Appendix G.11

TRAFFIC IMPACT ASSESSMENT

Proposed Igolide Wind Energy Facility
Traffic Impact Assessment
Scoping Phase

June 2023
Rev 1

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SYNOPSIS

Preparation of a Transport Study for the Proposed Igolide Wind Energy Facility (WEF), located in the Merafong City Local Municipality in Gauteng, and the associated grid infrastructure.

KEY WORDS:

Transport Study, Wind Energy Facility

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QUALITY VERIFICATION

This report has been prepared under the controls established by a quality management system that meets the requirements of ISO 9001: 2015 which has been independently certified by DEKRA Certification.

Verification	Capacity	Name	Signature	Date
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Proposed Igolide Wind Energy Facility
Traffic Impact Assessment
Scoping Phase

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1 INTRODUCTION

1.1 Scope and Objectives

Igolide Wind (Pty) Ltd is proposing to develop the Igolide Wind Energy Facility (WEF) with associated grid infrastructure, in the Merafong City Local Municipality in the Gauteng Province of South Africa (see **Figure 1-1**). The grid infrastructure for the WEF will be subject to a separate Basic Assessment (BA) process which is being undertaken in parallel to the WEF EIA process.

Figure 1-1:Locality Map

As part of the environmental impact process, the services of a Transportation Specialist are required to conduct the Transport Study for the proposed facility. The Traffic impact Assessment (TIA) will aid in determining the traffic impact of the proposed land development proposal and whether such development can be accommodated by the transportation system.

The following two main transportation activities will be investigated:

- Abnormal load vehicles transporting wind turbine components to the site.
- The transportation of construction materials, equipment, and people to and from the site/facility.

The transport study will aim to provide the following objectives:

- Recommend a preliminary route for the transportation of the components to the proposed site.
- Recommend a preliminary transportation route for the transportation of materials, equipment and people to site.
- Recommend alternative or secondary routes where possible.

1.2 Terms of Reference

The Terms of Reference for this Transport Study include the following:

General:

- an indication of the methodology used in determining the significance of potential environmental impacts.
- a description of all environmental issues that were identified during the environmental impact assessment process.
- an assessment of the significance of direct, indirect, and cumulative impacts in terms of the assessment methodology outlined in annexure B.
- a description and comparative assessment of all alternatives identified during the environmental impact assessment process.
- recommendations regarding practical mitigation measures for potentially significant impacts, for inclusion in the Environmental Management Programme (EMPr).
- an indication of the extent to which the issue could be addressed by the adoption of mitigation measures.
- a description of any assumptions, uncertainties, and gaps in knowledge.
- an environmental impact statement which contains:
  - a summary of the key findings of the environmental impact assessment; and
  - an assessment of the positive and negative implications of the proposed activity.

Specific:

- Extent of the transport study and study area.
- The proposed development.
- Trip generation for the facility during construction, operation and decommissioning.
- 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.

1.3 Approach and Methodology

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

- during the construction of the access roads.
- construction and installation of the turbines.
- operation and maintenance during the operational phase; and
- the decommissioning phase.

This transport study was informed by the following:

Site Visit and Project Assessment

- Site visit to gain good understanding of site location.
- An initial meeting with the client.
- Overview of project background information including location maps, component specifications and any resulting abnormal loads to be transported; and
- Research of all available documentation and information relevant to the proposed facility.

The transport study considered and assessed the following:

Traffic and Haul Route Assessment

- Estimation of trip generation.
- Discussion on potential traffic impacts.
- Assessment of possible haul routes between port of entry / manufacturing location; and
- Construction, operational (maintenance) and decommissioning vehicle trips.

Site layout, Access Points, and Internal Roads Assessment per Site

- Description of the surrounding road network.
- Description of site layout.
- Assessment of the possible access points onto the site; and
- Assessment of the proposed internal roads.

1.4 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 000mm, total maximum width 4 300mm and total maximum length 10 500mm.
- Maximum vertical height clearances along the haulage route is 5.2m for abnormal loads.
- The imported elements will be transported from the most feasible port of entry, which is deemed to be the Richards Bay Port.
- If any elements are manufactured within South Africa, these will be transported from their respective manufacturing centres, which would be either in the greater Johannesburg, Cape Town, or Pinetown/Durban.
- All haulage trips on the external road network 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.
- A maximum of 12 turbines is proposed for the site with a maximum hub height of 200m, and rotor diameter of 200m.
- Abnormal load components will include the generator (weight – 130tT and size), Nacelle (weight – 50t and size), Hub (weight – 60t and size), Blades (weight - 30t and length – up to 95m), Tower – 5 sections (weight per section – up to 81t, length up to 25m), and Transformer (s). (Weight – up to 240t).

1.5 Source of Information

Information and software used in the transport study includes:

- Project Information provided by the Client.
- Google Earth kmz provided by the Client.
- Google Earth Satellite Imagery.
- 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
- 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
- Project research of all available information.

2 Description Of Project Aspects Relevant To The Study

2.1 Port of Entry

Should wind turbine components be imported, it is envisaged that the components will be imported to South Africa via the Port of Richards Bay as the closest port to the site. Alternatively, the components can be imported via the Port of Durban.

2.1.1 Port of Richards Bay

The Port of Richards Bay is situated in the northern industrial hub of Kwa-Zulu Natal and accessible via rail and road. The port is a deep-sea water port with 13 berths. The Port can handle dry bulk ores, minerals and break bulk with a draft that easily accommodates Cape size and Panamax vessels.

The Port is currently creating capacity, investing in new equipment, and undergoing extensive refurbishments. The Richards Bay port will not only be a deep-sea water port, but South Africa's premium bulk mineral port within the next six years. The Richards Bay Expansion Programme is currently in progress, adding new berths and extending rail capacity within the port. (Transnet Port Terminals, n.d.)

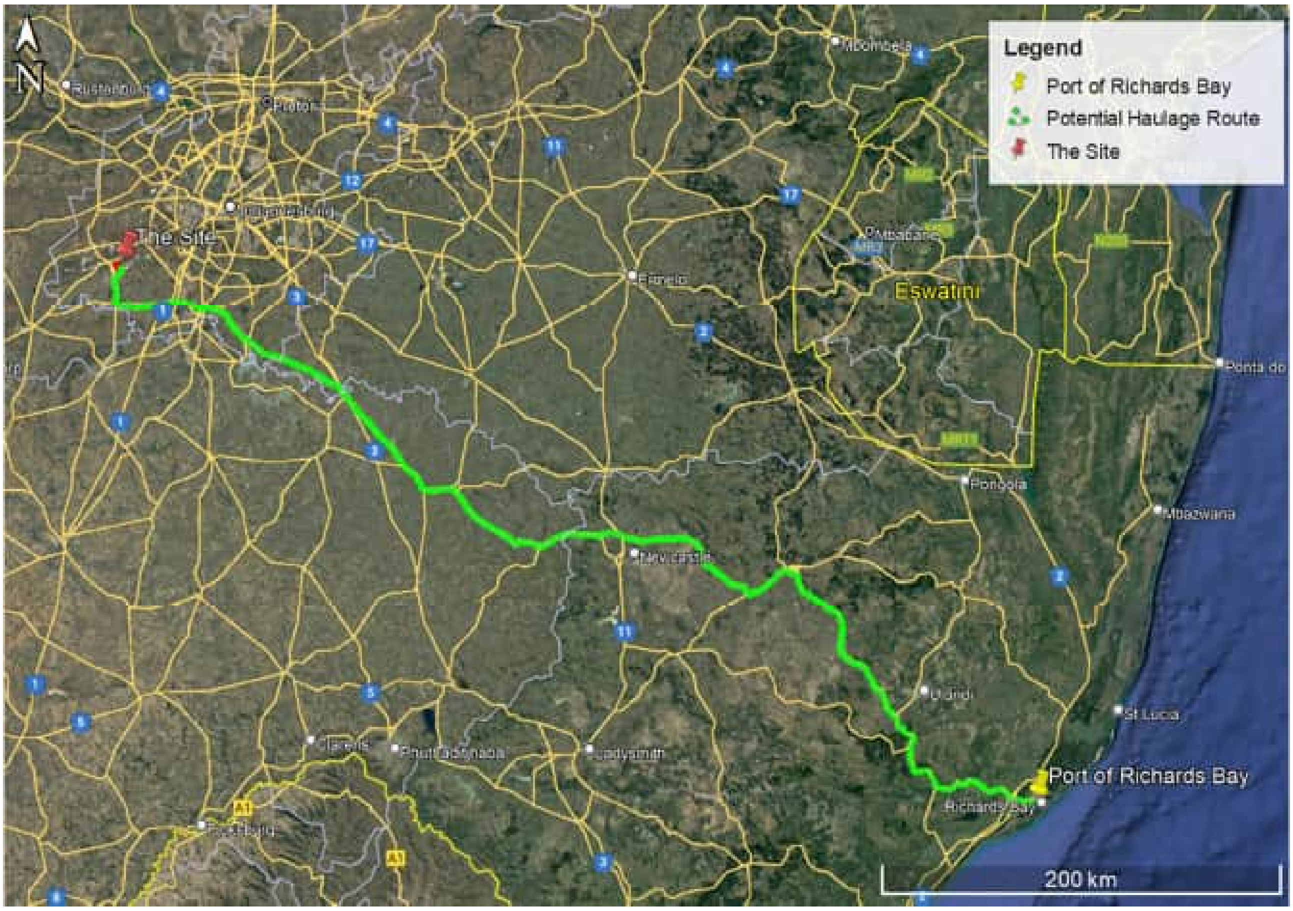


Figure 2-1:Route from the site to the Port of Richards Bay

2.1.2 The Port of Durban

The Durban container terminal operates as two terminals Pier 1 and Pier 2, handling 65% of South Africa's (SA) container volumes. It is ideally located to serve as a hub for containerized cargo from the Indian Ocean Islands, Middle East, Far East and Australia.

The Durban Container Terminal is Africa's biggest and busiest - home to the state of the art, twin lift ship-to-shore cranes. 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.)

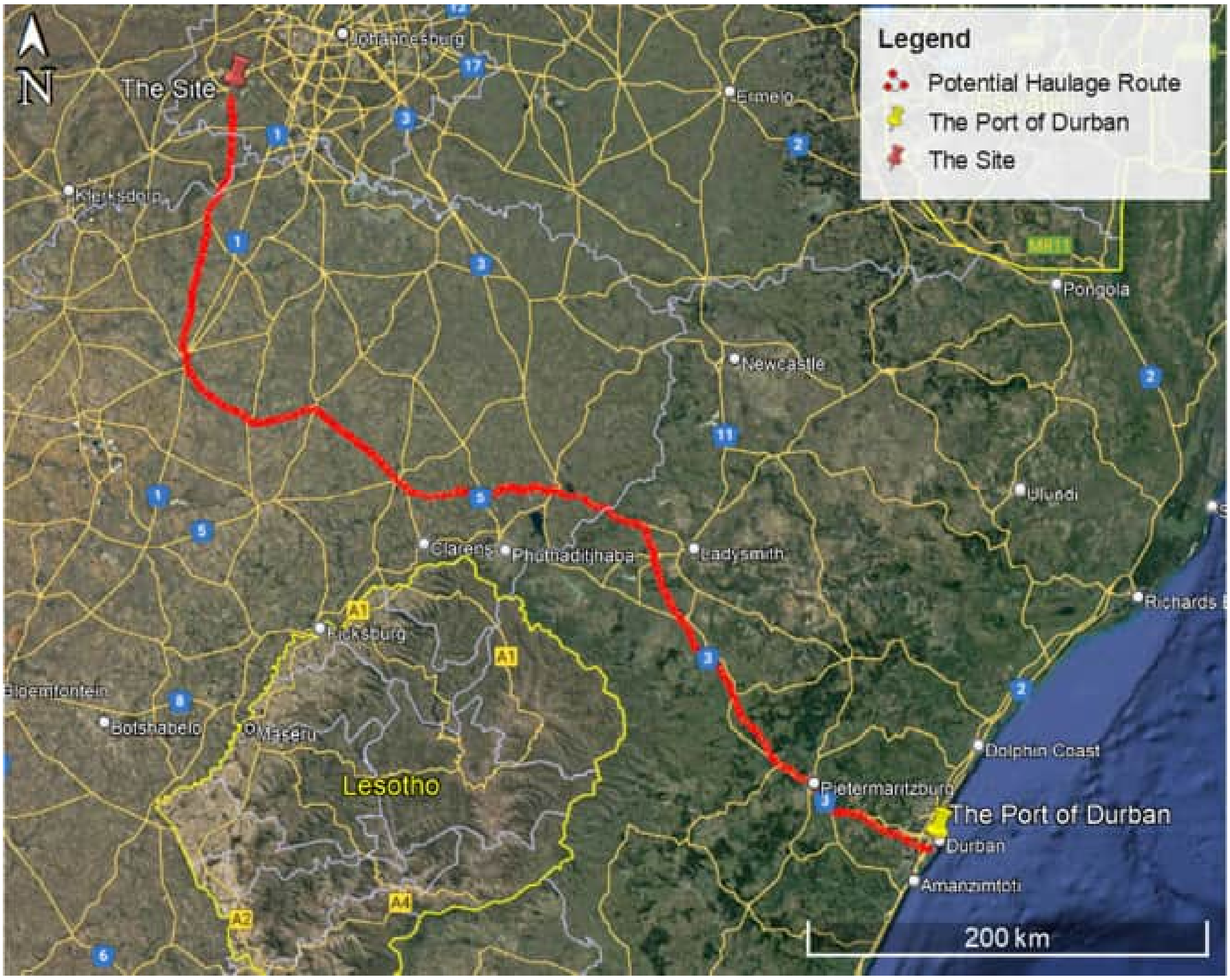


Figure 2-2:Route from the site to the Port of Durban

The Port of Durban is located approximately 681km south-east of the site (see **Figure 2-2**), and the Port of Richards Bay is located approximately 645km south-east of the site (see **Figure 2-1**). The travel routes to the site from the ports comprise mostly high order routes. It is however recommended to conduct a "dry run" with abnormal transport vehicles to determine the route limitations. Adjustments to the road width (e.g., at bellmouths) and road furniture may be required to accommodate the abnormal load vehicles, contingent on obtaining approvals from the relevant road authorities.

Due to the short travel distance to site, the Port of Richards Bay is considered the preferred port of entry. It must, however, be noted that availability at any of the considered ports will need to be confirmed with the Transnet Port authority. Deliveries may also be subject to delays/waiting periods at the port due to backlogs.

2.2 Transportation requirements

2.2.1 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: 22m for an interlink, 18.5m for truck and trailer and 13.5m for a single unit truck
- Width: 2.6m
- Height: 4.3m measured from the ground. Possible height of load – 2.7m.
- 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.

2.2.2 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.

2.2.3 Permitting – General Rules

The limits recommended in the TRH 11 guideline document 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 of permits. Embargo lists are compiled annually and are obtainable from the Issuing Authorities.

2.2.4 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.

2.2.5 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.

2.2.6 Transporting Wind Turbine Components

Wind turbine components can be transported in a number of ways with different truck / trailer combinations and configurations, which will be decided upon at a later stage by the transporting contractor and the plant hire companies, when applying for the necessary permits from the Permit Issuing Authorities. All required permits will need to be obtained prior to the commencement of construction.

2.2.6.1 Nacelle

The heaviest component of a wind turbine is the nacelle (approximately 100 tons depending on manufacturer and design of the unit). Combined with road-based transport, it has a total average vehicle mass of approximately 145 000kg for a 100-ton unit. For larger turbines, the maximum weight can even increase to around 180 tons. Route clearances and permits will therefore be required for transporting the nacelle by road-based transport. The unit will require a minimum height clearance of 5.2m.

Figure 2-3:Example - Transporting the Nacelle

2.2.6.2 Blades

These are the longest and possibly most vulnerable components of a wind turbine and hence need to be transported with utmost care. The blades need to be transported on an extendible blade transport trailer or in a rigid container with rear steerable dollies. The blades can generally be transported individually, in pairs or in threes, although different manufacturers have different methods of packaging and transporting the blades. It should be noted that larger blades are transported individually. The transport vehicle exceeds the dimensional limitation (length) of 22 m and will only be allowed under permit, provided the trailer is fitted with steerable rear axles or dollies.

For this study, turbine blades of a maximum length of 100 metres have been assessed and will need to be transported individually (see example in **Figure 2.2** and **Figure 2.3**).

Figure 2-4:Example -Transport of Blades on extendible trailers

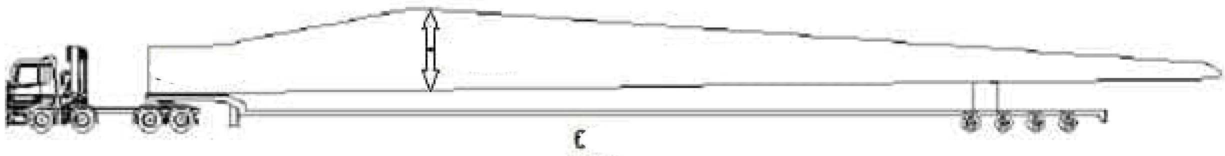


Figure 2-5:Example of Blade Transport

Due to the abnormal length, special attention needs to be given to the route planning, especially to suitable turning radii and adequate sweep clearance. Vegetation or/and road signage may have to be removed before transportation commences. Once transported to site, the blades need to be carefully stored at the respective laydown area before being installed onto the rotary hub.

2.2.6.3 Tower Sections

Towers sections can be manufactured from concrete or steel. Alternatively, a combination of steel and concrete sections can be utilised, typically with concrete sections at the base and steel towers at the top. Tower sections can have varying lengths, the number of sections is therefore dependent on the selected hub height. Each section is transported separately to site on a low-bed trailer. 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.

Figure 2-6:Example – Transportation of Tower Sections

2.2.6.4 Turbine Hub and Rotary Units

These components need to be transported separately, due to their significant weights – a hub unit weighs between 45 and 60 tons and the rotary unit weighs over 90 tons.

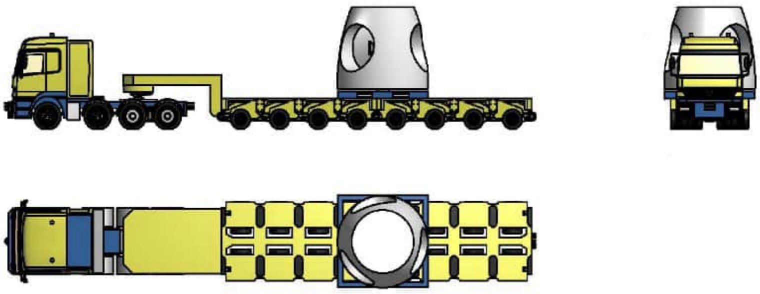


Figure 2-7:Transporting the Hub and Rotary Units

2.2.6.5 Transporting Cranes, Mobile Crane, and other Components

Crane technology has developed rapidly, and several different heavy lifting options are available on the market. Costs involved to hire cranes or import suitable cranes (if necessary) vary and should therefore be compared in advance. For this assessment, possible crane options are discussed hereafter.

2.2.6.6 Cranes for Assembly and Erection on Site

Cranes are typically required to perform the required lifts during the wind turbine construction, i.e., lifting the tower sections into position, lifting the nacelle to the hub height, and lifting the rotor and blades into place, will be a Crawler Crane. Additionally, smaller cranes are often used to lift the components and assist in the assembly of the larger cranes at each turbine location.

The cranes used (i.e., mobile cranes, hydraulic cranes, etc,) are selected by the Contractor to suite the construction process.

Figure 2-8:Example - Cranes at work

2.2.6.7 Cranes at Port of Entry

Most shipping vessels importing the turbine components will be equipped with on-board cranes for safe off-loading of wind turbine components to the abnormal load transport vehicles, parked adjacent to the shipping vessels.

Figure 2-9:Example - 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.

2.2.6.8 Transporting Other Plant, Material and Equipment

In addition to transporting the specialised lifting equipment, the normal civil engineering construction materials, plant, and equipment will need to be brought to the site (e.g., sand, stone, cement, concrete batching plant, gravel for road building purposes, excavators, trucks, graders, compaction equipment, cement mixers, transformers in the sub-station, cabling, transmission pylons etc.). Other components, such as electrical cables, pylons, and substation transformers, will also be transported to site during construction. The transportation of these items will generally be undertaken with normal heavy load vehicles.

3 APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

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

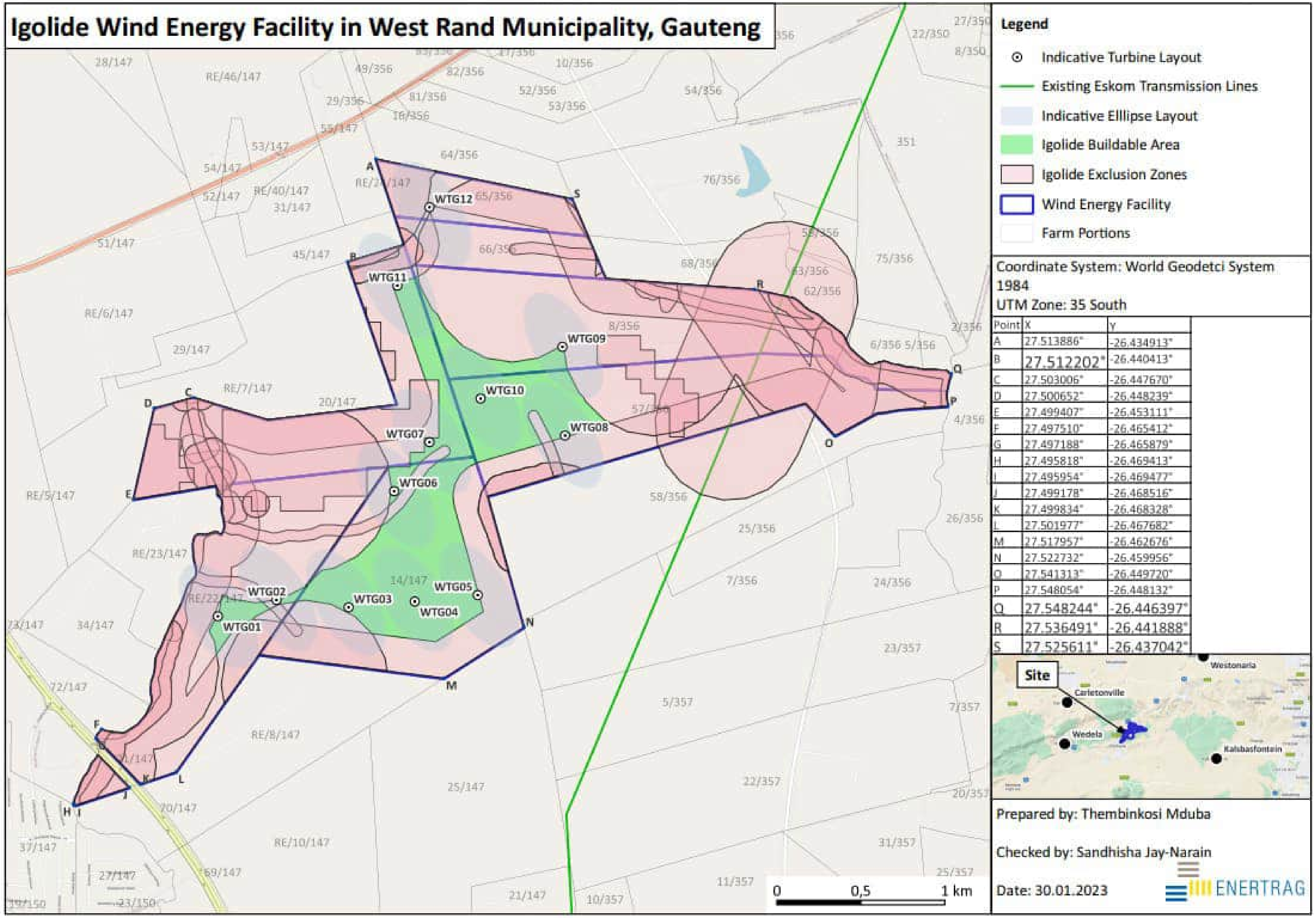
- Abnormal load permits, (Section 81 of the National Road Traffic Act 93 of 1996 and National Road Traffic Regulations, 2000).
- Port permit (Guidelines for Agreements, Licenses and Permits in terms of the National Ports Act No. 12 of 2005), and
- Authorisation from Road Authorities to modify the road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

4 Description of the Affected Environment

4.1 Description of the site

The proposed project will be developed within a project area of approximately 680 hectares (ha). Within this project area, the extent of the project footprint will be approximately 130 hectares (ha), subject to finalization based on technical and environmental requirements. The project is located approximately 6km northeast of Fochville, within the Merafong City Local Municipality in the Gauteng Province.

The proposed site, including the turbine locations, is indicated in **Figure 4-1**. The details of the properties associated with the proposed project, are outlined in **Table 4-1**.



Point	X	Y
A	27.513886°	-26.434913°
B	27.512202°	-26.440413°
C	27.503006°	-26.447670°
D	27.500652°	-26.448239°
E	27.499407°	-26.453111°
F	27.497510°	-26.465412°
G	27.497188°	-26.465879°
H	27.495818°	-26.469413°
I	27.495954°	-26.469477°
J	27.499178°	-26.468516°
K	27.499834°	-26.468328°
L	27.501977°	-26.467682°
M	27.517957°	-26.462676°
N	27.522732°	-26.459956°
O	27.541313°	-26.449720°
P	27.548054°	-26.448132°
Q	27.548244°	-26.446397°
R	27.536491°	-26.441888°
S	27.525611°	-26.437042°

Figure 4-1:The Proposed Site

Table 4-1:Project Summary- Igolide WEF

Facility Name:	Igolide Wind Energy Facility (WEF)
Applicant:	Igolide Wind (Pty) Ltd
Municipalities:	Merafong City Local Municipality in the Gauteng Province of South Africa
Extent:	680ha
Capacity:	Up to 100MW
No. of turbines:	12
Turbine hub height:	Up to 200m
Rotor Diameter:	Up to 200m
Tip Height:	Up to 300m
Foundation:	Approximately 25m diameter x 3m deep – 500 m^3 – 650m^3 concrete. Excavation approximately 2200m^2, in sandy soils due to access requirements and safe slope stability requirements.
Turbine Hardstand:	Approximately 1ha per turbine required
Tower Type	Steel or concrete towers can be utilised at the site. Alternatively, the towers can be of a hybrid nature, comprising concrete towers and top steel sections.
On-site IPP substation and battery energy storage system (BESS):	Total footprint will be up to 4ha in extent. The on-site IPP portion substation will have a footprint of approximately 2ha. The substation will consist of a high voltage substation yard to allow for multiple up to 132kV feeder bays and transformers, control building, telecommunication infrastructure, and other substation components, as required. A 500m buffer around the on-site IPP substation has been identified to ensure flexibility in routing the powerline. The Battery Energy Storage System (BESS) footprint will be up to 2ha. The BESS storage capacity will be up to 100MW/400 megawatt-hour (MWh) with up to four hours of storage. It is proposed that Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered as the preferred battery technology; however, the specific technology will only be determined following Engineering, Procurement, and Construction ("EPC") procurement. The main components of the BESS include the batteries, power conversion system and transformer which will

	all be stored in various rows of containers. The BESS components will arrive on site pre-assembled.
Grid (to form part of a separate application for EA)	A single or double circuit 132kV overhead powerline and 132kV switching station (adjacent to the on-site IPP substation) to feed the electricity generated by the proposed WEF into Eskom's Midas Main Transmission Substation via a 11km overhead line. A corridor of up to 250m in width (125m on either side of the centre line) has been identified for the placement of the up to 132kV single or double circuit power line to allow flexibility in the design of the final powerline route, and for the avoidance of sensitive environmental features (where possible).
Cables:	The medium voltage collector system will comprise cables up to and including 33kV that run underground, except where a technical assessment suggests that overhead lines are required, connecting the turbines to the on-site IPP.
Operations and Maintenance (O&M) building footprint:	Operations and Maintenance ("O&M") building footprint to be located near the on-site substation. Typical areas include Conservancy tanks with portable toilets. Typical areas include: - Operations building – 20m x 10m = 200m^2 - Workshop and stores area – of ~300m^2 - Refuse area for temporary waste storage and conservancy tanks to service ablution facility. The total combined area of the buildings will not exceed 5 000m^2.
Construction camps:	Typical area of 0.5ha. Sewage typically septic tanks and portable toilets.
Temporary laydown or staging areas:	Typical area of 2ha. Could increase to 3ha for concrete towers, should they be required. Will include diesel, cement, and chemical storage, as well as a small workshop area.
Cement Batching Plant	Footprint of 1-3ha.
Access and Internal Roads:	Internal roads will have a width of 8 - 10m, increasing up to 15m for turning circle/bypass areas to allow for larger component transport. Existing access roads will be used to minimise impact. Where required, the width of the existing roads will be widened to ensure the passage of vehicles.
Supporting Infrastructure:	- Fencing. - Lighting.

	- Lightning protection. - Telecommunication infrastructure. - Stormwater channels. - Water pipelines. - Offices. - Operational control centre. - Warehouse. - Ablution facilities. - Gatehouse. - Security building. - Visitor's centre; and - Substation building.
Site coordinates (centre point)	26°27'2.44"S / 27°30'58.82"E
Affected farm portion/s	- Portion 14 of Farm 147 Kraalkop - Portion 20 of Farm 147 Kraalkop - Portion RE/22 of Farm 147 Kraalkop - Portion 8 of Farm 356 Leeuwpoort - Portion 57 of Farm 356 Leeuwpoort - Portion 65 of Farm 356 Leeuwpoort - Portion 66 of Farm 356 Leeuwpoort

Table 4-2:Project Summary- Igolide WEF Electrical Grid Infrastructure

Facility Name:	Igolide WEF Electrical Grid Infrastructure
Applicant:	ENERTRAG South Africa (Pty) Ltd
Municipalities:	Merafong City and Westonaria Local Municipalities in the Gauteng Province of South Africa
Up to 132kV powerline (single or double circuit):	- Up to 132kV single or double circuit powerline design may include: o Intermediate self-supporting monopole. o Inline or angle-strain self-supporting monopole. o Suspension self-supporting monopole. o Triple pole structure. o Steel lattice structure; or o Similar powerline design at 132kV specification. - The above designs may require anchors with guywires or be anchorless. For up to 132kV structures, concrete foundation sizes may vary depending on design type up to 80m^2, with depths reaching up to 3.5m typically in a rectangular 'pad' shape. - A working area of approximately 100m x 100m is needed for each of the proposed structures to be constructed. - Gridline length: 10.3km - Height of powerline: Up to 40m - Width of gridline servitude: 32m A 250m wide corridor (125m on either side of the centre line), around each powerline alternative, has been identified for the assessment and micro-siting of the powerline.
Eskom Switching Station:	- Development footprint (permanent infrastructure area): approximately 2ha as the switching station will be located adjacent to the 33/132kV on-site IPP substation which is being assessed as part of the Igolide WEF Environmental Authorisation process. - Capacity: Up to 132kV - Standard substation electrical equipment, including, but not limited to, busbars, control building, telecommunication infrastructure, office area, operation and control room, workshop and storage area, feeder bays, stringer strain breams, insulators, arrestors, relays, capacitor banks, batteries, wave trappers, switchyard, metering and indication

	instruments, equipment for carrier current, surge protection and outgoing feeders, as may be required.
	- Associated infrastructure, including, but not limited to, lighting, fencing (~2m high), gating, parking area, and buildings required for operation (ablutions, office, workshop and control room, concrete batching plant (if required), waste storage/disposal and storerooms).
	- Eskom Switching Station coordinates:
	  o Corner 1: 26°27'10.25"S; 27°31'10.32"E
	  o Corner 2: 26°27'19.03"S; 27°31'13.13"E
	  o Corner 3: 26°27'20.02"S; 27°31'8.14"E
	  o Corner 4: 26°27'11.37"S; 27°31'5.25"E
	  o Centre: 26°27'15.15"S; 27°31'9.21"E

Termination point upgrades:	Upgrades to the existing Eskom Midas MTS will also be required. This includes the installation of additional feeders' bays to accommodate the power being evacuated from the proposed Igolide WEF. The upgrades will disturb an area of up to 4ha.
Access roads:	- During construction, a permanent access road along the length of the powerline corridor, between 4 – 6m wide will be established to allow for large crane movement. This track will then be utilised for maintenance during operation. - Permanent access roads to and within the substation, up to 8m wide, will be established.
Affected farm portion/s	- Portion 14 of Farm Kraalkop 147 IQ - Portion 5 of Farm Doornkloof 350 IQ - Remaining Extent /Portion 0 of Farm Leeudoorn 351 IQ - Portion 6 of Farm Doornkloof 350 IQ - Portion 22 of Farm Doornkloof 350 IQ - Portion 22 of Farm Driefontein 355 IQ - Portion 28 of Farm Driefontein 355 IQ - Portion 1of Farm Leeuwpoort 356 IQ - Portion 4 of Farm Leeuwpoort 356 IQ - Portion 8 of Farm Leeuwpoort 356 IQ - Portion 33 of Farm Leeuwpoort 356 IQ - Portion 35 of Farm Leeuwpoort 356 IQ - Portion 36 of Farm Leeuwpoort 356 IQ - Portion 57 of Farm Leeuwpoort 356 IQ - Portion 58 of Farm Leeuwpoort 356 IQ - Portion 59 of Farm Leeuwpoort 356 IQ - Portion 62 of Farm Leeuwport 356 IQ

	- Portion 63 of Farm Leeuwpoort 356 IQ - Portion 68 of Farm Leeuwpoort 356 IQ - Portion 70 of Farm Leeuwpoort 356 IQ - Portion 71 of Farm Leeuwpoort 356 IQ - Portion 75 of Farm Leeuwpoort 356 IQ - Portion 76 of Farm Leeuwpoort 356 IQ

4.2 Surrounding road network

The surrounding road network in the vicinity of the site is described below. The road classification mentioned has been derived from the *COTO's South African Road Classification and Access Management Manual (TRH26), (2012).* The surrounding road network in the vicinity of the site is show in **Figure 4-2** and is discussed thereafter.

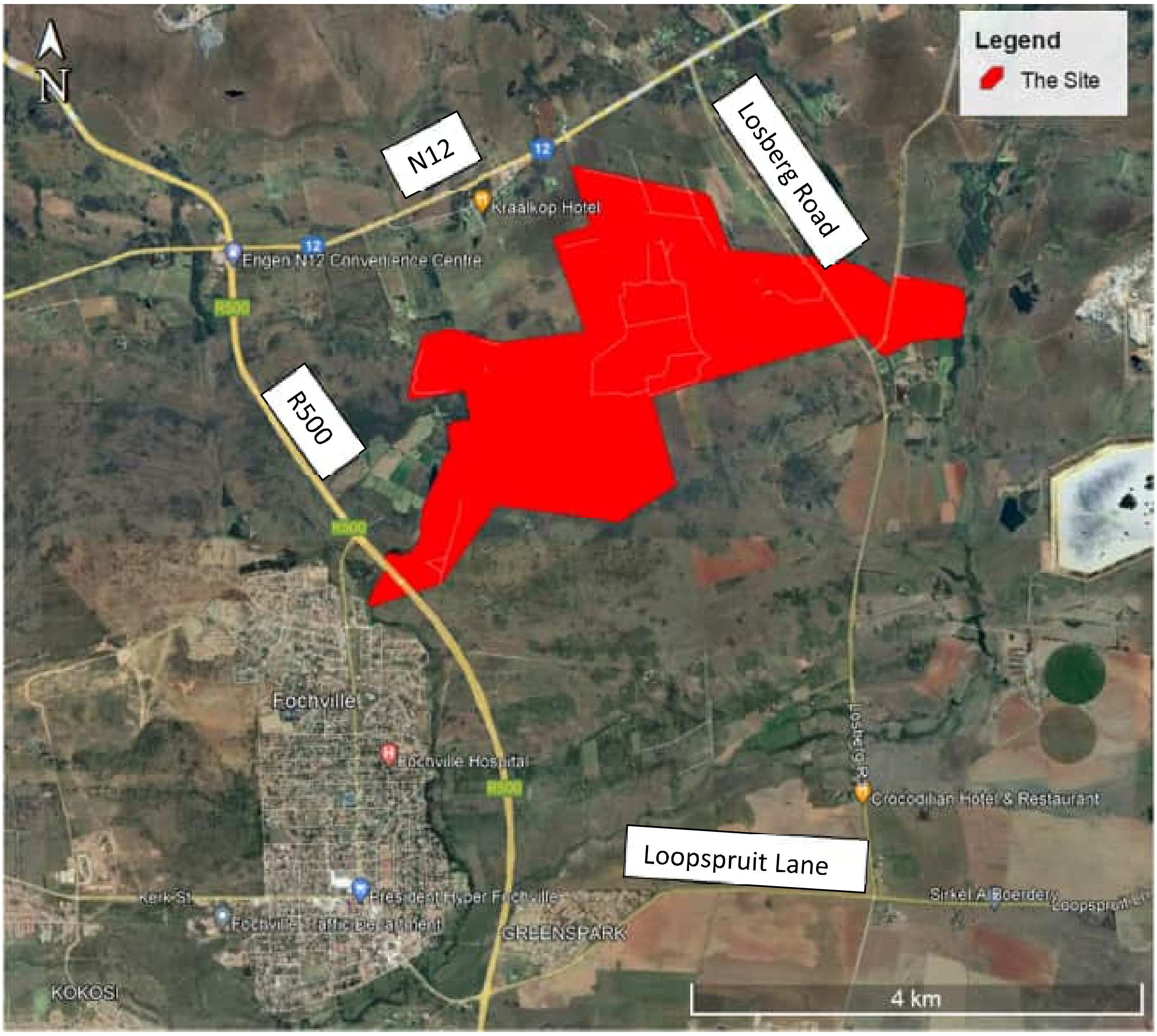


Figure 4-2:Surrounding road network

TRH26 makes a distinction between rural and urban areas. Roads in rural and urban areas have the same type of functional classes but at different scales and standards. Rural roads have longer reaches of connectivity and therefore require higher levels of mobility than urban roads. It is therefore necessary that the road classification system should differentiate between rural and urban areas.

- **<u>The N12</u>**
  The N12 is a Class R1 Rural Principal Arterial. The N12 stretches from, George in the Western Cape up until eMalahleni in Mpumalanga. A section of the N12 is located just north of the project site. This section of the N12 is a surfaced single carriageway which generally accommodates two lanes per direction of travel. The shoulders accommodated are gravel shoulders.

- **<u>The R500</u>**
  Based on the TRH26 rural road classification system the R500 can be classified as a Class R2 Rural Major Arterial. The road is located to the west of the site and is a surfaced dual carriageway. The section to the west of the site accommodates two lanes per direction and a gravel shoulder.

- **<u>Losberg Road</u>**
  Losberg Road can be classified as a Class R3 Rural Minor Arterial. The road is a surfaced single carriageway road with one lane per direction and gravel shoulders. The road is located to the east of the site.

- **<u>Loopspruit Avenue</u>**
  Loopspruit Avenue can be classified as a Class R3 Rural Minor Arterial. The road is a surfaced single carriageway road with one lane per direction and gravel shoulders. The road is located to the south of the site.

4.3 Site access

4.3.1 Access location

Three (3) site access point options are suggested for the site. One of the access points is proposed off the R500 approximately 0.6km south of the Losberg Avenue/R500 intersection. The remaining two access point alternatives are located off Losberg Road towards the east of the site.

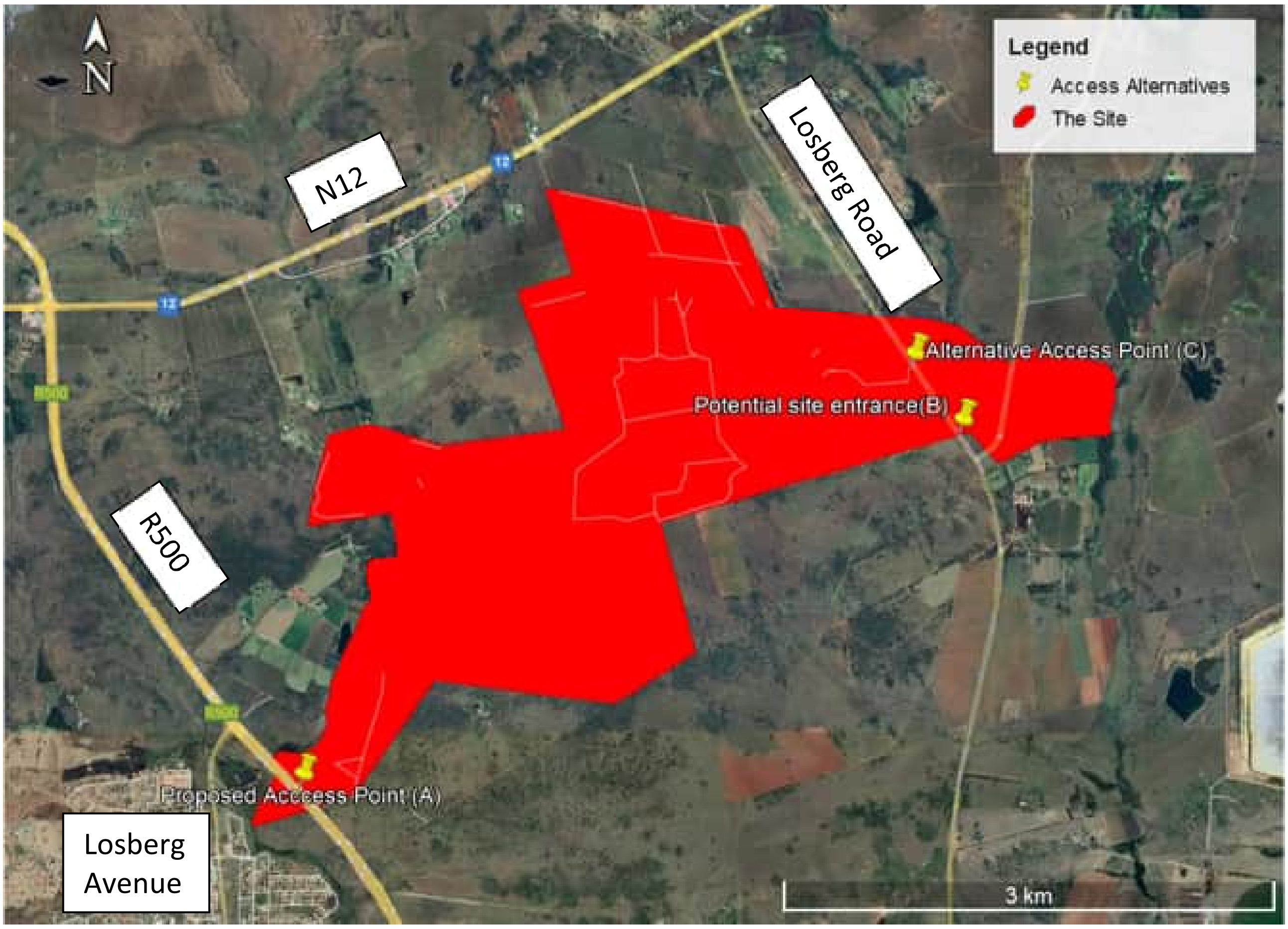


Figure 4-3:Site Access Points

When considering the location of site access points, the following considerations are recommended:

- Mobility and access requirements:
  The following access spacing requirements are outlined as per the TRH26 standards and guidelines.

  In rural areas, the traffic safety and mobility considerations dictate access spacing requirements, and these are considerably longer than urban requirements. **Table 4-3** below summarises the access spacing recommendations along the stipulated road classes.

Table 4-3:Minimum spacing recommendations for intersections on access streets

Road Class	Rural	Urban	
	Spacing	Signals (*)	Spacing (roundabouts and priority)
Class 1	8km	**n/a**	n/a
Class 2	5km	800m±15%	800m±15%
Class 3	1.6km	600m ±20%	600m ±20%

(*) These values can be halved for the leg of T-junctions and for one-way streets.

Closely spaced T junctions should be avoided as much as possible because they often do not meet access spacing requirements.

In terms of mobility and circulation, the access points to the site will need to be able to cater for construction and abnormal load vehicles in terms of road width, access bell-mouth radius, and road grade.

- Traffic safety:
  Access points should allow for sight distances as prescribed by appropriate road design guidelines for the design speed. To maintain sight lines, sight triangles should be kept clear of obstructions, including street furniture and landscaping elements. However, objects less than 0.6m in height, such as street signs, may be placed in the triangle.

  It is recommended that appropriate signage and markings are provided to alert road users of access points ahead, contingent on obtaining the requisite approvals from the relevant roads authorities. The road reserve needs to be maintained to prevent obstructions to sight lines. Additionally, road upgrades may be required along existing access roads to accommodate expected vehicles, contingent on the appropriate authorisations being obtained.

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

  It must however be noted that the above recommendations are subject to approval from relevant affected road authorities.

- Access recommendations:
  The access proposed off the R500 is not recommended due to access spacing restrictions along Class 2 roads.

  The proposed access points along Losberg Road are located off existing farm access points thus access spacing restrictions are not envisaged. It must however be noted that the potential site entrance (B) is located just north of a horizontal road curve on Losberg Road. Sight distance issues are envisaged towards the south of the access.

  It is therefore recommended that the road reserve be kept clear of obstructions to improve sight lines. Additionally, potential site entrance (B) can be utilised as an alternative access instead of a main access to limit the number of vehicles using the access.

4.3.2 Queue length storage (stacking distance)

Site access points to facilities are often controlled by gates or booms. To mitigate the impact of the vehicles waiting to access the site on the external road network, it is recommended to accommodate a stacking distance/queue length at the access. Queue length is the access road length between the access control and the road edge of the external connecting road.

TMH 16 Volume 2 provides guidelines on accessing queue length. The following considerations have to be made when considering queue length:

- Traffic ratio (i.e., Traffic ratio= $\frac{Total\ volume\ /PHF}{Service\ flow\ rate}x100$)
- The Peak Hour Factor (PHF) compares the traffic volume during the busiest 15-minutes of the peak hour with the total volume during the peak hour.

  (i.e., PHF= $\frac{Peak\ hour\ volume}{(peak\ 15\ minute\ volume\ within\ the\ peak\ hour\ )x4}$)

  To determine this value, one needs traffic data. In lieu of available traffic data typical values can be utilised; however, this affects the accuracy of the results.
- Service flow rates as outlined in **Table 4-4** below.

Table 4-4:Access control service flow rates

Access control type	Service flow (vph)
Swipe magnetic card	480
Remote controlled gates	450
Ticket dispenser: Automatic	390 -450
Ticket dispenser: Push button	220 - 360
Pin number operated gates	150
Pay fee on entry	120
Cell phone operated gates (gate opens when a call is received)	100
Manual recording, Visitor completes form	80
Intercom operated gates (visitor contacts resident by intercom)	50

- Assuming 12 peak hours trips during the operational phase, a typical rural PHF of 0.88 as suggested by the highway capacity manual and a service flow rate of 80 (i.e., Manual recording, Visitor completes form), the traffic ratio will be 17.

Once the traffic ratio is calculated for the site access, **Table 4-5** below can be utilised to determine the required storage (i.e., number of vehicles to be accommodated in the queue length).

At an estimated traffic ratio of 17 and one access lane anticipated (i.e., 1 channel), a storage length of 1 is recommended for the site (i.e., 1 x 6m passenger vehicle staking length = 6m stacking distance)

Table 4-5:TMH 16 Vol 2 Queue length at controlled access points

90th Percentile queue length (vehicles per channel) at controlled accesses						
Storage (Vehs)	Traffic ratio (Percentage) for different Numbers of Channels					
N_{Que}	1 Channel	2 Channel	3 Channel	4 Channel	5 Channel	6 Channel
1	23	58	97	140	188	235
2	39	94	155	220	292	363
3	49	115	186	261	341	421
4	56	128	205	283	367	449
5	61	137	216	297	382	466
6	65	143	224	306	392	476
7	68	147	229	312	399	484
8	70	151	233	317	403	489
9	71	153	236	321	407	493
10	73	155	239	324	410	496

It is anticipated that larger abnormal loads will visit the site during the construction stage. A traffic management plan can be used to minimise the impacts of such vehicles on the surrounding road network. For example, abnormal load vehicle access can be scheduled such that the access is fully open with no access control in place during abnormal load delivery.

4.3.3 Provision for emergency vehicles

Emergency vehicles will need to be able to enter and circulate through the development site. The site should be capable of accommodating the largest emergency vehicle which is required to cater for the risk of the premises.

The dimension of the access must be suitable for the largest emergency vehicle while the carrying capacity should cater for the heaviest emergency vehicle. The design emergency vehicle is recommended to cater for the risk of the premises and the emergency vehicle that is likely to be used on the premisses.

Emergency service vehicles typically include ambulances, fire engines and police vehicles.

As a guide, emergency service routes are typically recommended to have a total unobstructed width of not less than 5.0 m, while property access control gates and accesses to buildings must have a total unobstructed width of not less than 4.5m. A minimum height clearance of 4.2m, is recommended if an overhead structure is planned.

The design, road marking, use and maintenance of any emergency vehicle route not forming part of a public road must comply with the requirements of the controlling authority. To prevent the obstruction of emergency vehicle routes or facilities, appropriate maps, and signage to indicate emergency vehicle routes and facilities is recommended.

4.4 Internal Roads

The internal road geometric design and layout needs 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 any 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 gravel roads will require regular grading with a grader to obtain a flat even surface.

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.

4.5 Main Route for the Transportation of Materials, Plant and People to the proposed facility

It is assumed that the materials, plant, and workers will be sourced from the surrounding towns as far as possible. The closest towns to the site are Carletonville, Fochville, and Wedela.

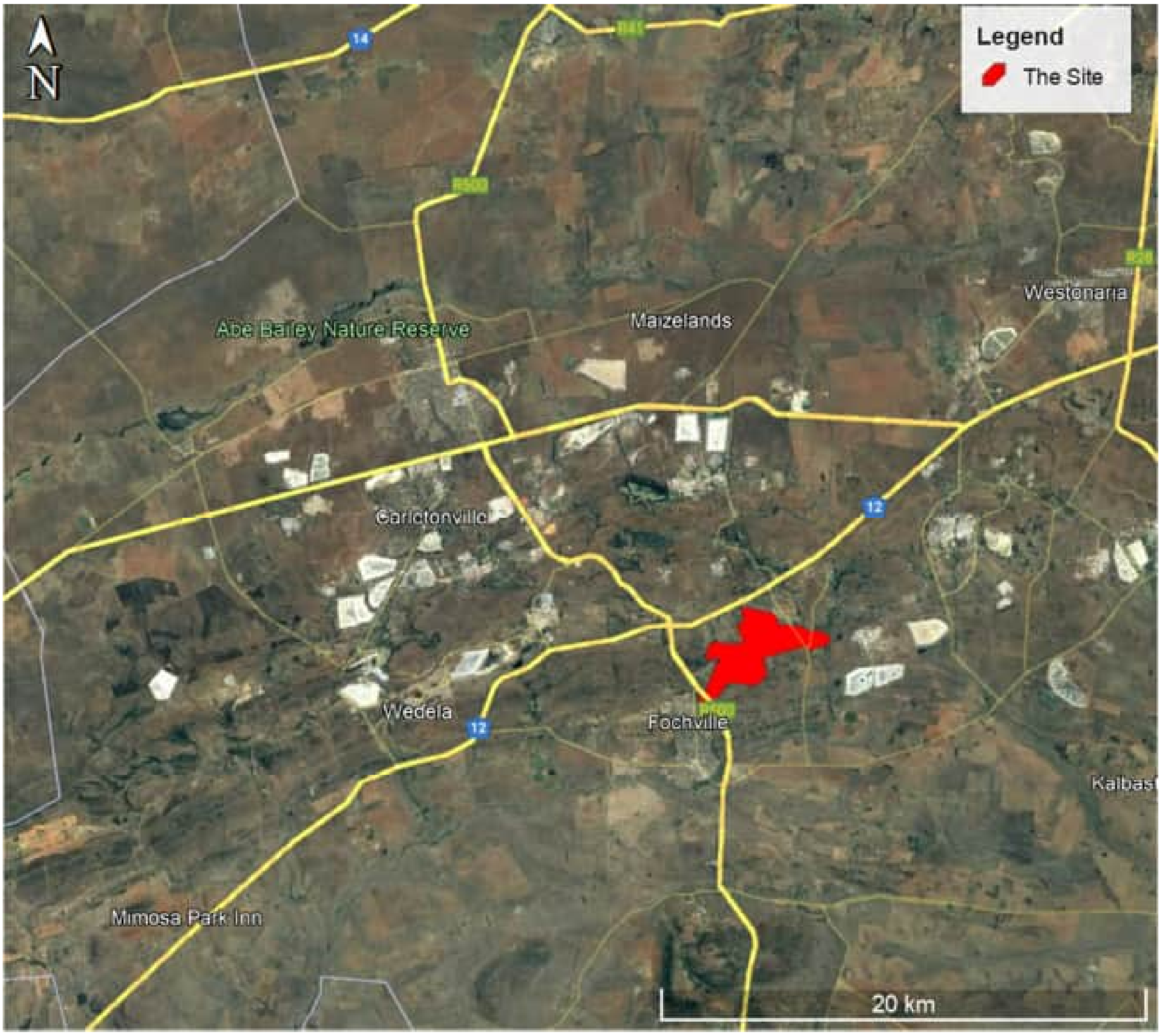


Figure 4-4:Surrounding Towns

5 IDENTIFICATION OF KEY ISSUES

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:

- The significance of the traffic impacts is expected to be higher during the construction and decommissioning phase because these phases generate the highest development traffic.
- Traffic impacts are typically assessed for the operational stage as the long-term road infrastructure impact. The construction and decommissioning phase are expected to produce high development traffic volume and a traffic management plan document is often compiled and managed throughout these phases to help manage traffic during these phases.
- TIA's are aimed at determining whether the development can be accommodated by the surrounding road network capacity. Secondary impacts resulting from traffic congestion (i.e., noise impact, dust impact, etc.) fall outside the scope of a TIA. Depending on the environmental impact assessment requirements, mitigation of the secondary impacts can be addressed in the EIA and Environmental Management Plan (EMP).

5.1 Potential Impact (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 the impact

- Traffic congestion due to construction related traffic.
- The construction traffic would also lead to noise and dust pollution.

Significance of impact without mitigation measures

- Traffic generated by the construction of the facility will have a significant impact on the surrounding road network (i.e., Moderate impact pre-mitigation and a low impact post - mitigation). The exact number of trips generated during construction will be determined by the contractor and the haulage company transporting the components to site, the staff requirements and where equipment is sourced from.

5.1.1 Estimated peak hour traffic generated.

1. **Traffic during the Construction of the wind energy facility:**

   i. **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.

   ii. **Component Delivery**

   The following wind turbine component trips are assumed: three (3) turbine blades, one (1) nacelle, one (1) turbine hub, and seven (7) tower sections (i.e., varying tower section heights for a 200m hub height). This results in 12 wind turbine components per turbine.

   Based on information provided by the client, it is estimated that two (2) turbines will be delivered per week for six (6) weeks. This results in an estimated four (4) daily trips ((12 trip x 2 turbines)/6 workdays per week). Assuming an eight (8) hour delivery window results in **one (1) peak hour trip for turbine component delivery**.

   iii. **Construction workers trips**

   The number of construction personnel is affected by project programming and is unclear at this stage. It is however noted that the most labour-intensive activity is site preparation and civil works. It can be anticipated that site preparation and civil works accounts for approximately half the total labour force required to install and connect a wind farm (IRENA (2017)).

   It is anticipated that a minimum of 60 workers can be expected at the site. From a traffic impact perspective, a conservative maximum number of workers is assessed in order to accommodate the worst-case scenario. Based on similar projects, a maximum of 300 to 400 workers can be assumed at peak construction.

   It is further assumed that approximately 50% (max 200) will be low skilled workers (construction labourers, security staff etc.), ~30% (max 120) semi-skilled workers (drivers, equipment operators etc.) and approximately 20% (max 80) skilled personnel (engineers, project managers etc.).

   Typically, contractors arrange transportation for site workers. Assuming the low skilled and semi-skilled labourers can commute by bus with a 64-passenger capacity, six (6) busses can be assumed for low skilled and semi-skilled labourers. The skilled labourers are conservatively assumed to travel by passenger car (80 trips).

   It is unlikely that all workers will arrive at the site at the same time. Typically, workers travel outside peak periods. For rural environments it is further estimated that the peak hour trips are around 20-40% of the average daily traffic. This results in a peak hour traffic of 40% x 86 = **35 trips**

iv. **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 exact trips are difficult to estimate at this stage however it is anticipated that a high peak traffic generator would result from the construction of turbine foundations because foundations are cast over short periods of time.

Based on project information, it is assumed that 80t of reinforced steel will be required per foundation. It is further assumed that 4 trucks will be required to deliver the reinforced steel per foundation (i.e., 4 trucks x 12 turbines= 48 trucks in total). This will result in an estimated two (2) reinforcement delivery trucks delivered per day over 24 days.

As a worst-case scenario two (2) reinforced steel delivery trips are assumed for the peak hour.

To estimate concrete delivery trips, as a worst-case scenario, the peak hour trips will be estimated for a scenario where concrete for foundations is sourced from a ready-mix plant. During the foundation pouring period, each foundation will require approximately 600m^3 of concrete. At 8m^3 per truck, each foundation will require 75 loads per foundation over a 24-hour period.

75 loads/24 hours result in four (4) peak hour trips assumed for concrete delivery.

The resulting estimated peak hour trips for **turbine foundation material delivery is six (6) trips**.

2. **Traffic during the Construction of Grids/Power lines:**

This typically includes the construction or installation of the infrastructure required to transmit and distribute electricity (e.g., on site substation, transmission lines, distribution lines etc).

i. **Material and component delivery**

Vehicle trips from material and component delivery vary depending on the construction task/program, fuel supply arrangements, as well as distance from the material source to the site. Not enough detail about the powerline is known at this stage to provide an estimated trip generation volume for material and component traffic.

The materials and most components expected for the powerline construction can generally be transported by normal heavy load vehicles. Project planning can be used to reduce delivery trips during peak hours. In addition to this, using a mobile batch plant as well as temporary construction material stockpile yards near the proposed site can also reduce peak hour trips.

The transmission tower sections, and transformer are expected to be transported by abnormal load. The number of tower sections and transformer units is unknown thus the number of abnormal loads cannot be estimated. The abnormal load trips are however expected to be low.

ii. **<u>Construction machinery</u>**

Cranes for pylon/tower assembly, heavy vehicles required for earthworks etc.

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.

iii. **<u>Site personnel and workers</u>**

Based on information obtained from similar projects it is assumed that 20-30 workers can be expected on site per workday for the powerline construction.

Minibus taxis have an average 15 passenger capacity and assuming approximately 5% highly skilled personnel will travel by means of passenger vehicles the following trips are assumed:

- for the skilled personnel a maximum of 2 trips are expected.
- The remaining 28 workers can travel by minibus (i.e., 2 minibus trips).

a maximum of 4 peak hour site personnel trips is assumed for the purposes of this assessment.

3. <u>Total estimated construction trips:</u>

The summary of estimated total development trips is shown in **Table 5-1**.

Table 5-1:Summary of total estimated maximum peak hour trips (construction phase)

	Trip generator	Estimated peak hour trips
Wind energy component	Material delivery	6
	Construction machinery	Negligible
	Component delivery	1
	Construction workers	35
Grid connection	Construction vehicles	Negligible
	Component delivery	Unknown but estimated to be low
	Site personnel	4

The above trip estimates are dependent on the construction period, construction programming, material availability, component delivery, abnormal load permitting etc.
It will be important to schedule the construction trips to spread the trips over the day, minimising congestion.

5.1.2 Proposed mitigation measures

The following mitigation measure are proposed to potentially reduce the impact during the Construction Phase:

- Pre-notification of affected parties regarding construction activities to minimize complaints regarding noise and vibration nuisance.
- Deliveries must be staggered, and trips must be scheduled to occur outside of peak traffic periods.
- All trucks and vehicles removing soil from the site are to be covered to prevent spills.
- Dust suppression of gravel roads during the construction and decommissioning phases, as required.
- Regular maintenance of gravel roads by the Contractor during the construction and decommissioning phases.
- The use of mobile batching plants and quarries on or in close proximity to the site would decrease the impact on the surrounding road network.
- Staff and general trips should occur outside of peak traffic periods as far as possible.
- 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.
  It must be noted that consent from the relevant authorities will be required to make adjustments to existing infrastructure.
- The preferred route should be surveyed to identify problem areas e.g., intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, that may require modification. After the road modifications have been implemented, it is recommended to undertake a “dry-run” with the largest abnormal load vehicle, prior to the transportation of any turbine components, to ensure that the delivery of the turbines will occur without disruptions. This process is to be undertaken by the haulage company transporting the components and the contractor, who will modify the road and intersections to accommodate abnormal vehicles. It needs to be ensured that the gravel sections 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.
- Design and maintenance of internal roads. The internal gravel roads will require grading with a road grader to obtain a flat even surface and the geometric design of these gravel roads needs to be confirmed at detailed design stage. This process is to be undertaken by a civil engineering consultant or a geometric design professional. The road designer should take cognizance that roads need to be designed with smooth, relatively flat gradients to allow an abnormal load vehicle to ascend to the top of a hill.
- Accommodation of secure material storage on site to allow for staggered delivery of materials.

5.2 Potential Impact (Operational Phase)

5.2.1 Estimated peak hour trips.

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

Nature of impact:

- Traffic congestion related to traffic generated during the operation of the facility.
- The operational traffic would also lead to noise and dust pollution.

Estimated peak hour traffic generated by the site:

- Trips generated by staff traveling to the site:

  It is anticipated that a minimum of 8 workers can be expected at the site. From a traffic impact perspective, a conservative maximum number of workers is assessed in order to accommodate the worst-case scenario. Based on similar studies it can be estimated that approximately a maximum of 30 full-time employees will be stationed on site. Assuming 40% of the trips occur during the peak hour ***12 peak hour trips*** can be assumed for the operational phase.

  The operational peak hour trips generated by staff are expected to be low and will have a negligible impact on the external road network.

5.2.2 Proposed mitigation measures

Noise, dust, and exhaust pollution cannot be completely mitigated. Where possible, the following measures will significantly reduce the impact:

- Encouraging workers to travel outside peak hour periods.
- Dust suppression as well as maintenance of internal roads.

5.3 Potential Impact (Decommissioning Phase)

The decommissioning phase will result in the same impact as the Construction Phase as similar trips are expected. The potential traffic impact will be of medium significance before mitigation measures during the construction and decommissioning phases. However, considering that this is temporary and short term in nature, the impact can be mitigated to an acceptable level of low significance.

5.4 Cumulative Impacts

5.4.1 Construction phase

To assess the cumulative impact, it will be assumed that all authorised and proposed renewable energy projects within the vicinity of the site, would be constructed at the same time. It must be noted that this is a conservative approach.

There is one (1) renewable energy projects located within a 55km radius of the site. The project is the authorised Sibanye Gold Limited 200MW Solar PV plant and its associated infrastructure (DEA/EIA/0000297/2016). This site is located approximately 8km northeast of the site.

The total estimated construction peak hour trips are summarised in **Table 5-2**.It must however be noted that this is a conservative estimate, and the likelihood of occurrence is considered low due to the following:

- Renewable energy projects are affected by funding and economic viability.
- projects targeted to supply energy to the national grid are subject to a highly competitive bidding process. Only a handful of projects would be selected to enter into a power purchase agreement with Eskom.
- even if all renewable energy projects are constructed and decommissioned on 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.

Table 5-2:Estimated Cumulative construction trips.

Developments	Megawatt	Estimated peak hour construction traffic
Igolide WEF	100	42
Sibanye Gold Limited Solar PV	200	Conservative estimate of 60 trips
	Total trips	102

5.4.2 Operational Phase

The total estimated operational peak hour trips are summarised in ***Table 5-3***.

Table 5-3:Estimated Cumulative operational trips.

Developments	Megawatt	Estimated peak hour traffic
Igolide WEF	100	12
Sibanye Gold Limited Solar PV	200	12
	Total trips	24

6 NO-GO ALTERNATIVE

The no-go alternative implies that the proposed development of the 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 of the proposed WEF. 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.

7 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

7.1 Construction Phase

Nature of the impact

- Traffic congestion and associated noise and dust pollution.

Table 7-1:Traffic related impact (Construction phase)

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation						
						(M+	E+	R+	D)x	P=	S	Rating
Impact 1:	Traffic congestion and associated noise and dust pollution	Impacts related to traffic due to construction activity	Construction	Negative	moderate	3	2	3	2	4	**40**	**Moderate**
				Significance		N/A						
						Post-Mitigation						
						(M+	E+	R+	D)x	P=	S	Rating
				Negative	moderate	2	1	3	2	3	**24**	**Low**
				Significance		N/A						

Note: M = Impact magnitude, E= Impact extent, R= Impact reversibility, D=Impact duration, P= probability of occurrence, and S= Significance.

7.2 Potential Impact (Operation Phase)

Nature of the impact

- Traffic congestion and associated noise and dust pollution.

Table 7-2: Traffic related impact (Operational phase)

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation						
						(M+	E+	R+	D)x	P=	S	Rating
Impact 1:	Traffic congestion and associated noise and dust pollution	Impacts related to traffic due to the operation of the facility	Operation	Negative	moderate	2	1	3	4	3	**30**	**Low**
				Significance		N/A						
						Post-Mitigation						
						(M+	E+	R+	D)x	P=	S	Rating
				Negative	moderate	1	1	1	4	2	**14**	**Very low**
				Significance		N/A						

Note: M = Impact magnitude, E= Impact extent, R= Impact reversibility, D= Impact duration, P= probability of occurrence, and S= Significance.

7.3 Decommissioning Phase

This phase will result in the same impact as the Construction Phase as similar trips are expected.

7.4 Cumulative Impacts

7.4.1 Construction phase

Table 7-3: Traffic related cumulative impact (Construction phase)

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation						
						(M+	E+	R+	D)x	P=	S	Rating
Impact 1:	Traffic congestion and associated noise and dust pollution	Impacts related to traffic due to construction activity	Construction	Negative	moderate	3	3	3	2	4	44	Moderate
				Significance		N/A						
						Post-Mitigation						
						(M+	E+	R+	D)x	P=	S	Rating
				Negative	moderate	3	2	3	2	3	30	Low
				Significance		N/A						

Note: M = Impact magnitude, E= Impact extent, R= Impact reversibility, D= Impact duration, P= probability of occurrence, and S= Significance.

7.4.2 Operational phase

Table 7-4:Traffic related cumulative impact (Operational phase)

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation						
						(M+	E+	R+	D)x	P=	S	Rating
Impact 1:	Traffic congestion and associated noise and dust pollution	Impacts related to traffic due to the operation of the facility	Operation	Negative	moderate	2	2	3	4	3	33	Moderate
				Significance		N/A						
						Post-Mitigation						
						(M+	E+	R+	D)x	P=	S	Rating
				Negative	moderate	1	1	3	4	2	18	low
				Significance		N/A						

Note: M = Impact magnitude, E= Impact extent, R= Impact reversibility, D= Impact duration, P= probability of occurrence, and S= Significance.

7.4.3 Decommissioning Phase

This phase will result in the same impact as the Construction Phase as similar trips are expected.

8 IMPACT ASSESSMENT SUMMARY

Table 8-1 shows a summary of the overall impact significance.

Table 8-1:Summary of Overall Impact Significance

Phase	Overall Impact Significance	
	Pre-Mitigation	Post Mitigation
Construction	Moderate	Low
Operational	Low	Very low
Decommissioning	Moderate	Low
Cumulative - Construction	Moderate	Low
Cumulative - Operational	Moderate	Low
Cumulative - Decommissioning	Moderate	Low

9 CONCLUSION

The potential traffic and transport related impacts for the construction, operation, and decommissioning phases of the proposed Igolide WEF were identified and assessed.

- The main impact on the external road network will be during the construction phase. This phase is temporary in comparison to the operational period. The number of abnormal loads vehicles was estimated and anticipated to be able to be accommodated by the road network.
- During operation, it is expected that maintenance and security staff will periodically visit the facility.

  It is anticipated that a minimum of 8 workers can be expected at the site. From a traffic impact perspective, a conservative maximum number of workers is assessed in order to accommodate the worst-case scenario. Based on similar studies, it is assumed that approximately 30 full-time employees will be stationed on site (Subject to change). However, based on experience with similar projects, the number of full-time employees is generally low and consequently, the associated trips are negligible.

  The traffic impact on the surrounding road network is considered negative and of **low significance** before and of **very low significance** after mitigation.

- The traffic generated during the construction phase, although significant, will be temporary and impacts are considered to be negative and of **moderate significance** before mitigation and of **low significance** after mitigation.
- The traffic generated during the decommissioning phase is anticipated to be similar to that of the construction phase. The traffic impact on the surrounding road network will also be considered negative and of **moderate significance** before and of **low significance** after mitigation.

The potential mitigation measures mentioned in the construction and decommissioning phases are:

- Pre-notification of affected parties regarding construction activities to minimize complaints regarding noise and vibration nuisance.
- Deliveries must be staggered, and trips must be scheduled to occur outside of peak traffic periods.
- All trucks and vehicles removing soil from the site are to be covered to prevent spills.
- Dust suppression of gravel roads during the construction and decommissioning phases, as required.
- Regular maintenance of gravel roads by the Contractor during the construction and decommissioning phases.
- The use of mobile batching plants and quarries on or in close proximity to the site would decrease the impact on the surrounding road network.
- Staff and general trips should occur outside of peak traffic periods as far as possible.
- 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.
  It must be noted that consent from the relevant authorities will be required to make adjustments to existing infrastructure.
- The preferred route should be surveyed to identify problem areas e.g., intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, that may require modification. After the road modifications have been implemented, it is

recommended to undertake a "dry-run" with the largest abnormal load vehicle, prior to the transportation of any turbine components, to ensure that the delivery of the turbines will occur without disruptions. This process is to be undertaken by the haulage company transporting the components and the contractor, who will modify the road and intersections to accommodate abnormal vehicles. It needs to be ensured that the gravel sections 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.

- Design and maintenance of internal roads. The internal gravel roads will require grading with a road grader to obtain a flat even surface and the geometric design of these gravel roads needs to be confirmed at detailed design stage. This process is to be undertaken by a civil engineering consultant or a geometric design professional. The road designer should take cognizance that roads need to be designed with smooth, relatively flat gradients to allow an abnormal load vehicle to ascend to the top of a hill.
- Accommodation of secure material storage on site to allow for staggered delivery of materials.

The construction and decommissioning phases of a wind farm are the only significant traffic generators and therefore noise and dust pollution will be higher during these phases. The duration of these phases is short term i.e., the impact of the WEF on the traffic on the surrounding road network is temporary and wind farms, when operational, do not add any significant traffic to the road network.

Three access alternatives are proposed for the site with one access connection proposed of the R500 and two access points proposed off Losberg Road. The access point off the R500 is not recommended due to access spacing restrictions. The access points off Losberg Road are existing access points and are therefore not envisaged to have access spacing issue.

It must however be noted that the southernmost access along Losberg Road (i.e., potential site entrance (B)) is located just north of a horizontal road curve on Losberg Road. Sight distance issues are envisaged towards the south of the access. It is therefore recommended that the road reserve be kept clear of obstructions to improve sight lines. Additionally, potential site entrance (B) can be utilised as an alternative access instead of a main access to limit the number of vehicles using the access.

10 FINAL SPECIALIST STATEMENT

Traffic impact assessments are generally assessed for the operation phase of a development. Based on similar studies, wind energy facilities have a low peak hour traffic impact with less than 50 peak hour trips expected to be generated. Considering the envisaged low traffic demand posed by the development during the operation phase, the development is supported from a transport perspective provided that the recommendations made in this study are adhered to.

11 REFERENCES

- Google Earth Pro
- Gouws. S: "Concrete Towers – a business case for sustained local investment", Concrete growth, www.slideshare.net/SantieGouws/concrete-towers-a-business-case-for-sustainedinvestmentrev-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

- 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
- IRENA (2017), Renewable energy benefits: Leveraging local capacity for onshore wind, International Renewable Energy Agency, Abu Dhabi.

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Annexure A: SPECIALIST EXPERTISE

ADRIAN WESLEY NATHANIEL JOHNSON

Position in Firm	*Associate and Manager: Traffic and Transportation*
Area of Specialisation	*Traffic and Transportation Engineering*
Qualifications	*PrTechEng, Master of Transport Studies, BSc (Hons) (Applied Science: Transport Planning), BTech Civil Engineering*
Years of Experience	*18 Years*
Years with Firm	*6 Years*

SUMMARY OF EXPERIENCE

Adrian Johnson is a Professional Technologist registered with ECSA (201570274). He joined JG Afrika (Pty)Ltd. in January 2017. Adrian holds a BSc (Hons) (Applied Sciences: Transportation Planning) degree from the University of Pretoria, a BTech degree in Civil Engineering from the Cape Peninsula University of Technology and completed a Masters' degree in Transport Studies at the University of Cape Town in 2020. He has more than 18 years of experience in a wide range of engineering projects.

He has technical and professional skills in traffic impact studies, transport impact assessments, public transport planning, non-motorised transport planning & design, data analysis of public transport systems, access management plans, quality control, project planning and implementation, geometric design, site supervision, transport assessments for renewable energy projects, speed limit reviews and road safety audits.

PROFESSIONAL REGISTRATIONS & INSTITUTE MEMBERSHIPS

PrTechEng - Engineering Council of South Africa, Registration No 201570274
SAICE - South African Institute of Civil Engineering. No 201700129
SARF WR - South African Road Federation Western Region Administrator and Committee Member

EDUCATION

2004 - **National Diploma** (Civil) – Peninsula Technikon
2006 - **BTech** (Civil) – Cape Peninsula University of Technology
2011 - **BSc (Hon)** (Applied Sciences: Transportation Planning) – University of Pretoria
2020 – **Master of Transport Studies –** University of Cape Town

SPECIFIC EXPERIENCE

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

September 2022 – Date
Position – Associate and Manager: Traffic and Transportation
Traffic Engineering Support Services Provision of Professional Services: Transport Engineering, Planning and Management to the City of Cape Town, Western Cape. Client: City of Cape Town

Adam Tas Corridor Transport Studies for the Adam Tas Corridor in Stellenbosch, Western Cape. Client" Stellenbosch Municipality

Limpopo Road Asset Management System Undertake network level road safety assessments and analysis of accident statistics of the Limpopo road network (5 000km). – Client: Roads Agency Limpopo SOC Ltd

Aberdeen WEFs Transport study for the proposed Windfarms, Western Cape Client: Private

Hydra B Solar Cluster Transport study for multiple solar facilities in the Northern Cape. Client: Private

Britstown WEFs Transport study for the proposed Windfarms, Northern Cape Client: Private

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

2017 – June 2022
Position – Senior Technologist (Traffic and Transportation Engineering)
Various Transport Impact Statements (TIA) and Traffic Impact Statements (TIS) for private clients including:

- Weltevreden Clinic TIS for Edifice Consulting Engineers
- Oakhurst Primary TIS for BVZ Plan
- Sinai Academy TIS for Bettesworth Scott Planners
- Rustlamere TIA for Bettesworth Scott Planners
- Joostenbergvlakte Farms 732 and 728 TIA for Asla
- Garden Emporium TIA for Rory Cameron Smith Architects
- Strandfontein Sandmine TIS for Chand Environmental Consultants
- Proposed development of Erf 538 Grassy Park TIA for First Plan
- Riebeek West: Proposed Function/Wedding Venue TIS for Elco Property Developers

Kampies Housing Development Proposed upgrade of the informal settlement on Cape Farm 616 Philipi and Erf 63 Spring Field, providing 275 units. Client: Ian Rout & Associates

Highlands Housing Project Traffic calming plans for three proposed sites in Mitchells Plain, Cape Town – Client: City of Cape Town

Richards Bay Gas to Power Facility Transport study for the proposed renewable energy facility in Richards Bay, KwaZulu Natal – Client: Private Client

Solid Waste Management Sector Plan – Collections Work Brief Information Analyst assisting with the assessments and detailed analysis of the collections and drop-off facilities operating model of the City of Cape Town – Client: City of Cape Town

Nooiensfontein Housing Project Transport Study for the Nooiensfontein Housing Development in Bluedowns (2500 units) – Client: Ian Rout & Associates

Bardale Housing Development Transport Impact Assessment and Signal timing plan, Western Cape – Client: Integrated Housing Development

Enkanini Housing Transport Impact Assessment for the development of the Enkanini Informal Settlement, Kayamandi - Client: Stellenbosch Municipality

Sutherland and Rietrug Access Road Transport study for the upgrading and widening of the access road to the proposed Sutherland Windfarm, Northern Cape Client: Nala Environmental Consulting

Pienaarspoort Windfarm Transport study for the proposed Pienaarspoort Windfarm, Western Cape Client: Savannah Environmental (Pty) Ltd

Speed Limit Review Main Road 546, Main Road 552 and Divisional Road 2220, Lutzville, Western Cape – Client: Western Cape Government

Gromis and Komis Wind Energy Facility Transport study for the proposed Windfarm, Northern Cape. Client: CSIR

Geelkop Solar Facility Transport study for the proposed Geelkop Solar PV Facility near Upington, Northern Cape – Client: AEP (Pty) Ltd

Khunab Solar Facility Transport study for the proposed Khunab Solar PV Facility near Upington, Northern Cape – Client: AEP (Pty) Ltd

Bloemsmond Solar Facility Transport study for the proposed Bloemsmond Solar PV Facility near Upington, Northern Cape – Client: AEP (Pty) Ltd

NMT Study for the Upgrading of DR1285, Elgin – Client: Western Cape Government

Traffic Study for the Kudusberg and Rondekop Wind Energy Facilities, Northern Cape. Client: G7

Speed Limit Review Main Road 540, Elandsbay, Western Cape – Client: Western Cape Government

Road Safety Audit for N1 Section 16 Winburg to Ventersburg – Client: Aurecon on behalf of SANRAL

Road Safety Audit for the for the N4 at Bapong, Client: Bakwena

Road Safety Audit for N2 Wild Coast Toll Road Projects, Eastern Cape & Natal, Client: Aurecon/Knight Piesold on behalf of SANRAL

Kuruman Wind Energy Facility Transport study for the proposed Kuruman Windfarm, Northern Cape. Client: CSIR

Coega West Windfarm Transportation and Traffic Management Plan for the proposed Coega Windfarm in Coega, Port Elizabeth – Client: Electrawinds Coega

Parking Audit of the Groenvallei area in Bellville – Client: City of Cape Town

Road Safety Appraisals for the Mpumalanga Province – Client: Mpumalanga Provincial Government

Transportation and Traffic Management Plan for the proposed Coega West Wind Energy Facility in Port Elizabeth – Client: Electrawinds Coega (Pty) Ltd

Road Safety Appraisals for North Region of Cape Town – Client: Aurecon on behalf of City of Cape Town

Speed Limit Reviews for North Region of Cape Town – Client: Aurecon on behalf of City of Cape Town

Road Safety Audit for the Upgrade of N1 Section 4 Monument River – Client: Aurecon on behalf of SANRAL

Road Safety Audit for the Upgrade of N2 Section 8 Knysna to Wittedrift – Client: SMEC on behalf of SANRAL

Road Safety Audit for the Upgrade of N1 Section 16 Zandkraal to Winburg South – Client: SMEC on behalf of SANRAL

Traffic and Road Safety Studies for the Improvement of N7 Section 2 and Section 3 (Rooidraai and Piekenierskloofpass) – Client: SANRAL

Traffic Engineer for the Upgrade of a 150km Section of the National Route N2 from Kangela to Pongola in KwaZulu-Natal, Client: SANRAL

GIBB (Pty) Ltd

2014 – 2016
Position – Technologist / Project Leader (Traffic and Transportation Engineering)
Operational Support to the MyCiTi Integrated Rapid Transit System - Tasks included analysis of AFC data, generating monthly operations reports, analysis of passenger surveys, journey time runs, travel time surveys, compilation of a MyCiTi Festive Season Report and compilation of reports for the Century City and V&A Waterfront stakeholders. Client: Transport for Cape Town.

Technical Support to the MyCiTi Business Planning Department - A detailed route-by-route analysis, during peak and off-peak conditions to generate daily demand profiles, with a focus on identifying inefficiencies.
Additional tasks included:

- An assessment of profitability of routes based on patronage, revenue and operating costs;
- Analysis of AFC data;
- Comparison between the manual survey results and the Transportation Reporting System (TRS) data;
- Analysis of the Free Token Card Promotion;
- Route and bus optimisation;
- Station and feeder stop utilization and
- Assessment of Parking Tariffs for Managed Parking Bays within the City of Cape Town.

Client: Transport for Cape Town.

AFC Data Analysis - Data Analysis of AFC Data of the City of Tshwane's A Re Yeng Bus Service.
Client: Development Bank of Southern Africa.

Ghana Transport Statues Quo Study - Transport Status Quo Study for the Greater Accra Regional Spatial Development Framework. Client: Government of Ghana: Ministry of Lands & Natural Resources.

Botswana TIA – Transport Impact Assessment for the Mogoditshane- Kanye Road project in Botswana. Client: Republic of Botswana's Ministry of Transport and Communications: Roads Department.

Botswana Access Management Plan Transport Impact Assessment for the Mogoditshane- Kanye Road project in Botswana. Client: Republic of Botswana's Ministry of Transport and Communications: Roads Department.

MyCiTi System Planning - Rationalisation of the GABS bus routes within the City of Cape Town. Client: Transport for Cape Town.

Road Safety Master Plan - Compilation of a Road Safety Master Plan for Stellenbosch Municipality. Client: Stellenbosch Municipality.

Constantia TIS - Transport Impact Statement and Parking Motivation for the proposed redevelopment of Erf 2134, Constantia. Client: High Constantia Properties.

Top Yard TIA - Transport Impact Assessment for the Government Garage Precinct Plan (Top Yard). Client: PricewaterhouseCoopers (PWC).

Boschendal TIA - Transport Impact Assessment for the development of Boschendal Village. Client: Boschendal (Pty)Ltd.

Vergenoegd TIA - Transport Impact Assessment for the development of Portion 19 of Farm 653, Vergenoegd. Client: Headland Planners.

Tygerberg Hospital Traffic Status Quo Study - Traffic Status Quo Study for the Development Framework for the Tygerberg Hospital Site in Bellville. Client: City Think Space.

Eerste River TIA - Transport Impact Assessment for Erf 5541, Eerste River. Client: Headland Planners

BVi Consulting Engineers

2013– 2014
Position – Technologist (Transportation Engineering)

Waaihoek Wind Energy Facility TIA - Transport Impact Assessment for the proposed construction of a Wind Energy Facility on Waaihoek Farm near Utrecht Town in Kwazulu-Natal. Client: Mainstream Renewable Power.

Sere Wind Farm - Supervision of bellmouth widening and other modifications along routes between the Saldanha Port and the Sere Wind Farm near Koekenaap. Client: Siemens.

Slip lane Design for Windhoek Service Station - Geometric design of a slip lane to the existing Windhoek Fuel Centre, Windhoek, Namibia. Client: Multi Consult.

Lafarge Industries

2011– 2013
Position – Quality Controller

Responsible for the quality control at four ReadyMix concrete plants and the Tygerberg Quarry.

- Design of new concrete mixes and optimisation of existing mix designs.
- Assist client with technical matters and problem solving.
- Compile technical reports.
- Motivate, train and develop staff to ensure growth and succession.

- Arrange and monitor staff schedules.
- Conduct Quality training for field technicians, reps and batchers.
- Statistical analysis of concrete results and monitoring product performance.

Aurecon Mozambique

2010– 2011
Position – Roadworks Engineer (Site Supervision)

Mozambique site supervision - Roadworks Engineer responsible for inspection of works and monitoring workmanship for the Construction of a 135km road from Montepuez to Ruaca in Northern Mozambique. Client: Administracao Nacional De Estradas (Mozambican Roads Authority)

Aurecon South Africa

2004– 2010
Position – Technician/Technologist (Traffic and Transportation Engineering)

Kewtown site supervision - Resident Engineer for the Community Residential Units Programme Pilot Project in Kewtown. Client: City of Cape Town.

N2 road design - Vertical and horizontal alignment of the N2 from Coega to Colchester. Client: SANRAL.

Western Cape Provincial Weighbridges - Resident Engineer on various projects involving the upgrading and expansion of the 9 Provincial Weighbridges in the Western Cape. Client: Provincial Administration: Western Cape.

Traffic and Transport tasks - Various traffic counts, traffic data analysis and transport impact statements. Client: Various.

CONTINUED PROFESSIONAL DEVELOPMENT

Courses

2007 - SAICE Flood estimation and Storm Water Drainage for Roads Course
2008 - Certificate in Project Management
2009 - SAICE Practical Geometric Design Course
2011 - C&CI Concrete Technology
2013 - Post graduate Courses – Financial Management and Asset Management
AutoCAD Civil 3D Training
2014 - Leadership Training -Project Risk Training and Anti- Corruption and Integrity Management
Post graduate Courses – Strategic Operations Management and Project Management
2015 - Leadership Training – Report Writing
2016 - Leadership Training - Quality Management and Time Management
2017 - Road Safety Auditor Course (SARF)
2018 - Road Safety in Engineering Seminar (SARF)
2020 Understanding and the Investigation of Road Traffic Accidents
2021 Intersection Optimisation course (SARF)

PERSONAL DETAILS

Nationality – South African
Date of Birth – 1984-05-31
Domicile – Cape Town, South Africa

Languages
English – Very Good
Afrikaans – Good

Annexure B: ASSESSMENT METHODOLOGY

IMPACT ASSESSMENT METHODOLOGY

SCOPING PHASE

REPORTING REQUIREMENTS

- Project Description
- Legislative Context (as applicable)
- Assumptions and limitations
- Description of Baseline Environment – including sensitivity mapping
- 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 0-3** and **Table 0-2** respectively.

Table 0-1: 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 0-2: 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.

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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 0-3: 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**	**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 0-4**) has been applied according to the nature and significance of the identified impacts.

Table 0-4: 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**

EIA PHASE

REPORTING REQUIREMENTS

- Project Description
- Legislative Context (as applicable)
- Assumptions and limitations
- Description of methodology (as required)
- Update and/or confirmation of Baseline Environment – including update and / or confirmation of sensitivity mapping
- Identification and description of Impacts
- Full impact assessment (including Cumulative)
- Mitigation measures
- Impact Statement

Ensure that all reports fulfil the requirements of the relevant Protocols.

ASSESSMENT OF IMPACTS AND MITIGATION

The assessment of impacts and mitigation evaluates the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts. The assessment considers direct[1], indirect[2], secondary[3] as well as cumulative[4] impacts.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e. residual impact). The significance of environmental aspects is determined and ranked by considering the criteria[5] presented in **Table 0-5**.

Table 0-5: Impact Assessment Criteria and Scoring System

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease	Very High: Permanent cessation of processes

[1] Impacts that arise directly from activities that form an integral part of the Project.
[2] Impacts that arise indirectly from activities not explicitly forming part of the Project.
[3] Secondary or induced impacts caused by a change in the Project environment.
[4] Impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.
[5] The definitions given are for guidance only, and not all the definitions will apply to all the environmental receptors and resources being assessed. Impact significance was assessed with and without mitigation measures in place.

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
Impact Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
Significance (S) is determined by combining the above criteria in the following formula:	$[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$				
IMPACT SIGNIFICANCE RATING					
Total Score	**4 to 15**	**16 to 30**	**31 to 60**	**61 to 80**	**81 to 100**
Environmental Significance Rating (Negative (-))	**Very low**	**Low**	**Moderate**	**High**	**Very High**
Environmental Significance Rating (Positive (+))	**Very low**	**Low**	**Moderate**	**High**	**Very High**

IMPACT MITIGATION

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this report.

The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

The mitigation sequence/hierarchy is shown in **Figure 1** below.

Avoidance / Prevention	Refers to considering options in project location, nature, scale, layout, technology and phasing to **avoid** environmental and social impacts. Although this is the best option, it will not always be feasible, and then the next steps become critical.
Mitigation / Reduction	Refers to considering alternatives in the project location, scale, layout, technology and phasing that would **minimise** environmental and social impacts. Every effort should be made to minimise impacts where there are environmental and social constraints.
Rehabilitation / Restoration	Refers to the **restoration or rehabilitation** of areas where impacts were unavoidable and measure are taken to return impacted areas to an agreed land use after the activity / project. Restoration, or even rehabilitation, might not be achievable, or the risk of achieving it might be very high. Additionally it might fall short of replicating the diversity and complexity of the natural system. Residual negative impacts will invariably still need to be compensated or offset.
Compensation / Offset	Refers to measures over and above restoration to remedy the residual (remaining and unavoidable) negative environmental and social impacts. When every effort has been made to avoid, minimise, and rehabilitate remaining impacts to a degree of no net loss, **compensation / offsets** provide a mechanism to remedy significant negative impacts.
No-Go	Refers to 'fatal flaw' in the proposed project, or specifically a proposed project in and area that cannot be offset, because the development will impact on strategically important ecosystem services, or jeopardise the ability to meet biodiversity targets. This is a **fatal flaw** and should result in the project being rejected.

Figure 1: Mitigation Sequence/Hierarchy

Annexure C: COMPLIANCE WITH APPENDIX 6 OF THE 2014 EIA REGULATIONS (AS AMENDED)

Requirements of Appendix 6 (Specialist Reports) of Government Notice R326 (Environmental Impact Assessment (EIA) Regulations of 2014, as amended)	***Section where this has been addressed in the Specialist Report***
1. (1) A specialist report prepared in terms of these Regulations must contain - *a) details of -* *i. the specialist who prepared the report; and* *ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;*	*Annexure A*
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	*Annexure D*
c) an indication of the scope of, and the purpose for which, the report was prepared;	*Section 1.1*
(cA) an indication of the quality and age of base data used for the specialist report;	*n/a*
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	*Section 5, and 7*
d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	*n/a*
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	*Section 1.3 and Annexure B*
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	*Section 4, and 5*
g) an identification of any areas to be avoided, including buffers;	*Section 4*
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;	*n/a*
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	*Section 1.4*
j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	*Section 4,7, and 8*
k) any mitigation measures for inclusion in the EMPr;	*Section 9*
l) any conditions for inclusion in the environmental authorisation;	*Section 5 and 7*
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	*Section 9*
n) a reasoned opinion- *i. whether the proposed activity, activities or portions thereof should be authorised;* *(iA) regarding the acceptability of the proposed activity or activities; and* *ii. if the opinion is that the proposed activity, activities, or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;*	*Section 7,8,9, and 10*
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	*Undertaken by EAP*
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	*Undertaken by EAP*
q) any other information requested by the competent authority.	*Undertaken by EAP*
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	*No traffic protocol published to date*

Annexure D: SPECIALIST DECLARATION

I, Adrian Johnson, 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: JG Afrika (Pty) Ltd

Date: 20-06-2023