iWink Consulting
Traffic & Transport Engineering
Road Safety

FE KUDU WIND ENERGY FACILITY
ABERDEEN
EASTERN CAPE PROVINCE

Transport Impact Assessment

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Prepared by:

iWink Consulting (Pty) Ltd

Plattekloof Glen
Cape Town
Project manager: Iris Wink
iris@iwink.co.za

www.iwink.co.za

FE KUDU WIND ENERGY FACILITY

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EXECUTIVE SUMMARY

This report serves as the Traffic Impact Assessment (TIA) aimed at determining the traffic impact of the proposed FE Kudu Wind Energy Facility (WEF). The FE Kudu WEF is proposed to be located approximately 40 km west of Aberdeen in the Eastern Cape Province of South Africa, adjacent to the proposed Kariega WEF. The site will accommodate up to 80 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 concerns. To ensure sight line are kept, it is advised allow for a setback distance of any obstructions, i.e., cutting back of vegetation/trees, and accommodating a convex roadside mirror where necessary.

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 during 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, dust, and exhaust pollution. Based on the high-level screening of impacts and mitigation, the site is expected to have a low negative significance during the construction and decommissioning stage, and a minimal negative significance during the operational stage.

1 INTRODUCTION

1.1 Project Description

FE Kudu (Pty) Ltd. is proposing the development of a commercial Wind Energy Facility (WEF) and associated infrastructure on a site located approximately 40 km west of Aberdeen in the Eastern Cape Province (see **Figure 1-1**).

The FE Kudu WEF project site is located in close proximity to the proposed Kariega WEF and the proposed FE Tango WEF projects (see **Figure 1-2**) and as such it is expected that the area will be well suited for the transported of components and materials to site. The site comprises a single affected property, Portion 2 of Farm Oorlogspoort 85. The project is known as the FE Kudu Wind Energy Facility (in this report shortened to FE Kudu WEF). The project is planned as part of a cluster of renewable energy projects, which includes a second wind energy facility with a capacity of up to 150MW (namely FE Tango Wind Energy Facility as before-mentioned), located approximately 20km east of the FE Kudu Wind Energy Facility.

The entire extent of the site falls within the Beaufort West Renewable Energy Development Zones (i.e., REDZ Focus Area 11). The undertaking of a basic assessment process for the project is in-line with the requirements stated in GNR 114 of 16 February 2018.

It is proposed that the FE Kudu WEF will comprise of up to 80 turbines with a contracted capacity of up to 600 MW (~7.5MW per turbine) on a project site extent of approximately 9 170 ha.

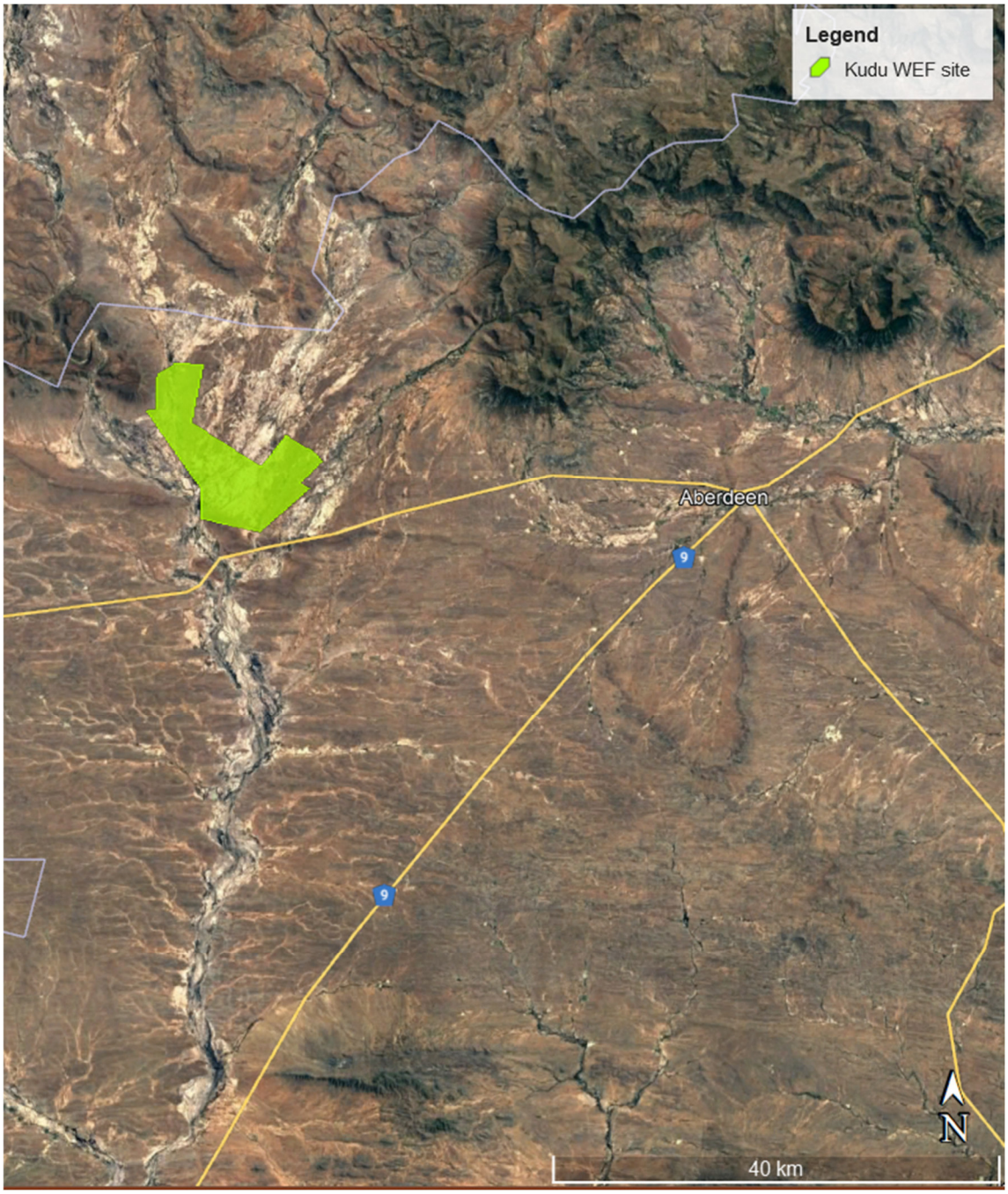

Figure 1-1: Aerial View of FE Kudu WEF site

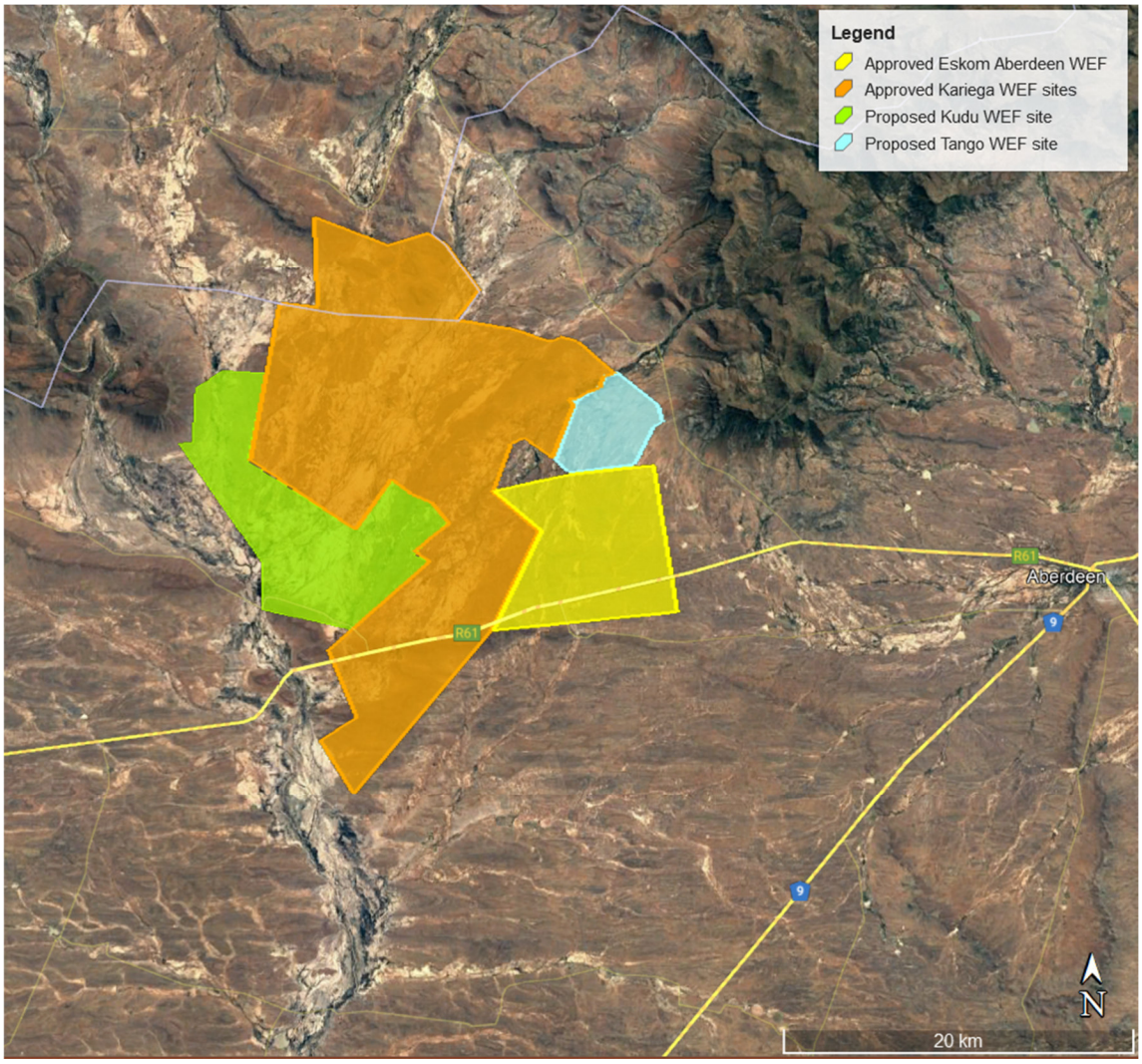

Figure 1-2: Aerial View of FE Kudu WEF, FE Tango WEF, Eskom Aberdeen and Kariega WEF sites

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

Table 1-1:Project information

Facility Name:	FE Kudu Wind Energy Facility
Applicant:	FE Kudu (Pty) Ltd.
Location:	Appr. 40 km west of Aberdeen in the Eastern Cape Province
Affected Farms:	Portion 2 of the Farm Oorlogspoort 85
Extent:	~ 9 170 ha
Total Capacity:	~600 MW
Number of turbines:	Up to 80
Turbine hub height:	164m
Transformer:	One transformer to be located at the base of each turbine
Battery Energy Storage:	Battery Energy Storage System (BESS) will be provided within development footprint. Preferred technology: Lithium-ion. Dimensions: ~20m long x 3m wide x 5m high. Footprint: ~5ha.
Turbine Foundation:	Concrete General estimated diameter of approximately 26 m x 3 m deep – Footprint: 1 000m² per turbine
Turbine Hardstand:	~7 500m² per turbine
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. Included in the operational and storage buildings are usually site office, stores, workshops, turbine storage areas, fuel storage, worker ablution facilities. Rehabilitation after end of 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 ~8m with a servitude of 13.5m to accommodate side drains. Access road length: tbc. Where required for turning circle/bypass areas, access or internal roads need to be up to 20 m to allow for larger component transport.
Cables:	Medium voltage (33 kV) cables/powerlines running from wind turbines to the facility substation. The routing will follow existing/proposed access roads and will be buried where possible

	Cabling between turbines will be underground between turbines where possible.
Substation:	One 132/33kV on-site substation to facilitate the connection between the wind farm and the electricity grid. Area: ~2ha.
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. For the operational phase (approximately 25 years), the water requirement can be assumed to be about 8kℓ per month for 11 months of the year. Water header tanks will be used to provide potable water. 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 R61 and farm road

1.2 Scope, Purpose, and Objectives of Specialist Report

The Transport Impact Assessment 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 and future road planning proposals,
- 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 where possible.
- Public Transport access,
- Non-motorised Transport facilities, and
- Recommended public transport and NMT upgrades, if necessary.

1.3 Details of Specialist

Iris Sigrid Wink of iWink Consulting (Pty) Ltd. is the Traffic & Transportation Engineering specialist appointed to provide a Transport Impact Assessment for the FE Kudu Wind Energy Facility. 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 map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;

(i) 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
- Traffic accommodation during construction.

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:

Project Assessment

- 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.

Access and Internal Roads Assessment

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

Haulage Route Assessment

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

Traffic Estimation and Impact

- 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.

Report (Documentation)

- 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;
- TMH 16 South African Traffic Impact and Site Traffic Assessment Manual (Vol 1), COTO, August 2012;
- TMH 16 South African Traffic Impact and Site Traffic Assessment Manual (Vol 2), COTO, February 2014;
- Google Earth Pro;
- Transnet Port terminals website; and
- Eastern Cape Roads Asset Management System.

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 FE Kudu WEF is estimated to be 80.
- 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.
- Projects in the vicinity of the site to be considered as part of the EIA cumulative impacts are listed in Table 6-1.
- A 18-months construction period is assumed with 48% of the construction period dedicated to site prep and civil works.

2.3 Consultation Processes Undertaken

The Transport 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

It is envisaged that the components will be imported to South Africa via the Port of Ngqura in the Eastern Cape being the closest port to the site, located approximately 300 km from the proposed site travelling via the R75 and R338 (see **Figure 4-1**).

The Port of Ngqura is a world-class deep-water trans-shipment hub offering an integrated, efficient, and competitive port service for containers on transit. The Port forms part of the Coega Industrial Development Zone (CIDZ) and is operated by Transnet National Ports Authority.

Figure 4-1: Route from the Port of Ngqura to FE Kudu WEF project site

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 in an abnormal load (on-site substation).

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 transformer, 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 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 4-2). 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 4-2: 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 4-3). 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 4-3: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 4-4**) 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 4-4: 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 4-5**). 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 4-5: 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 4-6**).

Figure 4-6: 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 west of Aberdeen in the Eastern Cape Province on Portion 2 of the Farm Oorlogspoort No. 85 (see **Figure 5-1).** The proposed project will consist of up to 80 wind turbines with a capacity of 600MW. The FE Kudu WEF project site is located in close proximity to the proposed Kariega WEF (not yet in process), authorised Eskom Aberdeen WEF. authorised Aberdeen Wind 1, 2 and 3, and the proposed FE Tango WEF projects and as such it is expected that the area will be well suited for the transported of components and materials to site. The entire extent of the site falls within the Beaufort West Renewable Energy Development Zones (i.e., REDZ Focus Area 11). The undertaking of a basic assessment process for the project is in-line with the requirements stated in GNR 114 of 16 February 2018.

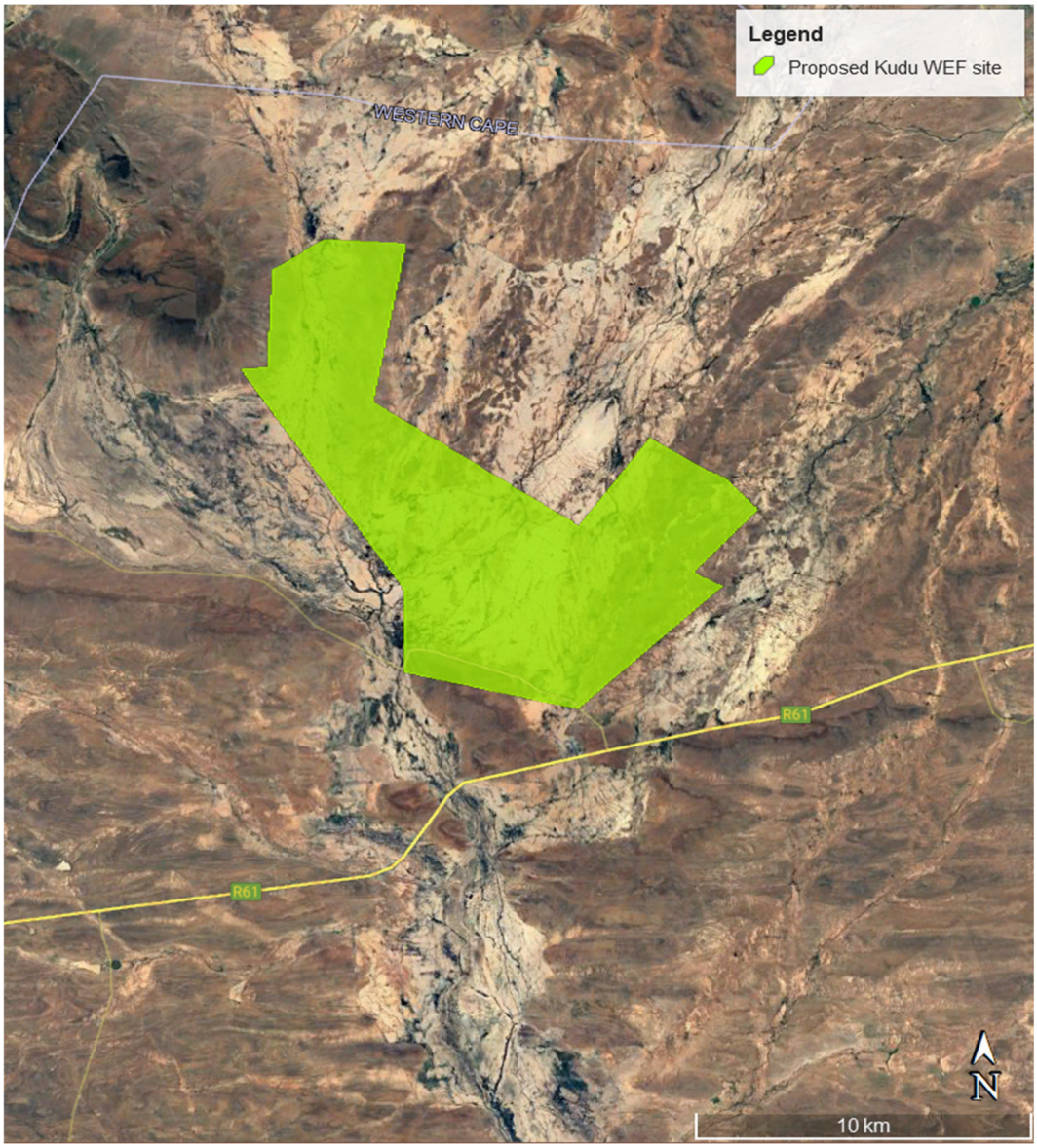

Figure 5-1: Aerial View of FE Kudu WEF site

5.1.1 Route for Components manufactured within South Africa

In South Africa, more than half (52%) of the manufacturing industry's national workforce resides in three metros - Johannesburg, Cape Town, 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, or Pinetown/Durban areas. Some components may be transported from the Coega area in the Eastern Cape. 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 twenty-six (26) 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 (approximately 570 km travelling via the N1 to site). No road limitations envisaged along the route for normal load freight (see **Figure 5-2)**.

Figure 5-2: Route from Cape Town area to the FE Kudu WEF project site

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 the route as shown in **Figure 5-3** below. No road limitations are envisaged along the route for normal load freight. The travel distance from the Johannesburg area to the site is approximately 930 km via the N1 and N9.

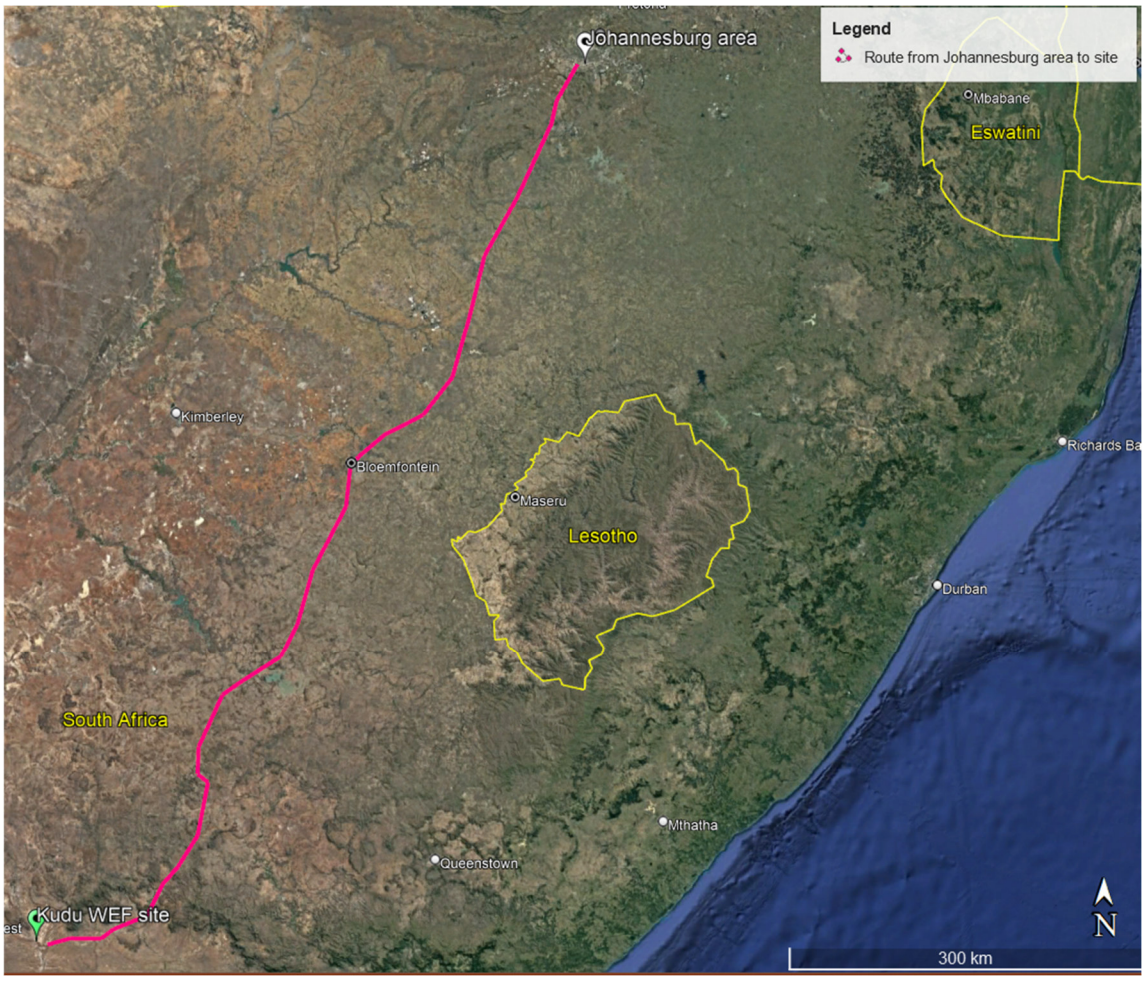

Figure 5-3: Route from Johannesburg Area to the FE Kudu WEF project site

5.1.1.3 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 1 150 km via the N3, N5, N1 and N9 as shown in **Figure 5-4** below.

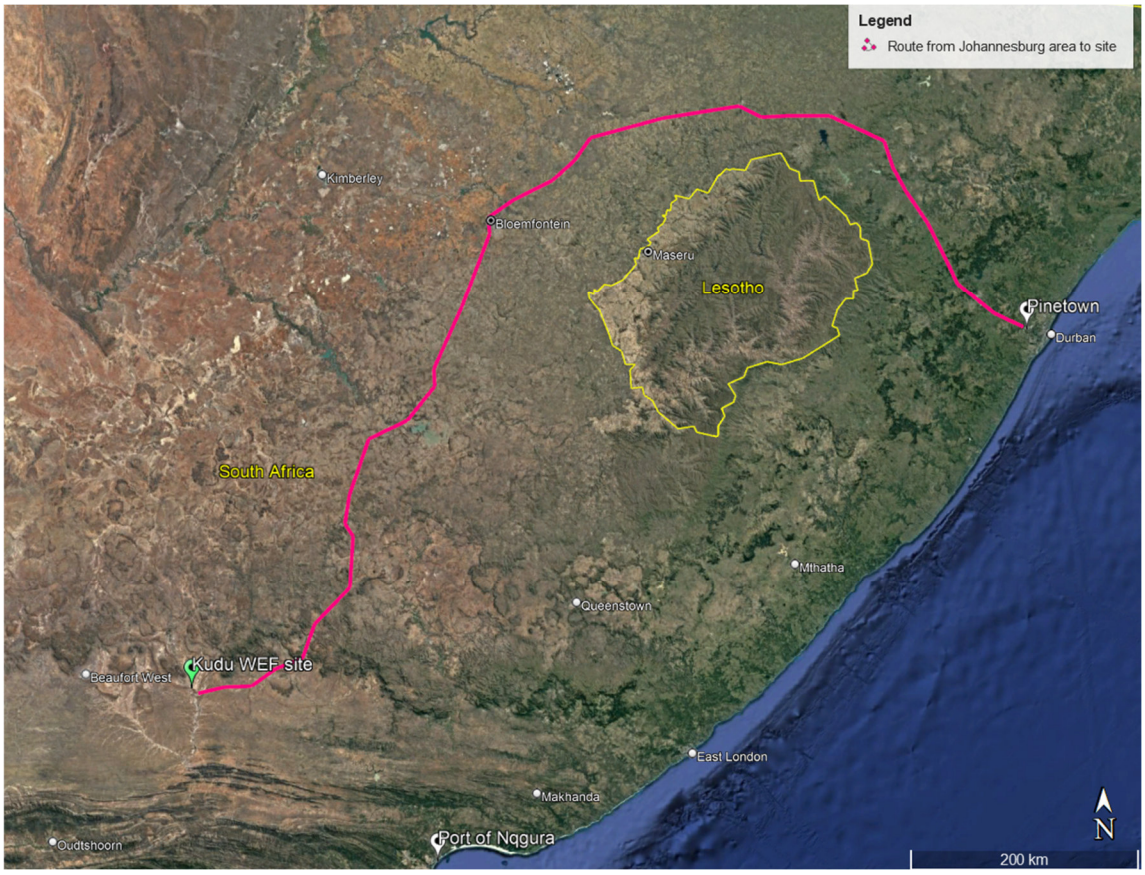

Figure 5-4: Route from Pinetown to the FE Kudu WEF project site

5.1.2 Surrounding road network

The proposed FE Kudu WEF site is located near Aberdeen in the Eastern Cape. The road classification of the surrounding road network as per the *Road Infrastructure Strategic Framework for South Africa (RISFSA*) is shown in **Figure 5-5** (sourced from the *Eastern Cape Road Asset Management System*).

The R61 can be classified as a Rural Class 2 route, which belongs to the major arterial roads that typically carry inter-regional traffic between:

- Smaller cities and medium to large towns (population typically greater than about 25 000);
- Smaller border posts;
- Class 1 and other Class 2 routes;
- Important regions, transport nodes and commercial areas that generate large volumes of freight and other traffic such as seaports and international airports.
- Smaller centres than the above when travel distances are relatively long (longer than 200 km).

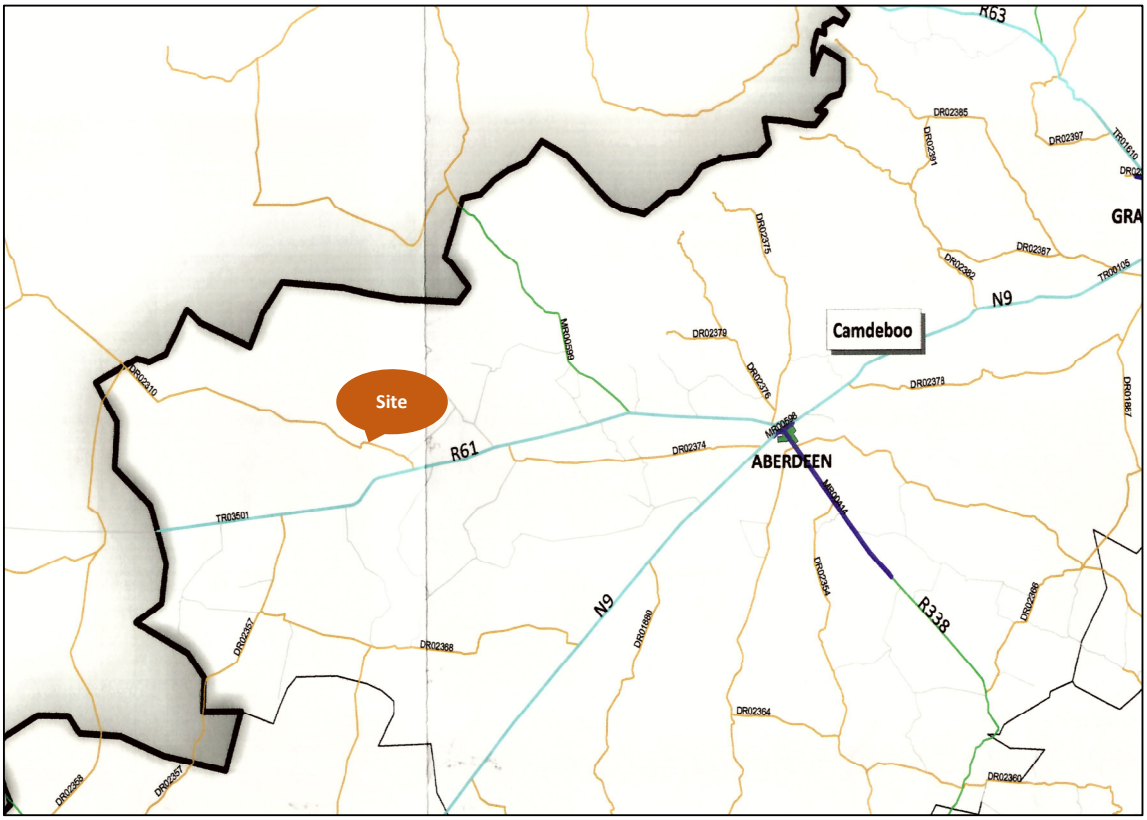

Figure 5-5: Road Network in vicinity of project site

5.1.3 Proposed Accesses

Feasible accessibility was established in consideration with required sight distances, minimum access spacing requirements and road safety principles.

Three possible access points are recommended for the FE Kudu WEF project (see **Figure 5-6).** To reach these access points, construction vehicles will need to turn from the R61 into DR02310 towards the site (see **Figure 5-7**).

Figure 5-6: Aerial View of recommended Access Points for the FE Kudu WEF

Figure 5-7: View of DR02310 at intersection with R61

In accordance with *Figure 2.5.5(a) of the TRH17 Guidelines for the Geometric Design of Rural Roads* (see **Figure 5-8**), the shoulder sight distance for a stop-controlled condition on a road with a speed limit of 60 km/h, needs to be a minimum of 250 m for the largest vehicle (5m set back from the intersecting road).

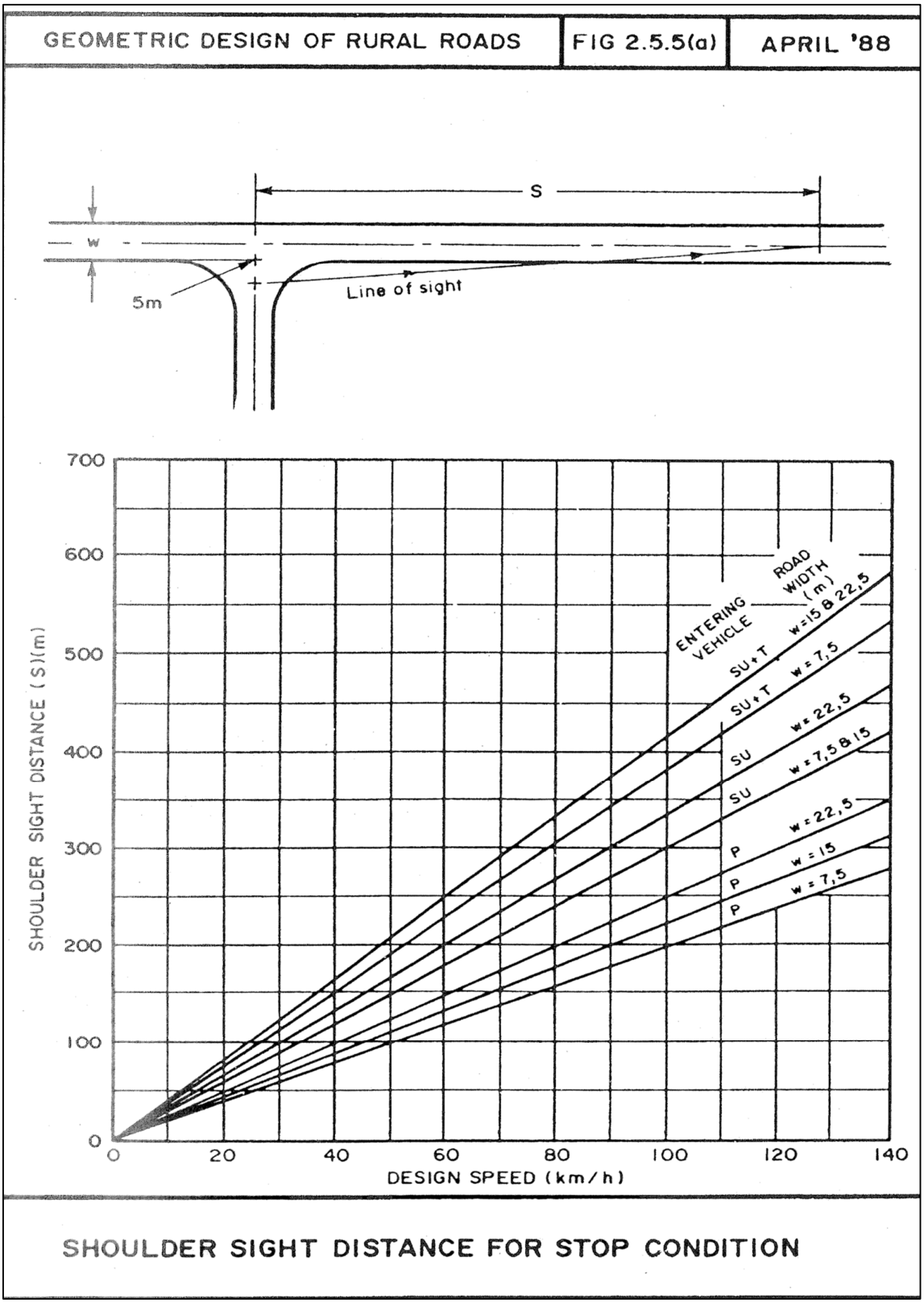

Figure 5-8: Shoulder sight distance (TRH17)

5.2 Access 1

Access 1 is located at an existing farm track (see **Figure 5-9**). The access will need to be upgraded to accommodate turning movements of the largest construction vehicle when entering and exiting the access safely.

Figure 5-9: Aerial View of Access 1 location

Required minimum shoulder sight distances are acceptable in both directions accessing the DR02310 from the access (see **Figure 5-15**). However, any trees and shrubbery, obstructing sight lines, will need to be cut back and maintained.

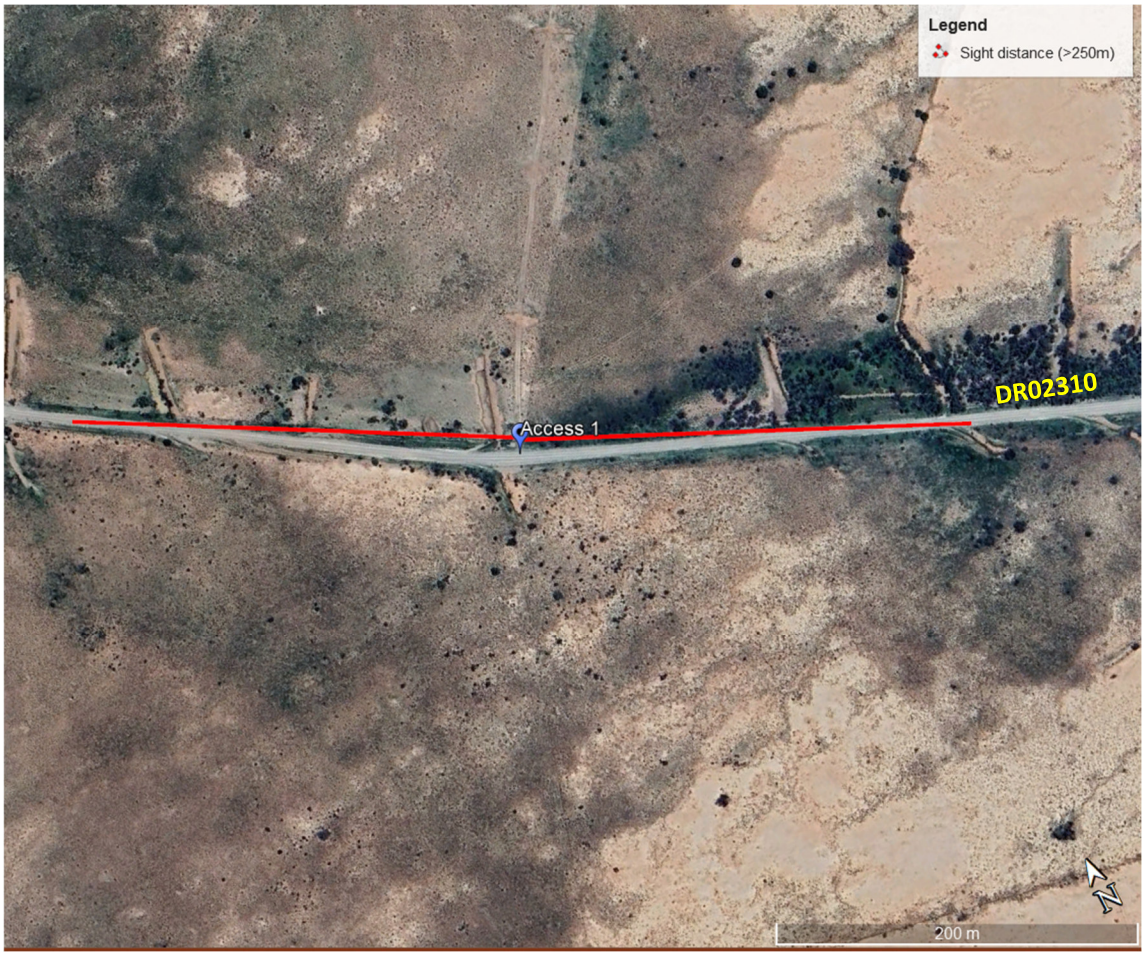

Figure 5-10: Shoulder Sight Distances on DR02310 from Access 1

5.3 Access 2

This access point is recommended at a location along the straight section of the DR02310 where an existing farm track is visible (see **Figure 5-11**). Accessing the site will be easy for construction vehicles as the terrain in the vicinity of this access is relatively flat.

The access point will need to be upgraded to accommodate all construction vehicles.

Figure 5-11: Aerial View of Access 2 location

The required minimum shoulder sight distances are met in both directions accessing the DR02310 from the access road (see **Figure 5-12**).

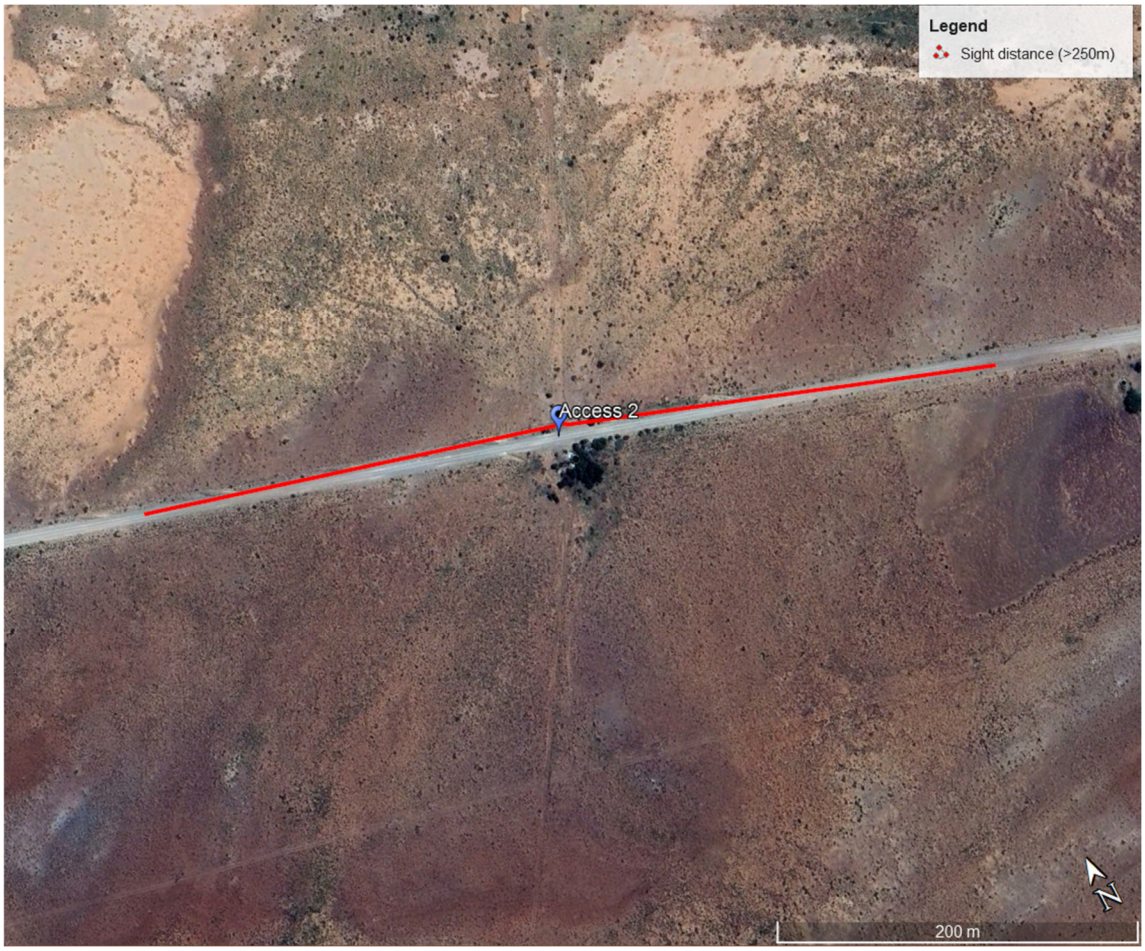

Figure 5-12: Shoulder Sight Distances on DR02310 from Access 2

5.4 Access 3

This access road is an existing farm road onto the project site (see **Figure 5-13**), which may need to be upgraded to cater for large construction vehicles. The elevation profile in **Figure 5-14** indicates suitable gradients for heavy loads vehicles to navigate.

Figure 5-13: Aerial view of Access 3 location

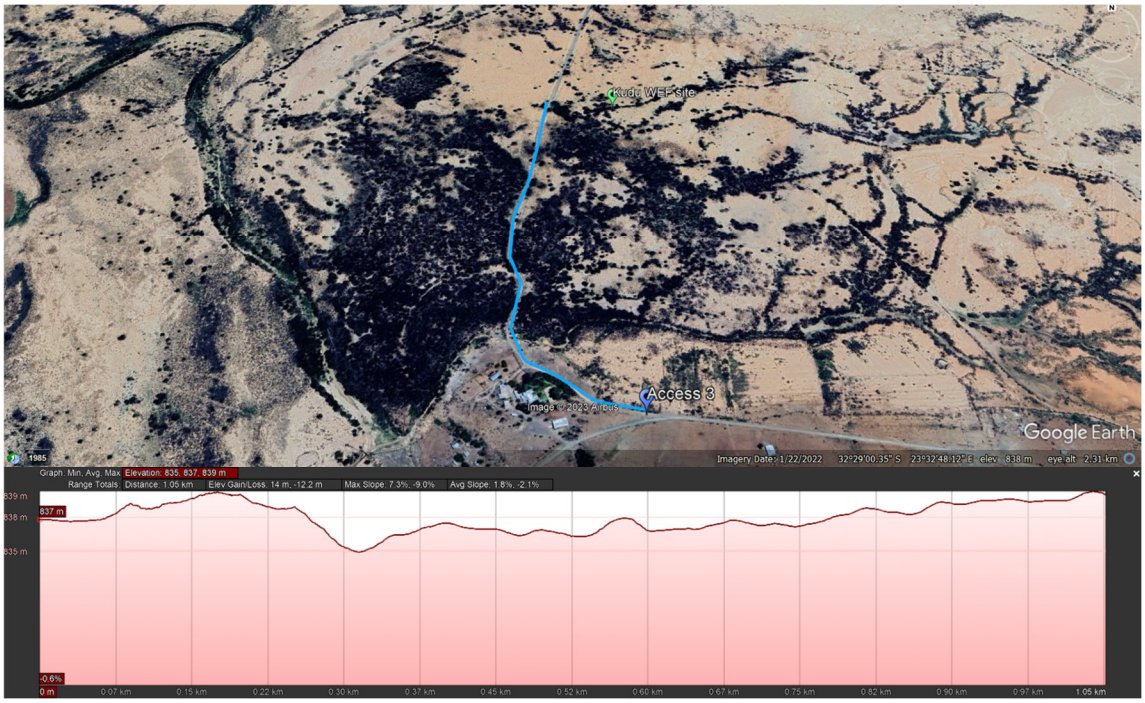

Figure 5-14: Elevation profile for Access road 3

The required minimum shoulder sight distances are met in both directions accessing the DR02310 from the access road (see **Figure 5-15**). However, the sight lines as indicated in the Figure need to be kept clear of any obstructions (i.e., vegetation, signage, or similar).

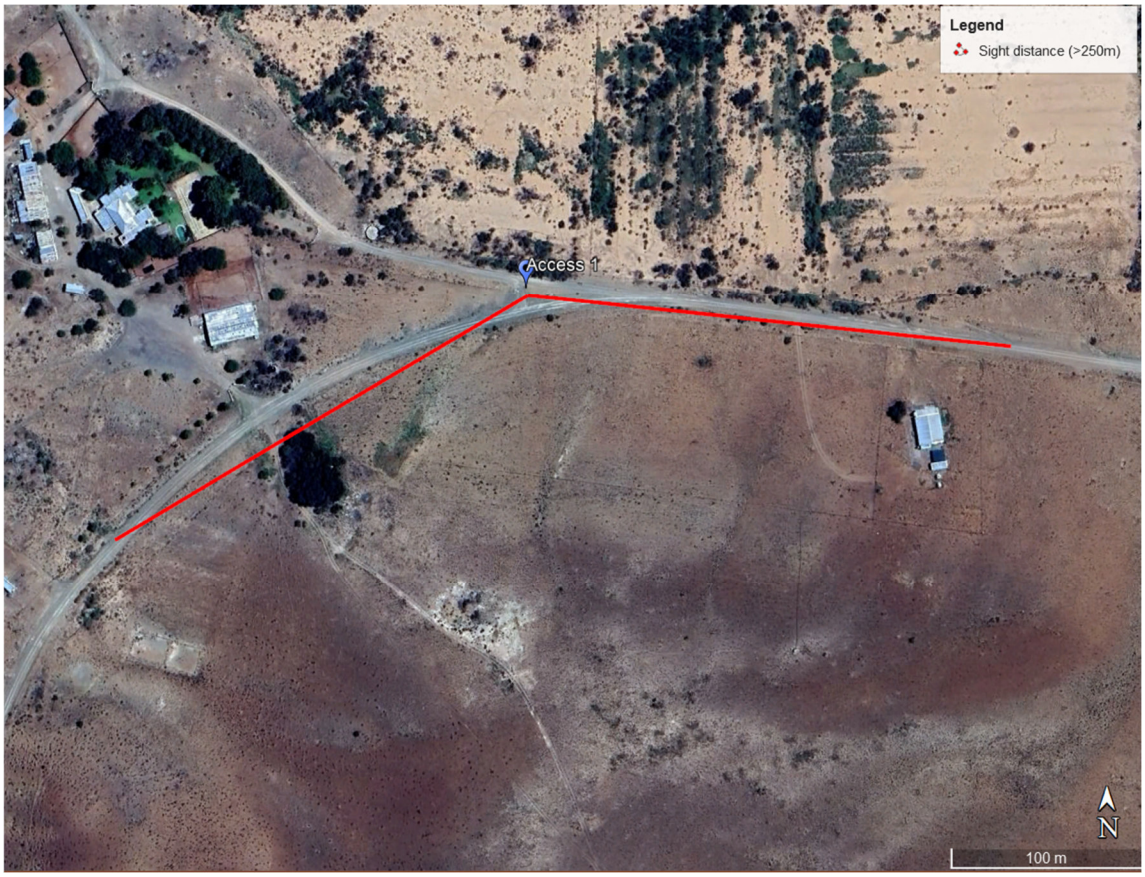

Figure 5-15: Shoulder Sight Distances on DR02310 from access road

5.4.1 General

The geometric design and layout for the internal roads from the access points 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.

It is recommended that the site access be security controlled and security staff be stationed on site at the access during construction. A minimum stacking distance of 25 m needs to be kept between the road edge of the external road and the boom.

All road markings and signage need to be in accordance with the South African Road Traffic Signs Manual (SARTSM).

5.4.2 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 Aberdeen.

5.4.3 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. However, generally the developer of a large-scale project, such as many renewable energy projects, will provide shuttle buses or similar for workers during the construction phase.

5.5 Alternatives

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 were considered in relation to the proposed activity:

<u>Location Alternatives</u>

The location for the WEFs was selected based on the following parameters:

- Quality of the wind resource;
- Proximity to Eskom grid connection point (i.e., existing Eskom substation which has sufficient capacity (or planned capacity) to support the proposed WEF project);

- Landscape features of the site (being relative flat, which makes construction easier and reduces cost);
- Relatively remote site (fewer sensitive receptors in terms of visual and noise impacts);
- Landowner support of the proposed development;
- Accessibility from the R61 and DR02310; and
- Relatively low agricultural potential land mostly used for extensive low intensity livestock grazing.

Based on these considerations, the FE Kudu WEF site has been selected as the preferred alternative due to the favourable factors listed above.

Design and layout alternatives

The site layout may change during the BA in response to the environmental, social and technical sensitivities identified during the BA process specialist assessments, and via engagement with the public and other stakeholders. The proposed WEF layout will therefore be developed and refined during the BA process and will be presented in the draft BA which will be made available for public comment. The layout has been designed taking all environmental sensitivities and constraints into consideration upfront. Accordingly, a single layout will be assessed in the draft BA. Micro-siting (restricted to the extent of the property boundaries) of the final layout that meets all technical specifications while avoiding fine scale environmental sensitivities will only be undertaken if the proposed WEF received a positive EA. This final optimised layout and the updated Environmental Management Programme will be provided to all registered I&APs for comment prior to submission to DFFE for authorisation.

Technology alternatives: Turbines

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 BA process. The maximum turbine specifications are provided in **Table 1-1**, which will be assessed during the BA although actual built specifications may be reduced.

To derive the desired capacity for the WEF the applicant is proposing to employ up to 80 turbines of up to 7.5 MW each. Turbine alternatives will not be considered as part of the EIA.

Routing Alternative for Linear Activities

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. The site is currently zoned for agricultural land uses. Should the proposed activity not proceed, the site will remain unchanged and will continue to be used for agricultural purposes. 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.

It needs to be highlighted, that the actual WEF design would have a nominal impact on the findings of the TIA report, unless significantly altered.

6 ISSUES, RISKS AND IMPACTS

6.1 Identification of Potential Impacts/Risks

The potential impacts to the surrounding environment expected to be generated form the development traffic is traffic congestion and associated noise, dust, and exhaust pollution. This will be true for the construction, operation, and decommissioning phase. It must be noted that significance of the impact is expected to be higher during the construction and decommissioning phase 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 FE Kudu 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.

- Heavy vehicles (turbine foundations): Based on similar studies, typically 87 trips per 500 m^3 foundation is estimated, which results in a total of 6 960 trips and then on average 18 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 approximately 120 000 m^2 of laydown and assembly areas and an assumed 0.2 m gravel wearing course, a total of around 4 000 trips is generated, resulting in an average of 10 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.

- **Construction machinery:** 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.

- **Component delivery trips:**
  The blades*:* For this project, a rotor diameter of 160 m is assumed (i.e., 80 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 240 trips for 80 wind turbines*).

  The nacelle: one (1) abnormal load trip per turbine *(i.e., 80 trips for 80 turbines)*

  The turbine hub and rotor unit: one (1) abnormal load trip per turbine (*i.e., 80 trips for 80 turbines*)

  Tower sections: It is proposed to provide a concrete tower bathing plant on site and as such no delivery trips for the tower sections would be generated.

  Total abnormal loads per turbine (turbine components): 5 trips per turbine (i.e., 400 trips for 80 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 80 transformers if one transformer will be installed at each turbine.

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

- **Construction workers trips:**
  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

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.

This is a 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 renewable energy project 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 wind energy projects, 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.

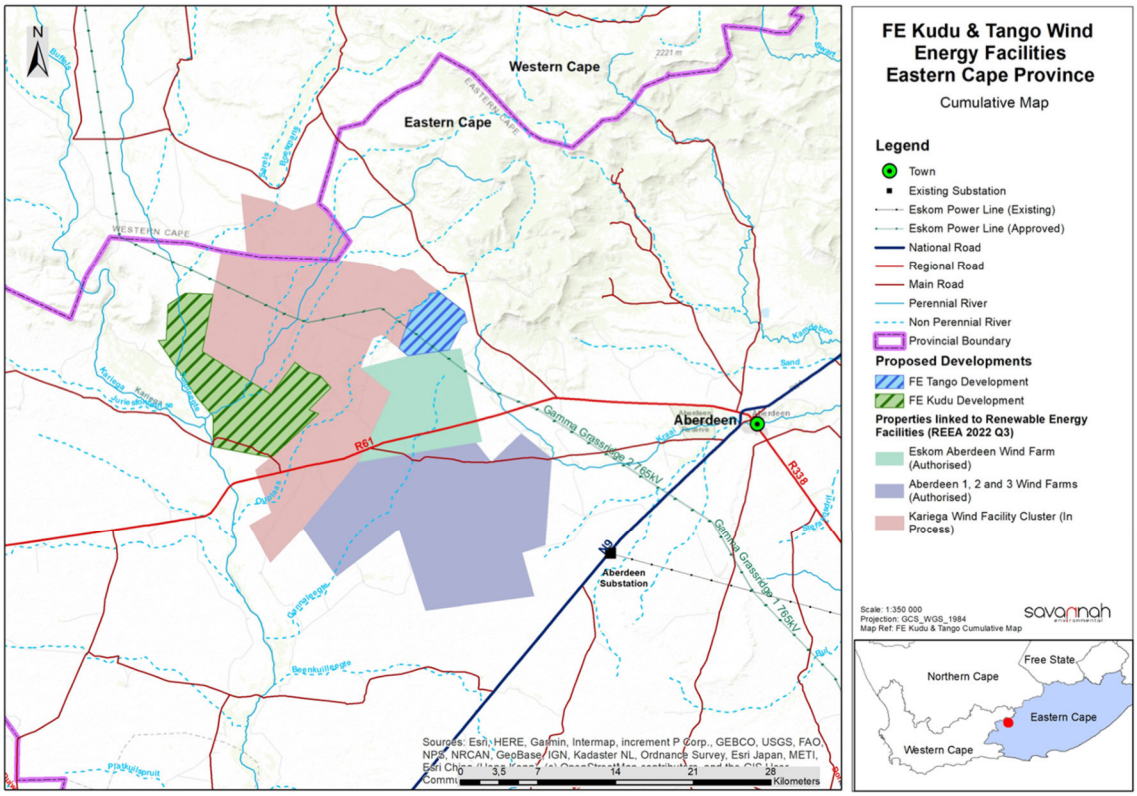

Figure 6-1: Aerial View of cumulative projects within a 30kms radius of the project site

It is noted that it is unlikely that the above developments will be constructed at the same time. However, for the event that some of the developments have similar construction periods, it is recommended to agree on a delivery schedule between those projects to reduce development trips and consequently the impact on the external road network.

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. Based on the high-level screening of impacts, a moderate significance rating can be expected during the construction stage (see **Table 7-1)**.

Nature of the impact

- Temporary increase in traffic, noise and dust pollution associated potential traffic
- Damage to road surface

Table 7-1: Impact Summary Table (Construction & Decommissioning Phases)

Nature: **Increase in trips on external roads due to transport of components, material and labour to site** **Noise/dust pollution during transport and construction activities on site** **Resulting damage to road surface**		
TYPE OF IMPACT	**WITHOUT Mitigation**	**WITH Mitigation**
Extent (E)	National (4)	National (4)
Duration (D)	Short term (2)	Short term (2)
Magnitude (M)	Moderate (6)	Low (4)
Probability (P)	Probable (3)	Probable (3)
Significance (S) S=(E+D+M) x P	**Medium (36)**	**Low (30)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: ▪ 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. ▪ Dust suppression of gravel roads close to and on site. ▪ Regular maintenance of gravel roads located within the site boundary, including the access road to the site. ▪ The use of quarries near the site as much as possible. ▪ Staff trips to occur outside of main peak traffic periods as far as possible. ▪ Delivery Management Plan ▪ Maintenance and repairs to sections of the R61 and gravel roads that have been damaged by construction vehicles. Any damage needs to be closely monitored to decide on the responsible party to fix any damage to roads.		
Residual Risk: Low		

7.2 Potential Impact (Operation Phase)

Nature of the impact

- Noise and dust pollution associated potential traffic

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

Table 7-2: Impact Summary Table (Operational Phase)

Nature: **Slight increase in trips on external roads due to transport of staff to and from site and irregular maintenance trips**		
TYPE OF IMPACT	**WITHOUT Mitigation**	**WITH Mitigation**
Extent (E)	Local (2)	Local (2)
Duration (D)	Long term (4)	Long term (4)
Magnitude (M)	Low (4)	Low (4)
Probability (P)	Improbable (2)	Improbable (2)
Significance (S) S=(E+D+M) x P	**Low (20)**	**Low (20)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	n/a	n/a
Mitigation: ▪ None required.		
Residual Risk: Low		

7.3 Cumulative Impacts

To assess a cumulative impact, it is generally assumed that all wind farms within a 30 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 listed in **Table 6.1** were considered in the cumulative impact assessment (see **Table 7-3**). The Table shows the rating for all projects with and without mitigations.

Nature of the impact

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

Table 7-3: Impact Summary Table: Cumulative Impacts

Nature: **Increase in trips on external roads due to transport of components, material and labour to site** **Noise/dust pollution during transport and construction activities on site**		
TYPE OF IMPACT	**WITHOUT Mitigation**	**WITH Mitigation**
Extent (E)	National (4)	National (4)
Duration (D)	Short term (2)	Short term (2)
Magnitude (M)	Moderate (6)	Moderate (6)
Probability (P)	Highly probable (4)	Probable (3)
Significance (S) S=(E+D+M) x P	**Moderate (48)**	**Moderate (36)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: ▪ Similar to Table 7-1 ▪ If possible, agree on a Delivery Management schedule.		
Residual Risk: Low		

8 NO-GO ALTERNATIVE

The no-go alternative implies that the proposed development of the FE Kudu 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 IMPACT ASSESSMENT SUMMARY

The overall impact significance findings, following the implementation of the proposed mitigation measures, are shown in **Table 9-1** below.

Table 9-1: Overall Impact Significance (Post Mitigation)

Phase	**Overall Impact Significance**
Construction	Low negative
Operational	Low negative
Decommissioning	Low negative
Nature of Impact	**Overall Impact Significance**
Cumulative - Construction	Moderate negative
Cumulative - Operational	Low negative
Cumulative - Decommissioning	Moderate negative

10 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.

11 ENVIRONMENTAL MANAGEMENT PROGRAMME INPUTS

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.
- Maintenance of gravel roads.

- Design of any access 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 to minimise dust and to reduce maintenance of gravel 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.

12 FINAL SPECIALIST STATEMENT AND AUTHORISATION RECOMMENDATION

The proposed development of the FE Kudu WEF and associated infrastructure is supported from a transport perspective, provided that the recommendations and mitigations contained in this report are adhered to.

A Traffic Management Plan (TMP) will need to be provided at start of construction and start of operational phase, respectively, giving directive on the following items:

- Preliminary Transport Requirements
- Transport Coordinator
- Stakeholder Engagement
- Licensing
- Construction Staff
- Inspection of all routes by haulage company
- Maintenance of roads
- Maintenance of vehicles
- Signage
- Speed limits
- Abnormal loads

The potential impacts associated with the proposed FE Kudu WEF, and associated infrastructure are acceptable from a transport planning perspective.

13 REFERENCES

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- 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 experiences 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: _____

Name of Company: iWink Consulting (Pty) Ltd

Date: 02/10/2023

forestry, fisheries
& the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12 399 9000, Fax: +27 86 625 1042

SPECIALIST DECLARATION FORM – AUGUST 2023

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

REPORT TITLE
FE Kudu Wind Energy Facility, Eastern Cape Province

Kindly note the following:

1. This form must always be used for assessment that are in support of applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting, where this Department is the Competent Authority.
2. This form is current as of August 2023. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.dffe.gov.za/documents/forms.
3. An electronic copy of the signed declaration form must be appended to all Draft and Final Reports submitted to the department for consideration.
4. The specialist must be aware of and comply with *'the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the act, when applying for environmental authorisation - GN 320/2020)'*, where applicable.

1. SPECIALIST INFORMATION

Title of Specialist Assessment	Traffic Impact Assessment
Specialist Company Name	iWink Consulting (Pty) Ltd.
Specialist Name	Iris Wink
Specialist Identity Number	7610121149180
Specialist Qualifications:	MScEng (Civil)
Professional affiliation/registration:	PrEng (ECSA) 20110156
Physical address:	44 Plattekloof Street, Plattekloof Glen 7460
Postal address:	same
Postal address	same
Telephone	082 691 9096
Cell phone	082 691 9096
E-mail	iris@iwink.co.za

IW

2. DECLARATION BY THE SPECIALIST

I, Iris Wink declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
- 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 NEMA Act.

Signature of the Specialist

iWink Consulting (Pty) Ltd.

Name of Company:

16/08/2023

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

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

Signature of the Specialist

iWink Consulting (Pty) Ltd

Name of Company

Click or tap here to enter text. 16/08/2023

Date

Click or tap here to enter text.

Signature of the Commissioner of Oaths

GUSTAV HEINRICH WEHMEYER
KOMMISSARIS VAN EDE
COMMISSIONER OF OATHS
PRAKTISERENDE PROKUREUR R.S.A
PRACTISING ATTORNEY R.S.A.
MAHOGANYSINGEL 8, BELLVILLE
7530, R.S.A.

Click or tap to enter a date. 16/08/2023

Date

Annexure C: Impact Assessment Methodology

- This must also include any gaps in knowledge at this point of the study. Consideration of areas that would constitute "acceptable and defendable loss" should be included in this discussion.
- A reasoned opinion as to whether the proposed project should be authorised.
- Summary of the positive and negative impacts and risks of the proposed project and identified alternatives.
- Mitigation measures and management recommendations to be included in the Environmental Management Programme to be submitted with the FEIR

3.2 ASSESSMENT OF IMPACTS

Direct, indirect and cumulative impacts of the issues identified in the BA must be assessed in terms of the following criteria:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
  - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - medium-term (5–15 years) – assigned a score of 3;
  - long term (> 15 years) - assigned a score of 4; or
  - permanent - assigned a score of 5;
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment
  - 2 is minor and will not result in an impact on processes
  - 4 is low and will cause a slight impact on processes
  - 6 is moderate and will result in processes continuing but in a modified way
  - 8 is high (processes are altered to the extent that they temporarily cease)
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- the **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- the **status**, which will be described as either positive, negative or neutral.
- the degree to which the impact can be reversed.
- the degree to which the impact may cause irreplaceable loss of resources.
- the *degree* to which the impact can be *mitigated*.

The **significance** is calculated by combining the criteria in the following formula:

S=(E+D+M)P

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The **significance weightings** for each potential impact are as follows:

» < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
» 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
» > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

Assessment of impacts must be summarised in the following table format. The rating values as per the above criteria must also be included. Complete a table and associated ratings for **each** impact identified during the assessment.

***Example* of Impact table summarising the significance of impacts (with and without mitigation)**

Nature: **[Outline and describe fully the impact anticipated as per the assessment undertaken]**		
	Without mitigation	**With mitigation**
Extent	High (3)	Low (1)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (36)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation: "Mitigation", means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible. Provide a description of how these mitigation measures will be undertaken keeping the above definition in mind		
Residual Impacts: "Residual Risk", means the risk that will remain after all the recommended measures have been undertaken to mitigate the impact associated with the activity (Green Leaves III, 2014).		

Assessment of Cumulative Impacts

As per requirements of the EIA Regulations, specialists are required to assess the cumulative impacts. In this regard, please refer to the methodology below that will need to be used for the assessment of Cumulative Impacts.

"Cumulative Impact", in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself

may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities[1].

The role of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e. whether the addition of the proposed project in the area will increase the impact). This section should address whether the construction of the proposed development will result in:

- Unacceptable risk
- Unacceptable loss
- Complete or whole-scale changes to the environment or sense of place
- Unacceptable increase in impact

The specialist is required to conclude if the proposed development will result in any unacceptable loss or impact considering all the projects proposed in the area.

Example of a cumulative impact table:

Nature: Complete or whole-scale changes to the environment or sense of place (example)

Nature: **[Outline and describe fully the impact anticipated as per the assessment undertaken]**		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Low (1)	Low (1)
Duration	Medium-term (3)	Long-term (4)
Magnitude	Minor (2)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	**Low (12)**	**Low (27)**
Status (positive or negative)	Negative	Negative
Reversibility	High	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	Yes
Confidence in findings: High.		
Mitigation: "Mitigation", means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible. Provide a description of how these mitigation measures will be undertaken keeping the above definition in mind.		

3.3 ENVIRONMENTAL MANAGEMENT PLAN TABLE FORMAT

Measures for inclusion in the draft Environmental Management Programme must be laid out as detailed below:

OBJECTIVE: Description of the objective, which is necessary in order to meet the overall goals; these take into account the findings of the environmental impact assessment specialist studies

Project component/s	List of project components affecting the objective
Potential Impact	Brief description of potential environmental impact if objective is not met

[1] Unless otherwise stated, all definitions are from the 2014 EIA Regulations, as amended, GNR 326

Activity/risk source	Description of activities which could impact on achieving objective
Mitigation: Target/Objective	Description of the target; include quantitative measures and/or dates of completion

Mitigation: Action/control	**Responsibility**	**Timeframe**
List specific action(s) required to meet the mitigation target/objective described above	Who is responsible for the measures	Time periods for implementation of measures

Performance Indicator	Description of key indicator(s) that track progress/indicate the effectiveness of the management plan.
Monitoring	Mechanisms for monitoring compliance; the key monitoring actions required to check whether the objectives are being achieved, taking into consideration responsibility, frequency, methods and reporting