure 4-1**), both have been taken into consideration.

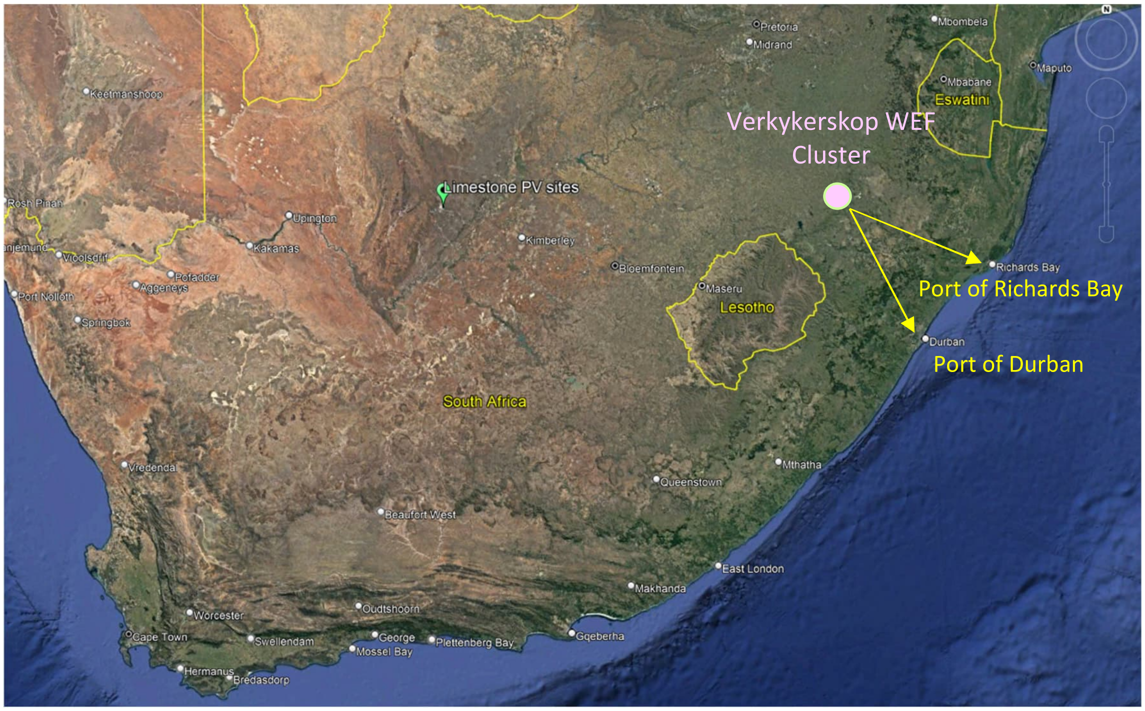

Figure 4-1: Possible Ports of Entry

4.1.1 Port of Richards Bay

The Port of Richards Bay is situated on the coast of KwaZulu-Natal and is a deep-sea water port boasting 13 berths. The terminal handles dry bulk ores, minerals and break-bulk consignments with a draft that easily accommodates Cape size and Panamax vessels. The Port is operated by Transnet National Ports Authority.

One possible route from the Port of Richards Bay to site is approximately 500 km travel distance via the N2, N3 and R722 (see **Figure 4-2**). This route is slightly longer than other available routes, however, for the transport of panels and possible abnormal loads more suitable to reduce traveling through communities and mountainous terrain.

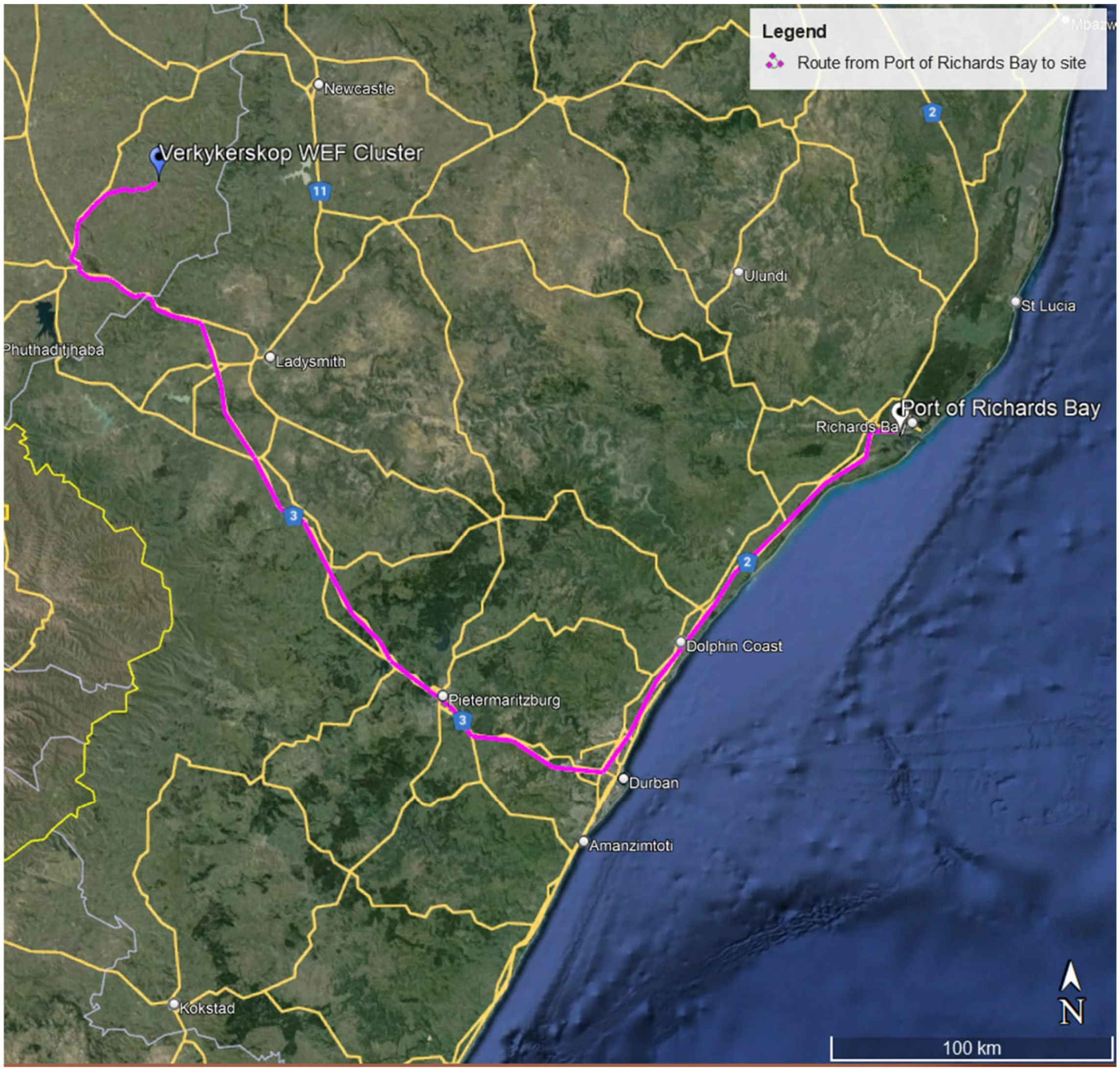

Figure 4-2: Route from Port of Richards Bay to proposed Verkykerskop WEF Cluster

4.1.2 The Port of Durban

The Durban container terminal is one of the largest container terminals in the African continent and operates as two terminals Pier 1 and Pier 2. It is ideally located to serve as a hub for containerized cargo from the Indian Ocean Islands, Middle East, Far East and Australia. Various capacity creation projects are currently underway, including deepening of berths and operational optimization. The terminal currently handles 65% of South Africa's container volumes. (Transnet Port Terminals, n.d).

Haulage vehicles can travel from the Port of Durban via the N3 and R722 to the proposed project site with a travel distance of approximately 320 km (**Figure 4-3**).

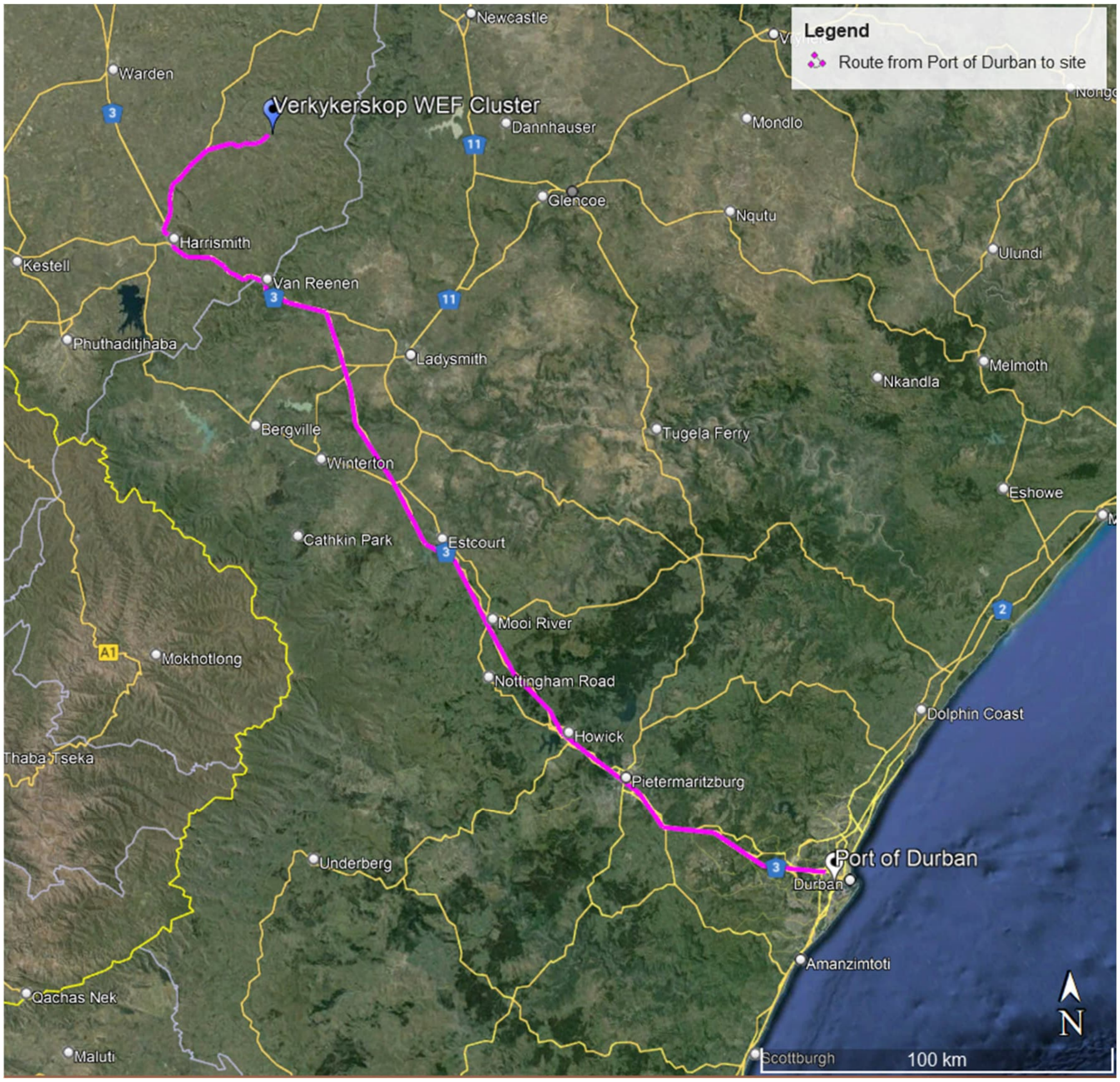

Figure 4-3: Route from Port of Durban to proposed Verkykerskop WEF Cluster

4.2 Transportation requirements

It is anticipated that the following vehicles will access the site during construction:

Wind Energy Component:

- Conventional trucks within the freight limitations to transport building material to the site,
- Light vehicles and buses transporting workers from surrounding areas to site,
- Drilling machines and other required construction machinery being transported by conventional trucks or via self-drive to site, and
- Nacelle transported by abnormal load,
- Turbine blades transported by abnormal load,
- Tower sections manufactured on site and/or transported by abnormal load,
- Turbine hub and rotary units by abnormal load,

- Abnormal mobile crane for assembly on site, and
- The transformer transported with an abnormal load vehicle.

On-site Grid Infrastructure:

- Conventional trucks within the freight limitations to transport building material to the site,
- Light vehicles and buses transporting workers from surrounding areas to site,
- Drilling machines and other required construction machinery being transported by conventional trucks or via self-drive to site, and
- The transformer transported in an abnormal load,
- Abnormal mobile crane for assembly on site, and
- Transmission tower sections transported by abnormal load.

4.3 Abnormal Load Considerations

Abnormal permits are required for vehicles exceeding the following permissible maximum dimensions on road freight transport in terms of the Road Traffic Act (Act No. 93 of 1996) and the National Road Traffic Regulations, 2000:

- Length: 22 m for an interlink, 18.5 m for truck and trailer and 13.5 m for a single unit truck
- Width: 2.6 m Height: 4.3m measured from the ground. Possible height of load – 2.7 m.
- Weight: Gross vehicle mass of 56t resulting in a payload of approximately 30t
- Axle unit limitations: 18t for dual and 24t for triple-axle units
- Axle load limitation: 7.7t on the front axle and 9t on the single or rear axles

Any dimension / mass outside the above will be classified as an Abnormal Load and will necessitate an application to the Department of Transport and Public Works for a permit that will give authorisation for the conveyance of said load. A permit is required for each Province that the haulage route traverses.

In addition to the above, the preferred routes for abnormal load travel should be surveyed prior to construction to identify any problem areas, e.g., intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, which may require modification. After the road modifications have been implemented, it is recommended to undertake a "dry-run" with the largest abnormal load vehicle, to ensure that the vehicle can travel without disruptions. It needs to be ensured that gravel sections (if any) of the haulage routes remain in good condition and will need to be maintained during the additional loading of the construction phase and reinstated after construction is completed.

There are bridges and culverts along the National and Provincial routes, which need to be confirmed for load bearing capacity and height clearances. However, there are alternative routes which can be investigated if the selected route or sections of the route should not be feasible.

Any low hanging overhead lines (lower than 5.1 m), e.g., Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles.

The expected abnormal load trip generators are for the transport of the transformers, nacelles, turbine blades, tower sections, and turbine hub and rotary units, as well as the abnormal mobile crane needed for assembly on site.

4.4 Further Guideline Documentation

The Technical Recommendations for Highways (TRH) 11: "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outlines the rules and conditions that apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts.

The general conditions, limitations and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power / mass ratio, mass distribution and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant regulations.

4.5 Permitting – General Rules

In general, the limits recommended in TRH 11 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) 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.
b) A permit can be withdrawn if the vehicle upon inspection is found in any way not fit to be operated.
c) 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.

4.6 Load Limitations

The maximum load that a road vehicle or combination of vehicles will be allowed to carry legally under permit on a public road is limited by:

- the capacity of the vehicles as rated by the manufacturer,
- the load which may be carried by the tyres,
- the damaging effect on pavements,
- the structural capacity on bridges and culverts,
- the power of the prime mover(s),
- the load imposed by the driving axles, and
- the load imposed by the steering axles.

4.7 Dimensional Limitations

A load of abnormal dimensions may cause an obstruction and danger to other traffic. For this reason, all loads must, as far as possible, conform to the legal dimensions. Permits will only be considered for indivisible loads, i.e., loads that cannot, without disproportionate effort, expense, or risk of damage, be divided into two or more loads for the purpose of transport on public roads. For each of the characteristics below there is a legally permissible limit and what is allowed under permit:

- Width,
- Height,

- Length,
- Front Overhang,
- Rear Overhang,
- Front Load Projection,
- Rear Load Projection,
- Wheelbase,
- Turning Radius, and
- Stability of Loaded Vehicles.

4.8 Transporting Wind Turbine Components

Wind turbine components can be transported in several ways with different truck/trailer combinations and configurations. The travel arrangements and logistics will be investigated when the transporting contractor and the plant hire companies apply for the necessary permits from the Permit Issuing Authorities.

4.8.1 Nacelle

The heaviest component of a wind turbine is the nacelle (i.e., approximately 100 tons depending on the manufacturer and design of the unit). Combined with road-based transport, a total vehicle mass of approximately 145 000 kg for a 100-ton unit can be expected. Based on the weight limitations, route clearances and permits will be required for transporting the nacelle by road-based transport. The unit will require a minimum height clearance of 5.1 metres.

4.8.2 Blades

A wind turbine blades are the longest and most vulnerable components and must be protected during shipment. Manufacturers are actively improving on blade designs with blade lengths that go beyond 100 m. Blades need to be transported on an extendible blade transport trailer or in a rigid container with rear steerable dollies (see an example in **Figure 4-4**). Blades can be transported individually, in pairs, or threes, although different manufacturers have different packaging methods for transporting the blades. The transport vehicle typically exceeds the dimensional limitation (length) of 22 metres and will only be allowed under permit, provided the trailer is fitted with steerable rear axles or dollies.

Figure 4-4: Blade transport (Froese, 2019)

For this study, turbine blades of a maximum length of 100 metres have been assessed. Due to this abnormal length, special attention needs to be given to route planning, especially to suitable turning radii and adequate sweep clearance. Therefore, vegetation or road signage may have to be removed before transport. Once transported to the site, the blades need to be carefully stored in their respective laydown areas before being installed onto the rotary hub.

4.8.3 Tower Sections

For the purpose of this report, it was assumed that tower sections will need to be transported from elsewhere. Tower sections generally consist of sections of around 20 metres in length. The number of tower sections required depends on the selected hub height and type of tower section (i.e., tubular steel, hybrid steel/concrete tower, etc.). For a hub height of 200 metres, a maximum of 10 tower sections is required. Each tower section is transported separately on a low-bed trailer (see an example in **Figure 4-5**). Depending on the trailer configuration and height when loaded, some of these components may not meet the dimensional limitations (height and width) but will be permitted under certain permit conditions. An exception are concrete towers, should there be a batch plant on site to manufacture them.

Figure 4-5:Transporting the Tower Sections (Montiea, 2014)

4.8.4 Turbine Hub and Rotary Units

The turbine hub needs to be transported separately due to its significant weight. A hub unit weighs from around 45 tons.

4.9 Transporting Cranes, Mobile Cranes, and other Components

Crane technology has developed rapidly, and several different heavy lifting options are available on the market. Costs involved to hire cranes tend to vary and should be compared beforehand. For this assessment, some possible crane options are outlined as follows.

4.9.1 Examples of Cranes for Assembly and Erection on Site

Option 1: Crawler Crane and Assembly Crane

The main lift crane capable of performing the required lifts (i.e., lifting the tower sections into position, lifting the nacelle to the hub height, and lifting the rotor and blades into place) needs to be similar to the Liebherr Crawler Crane LR1750 with an SL8HS (Main Boom and Auxiliary Jib) configuration. A smaller 200-ton Liebherr Mobile Crane LTM 1200-5.1 is also required to lift the components and assist in the assembly of the crawler crane at each turbine location.

- **Crawler Crane LR1750 with the SL8HS boom system (Main Lifting Crane):**

The Crawler Crane (see an example in **Figure 4-6**) will be transported to the site in components and the heaviest load will be the superstructure and crawler centre section (83 tons). The gross combination mass (truck, trailer, and load) will be approximately 133 000 kg. The boom sections, counterweights and other equipment will be transported on conventional tri-axle trailers and then assembled on site. It will require several truckloads of components to be delivered for assembly of the Crawler Crane before it can be mobilised to perform the heavy lifts.

Figure 4-6: Crawler Crane used to assemble turbine (Liebherr, 2017)

- **Mobile Crane LTM 1200-5.1 (Assembly Crane):**

The Liebherr LTM 1200-5.1 crane is a 5-axle vehicle with rubber tyres, which will travel to site on its own. However, the counterweights will be transported on conventional tri-axle trailers and then assembled on site. The assembly crane is required to assemble the main lift crane as well as assist in the installation of the wind turbine components.

Option 2: GTK 1100 Crane & Assembly Crane

For the single wind turbine at Coega, the GTK 1100 hydraulic crane was used (see example in **Figure 4-7**). The GTK 1100 was designed to lift ultra-heavy loads to extreme heights and its potential lies in being deployed on facilities such as wind farms.

Figure 4-7: Cranes at work

- **Hydraulic GTK 1100 Crane:**

A key benefit of the GTK 1100 is its quick set-up due to the vertical rigging of the self-erecting tower and it can be operational in four to six hours. The crane has a small footprint of 18x18m (including the boom set-up) for a restricted job site area and its self-levelling function results in minimal ground preparation. In addition, the crane can operate at these heights with very heavy loads of up to 100 tons without a counterweight. The GTK 1100 can be transported on four truckloads including two abnormal trailers (for the Boom and Crane).

- **Mobile Crane LTM 1200-5.1 (Assembly Crane):**

As above - a smaller 200-ton Liebherr Mobile Crane LTM 1200-5.1 is also required to lift the components and assist in the assembly of the hydraulic crane at each turbine location.

4.9.2 Cranes at the Port of Entry

Most shipping vessels importing the turbine components will be equipped with on-board cranes to do all the safe off-loading of the wind turbine components to the abnormal transport vehicles, parked adjacent to the shipping vessels (see **Figure 4-8**).

Figure 4-8: Cranes at Port of Entry

The imported turbine components may be transported from the Port of Entry to the nearby turbine laydown area. Mobile cranes will be required at these turbine laydown areas to position the respective components at their temporary storage location.

4.10 Transporting Other Plant, Material and Equipment

In addition to transporting the specialised equipment, the normal Civil Engineering construction materials, plant and equipment will need to be transported to the site (e.g., sand, stone, cement, gravel, water, compaction equipment, concrete mixers, etc.). Other components, such as electrical cables, battery energy storage compartments, pylons, transformers, and switchgear, will also be transported to site during construction. The transport of these items will be conducted with normal heavy loads vehicles.

5 BASELINE ENVIRONMENTAL DESCRIPTION

5.1 General Description

The project site is located approximately 40 km south-west of Harrismith (see **Figure 5-1**) in the Free State on affected farm portions as listed in **Table 1-1**. The proposed project will consist of up to 55 wind turbines with a capacity of up to 320 MW.

The Groothoek WEF site is located in close proximity to two other projects, which will form the Verkykerskop WEF Cluster (see **Figure 5-2**).

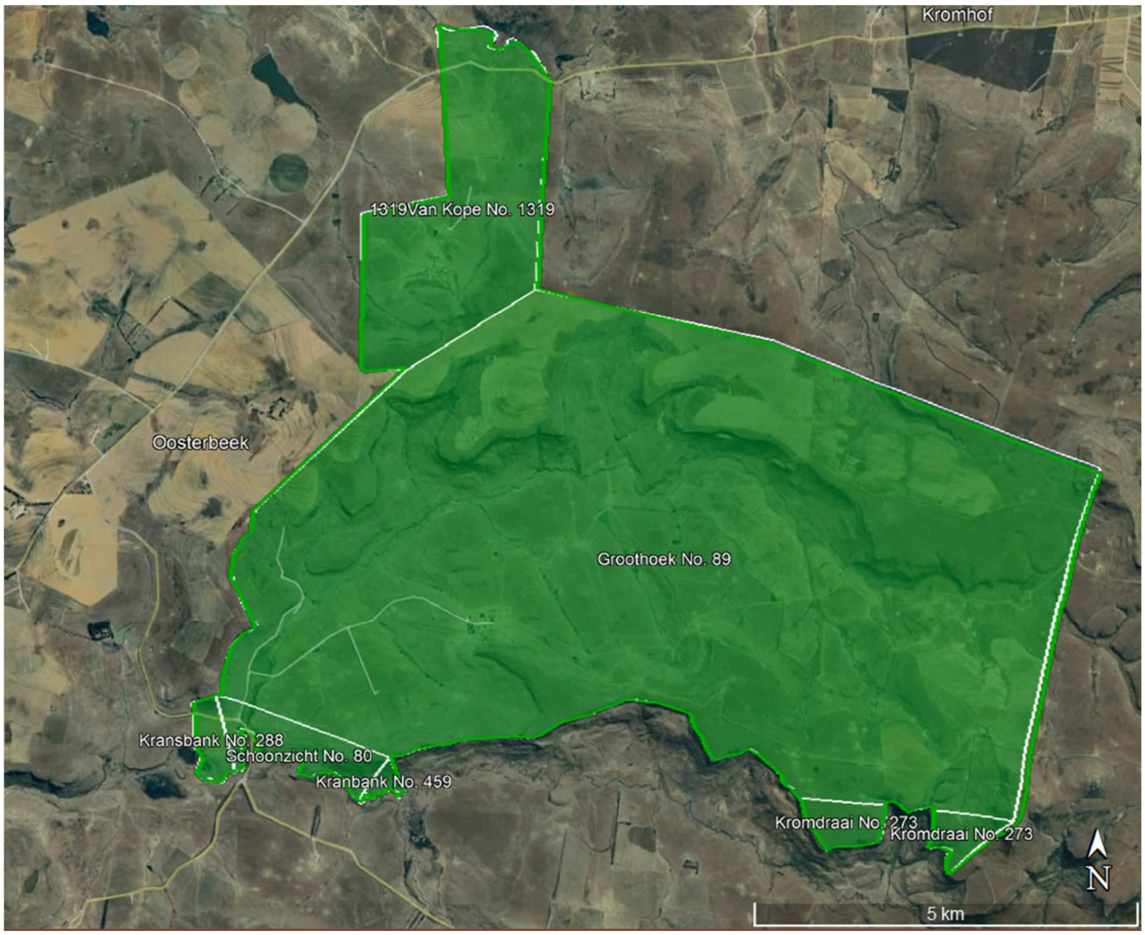

Figure 5-1: Aerial View of affected farm properties for the Groothoek WEF

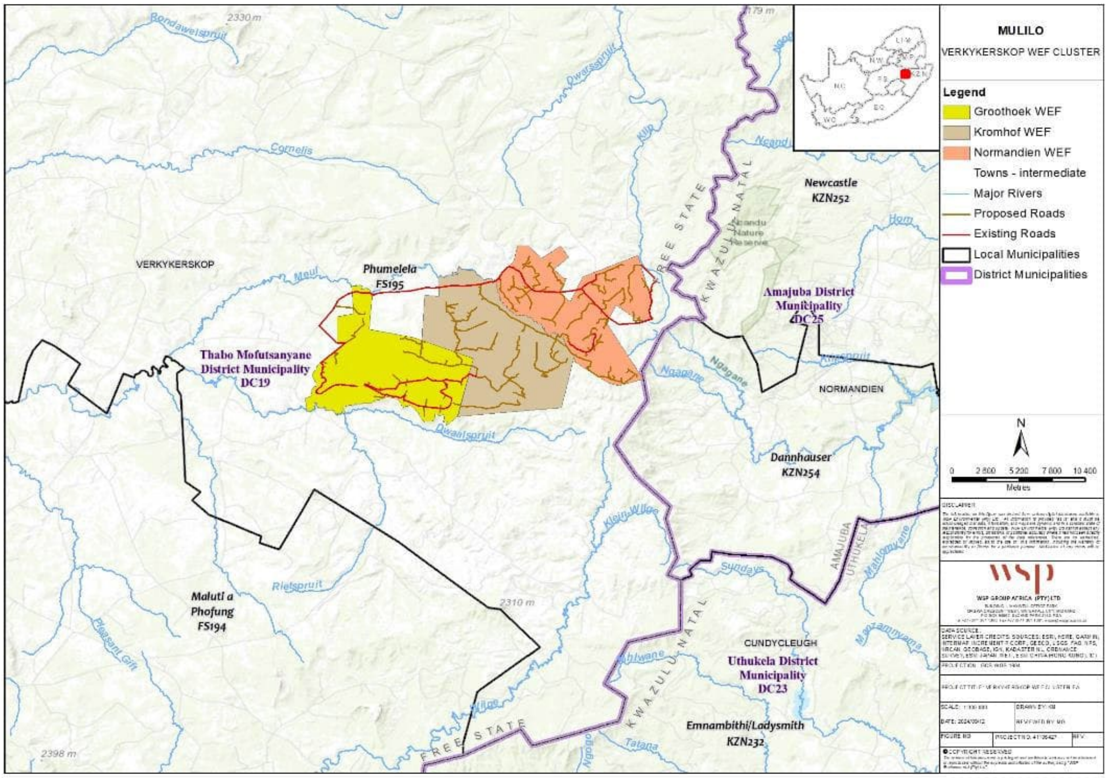

Figure 5-2: Regional locality map showing the proposed Verkykerskop WEF Cluster

5.1.1 Route for Components manufactured within South Africa

In South Africa, the majority of the manufacturing industry's national workforce resides in four metros - Johannesburg, Cape Town, Gqeberha and eThekwini. It is therefore anticipated that elements that can be manufactured within South Africa will be transported to the site from the Cape Town, Johannesburg, Gqeberha or Pinetown/Durban areas. Components will be transported to site using appropriate National and Provincial routes. It is expected that the components will generally be transported to site with normal heavy load vehicles.

5.1.1.1 Route from Cape Town Area to Site – Locally sourced materials and equipment

Cape Town has a large manufacturing sector with industrial areas located throughout the metro.

The proposed industrial hubs being considered to source the required materials and components is currently unknown. With quite an extensive and widespread industrial market, a specific route to the site cannot be considered at this point in time, but it is expected that a majority of the route length will be similar to the routes considered for the haulage of imported materials and equipment. No road limitations envisaged along the route for normal load freight. Several routes are available and one possible route is shown in **Figure 5-3** via the N1 with a travel distance of approximately 1 390km.

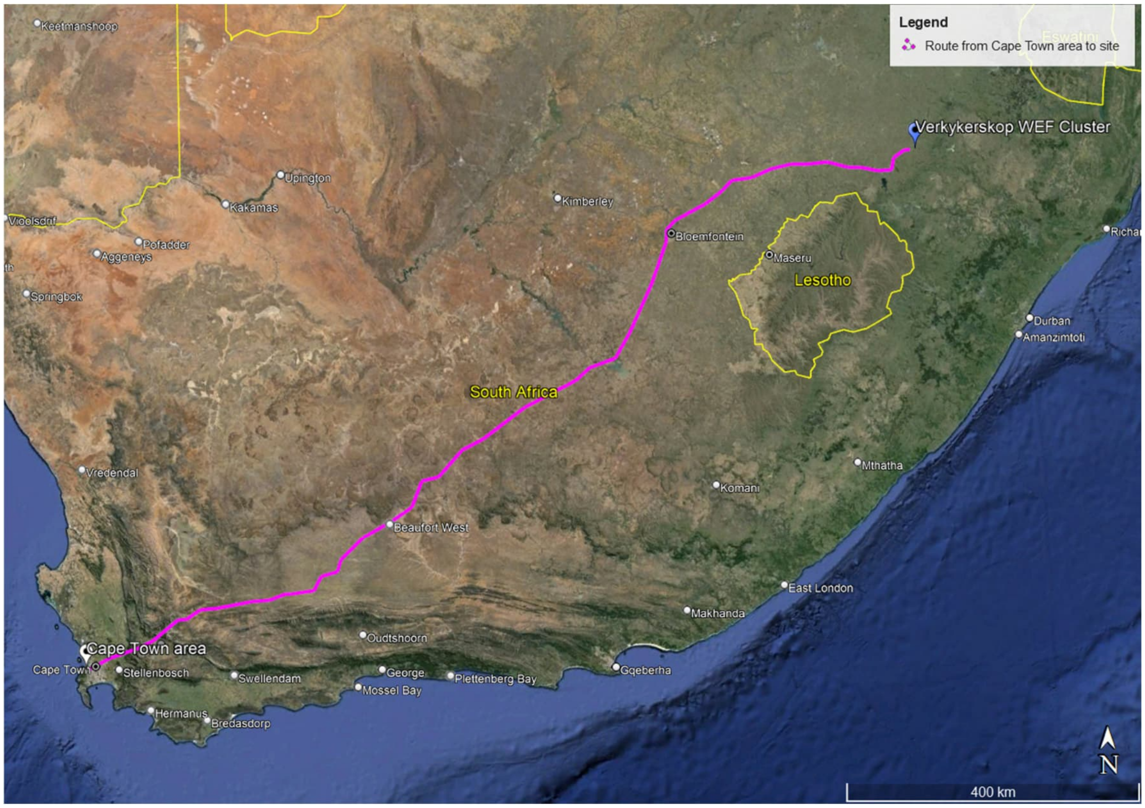

Figure 5-3: Route from Cape Town area to the proposed Verkykerskop WEF Cluster

5.1.1.2 Route from Johannesburg Area to Site – Locally sourced materials and equipment

If components from Johannesburg are considered, normal loads from Johannesburg to the site can be transported via several routes of which one is shown in **Figure 5-4** . No road limitations are envisaged along the route for normal load freight. The travel distance from the Johannesburg area to the site is approximately 300 km via the N3.

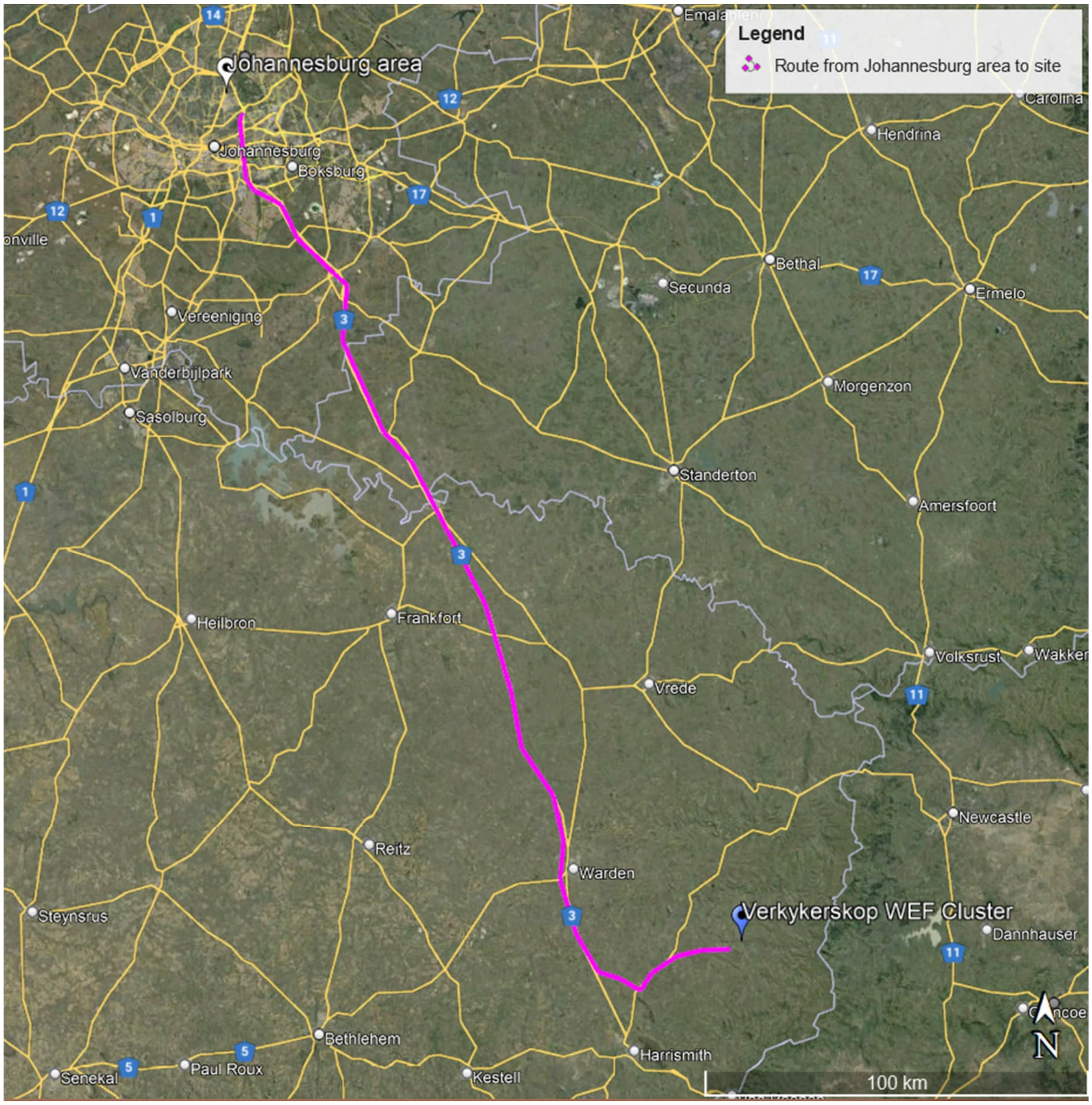

Figure 5-4: Route from Johannesburg Area to the proposed Verkykerskop WEF Cluster

5.1.1.3 Route from Gqeberha area to Site - Locally sourced materials and equipment

If loads are transported from the Gqeberha area to site, several routes to site are available. One potential route is shown in **Figure 5-5** via the R75, N9, N1 and N5 with a travel distance of approximately 1 050km.

Figure 5-5: Route from Gqeberha area to proposed Verkykerskop WEF Cluster

5.1.1.4 Route from Pinetown / Durban to Site - Locally sourced materials and equipment

Normal loads can transport elements via two potential routes from Durban and Pinetown to the site. No road limitations are envisaged along the route for normal load freight. The shortest distance from Pinetown to the site is approximately 300 km via the N3 (see **Figure 5-6**).

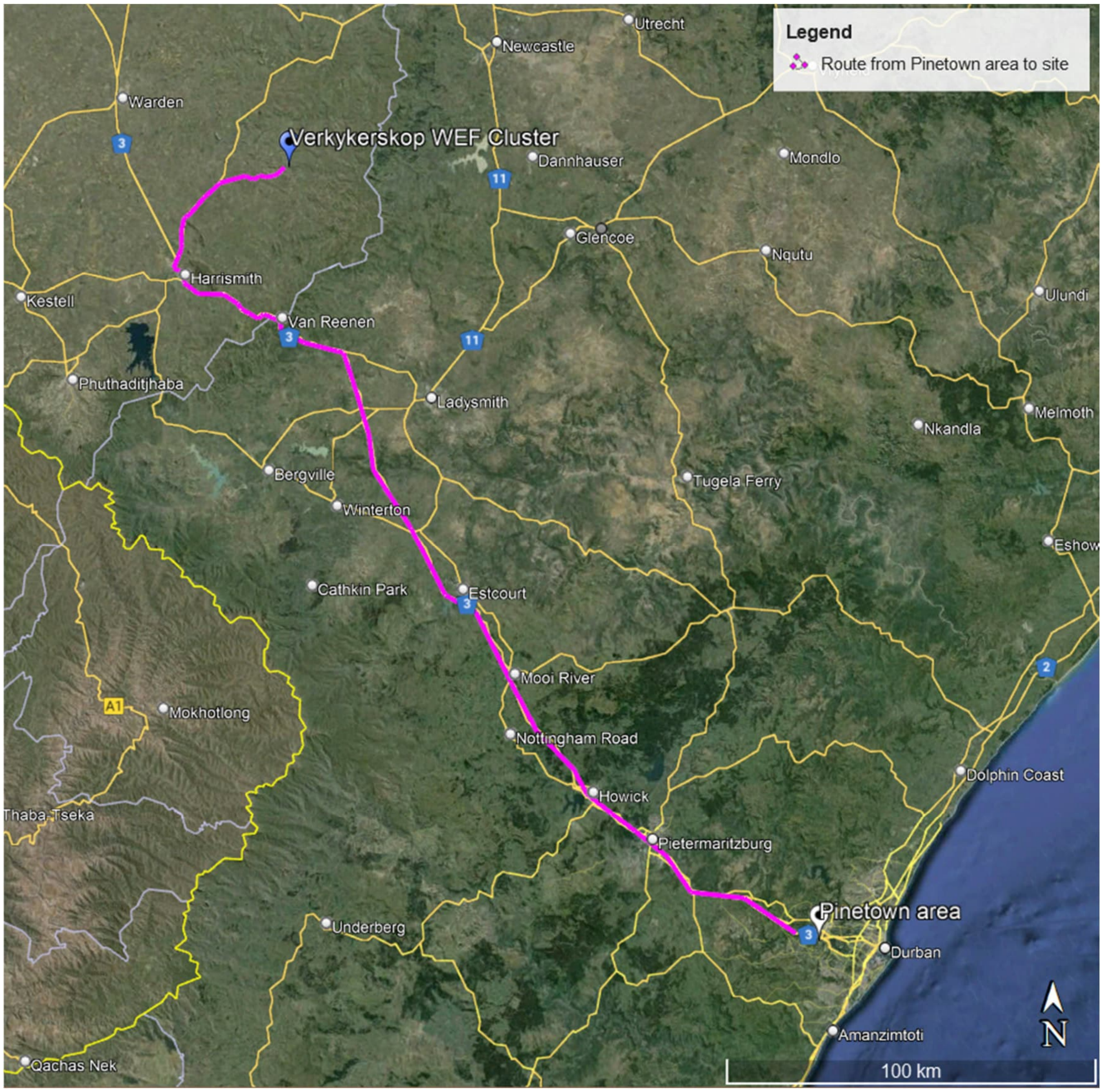

Figure 5-6: Route from Pinetown to the proposed Verkykerskop WEF Cluster

5.1.2 Surrounding road network

The construction vehicles for the proposed Groothoek WEF project can take access via the R722, which runs past the project site in approximately 13 km distance to the west of the site (see **Figure 5-7**).

The R722 is a regional route that connects Memel with Harrismith with a total length of approximately 85km. According to the road classification of the surrounding road network as per *COTO's TRH26 South African Road Classification and Access Management Manual*, the R722 can be classified as **Class 3 rural minor arterial**, which typically carries inter-district traffic between:

- Small towns, villages and larger rural settlements (population typically less than about 25000);
- Smaller commercial areas and transport nodes of local importance that generate relatively high volumes of freight and other traffic in the district (public transport and freight terminals, railway sidings, small seaports and landing strips);
- Very small or minor border posts;
- Tourist destinations;
- Other Class 1, 2 and 3 routes.
- Smaller centres than the above when travel distances are relatively long (longer than 50 to 100 km).

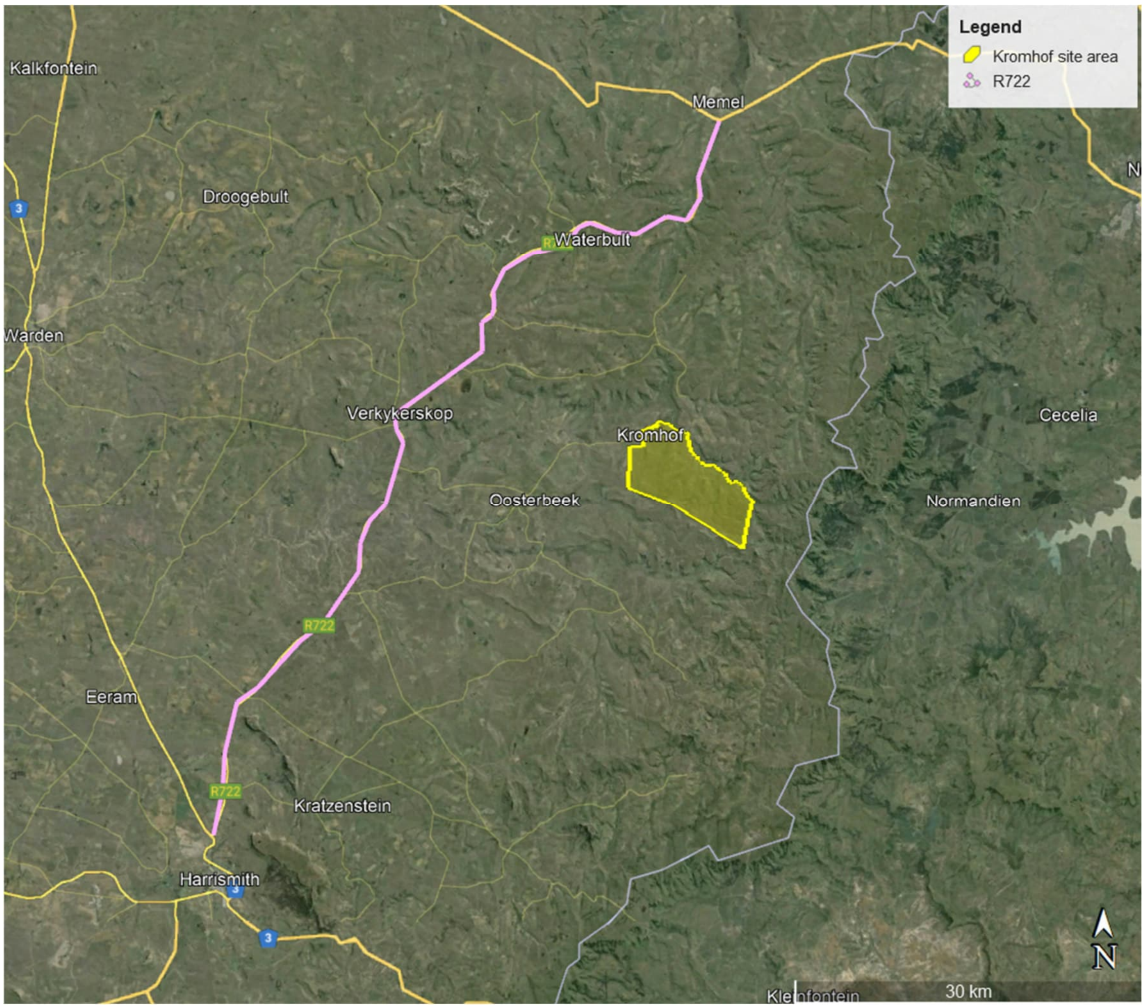

Figure 5-7: Aerial view of R722 route

5.1.3 Proposed Accesses

Feasible accessibility was established in consideration with required sight distances, minimum access spacing requirements and road safety principles. It needs to be noted that the access points discussed in this report are recommended from a traffic engineering and transport planning point of view only and do not factor in landownership or other considerations.

Figure 5-8 shows an overview of the proposed turbine locations for the entire Verkykerskop WEF Cluster including existing farm roads that can be used and proposed new roads that need to be built.

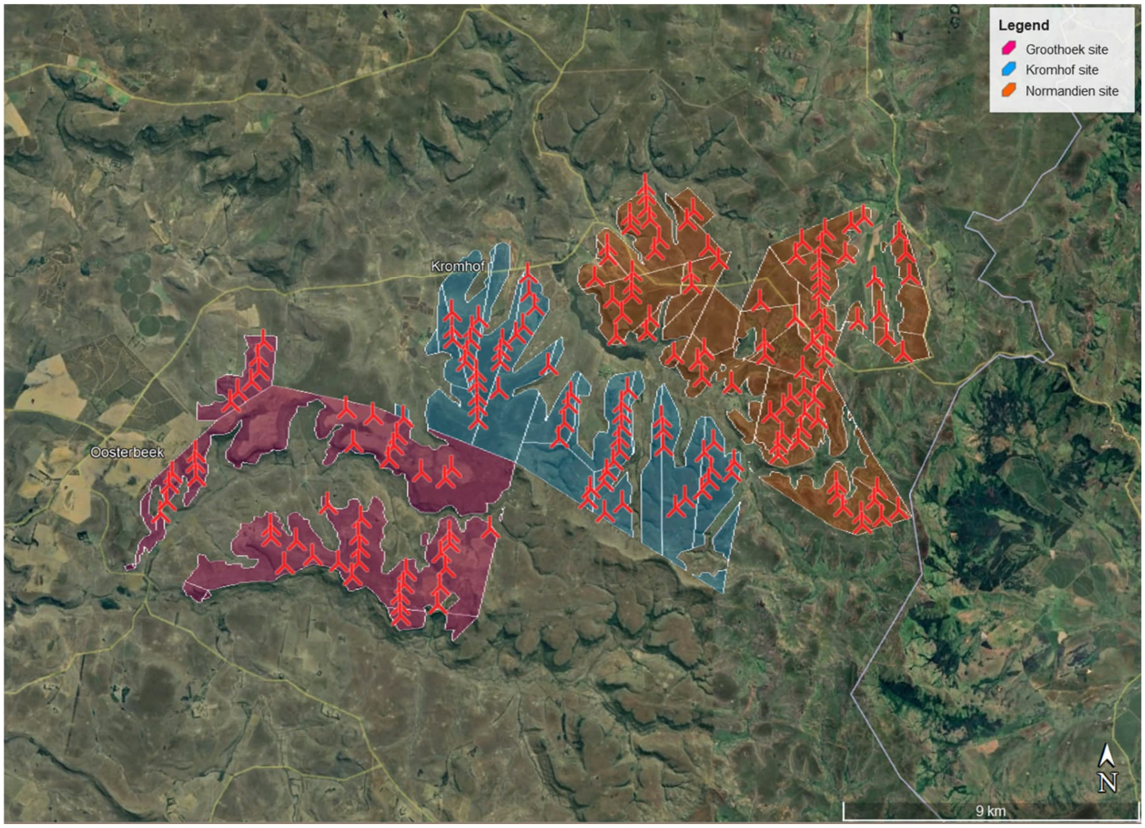

Figure 5-8: Aerial Overview of Turbine locations and roads for the Verkykerskop WEF Cluster

The above Figure assisted in the assessment of possible access routes from the external road network to the site as it was used to achieve connectivity of recommended access routes and site roads.

There are a number of public roads towards the site available, of which the following two access routes are recommended for the Groothoek WEF (see **Figure 5-9**):

- Access route 1 (blue): from R722 onto S795 for approximately 13 km before turning left into the S18 towards the site (see **Figure 5-10**); and
- Access route 2 (green): from R722 onto S18 and then S798 towards the site (see **Figure 5-11**).

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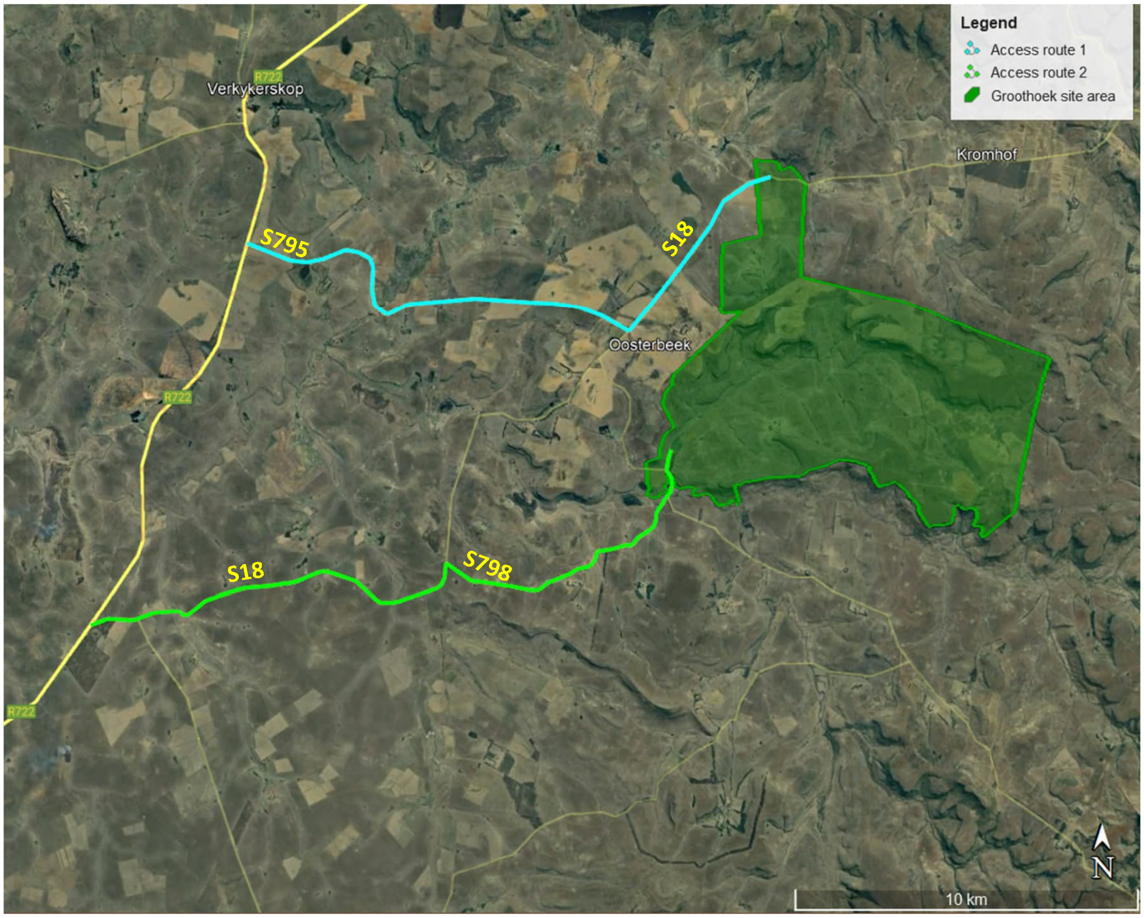

Figure 5-9: Aerial View of recommended Access routes to Groothoek WEF site

Figure 5-10: View of S795 from R722

Figure 5-11: View of S18 from R722

In accordance with *Figure 2.5.5(a) of the TRH17 Guidelines for the Geometric Design of Rural Roads* (see **Figure 5-12**), the shoulder sight distance for a stop-controlled condition on a road with a speed limit of 100 km/h, needs to be a minimum of 420m for the largest vehicle (5m set back from the intersecting road).

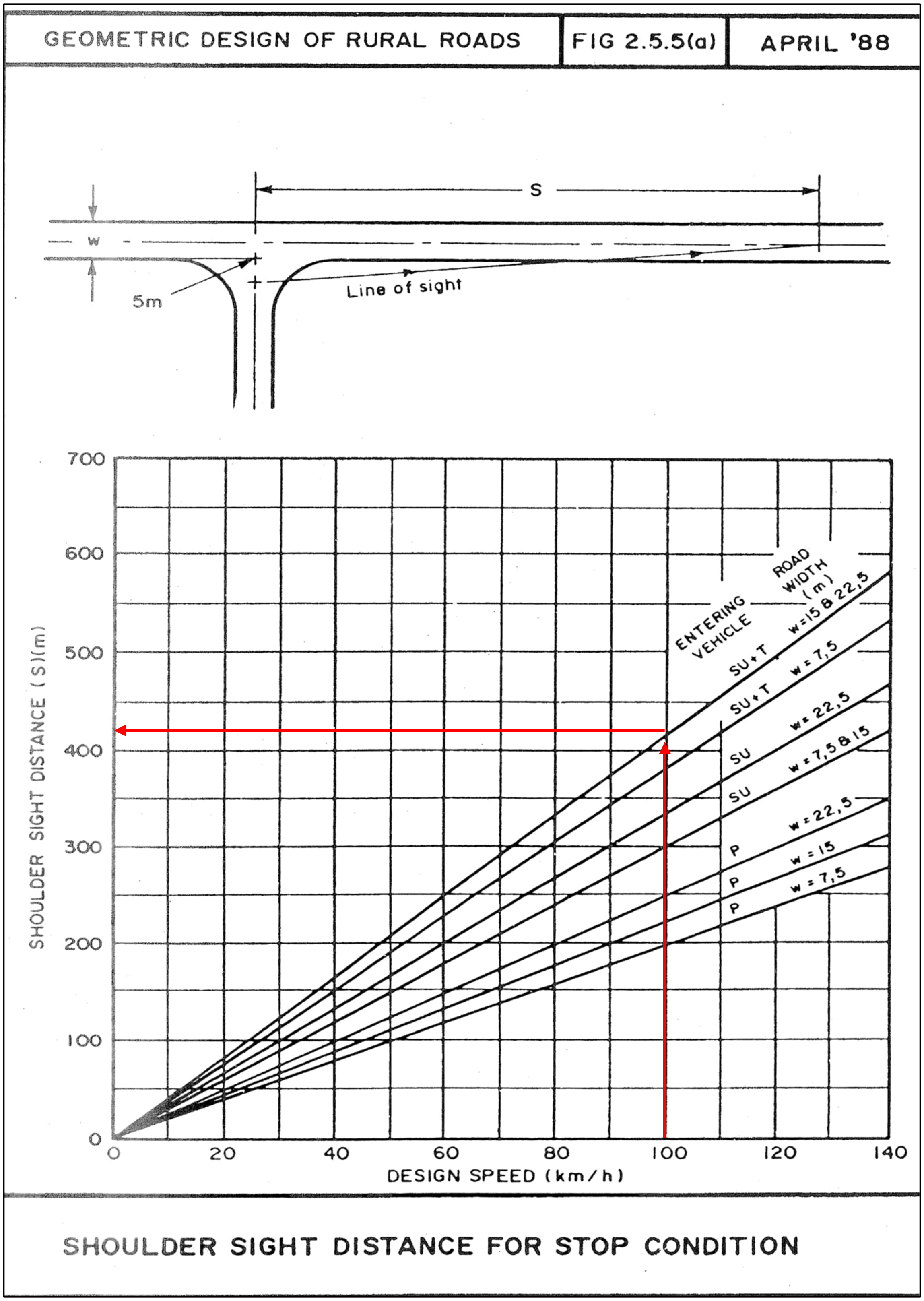

Figure 5-12: Shoulder sight distance (TRH17)

The required minimum shoulder sight distances are met in both directions accessing the R722 from the S795 and S18, respectively (see **Figure 5-13** and **Figure 5-14**).

Figure 5-13: Required Sight distances from S795 onto R722

Figure 5-14 Required Sight distances from S18 onto S722

5.1.4 General

The geometric design and layout for the access roads need to be established at detailed design stage. Existing structures and services, such as drainage structures, signage, street lighting and pipelines will need to be evaluated if impacting on the roads. It needs to be ensured that gravel sections remain in good condition and will need to be maintained during the additional loading of the construction phase and then reinstated after construction is completed.

The geometric design constraints encountered due to the terrain should be taken into consideration by the geometric designer. Preferably, the internal roads need to be designed with smooth, relatively flat gradients (recommended to be no more than 8%) to allow a larger transport load vehicle to ascend to the respective laydown areas.

The access points to the site will need to be able to cater for construction and abnormal load vehicles. A minimum road width of 8 m is recommended for the access points and the internal roads can have a minimum width of 6 m. The radius at the access point needs to be large enough to allow for all construction vehicles to turn safely (i.e., bellmouths of min. 15m). Sight lines at the intersections of the R722 with the S18 and S795, respectively, need to be kept clear of any trees and shrubbery.

It is recommended that the direct site accesses are security controlled during the construction phase.

All temporary road markings and signage need to be in accordance with the South African Road Traffic Signs Manual (SARTSM). It is advised to provide temporary road signage along the R722 passing the turn offs onto the S18 and S795 to alert drivers of large haulage vehicles entering and exiting the roads.

5.1.5 Transportation of Materials, Plant and People to the proposed site

It is assumed that the materials, plant, and workers will be sourced from the surrounding towns as far as possible, as for example from Harrismith.

5.1.6 Public Transport and Non-Motorised Transport

In terms of the National Land Transport Act (NLTA) (Act No.5 of 2009), the assessment of available public transport services is included in this report. The following comments are relevant in respect to the public transport availability for the proposed development.

Non-motorised transportation (NMT) is a dominant mode of transportation, with private cars and minibus/taxis being the second-most used mode of transport, followed by buses. Currently, there are no known future planned public transport facilities in the vicinity of the site, but it is assumed that minibus taxis travel at irregular intervals along the R722. However, generally the appointed contractor of a large-scale project, such as many renewable energy projects, will provide shuttle buses or similar for workers during the construction phase.

5.2 Alternatives

The proposed activity is a direct result of the growing demand for electricity and the need for renewable energy in South Africa. According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This growing demand, fuelled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this is the growing awareness of environmentally responsible development, the impacts of climate change and the need for sustainable development

The DEA&DP Guideline on Alternatives (2013) states that:
"Every EIA process must identify and investigate alternatives, with feasible and reasonable alternatives to be comparatively assessed. If, however, after having identified and investigated alternatives, no feasible and reasonable alternatives were found, no comparative assessment of alternatives, beyond the comparative assessment of the preferred alternative and the option of not proceeding, is required during the assessment phase. What would, however, have to be provided to the Department in this instance is proof that an investigation was undertaken and motivation

indicating that no reasonable or feasible alternatives other than the preferred option and the no-go option exist."

The 2014 EIA Regulations (GN R982) (as amended) provide the following definition:
"Alternatives", in relation to a proposed activity, means different ways of meeting the general purpose and requirements of the activity, which may include alternatives to the -

(a) *property* on which or location where the activity is proposed to be undertaken;
(b) type of *activity* to be undertaken;
(c) *design* or *layout* of the activity;
(d) *technology* to be used in the activity;
(e) *operational* aspects of the activity; and
(f) includes the option of not implementing the activity ("*No-Go*" alternative).

The following alternatives are to be considered in the specialist assessment:

<u>Location Alternatives</u>

The layout alternatives will be developed at the end of the Scoping Phase for assessment in the EIA Phase. The location for the WEFs was selected based on the following parameters:

- Quality of the wind resource;
- Proximity to Eskom grid connection;
- Relatively remote site (fewer sensitive receptors in terms of visual and noise impacts);
- Landowner support of the proposed development;
- Relatively low agricultural potential land mostly used for extensive low intensity livestock grazing.

<u>Design and layout alternatives</u>

The site layout may change during the EIA stage in response to the environmental, social and technical sensitivities identified during the EIA process, specialist assessments, and via engagement with the public and other stakeholders. The proposed WEF layout will therefore be developed and refined during the EIA process.

<u>Technology alternatives: Turbines</u>

Turbine technology is continually improving, with newer and more efficient turbine models being released on an ongoing basis. Based on these characteristics, a turbine which is best suited to the site will be selected closer to the time of construction and cannot be confirmed during the Scoping stage. The maximum turbine specifications are provided in **Table 1-1**. To derive the desired capacity for the WEF the applicant is proposing to employ up to 55 turbines.

<u>Routing Alternative for Linear Activities</u>

Route alternatives include different access and service route alternatives. Road routings will be designed to follow existing farm tracks and impacted areas as far as possible, while minimising total road length and avoiding environmental sensitivities. Route alternatives may change based micro-siting of the turbines.

No-go alternative

This alternative considers the option of ‘do nothing’ and maintaining the status quo. Should the proposed activity not proceed, the site will remain unchanged. The potential opportunity costs in terms of alternative land use income through rental for energy facility and the supporting social and economic development in the area would be lost if the status quo persist.

6 ISSUES, RISKS AND IMPACTS

6.1 Identification of Potential Impacts/Risks

The potential impacts to the surrounding environment expected to be generated from the development traffic is traffic congestion, associated noise and dust pollution and possible damage to road surfaces. It must be noted that significance of the impact is expected to be higher during the construction and decommissioning phases because these phases generate the highest development traffic.

6.1.1 Construction phase

This phase includes the transportation of people, construction materials and equipment to the site. This phase also includes the construction of the WEF, including construction of footings, roads, excavations, trenching, and ancillary construction works. This phase will temporarily generate the most development traffic.

Nature of impact:

The nature of the impact expected to be generated at this stage would be traffic congestion and delays on the surrounding road network as well as the associated noise, dust, and exhaust pollution due to the increase in traffic.

Estimated peak hour traffic generated by the Groothoek WEF:

- **Material delivery:** This includes heavy vehicles for the transport of building materials such as reinforced concrete materials for foundations, gravel material for roadworks, brickwork material for buildings, fencing material, etc. The major trip generation activities are assumed to result from the construction of turbine foundations and road material delivery. The following assumptions were made:

- Heavy vehicles (turbine foundations): Based on similar studies, typically around 80 trips per turbine foundation is estimated, which results in a total of 4 400 trips for 55 turbines and then on average 12 daily trips for the foundation material delivery (based on a construction period of 18 months and 22 work days).

- Heavy vehicle (road layer works): Assuming a typical 0.2 m gravel wearing course and a 10m road width, 2 m^2 of gravel wearing course is assumed for the purpose of the trip estimate.

  Typically, 1 trip/6 m^3 can be assumed for material delivery. The planned length of internal roads will still need to be communicated.

- Heavy vehicles (laydown area material): 1 trip/6 m^3 is assumed. Estimating a total of approximately 80 000 m^2 of laydown and assembly areas and an assumed 0.2 m gravel wearing course, a total of around 2 667 trips is generated, resulting in an average of 7 daily trips for laydown area material delivery.

It must also be noted that vehicle trips from material delivery vary depending on the construction task/program, fuel supply arrangements, as well as distance from the material source to the site. Project planning can be used to reduce material delivery during peak hours.

- **<u>Construction machinery:</u>** This includes cranes for turbine assembly, heavy vehicles required for earthworks and roadworks. These vehicles are expected to have negligible traffic impact as they will arrive on site in preparation for construction. Once on site, these vehicles will produce internal site traffic with minimal effect on the external road network.

- **<u>Component delivery trips:</u>**
  The blades*:* For this project, a maximum rotor diameter of 200 m applies (i.e., 100 m blades). As a worst-case scenario, it is assumed that the blades will be transported separately (i.e., *three* (*3) trips per turbine or 165 trips for 55 wind turbines*).

  The nacelle: one (1) abnormal load trip per turbine *(i.e., 55 trips for 55 turbines)*

  The turbine hub and rotor unit: one (1) abnormal load trip per turbine (*i.e., 55 trips for 55 turbines*)

  Tower sections: For a maximum hub height of 140 metres, a maximum of 7 tower sections is required. Each tower section is transported separately on a low-bed trailer *(i.e., 7 abnormal load trips per turbine or 385 trips for 55 turbines)*

  Total abnormal loads per turbine (turbine components): 12 trips per turbine (i.e., 660 trips for 55 turbines).

  In addition to the turbine component delivery trips, one (1) abnormal load is estimated for each transformer, resulting in a total of up to 55 transformers.

  The abnormal load trips are highly depended on project planning and abnormal load permitting. These trips are not necessarily concentrated to the peak hours. The number of peak hour vehicle trips generated by abnormal load vehicles is thus unknown at this stage.

- **<u>Construction workers trips:</u>**
  The number of construction personnel is affected by project programming, however, the estimate from experience with similar developments is at approximately 250 workers. It is further assumed that approximately 50% (~125) will be low skilled workers (construction labourers, security staff etc.), ~30% (~75) semi-skilled workers (drivers, equipment operators etc.) and approximately 20% (~50) skilled personnel (engineers, land surveyors, project managers etc.).

  Typically, contractors arrange transportation for site workers. Assuming the low skilled and semi-skilled labourers can commute by bus with a 60-passenger capacity, around four (4) busses can be assumed for low skilled and semi-skilled labourers. The skilled labourers are conservatively assumed to travel by passenger car (50 trips).

  For rural environments it is further estimated that the peak hour trips are around 30% of the average daily traffic (i.e., 16 peak hour trips).

6.1.2 Operational Phase

This phase includes the operation and maintenance of the WEF throughout its life span.

Nature of impact:
The nature of the impact expected to be generated at this stage would be traffic congestion and delays on the surrounding road network, and the associated noise, dust, and exhaust pollution due to the operational traffic trips.

Estimated peak hour traffic generated by the site:

- **Trips generated by staff traveling to the site:**

The number of permanent staff expected for the operational phase is still unknown. Based on similar studies it can be estimated that approximately 30 full-time employees will be stationed on site. Assuming 30% of trips occur during the peak hour, approximately 9 peak hour trips are estimated for the operational phase.

It is thus not envisaged that the generated operation traffic will go beyond 50 peak hour trips. The operational peak hour trips generated by staff are expected to be low and will have a negligible impact on the external road network.

6.1.3 Decommissioning phase

This phase will have similar impacts and generated trips as the Construction Phase.

6.1.4 Cumulative Impacts

Cumulative impacts with existing and planned facilities may occur during construction and operation of the proposed Verkykerskop WEF Cluster. While one project may not have a significant negative impact on sensitive resources or receptors, the collective impact of the projects may increase the severity of the potential impacts.

A number of projects within a 50km radius which have submitted applications for environmental authorisation (some of which have been approved) have been considered. The projects considered are from the latest REEA database from the DFFE (2023 Quarter 3). It is important to note that the existence of an approved EA does not directly equate to actual development of the project.

The proposed Verkykerskop WEF Cluster is not located within one of the promulgated Renewable Energy Development Zones (REDZ). To assess a cumulative impact, it is generally assumed that all currently approved and authorized projects within a 30 km radius would be constructed at the same time.

The construction phase of a renewable energy project is the highest traffic generator. The duration of this phases is short term, i.e., the potential impact of the traffic generated during the construction phase on the surrounding road network is temporary and wind energy projects, when operational, do not add any significant traffic to the road network.

At the time of preparing this report, the projects listed in **Table 6-1** and shown in **Figure 6-1** were considered.

Table 6-1: Projects within 50km of Groothoek WEF site

PROJECT NAME	APPLICANT	STATUS	REFERENCE NUMBER	DISTANCE TO STUDY PROJECT
Proposed Upgrade of Karbochem boilers and electricity project in Newcastle	Distributed Energy Generation (Pty) Ltd	In process	14/12/16/3/3/1/1164	37 km
Proposed Upgrade of Karbochem boilers and electricity project in Newcastle - Amendment	Distributed Energy Generation (Pty) Ltd	Approved	14/12/16/3/3/1/1164/AM1	37 km
Proposed Kromhof WEF (part of Verkykerskop WEF Cluster)	Kromhof Wind Power (Pty) Ltd	In process	Tbc	0 km
Proposed Normandien WEF (part of Verkykerskop WEF Cluster)	Normandien Wind Power (Pty) Ltd	In process	Tbc	0 km
Proposed Newcastle WEF and associated grid infrastructure near Newcastle, KwaZulu-Natal Province	Mulilo Newcastle Wind Power (Pty) Ltd	Approved	14-12-16-3-3-2-2457	35 km
Proposed Newcastle WEF 2 and associated grid infrastructure near Newcastle, KwaZulu-Natal Province	Mulilo Newcastle Wind Power (Pty) Ltd	Approved	14-12-16-3-3-2-2457	32 km

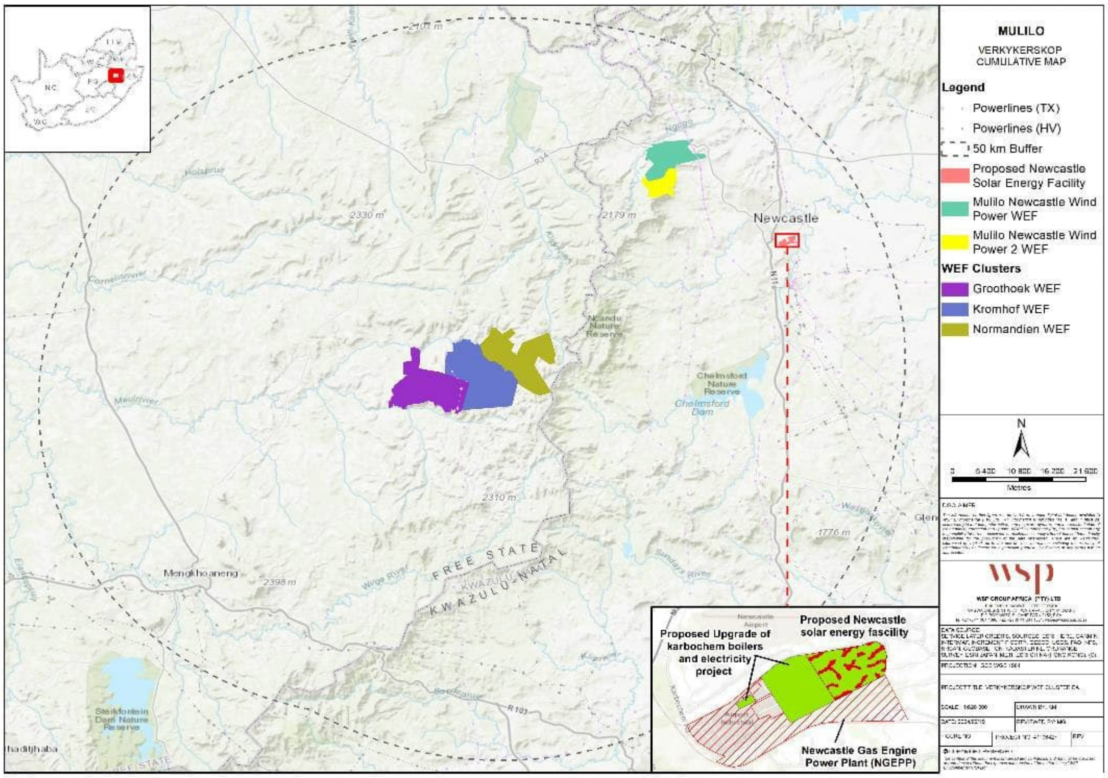

Figure 6-1: Aerial View of cumulative projects within a 50 km radius of the project site

7 IMPACT ASSESSMENT

7.1 Potential Impact during the Construction Phase

The construction phase will generate traffic including transportation of people, construction materials, water, and equipment (abnormal trucks transporting turbine components). It is therefore expected that both these phases are similar in nature in regard to the traffic demand expected. The exact number of trips generated will be determined by appointed the haulage company (see **Table 7-1**).

Nature of the impact

- Temporary increase in traffic
- Noise and dust pollution
- Damage to road surface

7.2 Potential Impact (Operation Phase)

Nature of the impact

- Nominal increase in traffic due to permanent staff and maintenance travelling to site

The traffic generated during this phase will have a nominal impact on the surrounding road network. The following items need to be clarified:

- The number of permanent employees

7.3 Cumulative Impacts

To assess a cumulative impact, it is generally assumed that all wind farms within a 50 km radius, currently proposed and authorized, would be constructed at the same time. This is the precautionary approach as in reality; these projects would be subject to a highly competitive bidding process and not all the projects may be selected to enter into a Power Purchase Agreement. Even if all the facilities are constructed and/or decommissioned at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.

The construction and decommissioning phases of a WEF are the only significant traffic generators. The duration of these phases is short term, i.e., the potential impact of the traffic generated during the construction and decommissioning phases on the surrounding road network is temporary and WEFs, when operational, do not add any significant traffic to the road network.

At the time of preparing this report, the projects shown in **Figure 6.1** were considered in the cumulative impact assessment (see Error! Reference source not found.).

Nature of the impact

- Temporary further increase in traffic, noise and dust pollution associated potential traffic
- Cumulative impact on road surfaces

Table 7-1: Scoping Evaluation Table – Construction/ Decommssioning Phase

Impact: **Traffic and Transport Impact – Construction/Decommissioning Phase**					
Issue	**Nature of Impact**	**Extent of Impact**	**Probability**	**Consequence**	**Impact**
Increase in traffic due to construction vehicles causing potentially negative impact on external traffic as well as damage to road surfaces	Direct impacts: » Temporary congestion on external roads » Damage to road surfaces not maintained Indirect impacts: » none	Regional	2	2	Low
Increase in Dust and Noise pollution through construction vehicles	Direct impacts: » None Indirect impacts: » Impact on communities and farms in the vicinity of the project site	Local	2	2	Low

Description of expected significance of impact

It is expected that the impact on the surrounding roads, i.e., traffic congestion due to construction vehicles and damage to road surfaces, can be mitigated with the recommended measures. The impact of noise and dust pollution is of nominal consequence due to the remoteness of the project.

Gaps in knowledge & recommendations for further study (EIA stage)

- Final kmz and more detailed project descriptions required.
- Number of construction staff.
- Final turbine locations and proposed site roads required.

Recommendations with regards to mitigation measures

- Source equipment, machinery and material locally as far as possible.
- Stagger deliveries of components to site and scheduled to occur outside of peak traffic periods as much as possible.
- Regular maintenance of gravel roads located within the site boundary, including the access road to the site.
- The use of existing licensed quarries near the site as much as possible.
- Staff trips to occur outside of main peak traffic periods as far as possible.
- Regular monitoring of road surfaces to address any damage caused by construction vehicles timeously.

Table 7-2: Scoping Evaluation Table – Operational Phase

Impact **Traffic and Transport Impact – Operational Phase**					
Issue	**Nature of Impact**	**Extent of Impact**	**Probability**	**Consequence**	**Impact**
Slight increase in traffic due to permanent staff and irregular maintenance trips to and from site during the life span of the wind farm.	Direct impacts: » Nominal impact on external traffic Indirect impacts: » none	Local	1	1	Very Low
Description of expected significance of impact It is expected that the impact on the surrounding roads will be nominal.					
Gaps in knowledge & recommendations for further study » Number of permanent staff. **Recommendations with regards to mitigation measures** » None required.					

Table 7-3: Scoping Evaluation Table – Cumulative

Impact **Traffic and Transport Impact – Cumulative**					
Issue	**Nature of Impact**	**Extent of Impact**	**Probability**	**Consequence**	**Impact**
Additional increase in construction vehicle traffic if approved projects would have similar construction periods.	Direct impacts: » Temporary congestion on external roads » Damage to road surfaces if not maintained Indirect impacts: » none	National	3	2	Medium
Additional increase in Dust and Noise pollution through construction vehicles	Direct impacts: » None Indirect impacts: » Impact on communities and farms in the vicinity of the project site	Local	2	2	Low
Description of expected significance of impact It is noted that it is unlikely that all projects in a 50km radius will have the same construction periods. However, should similar construction phases occur, it is recommended to agree on delivery schedules if possible. Besides that, mitigation measures as listed in Table 7-1 for the construction phase apply. The anticipated significance is then moderate to low.					

8 NO-GO ALTERNATIVE

The no-go alternative implies that the proposed development of the Groothoek WEF does not proceed. This would mean that there will be no negative environmental impacts and no traffic impact on the surrounding network during the construction and decommissioning phases. However, this would also mean that there would be no socio-economic benefits to the surrounding communities, and it will not assist government in meeting its targets for renewable energy. Hence, the no-go alternative is not a preferred alternative.

9 LEGISLATIVE AND PERMIT REQUIREMENTS

Key legal requirements pertaining to the transport requirements for the proposed WEF development are:

- Abnormal load permits, (Section 81 of the National Road Traffic Act 93 of 1996 and National Road Traffic Regulations, 2000);
- Port permit (Guidelines for Agreements, Licenses and Permits in terms of the National Ports Act No. 12 of 2005); and
- Authorisation from Road Authorities to modify the road reserve to accommodate turning movements of abnormal loads at intersections.

10 CONCLUSIONS

It is recommended that dust suppression and maintenance of gravel roads form part of the Environmental Management Programme (EMPr). This would be required during the Construction and Decommissioning phases when an increase in vehicle trips can be expected. No traffic related mitigation measures are envisaged during the Operation phase due to the negligible traffic volume generated during this phase.

Key mitigation measures:

- Dust suppression.
- Regular maintenance of the access route(s) to site for road surface damaged caused by haulage and construction vehicles.
- Design of any access and internal site roads according to the relevant design standards (i.e., SANRAL or Provincial guidelines, depending on the road the access is located on).
- Reduce *daily* traffic on public roads:
  - Stagger turbine component delivery to site.
  - Staff and general trips should occur outside of peak traffic periods as far as possible.

Monitoring recommendations

- Dust suppression at regular intervals.
- Regular monitoring of road surface quality of above mentioned road surfaces of access routes to site for any damage caused by project related vehicles.

The potential impacts associated with the proposed Groothoek WEF, and associated infrastructure are acceptable from a traffic and transport engineering perspective at Scoping Phase.

11 REFERENCES

- Gouws. S: “Concrete Towers – a business case for sustained local investment”, Concrete growth,www.slideshare.net/SantieGouws/concrete-towers-a-business-case-for-sustained-investmentrev-5
- Road Traffic Act, 1996 (Act No. 93 of 1996)
- National Road Traffic Regulations, 2000
- SANS 10280/NRS 041-1:2008 - Overhead Power Lines for Conditions Prevailing in South Africa
- Transnetportterminals.net. n.d. *Transnet Port Terminals*. [online] Available at: <https://www.transnetportterminals.net/Ports/Pages/default.aspx>
- The Technical Recommendations for Highways (TRH 11): “Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads
- Map from the Eastern Cape Road Asset Management System, Eastern Cape Transport & Public Works, May 2012
- Google Earth Pro Imagery (2022)

Annexure A: Specialist Expertise

SUMMARY OF EXPERIENCE

Iris is a Professional Engineer registered with ECSA (20110156) and obtained her Master of Science degree in Civil Engineering in Germany in 2003. She has more than 20 years of experience in a wide field of traffic and transport engineering projects.

Iris left Germany in 2003 and has gained work experience as a traffic and transport engineer in South Africa and Germany. She has technical and professional skills in traffic impact studies, public transport planning, non- motorised transport planning and design, design and development of transport systems, project planning and implementation for residential, commercial, and industrial projects.

Her passions are the renewable energies and road safety, and she is highly experienced in providing traffic and transport engineering advise.

Iris is registered with the International Road Federation as a Global Road Safety Audit Team Leader and is a regular speaker at conferences, seminars and similar.

PROFESSIONAL REGISTRATIONS & INSTITUTE MEMBERSHIPS

PrEng	Registered with the Engineering Council of South Africa No. 20110156 Registered Mentor with ECSA
MSAICE	Member of the South African Institution of Civil Engineers
ITSSA	Member of ITS SA (Intelligent Transport Systems South Africa)
SAWEA	Member of the South African Wind Energy Association
SARF	South African Road Federation: Committee Member of Council
SARF WR	South African Road Federation Western Region – Chair
SARF RSC	South African Road Federation National Road Safety Committee
IRF	Registered as International Road Safety Audit Team Leader

EDUCATION

1996 – Matric (Abitur)	Carl Friedrich Gauss Schule, Hemmingen, Germany
1998 - Diploma (Draughtsperson)	Lower Saxonian State Office for Road Engineering
2002 – BSc Eng (Civil)	Leibniz Technical University of Hannover, Germany
2003 - MSc Eng (Civil & Transpt)	Leibniz Technical University of Hanover, Germany

Master Thesis on the Investigation of the allocation of access rights *to the European rail network infrastructure - Research of the feasibility of the different bidding processes to allocate access rights of railway operators in the European railway market. Client: Technical University of Berlin and German Railway Company.*

SUMMARY OF EXPERIENCE

iWink Consulting (Pty) Ltd – Independent Consultant

2022 – present
Position: Independent Consultant – working as an independent Specialist in the field of Traffic & Transport Engineering, Renewable Energies and Road Safety.

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JG Afrika (Pty) Ltd (Previously Jeffares & Green (Pty) Ltd)

2016 – 2022
Position: Associate / Division Head: Traffic & Transport Engineering

Jeffares & Green (Pty) Ltd

2012 – 2016
Position: Senior Traffic & Transport Engineer

Arup (Pty) Ltd

2010 - 2012
Position – Senior Traffic & Transport Engineer

Arup (Pty) Ltd

2004 - 2010
Position – Traffic & Transport Engineer

Schmidt Ingenieursbüro, Hannover, Germany

2000
Position – Engineering Assistant

Leibniz University of Hannover, Germany

2000 - 2003
Position – Engineering Researcher - Institute for Road & Railway Engineering

SELECTION OF PROJECTS

Please note: The below lists show only a *selection* of projects that Iris has been involved in over the last 20 years. More information and a complete Schedule of Experience can be made available on request.

RENEWABLE ENERGY PROJECTS

Transport Impact Assessments /Traffic Management Plans for:

- Selebi Phikwe Solar PV Project, Botswana
- Cradock – Kaladokhwe WEFs
- Britstown WEFs
- Highveld Solar Cluster
- Dealsville & Bloemfontein Solar PV
- Great Karroo Wind and Solar Cluster
- Ummbila Emoyeni Solar Project
- Poortjie Wind&Solar
- Hydra B Solar Cluster
- Choje Windfarm, Eastern Cape
- Richards Bay Gas to Power Project
- Oya Black Mountain Solar Project
- De Aar Solar Project
- Euronotus Wind & Solar Cluster
- Pienaarspoort Wind Energy Project
- Karreebosch Wind Energy Project
- Dyasonsklip Solar Project
- Kuruman Windfarm
- Bloemsmond Solar Farms
- Hendrina Wind Energy Project
- Orkney Solar Project
- Bulskop Solar Project
- Hyperion Solar & Thermal Project
- Gromis & Komas Wind Energy Projects
- Kudusberg & Rondekop Wind Energy Projects
- Bayview Windfarm
- Coega West Windfarm
- Suikerbekkie Solar Project
- Poortjie Solar Project
- Northam Solar Project

- Sibanye Solar Project
- Du Plessis Dam Solar Project
- Mercury Solar Project
- Aberdeen Wind Energy Project
- Saldanha Wind and Solar Projects
- Ummbila Emoyeni Wind Energy Project
- Springhaas Solar Project

Clients:

- G7 Energies
- ABO Wind Renewable Energies
- Atlantic Renewable Energy Partners
- Mulilo
- Acciona
- Enel
- Engie
- DNV GL
- Enertrag
- Scatec Solar
- Red Rocket Energies
- Windlab
- Mainstream
- Africoast
- Genesis

FURTHER PROJECTS

Traffic Impact Studies & Site Development Plan Input:

- Nooiensfontein Housing Development, City of Cape Town
- Belhar Housing Development, City of Cape Town
- Baredale Phase 7, City of Cape Town
- Beau Constantia Wine Farm
- Constantia Glen Wine Farm
- Eagles Nest Wine Farm
- Groenvallei Parking Audit, City of Cape Town
- Kosovo Housing Development, Western Cape Government
- Enkanini Housing Development, Stellenbosch
- Delft Housing Development, City of Cape Town
- Secunda Sasol, Free State
- Marula Platinum Mine
- InnerCity Transport Plan, City of Cape Town
- Stellenbosch Road Master Plan
- Nyanga Public Transport Interchange
- Crawford Campus Cape Town
- Durban RoRo Car Terminal, Transnet

- Durban Farewell Container Site
- Msunduzi Waterfront Housing Development
- Transnet Park Site – Traffic Management and Evacuation Plans
- UWC Bellville Medical Campus
- Bloekombos District Hospital
- Malabar Extension 3, Port Elizabeth

Traffic Engineering for Roads Projects:

- Namibia Noordoewer to Rosh Pina, Road Agency Namibia
- N2 Section 19 Mthatha – NMT Studies
- R63 Alice to Fort Beaufort – NMT, Road Link and Intersection Studies
- N2 Kangela to Pongola Upgrade
- Cofimvaba Eastern Cape – NMT, Road and Intersection Upgrades
- Stellenbosch R44 Traffic Signals
- Secunda Traffic Signals
- Fezile Dabi District Gravel Roads Upgrade, Free State Province
- Zambia RD Rehabilitation Project
- R61 Eastern Cape – NMT Studies, SANRAL

CONTINUED PROFESSIONAL DEVELOPMENT (CPD)

*Last five years*full CPD list available*

2023 – International Traffic Safety Conference, Doha – Speaker

2022 – 7th Regional Conference for Africa & PIARC International Seminar on Rural Roads and Road Safety - Speaker

2022 – Non-motorised Transport Seminar (SARF) – Co-Organizer / Speaker

2021 – SARF KZN Road Safety Considerations (SARF) – Guest Speaker

2021 – Road Safety Audit Course (IRF) – Guest Speaker

2021 – Legal Obligations / Road Safety Act (SARF) – Presenter

2020 – Understanding Road Accidents (SARF)

2020 – Road Safety Auditor Course (SARF) – Co-Lecturer

2018 – African Road Conference (IRF/SARF/PIARC)

2018 – Road Safety in Engineering (SARF) – Presenter

2016 - SATC Road Safety Audit Workshop Pretoria (SARF)

2015 - Non-motorised Transport Planning (SARF

Annexure B: Specialist Statement of Independence

I, Iris Sigrid Wink, declare that –

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

Signature of the Specialist: I Wink ________________________

Name of Company: iWink Consulting (Pty) Ltd

Date: 23/09/2024

Annexure C: Impact Assessment Methodology

REPORTING REQUIREMENTS

- Project Description
- Legislative Context (as applicable)
- Assumptions and limitations
- Description of Baseline Environment
- Site Sensitivity Verification Assessment (including sensitivity mapping) (as applicable)
- Identification and high-level screening of impacts
- Plan of Study for EIA

HIGH-LEVEL SCREENING OF IMPACTS AND MITIGATION

Appendix 2 of GNR 982, as amended, requires the identification of the significance of potential impacts during scoping. To this end, an impact screening tool has been used in the scoping phase. The screening tool is based on two criteria, namely probability; and, consequence (**Table 0-3**), where the latter is based on general consideration to the intensity, extent, and duration.

The scales and descriptors used for scoring probability and consequence are detailed in **Table 0-8** and **Table 0-2** respectively.

Table 0-6: Probability Scores and Descriptors

SCORE	DESCRIPTOR
4	**Definite**: The impact will occur regardless of any prevention measures
3	**Highly Probable**: It is most likely that the impact will occur
2	**Probable**: There is a good possibility that the impact will occur
1	**Improbable:** The possibility of the impact occurring is very low

Table 0-7: Consequence Score Descriptions

SCORE	NEGATIVE	POSITIVE
4	Very severe: An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated.	Very beneficial: A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this benefit.
3	Severe: A long term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these.	Beneficial: A long term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these.

2	Moderately severe: A medium to long term impacts on the affected system(s) or party (ies) that could be mitigated.	Moderately beneficial: A medium to long term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this way.
1	Negligible: A short to medium term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary.	Negligible: A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.

Table 0-8: Significance Screening Tool

CONSEQUENCE SCALE

PROBABILITY SCALE		**1**	**2**	**3**	**4**
	1	**Very Low**	**Very Low**	**Low**	**Medium**
	2	**Very Low**	**Low**	**Medium**	**Medium**
	3	**Low**	**Medium**	**Medium**	**High**
	4	**Medium**	**Medium**	**High**	**Very High**

The nature of the impact must be characterised as to whether the impact is deemed to be positive (+ve) (i.e. beneficial) or negative (-ve) (i.e. harmful) to the receiving environment/receptor. For ease of reference, a colour reference system (**Table 0-9**) has been applied according to the nature and significance of the identified impacts.

Table 0-9: Impact Significance Colour Reference System to Indicate the Nature of the Impact

Negative Impacts (-ve)	**Positive Impacts (+ve)**
Negligible	**Negligible**
Very Low	**Very Low**
Low	**Low**
Medium	**Medium**
High	**High**
Very High	**Very High**