

ENERTRAG

JESSA WIND ENERGY FACILITIES

TRAFFIC IMPACT ASSESSMENT



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1 EXECUTIVE SUMMARY

ENERTRAG South Africa (Pty) Ltd (hereafter referred to as 'ESA') proposes developing three Wind Farms and associated Grid Connection southwest of Beaufort West within the Central Karoo District Municipality of the Western Cape Province. The proposed wind farms are the Jessa M Wind Farm, the Jessa S Wind Farm and the Jessa Z Wind Farm, collectively referred to as the Jessa Wind Farm Cluster.

A combined Traffic Impact Assessment for the Jessa Wind Farm Cluster hereafter referred to as the 'proposed development', is provided as part of the Environmental Impact Assessment process. This Traffic Impact Assessment is based on the latest available information for each of the Wind Farms, within the cluster will consist of up to a maximum of 35 wind turbine generator units per wind farm, with a maximum generating capacity in the order of 220 MW, which will be finalised once the turbine supplier has been appointed.

In line with the relevant guidelines, Mr A. Schwarz undertook a Traffic Impact Assessment to establish the proposed development's impact on the existing road network for the construction, operation, and decommissioning phases of the projects. A site visit was conducted during September 2021

Numerous renewable energy projects are earmarked for development in the adjacent area to the proposed Jessa Wind Farm Cluster. The proposed road network used to commute personnel and transportation of equipment and material, including abnormal loads, to the proposed developments are well-established.

Traffic generation estimates used in this assessment are based on information provided by ESA and the experience of similar projects. The worst-case scenario for the cumulative impact has been adopted, which assumes all three Jessa Wind Farms and a Wind Farm (hereafter referred to as 'Wind Farm X') are constructed simultaneously over a period of two years. The most significant increase in traffic will result from the daily commuting of personnel to and from the proposed development. The projected increase in cumulative traffic on the TR03305 exceeds 50 vehicles per hour, the threshold stipulated in the South African Traffic Impact and Site Traffic Assessment Manual (2012).

There will be a notable increase in traffic volumes on the road network during the construction phase of the proposed developments and less conspicuous during the operational phase. This report has assessed the cumulative impact of the additional traffic on the surrounding road network and found that the level of servers on these roads is acceptable (LOS B). The increase in traffic volumes will lead to more significant wear and tear, especially during the construction phase of the proposed developments, but will not have an undue detrimental impact on the structural integrity of the roads within the study area. Due to budgetary constraints within various spheres of government, only minor maintenance is undertaken on the road network. To this end, it is strongly suggested that the developer contributes towards the ongoing maintenance of the road network associated with the various phases of the proposed developments.

With the approval of the relevant road authorities, the developer will have to provide a new entrance to the Jessa Wind Farm Cluster from the TR03305. The roads designer shall determine the best position for this entrance, taking into account all the relevant geometric constraints and safety aspects, including sighting and stopping distances.

It should be noted that it is not possible to determine the expected traffic volumes generated during the decommissioning phase. It can be assumed that these volumes will be lower than during the construction phase as much of the infrastructure will be retained by the landowners. As part of the decommissioning process, a separate traffic impact assessment should be undertaken since many of the characteristics related to the traffic impact assessment, i.e. access routes, road geometry, traffic volumes, etc., would have changed over the operational life of the development.

A range of management and mitigation strategies are identified for implementation during the construction and operation phases of the development to minimise traffic impacts, reduce community disruption and the risk of traffic incidents.

Thus, from a traffic and transportation perspective, there are no constraints or notable impacts that would jeopardise the implementation of this development.

2 PROJECT SPECIFICATIONS

A synopsis of the project specification for Jessa Wind Farm Cluster, as supplied by ESA, is provided in Table 1.

Table 1 - Synopsis of Project Specifications

Project Components Description	Specifications	Estimated Combined Footprint (ha)
<i>Project</i>	<i>Jessa Wind Farm Cluster – consisting of Jessa M Wind Farm, the Jessa S Wind Farm and the Jessa Z Wind Farm</i>	
<i>Location</i>	<i>The proposed development is approximately 15 km southwest of Beaufort West within the Central Karoo District Municipality in the Western Cape Province.</i>	
<i>Land Use</i>	<i>Land use of the proposed development and surrounding properties comprises low-density livestock farming (grazing).</i>	
<i>Number of turbines</i>	<i>The number of WTG for each WEF is as follows</i> <ul style="list-style-type: none"> <i>Jessa M WEF = up to 29 ;</i> <i>Jessa S WEF = up to 28 and</i> <i>Jessa Z WEF = up to 35</i> 	
<i>Capacity of the facility</i>	<i>The maximum export capacity (MW) for each WEF is as follows:</i> <ul style="list-style-type: none"> <i>Jessa M WEF: 220MW</i> <i>Jessa Z WEF: 220MW</i> <i>Jessa S WEF: 203.5MW</i> 	
<i>Turbine hub height</i>	<i>The expected hub height will be in the order of 200m for all three WEFs</i>	
<i>Turbine rotor diameter</i>	<i>The rotor diameter for all three WEFs is up to 200m</i>	
<i>Tower-type</i>	<i>Steel or concrete towers (or hybrid) can be utilised at the site. Alternatively, the towers can be of a hybrid nature, comprising concrete towers with top steel sections</i>	
<i>Foundation</i>	<i>Approximately 25m diameter x 3m deep. However, these dimensions may be larger as required by the geotechnical conditions, which are still to be confirmed</i>	
<i>Hard stand/s</i>	<i>Comprising blade storage area, rotor hub laydown area as well as other turbine materials/component laydown areas and crane pad for primary and assistance crane (as required).</i>	<i>60 ha</i>
<i>Operations and Maintenance (O&M) building footprint:</i>	<i>Each WEF will include O&M buildings, to be located in close proximity to each project onsite substation. The total combined area of the buildings will not exceed 5000m².</i>	<i>0.5 ha</i>
<i>Construction camp laydown</i>	<i>Each WEF will include a construction camp with alternative locations for each project. Typical area: 100m x 50m = 5000m². The camps will use portable toilets and septic tanks during the</i>	

Project Components Description	Specifications	Estimated Combined Footprint (ha)
	construction phase.	
Cables	The medium voltage collector system will comprise cables that run underground, except where a technical assessment suggests that overhead lines are required.	
Temporary laydown or staging area	Each WEF will include a laydown area. Approximately 22000m ² . Laydown area could increase to 30000m ² for concrete towers, should they be required. Possible concrete batching plant at each WEF.	
Cement batching plant (temporary)	A temporary cement batching plant will be placed on site during the construction phase Course and fine aggregate will be stored in separate storage areas whilst the cement will be contained in a silo	
On-site substation	Each WEF will have an onsite substation of 33/132kV, including a transformer. Palisade fencing of 3m height will be placed around the substation complex encompassing the onsite buildings, as per Eskom's specifications.	3 ha
Masts (if applicable)	The overall project site has existing MET masts.	
Boreholes and storage tanks (if applicable)	The use of onsite boreholes, as far as technically possible, if water quality standards are met. To be decided upon with the landowner. Storage tanks Other water source alternatives will be considered, including water supply from the local Municipality or bulk water supplier in the region Temporary water containment tanks (i.e., Jojo tanks) may be used during the construction phase for water supply, whilst permanent tanks may be placed above the O&M buildings	
BESS	It is proposed that Lithium Battery Technologies (such as Lithium-Ion Phosphate and Lithium Nickel Manganese Cobalt oxides) or Vanadium Redox flow technologies will be considered as the preferred battery technology. The specific technology will however be determined when the contractor is appointed. The systems will have capacities of up to 200MW/800MWh.	10 ha
Procurement and employment (construction phase)	The construction phase of each of the WEF will take approximately 24 months to complete. Each WEF is likely to create employment opportunities for approximately 250 individuals. These employment opportunities will be temporary and will use local labour where possible. Employment opportunities generated during the construction phase will include low skilled, semi-skilled, and skilled options.	
Procurement and employment (operational phase)	The operational phase of each WEF will be in the order of 25 years The operation phase will create up to 40 full-time employment positions which will include low-skilled, semi-skilled and skilled personnel. Employees that can be sourced from the local municipal area include the less skilled and semi-skilled personnel (such as safety and security staff and certain maintenance crew). Highly skilled personnel may need to be recruited from outside the local area where these resources are not available within the area.	
Operation and Maintenance	Full time security, maintenance, and control room staff. All turbines will be operational except under circumstances of mechanical breakdown, inclement weather conditions, curtailment requirements or maintenance activities. Wind turbines to be subject to periodic maintenance and inspection. Areas that were disturbed during the construction phase to be utilised should a laydown area be required during operation.	

3 ABBREVIATIONS

The following abbreviations apply to this document.

Table 2 - List of Abbreviations

Abbreviation	Meaning
AADT	Average Annual Daily Traffic
ADT	Average Daily Traffic
BESS	Battery Energy Storage System
DEA	Department of Environmental Affairs
EIA	Environmental Impact Assessment
EPCM	Engineering, Procurement, Construction and Management
ESA	ENERTRAG South Africa (Pty) Ltd
IAP	Interested and Affected Parties
km/h	Kilometre per hour
LOS	Level of Service
MW	Megawatt
NEMA	National Environmental Management Act
O&M	Operation and Maintenance
PDP	Professional Driving Permit
RCAM	Road Classification Assit Management system
RNIS	Road Network Information System
SANRAL	South African National Roads Agency SOC Ltd
TMP	Traffic Management Plan
vph	Vehicle per hour
v/km	Vehicle per kilometre
WEF	Wind Energy Facility
WTG	Wind Turbine Generator

4 GLOSSARY

The following definitions apply to these words.

Table 3 - Definitions

Word/Phrase	Definitions
Average Annual Daily Traffic	An Average Annual Daily Traffic is the total traffic volume (in both directions) generated in a year, including school and public holidays and weekends, divided by the number of days in the year.
Average Daily Traffic	An Average Daily Traffic is the total traffic (in both directions) generated in a twenty-four-hour period on a typical working weekday.
Diurnal	Diurnal means happening or active during the daytime.
Follower density	Follower density is defined as the number of vehicles per kilometre per lane
Level of Service	The level of service in this document is based on the follower density and expressed as LOS A to LOS F.
Peak Traffic	traffic at the time it is most busy.
Traffic Volume	Traffic Volume is the number of vehicles passing a specific point in a given time, expressed in vehicles per hour.
Trip	A Trip is defined as a single (one-directional) movement of vehicles, with either the destination or the origin at the proposed development.

5 INTRODUCTION

5.1 TERMS OF REFERENCE

ESA appointed Mr A. Schwarz, to provide a Traffic Impact Assessment (TIA) for the proposed development within the Central Karoo Municipality District of the Western Cape. The properties on which the Jessa Wind Farm Cluster is to be developed, together with the adjacent properties, are shown in Figure 1.

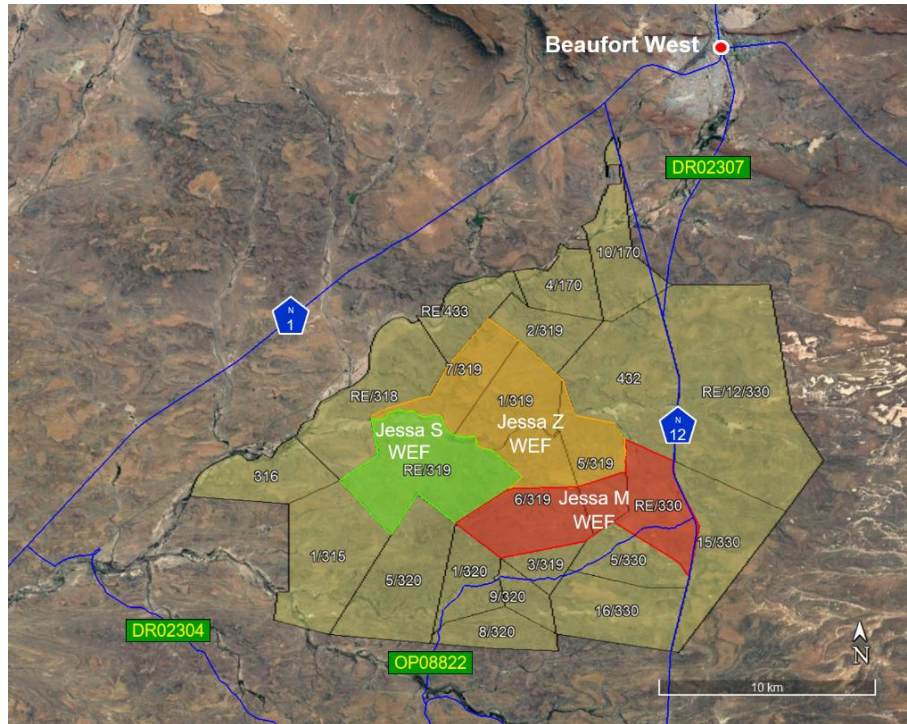


Figure 1 - Jessa Wind Farm Project

This Traffic Impact Assessment forms an integral part of the supporting documentation required for the Environmental Impact Assessment application to the Department of Forestry, Fisheries and the Environment (DFFE).

5.2 SCOPE AND OBJECTIVES

5.2.1 Scope

ESA propose developing three wind energy facilities, as shown in Figure 1. Each of the proposed developments shall consist of a number Wind Turbine Generator units, which will be selected from the current potential turbine locations identified.

The scope of this report includes, inter alia:

- Identify the potential road network that could be affected by the proposed development;
- Determine a traffic baseline against which the potential traffic impacts are to be measured;
- Identify potential impacts and cumulative impacts that may occur during the construction, operational and decommissioning phases of the proposed development;
- Determine mitigation and/or management measures which could be implemented, to, as far as possible, reduce the effect of negative impacts; and
- Incorporate and address all issues and concerns raised by Interested and Affected Parties (if and when applicable).

5.2.2 Objectives

This report aims to determine the potential traffic impact the proposed development will have on the existing road network.

5.3 LEGISLATION AND PERMIT REQUIREMENTS

The overarching environmental legislation for managing the environment in South Africa is the National Environmental Management Act, 1998 (Act 107 of 1998 “NEMA”). Its preamble states that sustainable development requires the integration of social, economic and environmental factors in the planning, implementation and evaluation of environmental decisions to ensure that the development serves present and future generations.

The DFFE Screening Tool and Report that was generated for the site (as per Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended) concluded that based on the selected classification of activity along with the environmental sensitivities of the proposed development footprint, a traffic impact assessment is identified for inclusion in the assessment report.

5.3.1 Roads

The relevant legislation associated with the road (infrastructure), transportation and traffic include, inter alia:

- *National Water Act (Act 36 of 1998), with regards to all crossings of watercourses;*
- *National Road Traffic Act (Act 93 of 1996);*
- *Advertising on Road and Ribbon Development Act (Act 21 of 1940):*
 - *Regulates the display of advertisements outside some urban regions at places visible from public roads, and the depositing or leaving of disused machinery or refuse and the erection, construction or laying of structures and other things near certain public roads, and the access to certain land from such roads;*
 - *Section 9: Prohibition of the erection of structures near-certain roads;*
 - *Section 9A: Prohibition of the erection of structures or construction of other things near intersections of certain roads;*
 - *Section 10: Restriction of access to land through a fence, etc., along certain roads.*
- *Roads Ordinance Number 19 of 1976:*
 - *Consolidate and amend the law relating to public roads and public paths and to provide for matters incidental thereto;*
 - *Section 13: Erection of gates across public roads and public paths;*
 - *Section 17: Erection of structures on or near public roads;*
 - *Section 18: Access to and exit from certain public roads and public paths.*

5.3.2 Vehicle Dimensions

Regulations 221 to 230 of the National Road Traffic Act relates to vehicle dimensions, the most salient points are summarised below.

Regulation 221: Defines the legislation requirements regarding the overall length of vehicles, and is summarised as follows:

- *a rigid vehicle shall not exceed 12.5 m;*
- *articulated motor vehicle and semi-trailers shall not exceed 18.5 m;*

- other combinations of motor vehicles (including interlinks, multiple trailers, etc.) shall not exceed 22.0 m;

Regulation 223: Defines the legislation requirements regarding the overall width of vehicles with a gross mass of 12 000 kilograms or more, shall not exceed 2.6 m.

Regulation 224: Define the legislative requirements regarding the overall height of a vehicle and transported load, which shall not exceed 4.3 m.

Regulation 225: Defines the legislation requirements regarding the maximum turning radius and wheelbase, which shall not exceed 13.1 m or 10.0 m (for a semi-trailer), respectively.

5.3.3 Vehicle Loads

Regulations 231 to 249 of the National Road Traffic Act relates to vehicles loads. The most salient points are summarised below.

Regulation 240: Defines the legislation requirements regarding the mass load carrying capacity on roads. The most relevant points are summarised below:

- The mass load of a wheel fitted to a steering axle shall not exceed 3 850 kg, and others shall not exceed 4 000 kg;
- The mass load of an axle fitted with two wheels, which is the steering axle, shall not exceed 7 700 kg, others shall not exceed 8 000 kg;
- The mass load of an axle fitted with four wheels shall not exceed 9 000 kg;
- The mass load of an axle unit, which consists of two axles, each of which are fitted with two wheels, acting as a steering axle unit shall not exceed 15 400 kg, and other axle units shall not exceed 16 000 kg;
- The mass load of an axle unit, which consists of two axles, each of which are fitted with four wheels, shall not exceed 18 000 kg;
- The mass load of an axle unit, which consists of three or more axles, each of which are fitted with two wheels, acting as a steering axle unit shall not exceed 23 100 kg, and other axle units shall not exceed 24 000 kg;
- The mass load of an axle unit, which consists of three or more axles, each of which are fitted with four wheels, shall not exceed 24 000 kg;
- The axle mass load of an axle unit consists of two axles, one of which is a drive axle with four wheels and the other is an axle with two wheels, the sum of the two axles shall not exceed 18 200 kg.

Regulation 241: Defines the legislation requirements regarding the mass load-carrying capacity of bridges.

5.3.4 Abnormal Loads

The National Road Traffic Act (Act 93 of 1996) and the National Road Traffic Regulations (2000) prescribe certain limitations on vehicle dimensions and axle and vehicle masses that a vehicle using a public road must comply with. Where the prescribed limits are exceeded, these loads are classified as abnormal loads. Provision for such abnormal vehicles and loads are made in Section 81 of the National Road Traffic, as substituted by Section 23 of the National Road Traffic Amendment Act (Act 64 of 2008).

The requirements and procedures for transporting abnormal loads are contained in the following two documents:

- “TRH 11 - Dimensional and Mass Limitations and Other Requirements for Abnormal Load Vehicles”; and

- “Administrative Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads”.

5.4 METHODOLOGY

The South African Traffic Impact and Site Traffic Assessment Standards (2014), and the Manual for Traffic Impact Studies (1995), form the basis for this traffic impact assessment.

The methodology adopted in the compilation of this report includes, inter alia:

- *Identify the road network which will be used by vehicles associated with the proposed development and other developments in the area;*
- *Establish the number of vehicle trips generated during the construction, operation and decommissioning of the proposed development;*
- *Determine the mode of transport, vehicle type and size for each trip or category of trip generated during the construction, operational and decommissioning of the proposed development;*
- *Establish peak-hour vehicle trip rate generated during the construction, operation and decommissioning of the proposed development;*
- *Identify and assess the significance and severity of development-related traffic on the existing road network. Where possible comparing the existing traffic volumes on the roads with the traffic generated by the proposed development;*
- *Propose practical measures to mitigate the impacts of development-related traffic on the existing road network.*

5.5 ASSUMPTIONS

The compiling of this report is based on the following assumptions:

- *ESA propose developing three separate Wind Farms in the Central Karoo Municipality District of the Western Cape. The cumulative impact shall assume that all three Wind Farms are constructed, operated and decommissioned simultaneously, together with any other projects in the area with valid Environmental Authorisation;*
- *A project duration of 24 months is expected and used to calculate traffic volumes.*
- *A workforce complement for each Wind Farm during the peak construction phase is assumed to be in the order of 250 individuals, comprising of approximately 90% low-skilled and semi-skilled individuals and 10% highly skilled individuals.*
- *A workforce complement for each Wind Farm during the operational phase is assumed to be in the order of 40 individuals, comprising approximately 80% low-skilled and semi-skilled individuals and 20% highly skilled individuals.*
- *No accommodation is to be provided on the proposed development;*
- *The construction staff is drawn from the entire area, not just one specific town. The distribution of personnel is based on the working population within a defined radius of the proposed development, as delineated in the document.*
- *Although most of the WTG components are imported into South Africa via one of the South African ports, some of the WTG components could be fabricated and transported to the proposed development from other centres within South Africa;*
- *The majority of the transportation will be via the N1, as the Meiringspoort Pass on the N12 to the South poses significant challenges for heavily loaded*

vehicles and is not a predominant traffic corridor from the larger commercial centres in South Africa;

- Construction equipment and materials (other than aggregates) for this development will be transported to site from various centres within South Africa;
- The supply of raw material for the manufacture of concrete and road construction, as a worst-case scenario, will be sourced from commercial sources outside the development area;
- A single batching plant will be provided for each of the developments. This is based on the assumption that each of the three developments will be a separate entity, each constructed by different contractors. However, it is more probable that a single contractor will be appointed for all three Wind Farms. In which case, a single batching plant might be provided for all WTG foundations;
- A single access point shall be provided from the TR03305 for the Jessa Wind Farm Cluster. However, the final position of this point is still to be finalised.

5.6 LIMITATIONS

This report excludes:

- Transport Management Plan for the proposed development;
- Site Development Plan of the infrastructure within the site boundary that does not affect the public road network;
- The geometric details of intersections and entrances onto the site from the public road network, as this will be finalised during the detailed design phase, which will require approval from the relevant roads' authorities;
- Assessment of risks and impacts associated with loading or off-loading of the vehicles at the site or associated facilities are not addressed since these will be addressed in the Standard Operating Procedures developed by the Engineering, Procurement, Construction and Management (EPCM) contractor for the construction and decommissioning of the development;
- Finalisation of the transportation route for the WTG components as this will be the responsibility of the logistics company appointed once the preferred turbine generator has been selected.

5.7 SOURCE OF INFORMATION

Information used in compiling this report was drawn from the following sources:

- Manual for Traffic Impact Studies, Department of Transport, RR 93/635, 1995;
- TMH 16, Volume 1 - South African Traffic Impact and Site Traffic Assessment Manual, COTO 2012;
- TMH 16, Volume 2 - South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual, COTO 2014;
- TMH 17 - The South African Trip Data Manual, COTO 2012;
- TRH 4 - Structural Design of Flexible Pavement for Interurban and Rural Roads, 1996;
- TRH 26 - South African Road Classification and Access Management Manual, 2012;
- All information relating to the roads within the Western Cape were obtained from the Western Cape Government Road Network Information System (https://rnis.westerncape.gov.za/rnis/rnis_web_reports.main.null);
- All information relating to traffic volumes on the roads within the Western Cape where obtained from the Western Cape Government Road Network Information System (https://rnis.westerncape.gov.za/rnis/rnis_web_reports.main.null);

- The number of households was obtained from the Department of Statistics South Africa (http://www.statssa.gov.za/?page_id=964);
- Information regarding mountain passes was obtained from Mountain Passes of South Africa (<https://mountainpassessouthafrica.co.za/>);
- Distance and estimated travelling times were obtained using Google Maps;
- Satellite imagery of the site available on Google Earth was also used for evaluation;
- The author took most of the photographs used in this report during the site visit.

6 DESCRIPTION OF THE AFFECTED ENVIRONMENT

6.1 ROAD NETWORK

The existing road network adjacent to the proposed development is well established. Consisting of a combination of national roads and first, second and third-order roads, it provides the proposed development accessibility to local towns and the major commercial centres within South Africa.

The road network immediately adjacent to the proposed development, which could be used to access the proposed development, are shown in Figure 2.

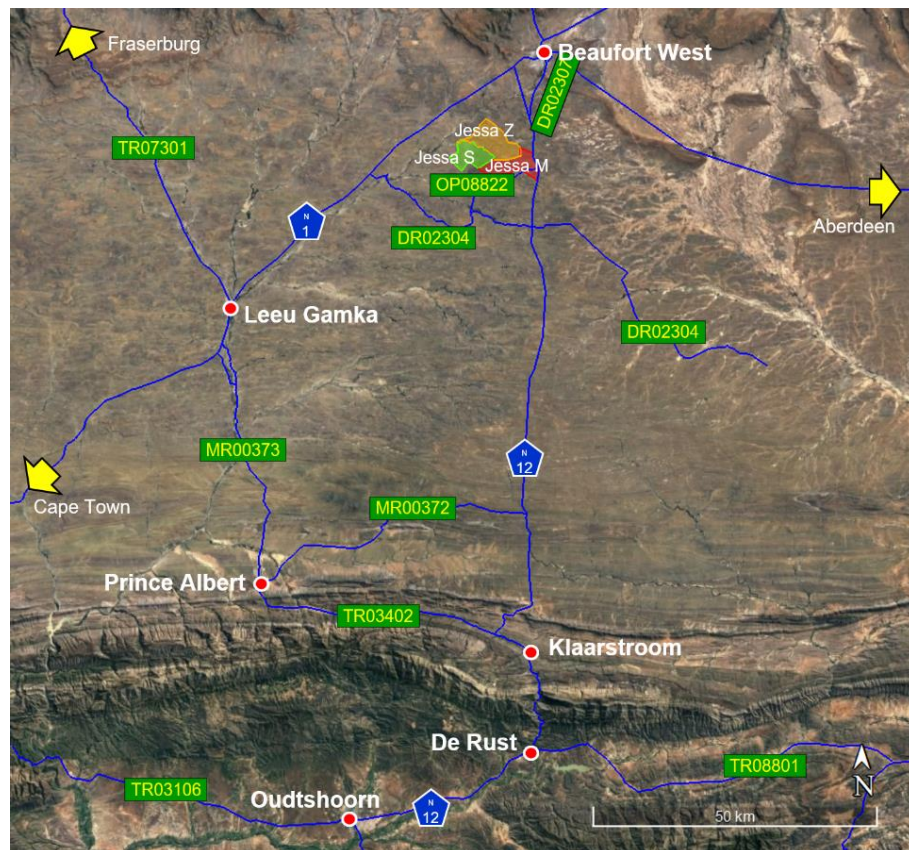


Figure 2 - Road Network

Not all of these roads will be utilised to access the proposed development. The most relevant roads to the proposed development used in this report are N1, N12, DR02307 and MR00372. The other roads, i.e. DR02304 and OP08822, have not been included in the transportation routes for reasons delineated below.

6.1.1 National Roads - N1 (NR00107)

The N1 is a Principal Arterial providing high mobility between provinces, regions and towns, and falls under the jurisdiction of the South African National Road

Agency. The N1 starts at the M6 (western Boulevard) in Cape Town and ends at Beit Bridge Border Post at the Zimbabwe border, passing through or bypassing many towns on route. The N1 and N12 merge approximately seven kilometres west of Beaufort West before splitting again at Three Sisters.

The N1 is a Class 1 road, generally consisting of a single paved carriageway, with one lane in each direction and paved shoulders, as shown in Figure 3. Climbing lanes are provided along various sections of the road, and turning lanes are provided at major intersections. In many cases, the shoulder is wide enough to allow yellow-line driving. The road is in good condition with a speed limit of 120 km/h.



Figure 3 - N1 (West of TR03305)

6.1.2 Trunk Road - N12 (TR03305)

The N1 is a Primary Arterial providing high mobility between provinces, regions and towns, and falls under the jurisdiction of the South African National Road Agency. The N12 starts at the N2/N9 (Kraaibosch Interchange) approximately 5 km south of George and ends at eMalahleni, passing through or bypassing many towns on-route. The N1 and N12 merge approximately seven kilometres west of Beaufort West, before splitting again at Three Sisters.

This Class 2 road generally consists of a single paved carriageway, with one lane in each direction and a combination of paved and gravel shoulders, as shown in Figure 4. The road is in good condition with a speed limit of 120 km/h.



Figure 4 - N12 (South of NR001)

Approximately 110 km south of the N1/N12 intersection is the “Droëkloof” pass, and a further 20 km is the “Meiringspoort” pass. The “Meiringspoort” pass is in superb condition and offers typically gentle poort gradients, but the 63 bends, corners, and curves require a high concentration level. It's easy to become mesmerised by the mind-boggling scenery. Hence, drivers need to remain focused and understand that the lack of safety shoulders and the large volume of heavy trucks means a certain level of danger is always present.

6.1.3 Divisional Roads

DR02304

The DR02307 is an Access Collector providing access between towns and other roads. The DR02304, is 97.09 km long, and starts at the NR001/7 (N1), as shown in Figure 5.



Figure 5 - DR02304 at NR001/7

At approximately 4 km, there is a level crossing, where the road crosses over the Trans-Karoo railway. Along this road there are a significant number of low level drifts, which are impassable during heavy downpours.

At 26.64 km, there is an at grade junction to the left with OP08822, at 38.85 km, the road crosses the TR03305, as shown in Figure 6, and ends at the Provincial boulder into the Eastern Cape.



Figure 6 - DR02304 at TR03305

The maintenance and management of this portion of the road falls under the jurisdiction of the Western Cape Provincial Roads Department.

According to the Western Cape Road Information System, this road is designed to be a Functional Class 4, with an RCAM classification of R4c. The gravel road is 6 m wide, situated in a 20 m wide servitude.

Due to the intrinsic dangers along this road, including the level crossing and the low-level drifts, this road is considered a high risk and as such this road has not been considered a feasible access route to the proposed developments. Users of this road should be cautioned against using it to access the proposed developments.

DR02307

The DR02307 is an Access Collector providing access between towns and other roads. The road is paved with gravel shoulders and is 18.2 km long. It starts at the TR03305 (N12), as shown in Figure 7, and ends in Beaufort West.



Figure 7 - DR02307 at TR03305

The maintenance and management of the first 10.0 km of this road falls under the jurisdiction of the Western Cape Provincial Roads Department, and the balance of the road falls under the jurisdiction of the Beaufort West Municipality.

According to the Western Cape Road Information System, this road is designed to be a Functional Class 4, with an RCAM classification of R4c. The road is situated in a 20 m wide servitude, with an 8.5 m wide gravel surface.

6.1.4 Main Roads

MR00372

The MR00372 is a Residential Access Collector providing access between towns and other roads. This is a gravel road that connects Prince Albert to the TR03305, and is 55.3 km long.

The maintenance and management of this road falls under the jurisdiction of the Western Cape Provincial Roads Department.

According to the Western Cape Road Information System, this road is designed to be a Functional Class 3, with an RCAM classification of R4a. The road is situated in a 20 m wide servitude, with a 7 m wide gravel surface.

The road is assumed to provide access to the proposed development from Prince Albert.

6.1.5 Minor Roads

OP08822

The OP08822 is a Local Access Collector providing access between other roads. The road is 17.68 km long. It starts at the TR03305 (N12), as shown in Figure 8, and ends the junction with DR02304. It is clear from the image provided that this road is not accessible from the TR03305 and does not appear to have been used in many years.



Figure 8 - OP08822 on TR03305

The maintenance and management of this road falls under the jurisdiction of the Western Cape Provincial Roads Department.

According to the Western Cape Road Information System, this road is designed to be a Functional Class 5. The gravel road is 6 m wide, situated in a 20 m wide servitude.

According to correspondence received from Mr Andrew Raath (Control Engineering Technician, Road Planning: Proclamation and Road Use, Transport and Public Works, WESTERN CAPE GOVERNMENT), there could be closed gate/s along a proclaimed Minor Road (in this case 8822), as long as these gates are not locked for the public to use. The gates are often closed (but not locked) to keep the farmer's stock in a particular area and or prevent them from escaping as such. One would normally drive up to the gate, open it, drive through, stop on the other side of said gate, and close the gate again. Similar on their return trip.

If the developer intends using this as an access road, the developer will have to engage with the interested and affected land owners in this area, regarding the development of this road.

6.2 SITE ACCESS

All three proposed developments are envisaged to be constructed to the west of TR03305 (N12), as shown in Figure 9.

There are only two existing access points to the proposed development from the TR03305.

- The one is the entrance to OP08822, as shown in Figure 8. The sighting distance to the north is reasonable. However, the same can not be said for the sighting distance to the south.
- The other existing entrance to the proposed development from the TR03305 is at chainage 62.6 km. It appears that this is an Eskom servitude for a current power line. The entrance is located on a curve which compromises the sighting distances in both directions. It is not recommended that this access point be considered as possible access to the proposed developments.

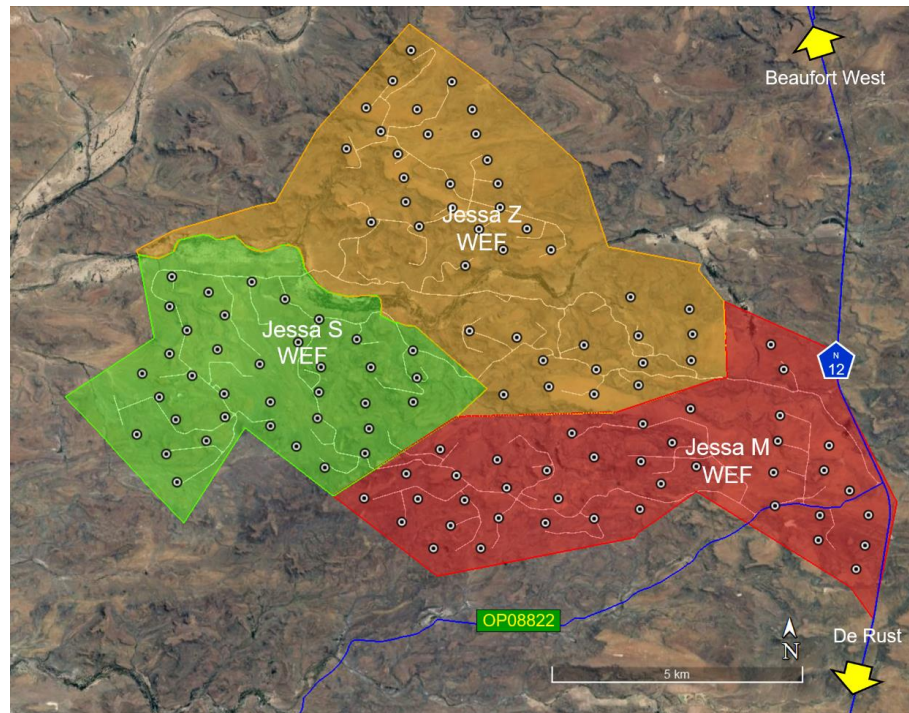


Figure 9 - Potential WTG Layout

The proposed internal road network and the access points onto the public road OP08822 for the three proposed developments are shown in Figure 9. However, since access on the OP08822 was not possible the proposed access points on to the proposed development could not be visually assessed.

6.3 TRANSPORTATION ROUTES

6.3.1 Commuter Routes

The towns in this part of the country are few and far apart. The closest town to the proposed development is Beaufort West, approximately 30 km on surfaced roads. All the other towns in the area are more than 75 km away.

The distance to the surrounding towns and the estimated travelling time, together with the “working age” population in the adjacent towns, are shown in table 5.

Table 4 - Surrounding Towns

Town	Travel Distance*	Estimated Travel Time**	Population
Beaufort West (via N1)	± 26.4 km	17 min	21 608
Beaufort West (via DR)	± 22.7 km	19 min	
De Rust & Klaarstroom	± 120 km	1 hour 16 min	2 554
Leeu Gamka (via N1)	± 88 km	51 min	1 679

Leeu Gamka (via DR)	± 85.8 km	1 hour 10 min	4 452
Prince Albert (via N1)	± 143 km	1 hour 49min	
Prince Albert (via N12)	± 120 km	1 hour 37 min	

* Distance from the Access Point on N12 to the main intersection in the Town

** Obtained from Garmin Software

In light of the current economic situation in the country and REIPPPP requirements, it is assumed that the workforce will be drawn from surrounding communities. The proportions are based on a 'working-age' population, which have been modified by a 'weighted factor'. The 'weighted factor' is calculated based on the distance travelled to the proposed development from the relevant towns. The expected proportion of the workforce from the surrounding communities is depicted in Table 5.

Table 5 - Proportion

Town	Proportion (%)
Beaufort West	± 92%
De Rust & Klaarstroom	± 2%
Leeu Gamka	± 2%
Prince Albert	± 4%

There are two routes to the proposed development from Beaufort West, one is via the N1, and the other is via DR02307. It is more likely that the DR02307 will be used by light vehicles, while the larger vehicles will use the N1. Thus, for this report's purpose, it has been assumed that 58% of the traffic commuting to the proposed development will use the DR02307, and the remaining 42% will use the N1.

The workforce commuting to the proposed development from De Rust and Klaarstroom will be via the TR03305 (N12).

There are two routes to the proposed development from Leeu Gamka, the longer but quickest is via the N1, while the shorter route is via the DR02304. The route via the N1 is surfaced, while the route via the DR02304 is a gravel road that passes over a level crossing and through many drifts. Thus, from a safety aspect, the route via the DR02304 has not been considered a viable commuting route to the proposed development, due to the potential risks.

There are various routes to the proposed development from Prince Albert, the longest one is via the N1, and the shorter route is via MR00372. For this report, the shorter route has been selected as the most viable option.

Thus, personnel commuting to and from the proposed development from Beaufort West and Leeu Gamka will be on the TR03305 to the North, while personnel from De Rust, Klaarstroom and Prince Albert will commute on the TR03305 to the South.

6.3.2 Freight Routes

Container Terminals

Transnet Port Terminals is a division of Transnet SOC Limited, South Africa's state-owned freight transport company, which owns and operates the terminal at several Ports in South African. Operations are divided into the major market sectors: containers, bulk, breakbulk, and automotive, organised into three geographical regions – Eastern Cape, Western Cape, and Kwa-Zulu Natal.

The port of entry into South Africa for all import WTG components is limited to Ngqura (located close to Gqeberha) or Saldanha Terminals. The possible routes from these terminals to the proposed developments are shown in Figure 10.

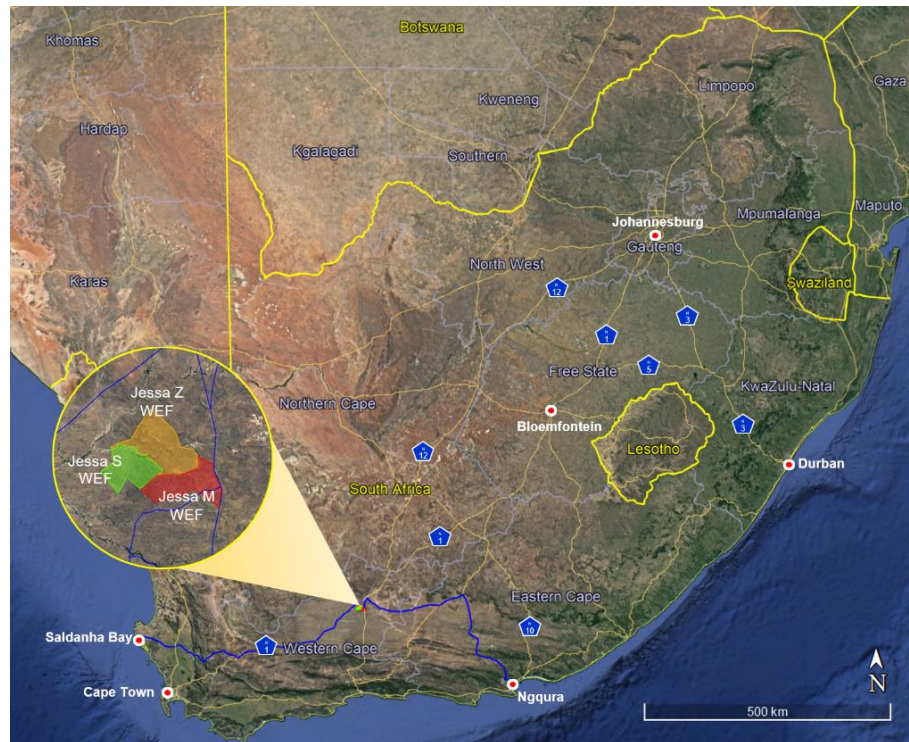


Figure 10 - Terminals

The potential transportation routes from the various Port Terminals in South Africa, with the capability to import wind turbine components, to the proposed development, are detailed in Table 6.

Table 6 - Distance - Port Terminals

Container Terminals	Distance
Ngqura	473 km
Saldanha	531 km

The closest terminal to the proposed developments is the Ngqura Port Terminal (close to Gqeberha) based on the information provided above.

However, the length and weight of the various WTG components will only be available once the turbine supplier has been appointed. There is a strong possibility that the length of the blades for the WTG units could exceed 95 m.

Each of the proposed transportation routes has challenges that the logistics company appointed will need to address. In some cases, the challenges can be easily overcome, and for others, alternative routes will have to be considered.

The geometric design and gradient of the Meiringspoort Pass on the TR03305 (N12) could pose constraints that would inhibit the use of this road for transportation of the WTG components to the proposed development with the current transportation equipment available in South Africa.

Commercial Centres

The most likely transportation routes for domestically supplied and manufactured components from the major commercial centres to the proposed developments are either Cape Town or Johannesburg (or any supplier along these routes), as shown in Figure 11.

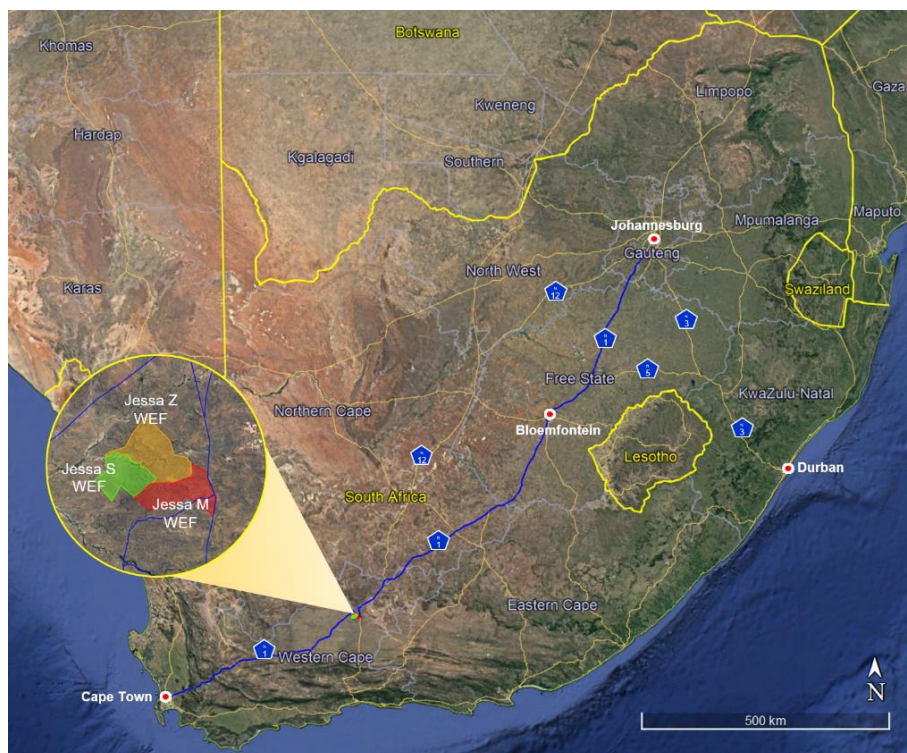


Figure 11 - Commercial Centres

The distances from the proposed developments to the major commercial centres in South Africa are shown in Table 7.

Table 7 - Distance - Major Commercial Centres

Commercial Centres	Distance
Cape Town	471 km
Johannesburg	969 km

The closest major commercial centre to the proposed developments is located in the Cape Town area. However, some components will have to be transported from the Johannesburg area.

Route Distribution

The envisaged distribution of the freight routes on the public road network adjacent to the proposed development is provided in Table 8.

Table 8 - Route Distribution

Commercial Centres	Distribution (%)
Cape Town (via N1)	± 35%
Johannesburg (via N1)	± 55%
Johannesburg (via DR02307)	± 5%
Garden Route (N12)	± 5%

6.4 RENEWABLE DEVELOPMENTS

All renewable energy developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed developments, as provided by the South African Renewable Energy EIA Application Database (REEA), are listed in Table 9.

Table 9 - Proposed Developments

No	EIA Reference No	Classification	Status of application
1	12/12/20/1784	Wind	Approved
2	12/12/20/2133/AM5	Solar PV	Approved
3	12/12/20/2286/AM4	Solar PV	Approved
4	14/12/16/3/3/2/772	Solar PV	Approved
5	14/12/16/3/3/2/773	Solar PV	Approved
6	14/12/16/3/3/2/774	Solar PV	Approved

The relation of the renewable energy developments listed in Table 7 to the proposed ESA developments is depicted in Figure 12.

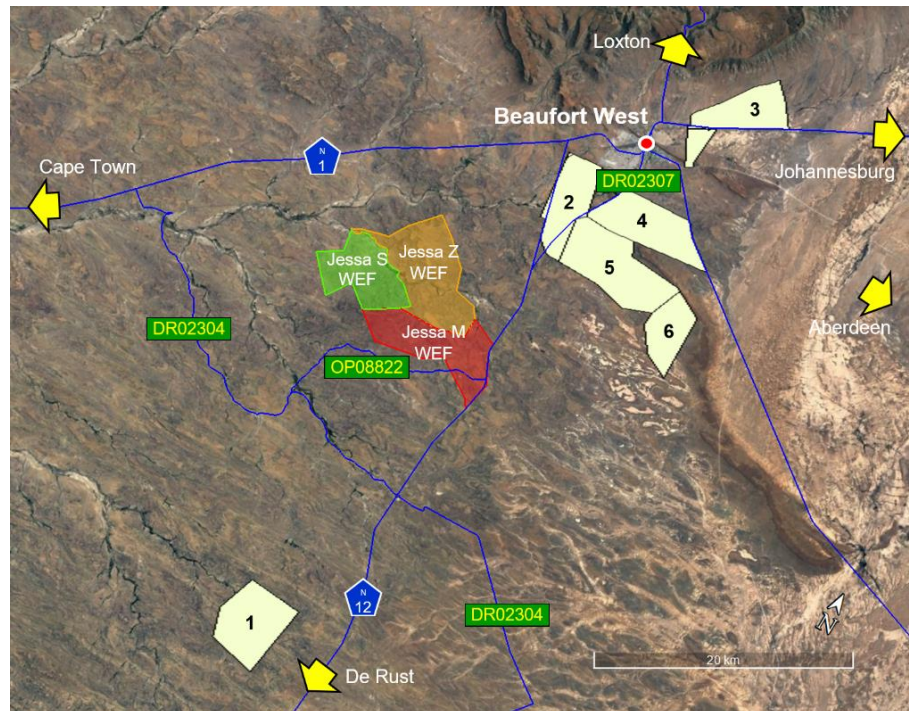


Figure 12 - Proposed Renewable Energy Facilities

The author was unable to obtain the name and details of the other proposed developments. Since development 12/12/20/1784 is of significant importance to the cumulative effect, this development will be referred to as 'Wind Farm X'. However, based on information provided by SLR Consulting, it is unlikely that this development will reach financial closure.

7 TRAFFIC VOLUMES

The South African Trip Data Manual (TMH 17), as provided by COTO, does not make provision for expected trip generation for the construction, operation and decommissioning phases of a wind farm. Thus, the traffic trip generation for the construction, operation and decommissioning phases used in this document is based on data obtained for similar projects. The estimated traffic generation detailed below represents a worst-case scenario.

7.1 STATUS QUO

The current traffic volumes on the road network are based on information extracted from the Western Cape Road Information System. The data is obtained from counting stations and strip charts

7.1.1 Counting Stations

The Western Cape Road Information System provides counting stations at various intersections on the roads network adjacent to the proposed developments, these are shown in Figure 13.

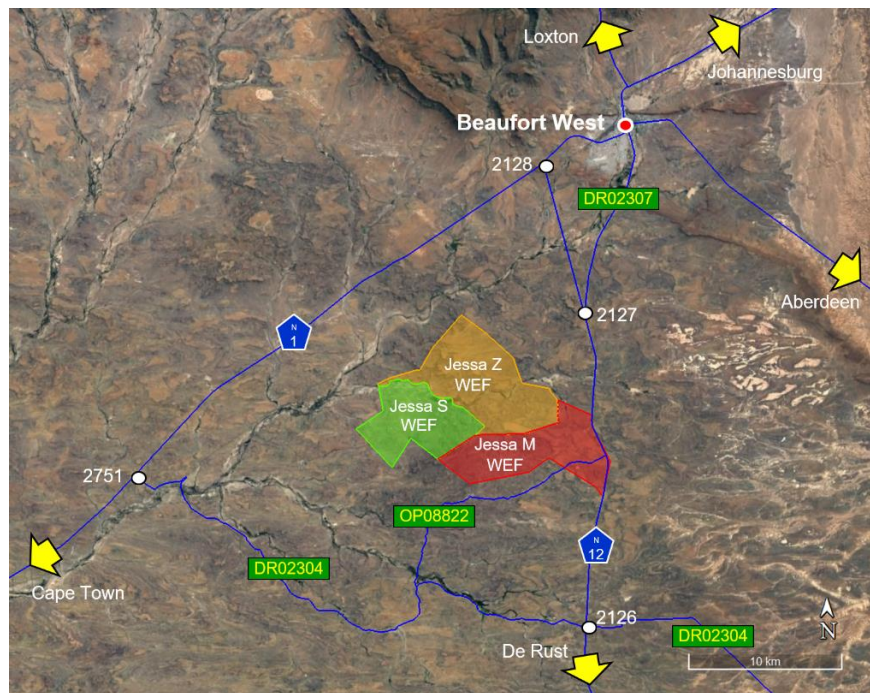


Figure 13 - Counting Station

7.1.2 Baseline Traffic Volumes

The baseline traffic volumes for the road network adjacent to the proposed developments are based on the AADT values obtained from the various counting stations. The values used are the average values between intersections, which have been adjusted by a growth factor relevant to the road. The adjusted AADT values used in this assessment are provided in Figure 14.

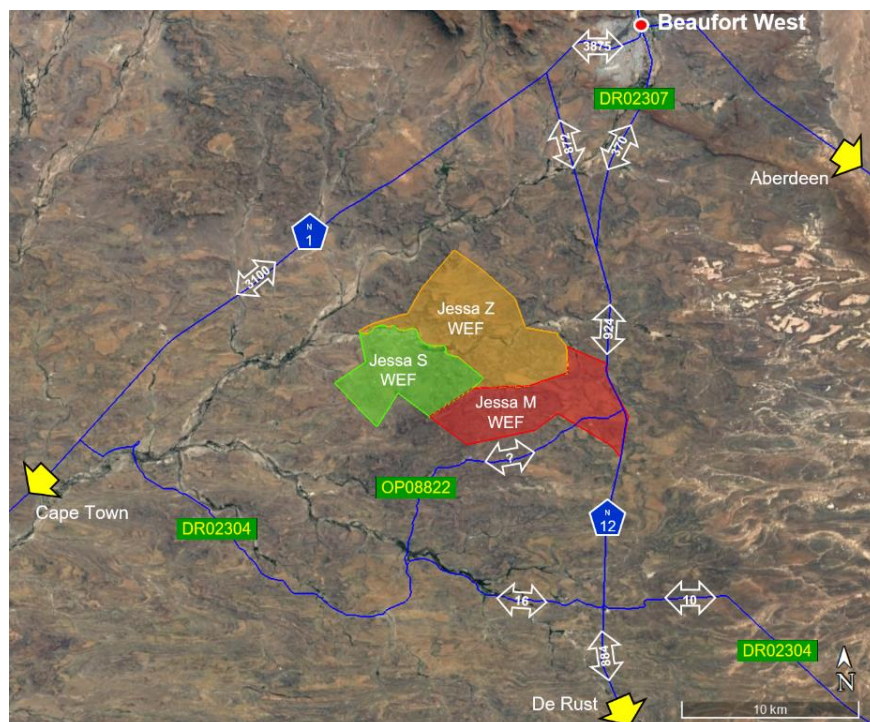


Figure 14 - Baseline AADT

7.2 ROAD NETWORK

The road network has been comprehensively delineated in section 6.1 above. The N1 and the TR03305 have been subdivided into shorter lengths for modelling and analysis purposes, as shown in Figure 15. Intersections indicated by yellow stars form the boundaries of the subdivisions. This Figure is the primary reference for the balance of this report.

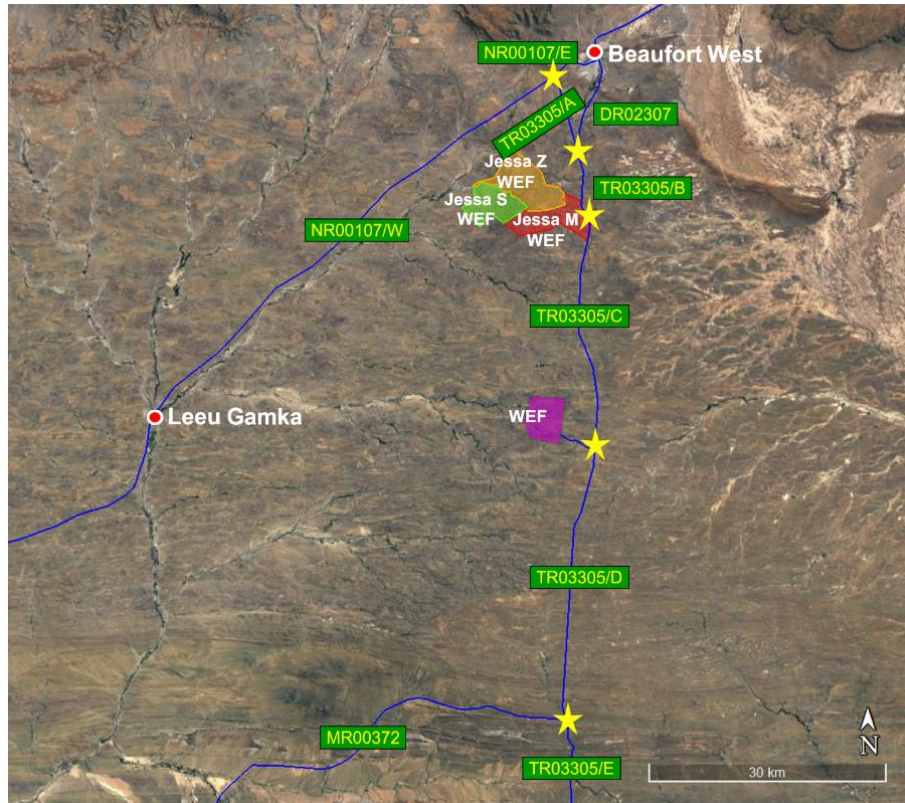


Figure 15 - Road Network - Subdivisions

7.3 CONSTRUCTION PHASE

The construction phase of the development will generate the most significant increase in traffic volumes on the local road network. Construction traffic will include vehicles transporting equipment, material and personnel. The trips will include the delivery of abnormal and oversized components such as rotor blades, tower sections, transformers and generators.

A construction period of 24 months is anticipated for this development. The construction activities and duration will vary according to the construction schedule.

The two most significant activities, that impact traffic volumes during the construction phase, are:

- The commuting of personnel, to and from the proposed development; and
- The delivery of equipment and material to the proposed development.

The simultaneous occurrence of these two activities is improbable.

The commuting of personnel to and from the proposed development are two different activities, one occurring at the beginning of the working day (constituting the morning peak) and the other occurring at the end of the working day (constituting the afternoon peak). These activities contribute to Peak Traffic. Traffic movement statistics have shown a noticeable difference between morning and afternoon traffic peaks. Although the same number of trips are generated during

these peaks, the morning peak is more concentrated, and the afternoon peak is spread over a longer period. Thus, for analysis purposes, the morning traffic shall be adopted for both morning and afternoon peaks to demonstrate a worst-case scenario.

The delivery of equipment and materials to the proposed developments is envisaged to occur during normal working hours throughout the day. No night deliveries are anticipated and are strongly discouraged. Given the distance from the origin of the material and components and the development, it is assumed that most deliveries will only start arriving at the proposed development an hour or two after work on site commences and will stop an hour or two before work on site concludes for the day. These activities contribute to Diurnal Traffic.

The envisaged timeframes for these activities, as adopted in this document, are:

- Morning Peak Traffic - between 6:30 to 7:30;
- Diurnal Traffic - between 7:30 to 16:30;
- Afternoon Peak Traffic - between 16:30 to 17:30.

7.3.1 Peak Traffic

It has been estimated that a total workforce complement of approximately 250 individuals will be required during the peak construction for each of the proposed developments, a total of 750 individuals for the cluster. Since no accommodation is provided on-site, the personnel will have to be accommodated in the surrounding towns and commute to the proposed development. As identified in section 6.3.1, all the personnel on the proposed development will be drawn from surrounding towns.

Based on the project specification for each of the proposed developments, the anticipated breakdown of the site personnel is as follows:

- Senior Staff, consisting of Construction managers, supervisors and other key staff, constitute 10% of the site personnel, equating to approximately 25 persons. It is assumed that senior staff will reside within the community and will commute to the site in pairs, using light vehicles. A fleet of 14 vehicles is envisaged.
- Workforce, consisting of semi-skilled and unskilled workers, will constitute 90% of the site personnel, equating to 225 persons. It is assumed that the workforce will reside within the community and will commute to the site using mini-buses and buses. A fleet of mini-buses and various sizes of buses are envisaged, equating to approximately 7 vehicles.

It is assumed that the transport vehicles will remain on-site during the workday.

The maximum traffic volumes on the road network during the Peak Traffic of the proposed development is depicted in Table 10.

Table 10 - Construction Phase - Peak Traffic

Road	Number of Vehicles
NR00107/W	6.00 vph
NR00107/E	24.00 vph
TR03305/A	30.00 vph
TR03305/B	51.00 vph
TR03305/C	12.00 vph
TR03305/D	12.00 vph
TR03305/E	6.00 vph
MR00372	6.00 vph

Road	Number of Vehicles
DR02307	21.00 vph
JESSA WEF	63.00 vph

Based on the information provided above, the maximum number of vehicles during the Peak Traffic is on the TR03305/B, which is in the order of 51 vph. However, the maximum number of vehicles on the main access to the proposed development will be in the order of 63 vph.

7.3.2 Diurnal Traffic

The construction phase of the proposed development consists of several activities, and some occur sequentially while others occur concurrently. Thus, not all the traffic volumes estimated in this document for the various activities are cumulative.

The construction phase activities, which will increase the traffic volumes include, inter alia:

- Site establishment: the initial activity of the development, the increase in traffic volumes resulting from this activity is not cumulative;
- Delivery of material and equipment to site: the traffic volumes resulting from these activities are cumulative and include the delivery of;
 - gravel for the construction of the roads, terraces, battery storage facility and substation platforms;
 - raw material (i.e. cement, sand, stone) for batching of concrete;
 - construction material (i.e. scaffolding, formwork, reinforcing steel, brick, roof sheeting, fencing, etc.);
 - construction vehicles and equipment (i.e. earthmoving equipment, batching plant, etc.)
 - substation components (i.e. steel gantries, transformers, switchgear, cables, circuit breakers, surge arresters, lightning conductor masts, etc.)
 - components for the battery storage facility (i.e. containers and equipment such as batteries, inverters, transformers, HVAC equipment, switchgear, etc.)
- Delivery of the WTG components are cumulative (i.e. tower sections, blades, nacelle, gearbox, generator, nose cone, hub, etc.). Due to the physical characteristics of most of these components, they will be transported as abnormal loads.

The diurnal traffic volumes for the proposed developments are based on the cumulative volumes generated by the following activities.

The various freight transportation routes to the proposed development have been addressed in Section 6.3.2 above, see Table 8.

The traffic volumes generated for each proposed development by the various construction activities are delineated below.

The information provided in this document is an informed estimate. Construction-related traffic may vary and be different from the information provided in this report due to the availability of contractors' resources and schedules.

Construction Equipment and Materials

Once the site has been established, the delivery of construction equipment and materials will commence. Equipment, such as tools, machinery, scaffolding, formwork, etc., will be delivered to the proposed developments at the

commencement of the construction and will be gradually removed from the proposed developments as construction draws to an end. Materials, such as reinforcing steel, brick, roof sheeting, fencing, transformers, switchgear, cables, etc., will be delivered to the proposed development as an ongoing activity. These deliveries will start increasing during the early stages of the construction phase, ramping up to maximum deliveries, before tapering off again close to the end of the construction phase

Various types of vehicles will be used to deliver the construction equipment and materials to the site. The increase in traffic volume for this activity is conservatively estimated to be in the order of eight return trips per day, which equates to approximately 2 vph.

Due to the size of the vehicles delivering the construction equipment and material, the most likely route for the majority of these deliveries to the proposed developments will be from the NR00107 via the TR03305/A & B.

Earthworks

The construction of the sub-station platforms, battery storage area, roads and hardstand platforms adjacent to the WTG units will be constructed from suitable gravels. To minimise the unnecessary importing of suitable material, cut and fill operations shall be adopted as far as possible for these elements. It is envisaged that material excavated from the WTG foundations will also be used to augment any potential shortfall of material required for the earthworks.

However, provision has been made to source approximately 115 000 m³ of suitable material from commercial quarries outside the study area. The gravel is assumed to be delivered to the proposed developments in 20 m³ articulated rear tippers, over a period of 24 months. The increase in traffic volume for this activity is estimated to be in the order of 10 return trips per day, which equates to 2.5 vph.

Due to the size of the vehicles delivering this material, the most likely route for the majority of these deliveries to the proposed developments will be from the NR00107 via the TR03305/A & B.

Raw Material – Concrete

It is estimated that approximately 66 500 m³ of concrete will be mixed and placed on the proposed development, over a period of 24 months. The majority will be for the WTG foundation and the balance for the sub-station and battery storage facility.

A single on-site batching plant will be installed that will mix the concrete for the proposed developments. The raw material for the concrete is to be delivered to the proposed development from commercial sources and includes 23 250 tonnes of cement, 40 000 m³ of sand, and 46 500 m³ of stone.

The cement is assumed to be delivered to the proposed development using pneumatic bulkers, with a 40 m³ tridem semi (payload 32 000 kg) and 15 m³ pup (payload of 10 000 kg), as shown in Figure 16.



Figure 16 - Bulk Cement Tanker and Pup

The aggregate is assumed to be delivered to the proposed development in 20 m³ articulated rear tippers.

The increase in traffic volume resulting from this activity is estimated to be in the order of ten return trips per day. Over an eight-hour day, this equates to 2.5 vph.

Due to the size of the vehicles delivering this material, the most likely route for the majority of these deliveries to the proposed developments will be from the NR00107 via the TR03305/A & B.

WTG Components

The type and number of WTG components to be transported to the proposed developments for each WTG are listed in Table 11.

Table 11 - Wind Turbine Components

Components	Size	Weight	Number
Nacell	13 x 4.3 x 4 m	± 120 000 kg	1
Baldes	90 m (length)	± 25 000 kg	3
Steel Tower Section	4.2 m Ø x 30 m (length)	± 51 500 kg	5
Hub/Nose Cone	20' ICC Container	± 40 000 kg	1
Cables & Controlles	40' IAA Container	max 32 500 kg	1
Generator	40' IAA Container	max 32 500 kg	1
Foundation Insert	4.7 m Ø x 2.5 m (length)	± 27 500 kg	1
Sundaries	40' IAA Container	max 32 500 kg	1

Approximately 14 components are to be transported to the proposed development for each WTG to be installed. Of these 14 components, only nine are considered abnormal loads, and the rest are deemed normal loads. It must be noted that this information is generic as the details of the WTG components will only be available once the supplier has been appointed.

Based on the information provided in Table 1, no more than 35 WTG are to be installed per proposed development over a period of 24 months. The increase in traffic volume resulting from this activity is estimated to be in the order of less than two return trips per day. Over an eight-hour day, this equates to less than 0.5 vph.

Due to the size of the vehicles delivering this material, the most likely route for the majority of these deliveries to the proposed developments will be from the NR00107 via the TR03305/A & B.

Battery Storage Facility

A Battery Energy Storage System (BESS) is to be constructed as part of the proposed development. The facility takes excess power generated by the wind farm, converts and stores it in batteries. The BESS consists mainly of purpose-

made steel containers, in which the batteries are stored and managed, together with inverters and transformers.

Since very little information is available regarding the number of trips generated for installing this equipment, the number of trips is based on how many containers can fit in the allocated area, considering fire and access requirements. Approximately 1 500 trips will be required over a period of six months. The increase in traffic volume resulting from this activity is estimated to be in the order of 12 return trips per day. Over an eight-hour day, this equates to 3 vph.

Due to the size of the vehicles delivering this equipment, the most likely route for the majority of these deliveries to the proposed developments will be from the NR00107 via the TR03305/A & B.

Concrete

The concrete for the WTG foundations is batched on-site and transported to each foundation. Each foundation consists of approximately 1 450 m³ of concrete and takes up to 18 hours to cast. The contractor is most likely to use 8 m³ concrete mix trucks to transport concrete. Thus, to cast a WTG foundation, approximately 190 trips will be generated (including 2.5% wastage) over a period of 18 hours. Therefore the expected increase in traffic (in one direction) will be approximately 10 vehicles per hour (one every six minutes). If the vehicles are using the same return route, the traffic will increase by the same volume.

The internal road network of the proposed development is such that the delivery of concrete will not result in interaction on the public road network.

Summary

Based on the above information, a summary of the expected Diurnal Traffic on the various roads for the proposed developments are provided in Table 12.

Table 12 - Construction Phase - Diurnal Traffic

Road	Construction Equipment and Material	Earthworks	Raw Material for Concrete	WTG Components	Batter Energy Storage System	Total
NR00107/W	2.10 v/h	2.63 v/h	2.63 v/h	0.53 v/h	3.15 v/h	11.00 v/h
NR00107/E	3.30 v/h	4.13 v/h	4.13 v/h	0.83 v/h	4.95 v/h	17.50 v/h
TR03305/A	5.40 v/h	6.75 v/h	6.75 v/h	1.35 v/h	8.10 v/h	28.50 v/h
TR03305/B	5.70 v/h	7.13 v/h	7.13 v/h	1.43 v/h	8.55 v/h	30.00 v/h
TR03305/C	0.30 v/h	0.38 v/h	0.38 v/h	0.08 v/h	0.45 v/h	1.50 v/h
TR03305/D	0.30 v/h	0.38 v/h	0.38 v/h	0.08 v/h	0.45 v/h	1.50 v/h
TR03305/E	0.30 v/h	0.38 v/h	0.38 v/h	0.08 v/h	0.45 v/h	1.50 v/h
MR00372	0.00 v/h	0.00 v/h	0.00 v/h	0.00 v/h	0.00 v/h	0.00 v/h
DR02307	0.30 v/h	0.38 v/h	0.38 v/h	0.08 v/h	0.45 v/h	1.50 v/h
JESSA WEF	6.00 v/h	7.50 v/h	7.50 v/h	1.50 v/h	9.00 v/h	31.50 v/h

An argument could be made that all earthwork activities would be complete by the time the BESS is installed. However, as a worst-case scenario, it shall be assumed that these activities occur concurrently.

The information provided above is an informed estimate. Construction-related traffic may vary and be different from the information provided above due to the availability of contractors' resources and schedules.

7.4 OPERATIONAL PHASE

The operational life of the proposed development is expected to be approximately 20 years. The proposed development will operate on a 24-hour basis, except when there is a mechanical breakdown, extreme weather conditions or maintenance activities. Wind turbines will be subject to regular maintenance and inspection (i.e. routine servicing) to ensure the optimum performance of the turbine components.

The only on-site activities related to the development will be monitoring, routine servicing and unscheduled maintenance of the WTG units.

7.4.1 Peak Traffic

It is envisaged that the proposed developments are maintained and operated by a team of approximately 40 personnel.

Thus, the envisaged traffic volumes on the various public roads for the proposed development is depicted in Table 13.

Table 13 - Operational Phase - Peak Traffic

Road	Number of Vehicles
NR00107/W	3.00 vph
NR00107/E	9.00 vph
TR03305/A	12.00 vph
TR03305/B	18.00 vph
TR03305/C	9.00 vph
TR03305/D	9.00 vph
TR03305/E	3.00 vph
MR00372	6.00 vph
DR02307	6.00 vph
JESSA WEF	27.00 vph

Peak traffic is generated by commuting personnel to and from the proposed developments in the morning and afternoon. The maximum number of additional vehicles on the public road network is in the order of 18 vph.

7.4.2 Diurnal Traffic

The servicing, delivery of goods and visitors to the proposed developments are the only Diurnal Traffic envisaged for the proposed development and is assumed to be in the order of two vehicles per day. It is assumed that this traffic will travel to the proposed development from Beaufort West via both the TR00107 and DR02307.

Thus, the envisaged traffic volumes on the various public roads during the operational phase for the proposed development is depicted in Table 14.

Table 14 - Operational Phase - Diurnal Traffic

Road	Number of Vehicles/Hour
NR00107/E	0.75 vph
TR03305/A	0.75 vph
TR03305/B	1.50 vph
DR02307	0.75 vph
JESSA WEF	1.50 vph

Based on the information provided above, the maximum number of vehicles on the road network contributing to the Diurnal Traffic is in the order of 1.5 vph.

7.5 DECOMMISSIONING PHASE

At the end of the operational phase, the development may be decommissioned, or its continued economic viability may be investigated. If the development is still deemed economically viable, the development may be re-engineered, and the operational life may be extended. If the development is not economically viable, then the development shall be decommissioned. The components will be disassembled, reused, recycled or disposed of in accordance with the relevant regulatory requirements. The turbines may also be traded or sold as there is an active second-hand market for wind turbines, or they may be used as scrap metal. The decommissioning procedures will be undertaken in line with an Environmental Management Plan, and the site will be rehabilitated and returned to its pre-construction state.

The decommissioning phase of the development is expected to create skilled and unskilled employment opportunities. The traffic impacts on the public roads during the decommissioning phase of the site will be significantly less than the traffic impact determined during the construction phase, as many of the internal infrastructures will be retained by the landowners.

As part of the decommissioning process, a separate traffic impact assessment should be undertaken since many of the characteristics related to the traffic impact assessment, i.e. access routes, road geometry, traffic volumes, etc., would have changed over the operational life of the development. Thus, a specific decommissioning assessment has not been undertaken at this stage.

8 ASSESSMENT OF IMPACTS

As described in section 6.2, the proposed development is primarily accessed from the NR00107 via TR03305.

The level of service of these roads in this assessment is based on the 'Follower Density'. This minimum level of service for Class 1 and 2 roads is LOS B, and for Class 3 to 5 roads is LOS C.

8.1 CONSTRUCTION PHASE

The duration of the construction phase is estimated to be in the order of 24 months. During the construction phase, traffic will be generated through two distinct sources:

- The commuter traffic, getting personnel to and from the proposed developments (Peak Traffic); and*
- The freight traffic, the delivery of materials and equipment to the proposed development (Diurnal Traffic).*

It is envisaged that the transportation of the site personnel will result in Peak Traffic, while the delivery of equipment and materials to the site will be distributed throughout the day.

The traffic volumes generated, for both Peak Traffic and Diurnal Traffic, resulting from the proposed developments has been addressed in Section 7. Thus, the combined expected increase in the traffic volumes on the road network during the peak construction phase of the proposed developments is summarised in Table 15.

Table 15 - Construction Phase – Traffic Volumes

Roads	Day (divided into three-time frames)					
	06:30	Morning Peak Traffic (vph)	07:30	Diurnal Traffic (vph)	16:30	Afternoon Peak Traffic (vph)
NR00107/W		6.0 vph		10.5 vph		6.0 vph
NR00107/E		24.0 vph		18.0 vph		24.0 vph
TR03305/A		30.0 vph		28.5 vph		30.0 vph
TR03305/B		51.0 vph		30.0 vph		51.0 vph
TR03305/C		12.0 vph		1.5 vph		12.0 vph
TR03305/D		12.0 vph		1.5 vph		12.0 vph
TR03305/E		6.0 vph		1.5 vph		6.0 vph
MR00372		6.0 vph		0.0 vph		6.0 vph
DR02307		21.0 vph		1.5 vph		21.0 vph
JESSA WEF		63.0 vph		31.5 vph		63.0 vph

Based on the information provided in the table above, the peak traffic volumes on the TR03305/B is increased by more than 50 trips an hour, thus requiring a TIA, as per section 2.6 of the "South African Traffic Impact and Site Traffic Assessment Manual", which reads as follows; "A Traffic Impact Assessment shall be undertaken and submitted when an application is made for a change in land use and when the highest total additional hourly vehicular trip generation (including pass-by and diverted trips) as a result of the application exceeds 50 trips per hour".

Traffic volume generated during the peak construction phase of the development is in the order of:

- **Peak Traffic:** The maximum number of additional vehicles due to the proposed development on the TR03305/B within a given hour is estimated to be in the order of 51 vph. The access to the WEF is in the order of 63 vph.
- **Diurnal Traffic:** The maximum number of additional vehicles due to the proposed development on the TR03305/B within a given hour is estimated to be in the order of 30 vph. Which equates to approximately 240 vehicles, over an eight hour period.

The ADT generated during the peak construction phase on the roads, expressed as an "Increased ADT", are shown in Table 16.

Table 16 - Construction Phase - Traffic Assessment

Road	ADT Baseline*	Additional Traffic Generated**	Increased ADT
NR00107/W	3100	(12+84) = 96	3196
NR00107/E	3875	(48+144) = 192	4067
TR03305/A	872	(60+228) = 288	1160
TR03305/B	924	(102+240) = 342	1266
TR03305/C	884	(24+12) = 36	920
TR03305/D	884	(24+12) = 36	920
TR03305/E	878	(12+12) = 24	902
MR00372	37	(12+0) = 12	49
DR02307	370	(42+12) = 54	424
JESSA WEF	0	(126+252) = 378	378

* Average AADT of the legs along the section of road

** The first value represents the Peak Traffic and the second value represents the Diurnal Traffic

The expected ADT on TR03305/B is expected to increase from 924 to 1 266 trips per day. The most significant increase occurs during the Peak Traffic, 51 vph in

one direction. Based on traffic flow of 102 vph and a speed of 90 km/h, the traffic volume will result in a Following Density of 1.133 v/km, equating to a LOS B. The Diurnal Traffic of approximately 60 vph, in both directions, based on a speed of 90 km/h, the traffic volume will result in a Following Density of 0.333 v/km, equating to a LOS A.

The additional traffic volumes on the road network, does not compromise the level of service for these roads. Thus the additional traffic volumes on the road network are deemed acceptable.

Concrete Transportation

Since all the WTG's are located west of the TR03305 and are accessed via an internal road network, there is no need for the concrete trucks to travel on the public roads during the casting of the WTG foundations for this development. Thus, there is no impact on the public road network due to concrete transportation for the WTG foundations casting.

8.2 OPERATIONAL PHASE

The duration of the operational phase of the proposed developments is estimated to be in the order of 20 years. During this phase, traffic will be generated through two distinct sources:

- The commuter traffic, getting personnel to and from the proposed developments (Peak Traffic); and
- The delivery of goods and servicing of the proposed development (Diurnal Traffic).

It is envisaged that the transportation of the site personnel will result in Peak Traffic, while daily inspections, periodical maintenance, delivery of goods and servicing of the proposed development will be distributed throughout the day.

The traffic volumes generated, for both Peak Traffic and Diurnal Traffic, resulting from the proposed development's operational phase have been addressed in Section 7. Thus, the expected increase in the traffic volumes on the various roads during the operational phase of the proposed developments are summarised in Table 17.

Table 17 - Operational Phase – Traffic Volumes

Roads	Day (divided into three-time frames)			
	06:30 Morning Peak Traffic (vph)	07:30 Diurnal Traffic (vph)	16:30 Afternoon Peak Traffic (vph)	17:30
NR00107/W	3.0 vph	0.0 vph	3.0 vph	
NR00107/E	9.0 vph	0.8 vph	9.0 vph	
TR03305/A	12.0 vph	0.8 vph	12.0 vph	
TR03305/B	18.0 vph	1.5 vph	18.0 vph	
TR03305/C	9.0 vph	0.0 vph	9.0 vph	
TR03305/D	9.0 vph	0.0 vph	9.0 vph	
TR03305/E	3.0 vph	0.0 vph	3.0 vph	
MR00372	6.0 vph	0.0 vph	6.0 vph	
DR02307	6.0 vph	0.8 vph	6.0 vph	
JESSA WEF	27.0 vph	1.5 vph	27.0 vph	

Based on the information provided in the table above, no traffic volumes are increased by more than 50 trips an hour. Thus negating the requirement for a TIA

as specified in section 2.6 of the "South African Traffic Impact and Site Traffic Assessment Manual", which reads as follows; "A Traffic Impact Assessment shall be undertaken and submitted when an application is made for a change in land use and when the highest total additional hourly vehicular trip generation (including pass-by and diverted trips) as a result of the application exceeds 50 trips per hour".

Traffic volume generated during the operational phase of the proposed developments are as follows:

- **Peak Traffic:** The maximum number of vehicles on the public road network within a given hour is estimated to be in the order of 18 vph.
- **Diurnal Traffic:** The maximum number of vehicles on the public road network within a given hour is estimated to be in the order of 1.5 vph. Which equates to approximately 4 vehicles, over an eight hour period.

The ADT generated during the operational phase on the public road network, expressed as an "Increased ADT", are shown in Table 18.

Table 18 - Operational Phase - Traffic Assessment

Road	ADT Baseline*	Additional Traffic Generated**	Increased ADT
NR00107/W	3100	(6+0) = 6	3106
NR00107/E	3875	(18+6) = 24	3899
TR03305/A	872	(24+6) = 30	902
TR03305/B	924	(36+12) = 48	972
TR03305/C	884	(18+0) = 18	902
TR03305/D	884	(18+0) = 18	902
TR03305/E	878	(6+0) = 6	884
MR00372	37	(12+0) = 12	49
DR02307	370	(12+6) = 18	388
JESSA WEF	0	(54+12) = 66	66

* Average AADT of the legs along the section of road

** The first value represents the Peak Traffic and the second value represents the Diurnal Traffic

The expected ADT on TR03305/B is expected to increase from 924 to 972 trips per day. The most significant increase occurs during the Peak Traffic, 10 vph in one direction. Based on a traffic volume of 80 vph and a speed of 90 km/h, the traffic volume will result in a Following Density of 0.889 v/km, equating to a LOS A. The increase in Diurnal Traffic is negligible.

The additional traffic volumes on the road network, does not compromise the level of service for these roads and is deemed insignificant.

8.3 DECOMMISSIONING PHASE

As described in Section 7.4 above, a separate traffic impact assessment should be undertaken as part of the decommissioning process since many of the characteristics related to the traffic impact assessment, i.e. access routes, road geometry, traffic volumes, etc., would have changed over the operational life of the development. Thus, no traffic assessment for the decommissioning phase has been undertaken in this report.

9 ASSESSMENT OF CUMULATIVE IMPACTS

The assessment of the cumulative increased traffic volumes on the road network within the study area during this proposed development's construction, operational and decommissioning phases are delineated below.

The construction of the proposed development is subject to the relevant approval by the various authorities.

In addition to the proposed developments there is only one other proposed development on the TR03305 within a 30 km radius, as detailed in Section 6.4. However, several other renewable energy developments and grid connections are proposed further to the South, outside the 30 km radius of the proposed development. The impact of this traffic has not been included in this assessment.

It is unclear whether all three of the Jessa Wind Farm Projects will be constructed concurrently or sequentially. As a worst-case scenario, concurrent construction of these three developments and the Wind Farm X are assumed for evaluation.

To summarise:

- The cumulative construction phase assessment includes the simultaneous construction of the three Jessa Wind Farm Projects and the Wind Farm X;
- The cumulative operation phase assessment includes the simultaneous operation of the three Jessa Wind Farm Projects and the Wind Farm X.

For assessment purposes, the traffic generated by Wind Farm X shall be assumed to be equal to the traffic generated by a single Jessa Wind Farm development.

9.1 CONSTRUCTION PHASE

The cumulative traffic volumes during the construction phase of the Jessa Wind Farms and Wind Farm X, are based on:

- A combined workforce complement of 750 for the three Jessa Wind Farm Projects, which includes the construction of the BESS and Substations;
- A workforce complement of 250 for Wind Farm X.

Thus the cumulative traffic volumes on the road network related to the proposed development are based on a combined workforce of 1 000 individuals. The Peak Traffic and Diurnal Traffic is provided in Table 19.

Table 19 - Cumulative Peak Constructional Phase - Traffic Volume

Roads	Day (divided into three-time frames)			
	06:30 Morning Peak Traffic (vph)	07:30 Diurnal Traffic (vph)	16:30 Afternoon Peak Traffic (vph)	17:30
NR00107/W	8.0 vph	14.0 vph	8.0 vph	
NR00107/E	32.0 vph	24.0 vph	32.0 vph	
TR03305/A	40.0 vph	38.0 vph	40.0 vph	
TR03305/B	68.0 vph	40.0 vph	68.0 vph	
TR03305/C	38.0 vph	11.5 vph	38.0 vph	
TR03305/D	16.0 vph	2.0 vph	16.0 vph	
TR03305/E	8.0 vph	2.0 vph	8.0 vph	
MR00372	8.0 vph	0.0 vph	8.0 vph	
DR02307	28.0 vph	2.0 vph	28.0 vph	
JESSA WEF	63.0 vph	31.5 vph	63.0 vph	

Based on the information provided in the table above, there is only one sections on the TR03305 where the traffic volume is increased by more than 50 trips an hour, thus requiring a TIA, as per section 2.6 of the "South African Traffic Impact and Site Traffic Assessment Manual", which reads as follows; "A Traffic Impact Assessment shall be undertaken and submitted when an application is made for a change in

land use and when the highest total additional hourly vehicular trip generation (including pass-by and diverted trips) as a result of the application exceeds 50 trips per hour".

The maximum cumulative traffic volumes generated on the various roads during the construction phase of the proposed developments are in the order of:

- **Peak Traffic:** The maximum number of vehicles on the public road network within a given hour is estimated to be in the order of 68 vph.
- **Diurnal Traffic:** The maximum number of vehicles on the public road network within a given hour is estimated to be in the order of 40.0 vph. Which equates to approximately 320 vehicles, over an eight hour period.

The assessment of the cumulative traffic impact generated during the peak construction phase expressed as an "Increased ADT" is provided in Table 20.

Table 20 - Cumulative Constructional Phase - Traffic Assessment

Road	ADT Baseline*	Additional Traffic Generated**	Increased ADT
NR00107/W	3100	(16+112) = 128	3228
NR00107/E	3875	(64+192) = 256	4131
TR03305/A	872	(80+304) = 384	1256
TR03305/B	924	(136+320) = 456	1380
TR03305/C	884	(76+92) = 168	1052
TR03305/D	884	(32+16) = 48	932
TR03305/E	878	(16+16) = 32	910
MR00372	37	(16+0) = 16	53
DR02307	370	(56+16) = 72	442
JESSA WEF	0	(126+252) = 378	378

* Average AADT of the legs along the section of road

** The first value represents the Peak Traffic and the second value represents the Diurnal Traffic

The maximum expected ADT is on TR03305/B, and the ADT will increase from 924 to 1 380 trips per day. During Peak Traffic, the max estimated ADT on this section of the road is in the order of 82 vph, which with the estimated peak traffic of all the projects, is increased to 109 vph. The Following Density of the traffic on this section of the road, assuming a speed of 90 k/h is 1.211 v/km, equating to a LOS B. During Diurnal Traffic, the max estimated ADT on this section of the road is in the order of 41 vph, which with the estimated peak traffic of all the projects, is increased to 81 vph (both directions). The Following Density of the traffic on this section of the road, assuming a speed of 90 k/h is 0.450 v/km, equating to a LOS A.

Concrete Transportation

The transportation of concrete delivery for the casting of the WTG foundations uses the internal road network proposed developments and does not use the public road network. Thus, there is no impact on the public road network.

9.2 OPERATIONAL PHASE

The cumulative traffic volumes during the operational phase of the Jessa Wind Farms and Wind Farm X are based on a combined workforce of 160 individuals. The cumulative Peak Traffic and Diurnal Traffic is provided in Table 21.

Table 21 - Cumulated Operational Phase – Traffic Volumes

Roads	Day (divided into three-time frames)			
	06:30 Morning Peak Traffic (vph)	07:30 Diurnal Traffic (vph)	16:30 Afternoon Peak Traffic (vph)	17:30
NR00107/W	4.0 vph	0.0 vph	4.0 vph	
NR00107/E	12.0 vph	1.0 vph	12.0 vph	
TR03305/A	16.0 vph	1.0 vph	16.0 vph	
TR03305/B	24.0 vph	2.0 vph	24.0 vph	
TR03305/C	15.0 vph	0.5 vph	15.0 vph	
TR03305/D	12.0 vph	0.0 vph	12.0 vph	
TR03305/E	4.0 vph	0.0 vph	4.0 vph	
MR00372	8.0 vph	0.0 vph	8.0 vph	
DR02307	8.0 vph	1.0 vph	8.0 vph	
JESSA WEF	27.0 vph	1.5 vph	27.0 vph	

Based on the information provided in the table above, there are no traffic volumes that are increased by more than 50 trips an hour, thus negating the requirement for a TIA as specified in section 2.6 of the "South African Traffic Impact and Site Traffic Assessment Manual", "A Traffic Impact Assessment shall be undertaken and submitted when an application is made for a change in land use and when the highest total additional hourly vehicular trip generation (including pass-by and diverted trips) as a result of the application exceeds 50 trips per hour".

The cumulative traffic volumes generated on the road network within the study area during the combined operational phase is in the order of:

- **Peak Traffic:** The maximum number of vehicles on the public road network within a given hour is estimated to be in the order of 24 vph;
- **Diurnal Traffic:** The maximum number of vehicles on the public road network within a given hour is estimated to be in the order of 2.0 vph. Which equates to approximately 16 vehicles, over an eight hour period.

The assessment of the cumulative traffic impact generated during the operational phase expressed as an "Increased ADT" is provided in Table 22.

Table 22 - Cumulative Operational Phase – Traffic Assessment

Road	ADT Baseline*	Additional Traffic Generated**	Increased ADT
NR00107/W	3100	(8+0) = 8	3108
NR00107/E	3875	(24+8) = 32	3907
TR03305/A	872	(32+8) = 40	912
TR03305/B	924	(48+16) = 64	988
TR03305/C	884	(30+4) = 34	918
TR03305/D	884	(24+0) = 24	908
TR03305/E	878	(8+0) = 8	886
MR00372	37	(16+0) = 16	53
DR02307	370	(16+8) = 24	394
JESSA WEF	0	(54+12) = 66	66

* Average AADT of the legs along the section of road

** The first value represents the Peak Traffic and the second value represents the Diurnal Traffic

The maximum expected ADT is on TR03305/B, and the ADT will increase from 924 to 988 trips per day. During Peak Traffic, the max estimated ADT on this section of

the road is in the order of 82 vph, which with the estimated peak traffic of all the projects, is increased to 65 vph (one direction). The Following Density of the traffic on this section of the road, assuming a speed of 90 k/h is 0.722 v/km, equating to a LOS A. During Diurnal Traffic, the max estimated ADT on this section of the road is in the order of 41 vph, which with the estimated peak traffic of all the projects, is increased to 43 vph (both directions). The Following Density of the traffic on this section of the road, assuming a speed of 90 k/h is 0.239 v/km, equating to a LOS A.

9.3 DECOMMISSIONING PHASE

As described in Section 7.4 above, a separate traffic impact assessment should be undertaken as part of the decommissioning process since many of the characteristics related to the traffic impact assessment, i.e. access routes, road geometry, traffic volumes, etc., would have changed over the operational life of the development. Thus, no cumulative traffic assessment for the decommissioning phase of the proposed development has been undertaken in this report.

10 RISKS AND IMPACTS

Developments within an established environment can cause a significant impact on the road network, mainly when new developments are introduced into the environment, which leads to an increase in traffic on the existing public roads. The traffic volume will vary depending on the phase of the development. More traffic is envisaged during the construction and decommissioning phases of the proposed developments, while traffic volumes during the operational phase of the proposed developments are deemed insignificant.

With the increase of traffic on the roads comes the potential increase in incidents. The incidents could vary from minor damage to the vehicle due to the road conditions to fatal collisions with other vehicles, pedestrians or even animals.

Traffic safety is directly related to the attitude of the drivers using the roads. The road condition will dictate the safe speed limit a responsible driver will travel. However, not all road users are responsible, resulting in frustrated drivers taking unnecessary chances, many of which involve excessive speeding.

Thus, to improve traffic safety on the roads, it is strongly suggested that all key personnel, including mini-bus and bus drivers, be provided with advanced driver training.

10.1 RISKS

The existing road network has numerous intrinsic risks, which could be exacerbated by the traffic generated due to the proposed developments. The most pertinent risks that need to be considered by the developer during the various phases of the proposed developments include the following:

- Congestion on the roads due to the abnormal loads and mixed modes of traffic, resulting in drivers taking unnecessary and dangerous “chances”.*
- Reduced visibility*
- Incidents with other road users, i.e. vehicles, cycles, pedestrians and animals*
- Road degradation resulting in increased maintenance.*

10.1.1 Congestion

Congestion on the road network will be significantly more during the construction phase than expected during the proposed developments' operational phase.

During the construction phase of the proposed developments, a significant increase in traffic is anticipated during the morning and afternoon peaks. The diurnal traffic related to this development is less significant as it is spread over the entire day.

Abnormal loads will typically be transported to the proposed developments in convoys under escort, resulting in queues of slow-moving vehicles behind the convoy.

During the operational phase of the development, there will be a nominal increase in traffic on the local road network. The increase in traffic volumes will be limited to peak traffic with negligible diurnal traffic generated.

The increased traffic volumes will increase the potential of incidents on the roads within the study area, specifically at intersections and with other road users.

A Transport Management Plan will need to be compiled to identify and manage mitigation measures for the project.

10.1.2 Reduced Visibility

Numerous natural phenomena could compromise the road user's visibility, thus increasing the potential for accidents. These include inter alia:

- Sun glare: When driving on the road into the sun, there is a high probability of being blinded by the sun, not being able to observe activities along the road and at intersections, which could result in an incident;*
- Inclement weather: Visibility is the primary concern when driving in inclement weather. Reduced visibility resulting from either the rain itself or from the spray of the vehicles travelling on the road. Skidding and aquaplaning resulting from water on the road surface is a probable risk;*
- Dust: The generation of dust when travelling on unpaved roads is inevitable. The larger the vehicle, the more dust is generated. This dust hinders the drivers wishing to over-take with a clear view for over-taking, resulting in drivers taking unnecessary chances, resulting in unfavourable consequences.*

Mitigation measures to consider include

- Compile a Transport Management Plan, sections of which to be part of induction training for all personnel travelling to the development,*

10.1.3 Pedestrians and Animals

The development is to be constructed in the rural area, consisting predominately of wide-open areas. Large portions of the area are undeveloped and are home to various species of antelope.

Stray livestock, wild animals, pedestrians and cyclists are all potential risks to road users. If drivers take evasive action at high speed, there is a strong probability that the vehicle could roll, resulting in severe injuries or even fatalities. Failing to take evasive action will result in the inevitable fatality of the animal or other road users.

Mitigation measures are limited to providing drivers with advanced driver training and training on how to handle a vehicle in the event of a tire blow-out or an antelope jumping in the road, as the incorrect evasive action could have dire consequences

10.1.4 Road Degradation

The majority of the roads in the study area are paved, and the structure varies from wide, well-maintained roads to narrow, poorly maintained gravel roads.

During the construction phase of the proposed developments, there will be an increase in the traffic volumes on the local road network. The increased traffic volumes will place an additional burden on the roads within the study area.

Mitigation of this impact is regular maintenance of the roads by the local roads' authorities. However, it is unlikely that the local authorities will undertake the necessary road maintenance due to budget constraints. As is standard practice and customarily enforced as part of the planning approval for the development, the developer undertakes to contribute towards or conducts regular maintenance of the roads network used by the developer.

10.2 IMPACTS

The road network within the study area is limited, offering very little opportunity of selecting alternative routes. All routes evaluated for the development are existing roads, and no new roads need to be constructed.

Traffic-related risks and impacts on the road network within the study area have been assessed using an assessment methodology provided by SLR Consulting South Africa (Pty) Ltd for various phases of this development.

10.2.1 Construction Phase

During the peak construction phase of the development, the following safety and road network integrity impacts have been assessed.

Increased Road Incidents

The impact of increased traffic volumes on the public roads, which will increase the potential of incidents on the road network within the study area, is provided in Table 23.

Table 23 - Construction Phase - Increased Road Incidents

Table 23 – Construction Phase – Increased Road Incidents		
Issue	Increased Road Incidents	
Description of Impact		
The increased traffic volumes on the public roads will increase the potential of incidents on the road network within the study area		
Type of Impact	Indirect	
Nature of Impact	Negative	
Phases	Construction	
Criteria	Without Mitigation	With Mitigation
Intensity	Very High	Very High
Duration	Short-term	Short-term
Extent	Local	Local
Consequence	Medium	Medium
Probability	Definite / Continuous	Conceivable
Significance	Medium	Low
Degree to which impact can be reversed	The resource is irreparably damaged and is not represented elsewhere	
Degree to which impact may cause irreplaceable loss of resources	The resource is irreparably damaged and is not represented elsewhere	
Degree to which impact can be mitigated	Mitigation does not exist, or mitigation will slightly reduce the significance of impacts	
Mitigation actions		
The following measures are recommended:	Post relevant road signage along affected routes; Create local WhatsApp Group, notifying other road users of expected deliveries and associated routes; Transport Management Plan(TMP) is to be compiled once the contractor has been appointed and all the relevant details of the construction process are known. Refer to Section 11.The TMP needs to address, inter alia: - clearly defined route/s to the site for specific vehicles needed to transport	

	equipment and materials - scheduled deliveries to avoid local congestion; Ensure all vehicles are roadworthy, visible, adequately marked, and operated by an appropriately licenced operator.	
Monitoring		
The following monitoring is recommended:	Incident register and ongoing road safety awareness training	
Cumulative impacts		
Nature of cumulative impacts	The cumulative impact resulting from the traffic volumes on the road network	
Rating of cumulative impacts	Without Mitigation	With Mitigation
	Medium	Low

Road Degradation

The impact of increased traffic volumes on the public roads, which will increase the potential for localised road network degradation within the study area, is presented in Table 24.

Table 24 - Construction Phase - Road Degradation

Table 2.4 - Construction Phase - Road Degradation		
Issue	Road Degradation	
Description of Impact		
The increased traffic volumes on the public roads will increase the potential for localised road network degradation within the study area.		
Type of Impact	Indirect	
Nature of Impact	Negative	
Phases	Construction	
Criteria	Without Mitigation	With Mitigation
Intensity	Medium	Low
Duration	Short-term	Short-term
Extent	Local	Local
Consequence	Medium	Medium
Probability	Definite / Continuous	Conceivable
Significance	Medium	Low
Degree to which impact can be reversed	The affected environment will be able to recover from the impact	
Degree to which impact may cause irreplaceable loss of resources	The resource is not damaged irreparably or is not scarce	
Degree to which impact can be mitigated	Mitigation exists and will notably reduce the significance of impacts	
Mitigation actions		
The following measures are recommended:	Create a local WhatsApp Group and post notices of road conditions and proposed alternatives. Developer to contribute to the maintenance of the public roads in the area during construction phase of the development/s. A photographic record of the road condition should be maintained throughout the various phases of the development/s. This provides an objective assessment and mitigates any subjective view from road users. Upgrade unpaved roads to a suitable condition for proposed construction vehicles; Ensure that the roads are left in the same or better condition, post-construction.	
Monitoring		
The following monitoring is recommended:	Weekly inspection,	
Cumulative impacts		
Nature of cumulative impacts	The cumulative impact resulting from the traffic volumes on the road network	
Rating of cumulative impacts	Without Mitigation	With Mitigation
	Medium	Lo -

Dust

The larger the vehicle, the more dust is likely to be generated. This dust hinders the drivers wishing to over-take without a clear view for over-taking, resulting in drivers

taking unnecessary chances, which could result in unfavourable consequences. The impact of increased traffic volumes on the unpaved public roads that will generate dust is presented in Table 25.

Table 25 - Construction Phase – Dust

Issue	Dust	
Description of Impact		
The increased traffic volumes on the unpaved public roads will generate more dust. The larger the vehicle, the more dust is likely to be generated. This dust hinders the drivers wishing to over-take without a clear view for over-taking, resulting in drivers taking unnecessary chances, which could result in unfavourable consequences		
Type of Impact	Indirect	
Nature of Impact	Negative	
Phases	Construction	
Criteria	Without Mitigation	With Mitigation
Intensity	High	High
Duration	Medium-term	Short-term
Extent	Regional	Regional
Consequence	High	Medium
Probability	Possible / frequent	Conceivable
Significance	Medium -	Low -
Degree to which impact can be reversed	The affected environment will not be able to recover from the impact - permanently modified	
Degree to which impact may cause irreplaceable loss of resources	The resource is irreparably damaged and is not represented elsewhere	
Degree to which impact can be mitigated	Mitigation does not exist, or mitigation will slightly reduce the significance of impacts	
Mitigation actions		
The following measures are recommended:	Reduce travel speed for construction vehicles on the gravel road to reduce dust Dust suppression of the roads in the immediate vicinity of the site where feasible Regular preventative maintenance of roads within the immediate vicinity of the site should be conducted over weekends to minimise the impact on the average construction period.	
Monitoring		
The following monitoring is recommended:	Continues observation, remedial action needs to be taken as and when required	
Cumulative impacts		
Nature of cumulative impacts	The development would contribute to cumulative impacts on Riverine Rabbits especially due to vehicle collisions, but this would be transient and the overall contribution to cumulative impact would be low.	
Rating of cumulative impacts	Without Mitigation	With Mitigation
	Medium -	Low -

Intersection Safety

The impact due to the increased traffic volumes at intersections, which will increase the potential risk of accidents at the intersections, resulting in serious injuries or even fatalities, is presented in Table 26, especially at the intersection on the main roads, when vehicles from the site needing to cross over oncoming traffic.

Table 26 - Construction Phase - Intersection Safety

Table 20 Construction Phase Intersection Safety	
Issue	Intersection Safety
Description of Impact	
The increased traffic volumes at intersections will increase the potential risk of accidents at the intersections, resulting in serious injuries or even fatalities, especially at the intersection on the main roads, when vehicles from the site need to cross over oncoming traffic.	
Type of Impact	Indirect
Nature of Impact	Negative
Phases	Construction

Criteria	Without Mitigation	With Mitigation
Intensity	High	High
Duration	Short-term	Short-term
Extent	Site	Site
Consequence	Medium	Medium
Probability	Definite / Continuous	Definite / Continuous
Significance	Medium -	Medium -
Degree to which impact can be reversed	The affected environment will not be able to recover from the impact - permanently modified	
Degree to which impact may cause irreplaceable loss of resources	The resource is irreparably damaged and is not represented elsewhere	
Degree to which impact can be mitigated	Mitigation exists and will notably reduce significance of impacts	
Mitigation actions		
The following measures are recommended:	Compile TMP, refer to Section 11 of the Traffic Report/ Section x of EIA Reduce speed at intersections and use appropriate traffic warning signs Identify alternative routes where possible Request the assistance of local law enforcement Ensure that all construction vehicles are roadworthy, visible, adequately marked, and operated by an appropriately licenced operator.	
Monitoring		
The following monitoring is recommended:	Incident register and ongoing road safety awareness training	
Cumulative impacts		
Nature of cumulative impacts	The cumulative impact due to the increased traffic volumes at intersections, which will increase the potential risk of accidents at the intersections, resulting in serious injuries or even fatalities, especially at the intersection on the main roads, when vehicles from the site need to cross over oncoming traffic.	
Rating of cumulative impacts	Without Mitigation	With Mitigation
	Medium -	Low -

10.2.2 Operational Phase

During the operational phase of the development, the traffic volumes are considerably less than during the construction phase of the proposed development. Thus all impacts associated with increased traffic volumes have been omitted. Therefore, the only impact deemed essential during the operational phase of the proposed development is addressed below.

Intersection Safety

The cumulative impact due to the increased traffic volumes at intersections, which will increase the potential risk of accidents at the intersections, resulting in serious injuries or even fatalities, is presented in Table 27, especially at the intersection on the main roads, when vehicles from the site need to cross over oncoming traffic.

Table 27 - Operational Phase - Intersection Safety

Issue	Intersection Safety	
Description of Impact		
The increased traffic volumes at intersections will increase the potential risk of accidents at the intersections, resulting in serious injuries or even fatalities, especially at the intersection on the main roads, when vehicles from the site need to cross over oncoming traffic.		
Type of Impact	Indirect	
Nature of Impact	Negative	
Phases	Operation	
Criteria	Without Mitigation	With Mitigation
Intensity	High	High
Duration	Short-term	Short-term
Extent	Site	Site
Consequence	Medium	Medium

Probability	Definite / Continuous	Definite / Continuous
Significance	Medium -	Medium -
Degree to which impact can be reversed	The affected environment will not be able to recover from the impact - permanently modified	
Degree to which impact may cause irreplaceable loss of resources	The resource is irreparably damaged and is not represented elsewhere	
Degree to which impact can be mitigated	Mitigation exists and will notably reduce the significance of impacts	
Mitigation actions		
The following measures are recommended:	Compile TMP, refer to Section 11 of the Traffic Report/ Section x of EIA Reduce speed at intersections and use appropriate traffic warning signs Identify alternative routes where possible Request the assistance of local law enforcement Ensure that all construction vehicles are roadworthy, visible, adequately marked, and operated by an appropriately licenced operator.	
Monitoring		
The following monitoring is recommended:	Incident register and ongoing road safety awareness training	
Cumulative impacts		
Nature of cumulative impacts	The cumulative impact due to the increased traffic volumes at intersections, which will increase the potential risk of accidents at the intersections, resulting in serious injuries or even fatalities, especially at the intersection on the main roads, when vehicles from the site need to cross over oncoming traffic.	
Rating of cumulative impacts	Without Mitigation	With Mitigation
	Medium -	Low -

10.2.3 No-go Alternative

If the proposed development does not materialise, the increase in the traffic volume will not transpire, resulting in the following impacts:

Road Degradation

Less traffic on the roads means that the rate of degradation to the roads will be less. However, the maintenance of the roads will not be augmented by the proposed development. Improved maintenance of the roads will improve the quality of life to the road users and increase the economic opportunities in the area.

Road Safety

Less traffic on the roads means less probability of an incident, reducing the likelihood of a fatality.

Statement

The improved road maintenance counteracts the negative impacts on the road network due to the development and economic prospects the development will bring to the local community and the impact the development has on a national scale.

11 TRANSPORT MANAGEMENT PLAN

A Transport Management Plan (TMP) for the project shall be developed once the construction contractor has been appointed. The TPM must consider all the potential risks along the access routes and the roads on the site.

The main objectives of a TMP are to identify potential risks and mitigation measures to be implemented to negate the potential risks as far as reasonably possible. Preventing traffic congestion on public roads needs to be a key consideration when compiling the TMP. The implementation of the TMP needs to be vigorously managed.

A description of the most pertinent elements, together with the proposed transportation routes, are summarised below:

- *Abnormal loads, including WTG components and transformers for the proposed developments, emanating from one of the Terminal and/or Commercial centres in South Africa, is expected to be via the TR03305;*
- *Aggregate and cement for the concrete batching plant is envisaged to be transported to the proposed development from commercial sources is via the TR03305;*
- *Personnel commuting routes originating from the local community will access the proposed developments either via the TR05801 or DR02315;*
- *Movement of material on site. Due to the layout of the proposed development, the interaction of site vehicles with vehicles on the public road network is unlikely.*

Other key points include, inter alia:

- *Compile a Transport Management Plan, sections of which to be part of induction training for all personnel travelling to the proposed development;*
- *Outline specific traffic management measures across all phases of the proposed development;*
- *Defined specific routes for each type of vehicle needed to transport equipment, materials and personnel to the proposed development;*
- *Identify mitigation measures to minimise impacts on existing road users;*
- *Reduce the number of individual vehicles travelling to the proposed development;*
- *Provide minibuses/buses for personnel commuting to the proposed development;*
- *Schedule deliveries by heavy vehicles to avoid the formation of convoys. Sufficient distance must be maintained between heavy vehicles to allow light vehicles to overtake safely;*
- *Avoid route which passes through dangerous intersections;*
- *Traffic routes to and from the proposed development are to be spread as far as possible.*
- *Define the repair and maintenance strategy to be adopted during the various phases of the development;*

12 CONCLUSION AND RECOMMENDATIONS

ENERTRAG South Africa (Pty) Ltd propose developing three wind energy facilities southwest of Beaufort West within the Central Karoo District Municipality of the Western Cape. The proposed wind farms are the Jessa M Wind Farm, the Jessa S Wind Farm, and the Jessa Z Wind Farm, collectively referred to as the Jessa Wind Farm Cluster.

12.1 CONCLUSION

Based on the information provided in this document, the following conclusions can be drawn:

Assessment Assumptions

- *A 24-month construction phase for each WEF is expected;*
- *Cumulative impact during the peak construction phase, worst-case scenario, includes simultaneous construction of the three Jessa Wind Energy Facilities and Wind Farm X. The combined workforce complement is assumed to be in the order 1 000;*

- *Cumulative impact during the operational phase includes the simultaneous operation of the three Jessa Wind Energy Facilities and Wind Farm X. The combined workforce complement is assumed to be in the order 160;*
- *It is not possible to determine the volume of traffic that will be generated during the decommissioning phase. It can, however, be expected that the volumes will be lower than during the construction phase. As part of the decommissioning process a separate traffic impact assessment should be undertaken, since many of the characteristics related to the traffic impact assessment, i.e. access routes, road geometry, traffic volumes etc., would have changed over the operational life of the proposed developments;*

Road Conditions

- *The TR03305, between the NR00107 and the proposed development, is relatively flat with minor inclination. The trunk road has a paved surface with gravel shoulders. The current condition is fair but is expected to deteriorate due to the envisaged traffic volumes. The maintenance regime on this road is questionable, and the developer would have to assist local roads authorities with regular maintenance of this road;*
- *It is proposed that the majority of the deliveries to the proposed development will be via the TR03305, between the NR00107 and the proposed development.*
- *In consultation with the relevant roads' authorities, the developer would need to investigate constructing a new intersection at the entrance of the proposed development from the TR03305 to accommodate the expected transportation requirements. This upgrade would need to be implemented to facilitate all deliveries, including abnormal loads, to the site;*
- *The expected traffic increase on the road network during the peak construction phase will lead to greater wear and tear of the roads but will not have an undue detrimental impact on the structure of the roads if the roads are properly maintained. The developer shall contribute to maintaining the public road network affected by the development as identified by the local roads' authorities. It is proposed that the developer contribute to the maintenance of the road network during the construction and the operational phases, commencing the year after successfully achieving Commercial Operation;*
- *Additional ongoing funding from the wind farms towards the maintenance of the roads will have a positive impact on the local road conditions and community;*

Transportation Route

- *The development is accessed from well-established transportation routes between large commercial centres within South Africa;*
- *Previously established transportation routes from the Ngqura Container Terminal, near Gqeberha, to existing wind farms, could be used for the transportation of equipment and material, including abnormal loads;*
- *The final route selection is subject to the limitations specified in the transport permits and the vehicles to be used by the appointed logistics company;*
- *All site entrances from public roads, existing intersection and road alignments that require upgrading to accommodate the transportation requirements of equipment and material, are to comply with geometric standards and approved by the relevant roads' authorities;*
- *All equipment and material transported to the proposed development shall be via the TR03305;*
- *Any constraints along the proposed transportation routes will have to be resolved once the appointed logistics contractor has identified the final route;*

- No anomalies associated with the proposed transportation routes were observed or identified that will compromise the development. However, this will have to be confirmed by the logistics contractor once the preferred WTG supplier has been selected;

Traffic Volumes

- The most significant impact on traffic volumes is as a result of commuting personnel to and from the site, in the morning and the afternoon;
- The combined traffic volume on the TR03305 exceeds 50 trips per hour during the construction phases for the proposed development, which is the threshold for a detailed Traffic Impact Assessment;
- At no point during the operational phases for the combined proposed development does the traffic volume on the various roads exceed 50 trips per hour, which is the threshold for a detailed Traffic Impact Assessment;
- The cumulative traffic volumes resulting from the construction phase of the Jessa Wind Energy Facilities and Wind Farm X, result in traffic volumes exceeding 50 trips per hour;
- The traffic volume generated during the peak construction phase of the combined proposed developments is in the order of:
 - Peak Traffic: The maximum number of vehicles on the public road network within a given hour is estimated to be in the order of 51 vph;
 - Diurnal Traffic: The maximum number of vehicles on the public road network within a given hour is estimated to be in the order of 30 vph. Which equates to approximately 240 vehicles, over an eight hour period.
- The traffic volume generated during the operational phase of the combined proposed developments is in the order of:
 - Peak Traffic: The maximum number of vehicles on the public road network within a given hour is estimated to be in the order of 18 vph;
 - Diurnal Traffic: The maximum number of vehicles on the public road network within a given hour is estimated to be in the order of 1.5 vph. Which equates to approximately 12 vehicles, over an eight hour period.
- The cumulative traffic volume generated during the peak construction phase of the three Jessa Wind Farms and Wind Farm X, is in the order of:
 - Peak Traffic: The maximum number of vehicles on the public road network within a given hour is estimated to be in the order of 68 vph;
 - Diurnal Traffic: The maximum number of vehicles on the public road network within a given hour is estimated to be in the order of 40.0 vph. Which equates to approximately 320 vehicles, over an eight hour period.
- The cumulative traffic volume generated during the operational phase of all the three Jessa Wind Farms and Wind Farm X, is in the order of:
 - Peak Traffic: The maximum number of vehicles on the public road network within a given hour is estimated to be in the order of 24 vph;
 - Diurnal Traffic: The maximum number of vehicles on the public road network within a given hour is estimated to be in the order of 2.0 vph. Which equates to approximately 16 vehicles, over an eight hour period.
- The minimum required level of service for a Class 2 road is LOS B. The combined and cumulative effects of the peak traffic result in a LOS B, which is the minimum requirement. While the combined and cumulative diurnal traffic results in a LOS A. Thus, the additional traffic volume does not compromise the level of service of the roads.

Safety

- *This is an agricultural area, home to many species of small fauna, including livestock and wild animals. Stray animals on or crossing the road is a common occurrence that could result in a collision;*
- *Additional vehicles on the road will be subject to these hazards, with a potential for an increase in incidents;*
- *Intersections on the TR03305 are high-risk areas for incidents that need to be addressed.*

12.2 RECOMMENDATIONS

Based on the conclusions of this report, the following recommendations are made and should be included in the conditions of the environmental authorisation:

- *The developer shall upgrade the intersection at the entrance to the proposed development from the TR03305 to accommodate the expected transportation requirements. This upgrade would need to be implemented to facilitate the deliveries, including abnormal loads, to the proposed development;*
- *The developer shall contribute to the maintenance of all roads affected by the development, during the construction and operational phases of the development;*
- *A Traffic Management Plan (TMP) is required. The TMP is to be compiled once the contractor has been appointed and all the relevant details of the construction process are known;*
- *The TMP should consider the scope of the development and take cognisance of the existing condition of the road network at the time the project commences;*
- *Intersections are high-risk areas and shall be a key area of consideration;*
- *The developer shall ensure that the contractor provides the necessary driver training to key personnel to minimise the potential of incidents on the public road network;*
- *Temporary signs warning motorists of construction vehicles should be erected on the approaches to the access road;*
- *The developer shall ensure that the condition of the roads impacted by construction of the development is left in a similar or better state once the construction phase is complete;*

Considering the above findings, it can be concluded that the proposed development of the Jessa Wind Farm Cluster will have a notable increase in traffic volumes on the road network during the peak construction phase of the proposed developments. However, this report has assessed the impact of these additional traffic volumes on the surrounding road network. It can conclude that the level of service on all the roads are acceptable. Although the road network is not well maintained due to budgetary constraints within various spheres of government. The increase in traffic volumes will lead to greater wear and tear, especially during construction, but will not have an undue detrimental impact on the road network within the study area if the mitigation measures are undertaken.

It is the reasoned opinion of the author that the proposed development of the Jessa Wind Farm Cluster can be approved from a traffic and transportation perspective as there are no constraints or notable impacts that would jeopardise the implementation of the development, subject to the specific requirements included within this report.

13 APPENDICES

Appendix 1: Declaration

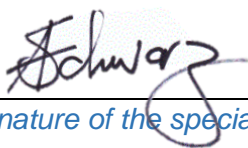
Appendix 2: NEMA Requirements for Specialist Reports

Appendix 3: Curriculum Vitae

APPENDIX 1 - DECLARATION

I, Athol Carl Schwarz, as the appointed specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that I:

- *in terms of the general requirement to be independent:*
 - *other than fair remuneration for work performed/to be performed in terms of this application, have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity; or*
 - *am not independent, but another specialist that meets the general requirements set out in Regulation 13 has been appointed to review my work (Note: a declaration by the review specialist must be submitted);*
- *in terms of the remainder of the general requirements for a specialist, am fully aware of and meet all of the requirements and that failure to comply with any the requirements may result in disqualification;*
- *have disclosed/will disclose, to the applicant, the Department and interested and affected parties, all material information that has or may have the potential to influence the decision of the Department or the objectivity of any report, plan or document prepared or to be prepared as part of the application;*
- *have ensured/will ensure that information containing all relevant facts in respect of the application was/will be distributed or was/will be made available to interested and affected parties and the public and that participation by interested and affected parties was/will be facilitated in such a manner that all interested and affected parties were/will be provided with a reasonable opportunity to participate and to provide comments;*
- *have ensured/will ensure that the comments of all interested and affected parties were/will be considered, recorded and submitted to the Department in respect of the application;*
- *have ensured/will ensure the inclusion of inputs and recommendations from the specialist reports in respect of the application, where relevant;*
- *have kept/will keep a register of all interested and affected parties that participate/d in the public participation process; and*
- *am aware that a false declaration is an offence in terms of regulation 48 of the 2014 NEMA EIA Regulations.*



Signature of the specialist:

Athol Schwarz

Name:

15th February 2022

Date:

APPENDIX 2 - NEMA REQUIREMENTS FOR SPECIALIST REPORTS

Appendix 6	Specialist Report content as required by the NEMA 2014 EIA Regulations, as amended	Section
1 (1)(a)	(i) the specialist who prepared the report; and	Appendix 3
	(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;	
(b)	a declaration that the specialist is independent in a form as may be specified by the competent authority;	Appendix 1
(c)	an indication of the scope of, and the purpose for which, the report was prepared;	Section 5.2
(cA)	an indication of the quality and age of the base data used for the specialist report;	Section 7.1.2
(cB)	a description of existing impacts on the site, cumulative impacts of the development and levels of acceptable change;	Section 8 & 9
(d)	the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 1
(e)	a description of the methodology adopted in preparing the report or carrying out the specialised process, inclusive of equipment and modelling used;	Section 5.4
(f)	details of an assessment of the specifically 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 6.1
(g)	an identification of any areas to be avoided, including buffers;	NA
(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;	NA
(i)	a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 5.5
(j)	a description of the findings and potential implications of such findings on the impact of the proposed activity, or activities;	Section 10
(k)	any mitigation measures for inclusion in the EMPr;	Section 12.2
(l)	any conditions for inclusion in the environmental authorisation;	Section 12.2
(m)	any monitoring requirements for inclusion in the EMPr or environmental authorisation;	NA
(n)	a reasoned opinion-	Section 12.2
	(i) whether the proposed activity or portions thereof should be authorised; and	
	(iA) regarding the acceptability of the proposed activity or activities; and	
	(ii) if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	
(o)	a description of any consultation process that was undertaken during the course of preparing the specialist report;	Section 6.1.5
(p)	a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	NA
(q)	any other information requested by the competent authority.	NA
2	Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A

APPENDIX 3 - CURRICULUM VITAE

ATHOL SCHWARZ Pr Tech Eng

Independent Author

Athol, is a Professionally Registered Civil Engineering Technologist with more than 35 years of experience, specialising in Civil and Structural Engineering services for renewable energy facilities and infrastructure. These services range from the concept phase all the way through to project close-out, including inter alia: design, contract and construction management phases.

Since 2010, Athol was employed by Hatch, as a Civil Engineering Author working on numerous infrastructure and renewable energy projects (including wind farms, fixed and rotating PV solar plants, CPV solar plants) for various Independent Power Producers (IPP) / Developers.

Athol has experience in traffic impact assessments, transportation route analysis, infrastructure development and design, construction and project management (NEC), with a keen eye for detail.

SPECIFIC RELEVANT EXPERIENCE

- Red Cap Energy (Pty) Ltd - Impofu Wind Farms consisting of Impofu North Wind Farm, Impofu West Wind Farm and Impofu East Wind Farm
- juwi Renewable Energies (Pty) Ltd – Paulputs Traffic Impact Assessment
- CPV1 Solar - Touwsriver Solar, Western Cape, 36 MW Concentrated Photovoltaic Plant (1500 trackers), supervised civil infrastructure activities
- juwi Renewable Energies (Pty) Ltd - Moorreesberg Wind Energy Facility, Moorreesberg, Western Cape, consisting of 25 wind Turbine Generators - feasibility study for the routing of the access roads.
- juwi Renewable Energies (Pty) Ltd - Garob Wind Farm, Copperton, Northern Cape, consists of 46 Acciona 3.0 MW Wind Turbine Generators - conducted a hydrological study to determine the potential impact of the flood levels on the development,
- juwi Renewable Energies (Pty) Ltd - Wolf Wind Farm, Kleinpoort, Eastern Cape, consisting of 28 Wind Turbine Generators - identify the most viable access point onto the property and internal access road.
- Scatec Solar AS (Norway) - Dreunberg Filter Yard (Capacitor bank), 75 MW Single-axis PV plant – Burgersdorp, Eastern Cape – Quality control of civil activities.
- Scatec Solar AS (Norway) - Linde Filter Yard (Capacitor bank), 36.8 MW Single-axis PV plant – Hanover, Northern Cape – Quality control of civil activities.
- Scatec Solar AS (Norway) - Kalkbult Filter Yard (Capacitor bank), 75 MW Single-axis PV plant – De Aar, Northern Cape – Quality control of civil activities.
- juwi Renewable Energies (Pty) Ltd - Keiskammahoek Wind Farm, King William's Town, Eastern Cape, consisting of 16 Wind Turbine Generators - feasibility study to minimise the impact on the commercial plantation due to the development of Keiskammahoek Wind Farm
- South Africa Mainstream Renewable Power De Aar PV (Pty) Ltd - 50 MW PV Plan – De Aar, Northern Cape – clients engineer
- South Africa Mainstream Renewable Power Droogfontein PV (Pty) Ltd – 50 MW PV Plan – Kimberly, Northern Cape – clients engineer
- juwi Solar ZA Construction 3 (Pty) Ltd - Aries, 9.7 MW PV Plant – Kenhardt, Northern Cape - civil author services and Traffic Impact Assessment
- juwi Solar ZA Construction 3 (Pty) Ltd - Konkoonsies, 9.7 MW PV Plan – Pofadder, Northern Cape - civil author services and Traffic Impact Assessment
- juwi Renewable Energies (Pty) Ltd - Namies Wind Energy Facility, near Aggeneys, Northern Cape, consists of between 46 and 58 wind turbine generators - transportation route assessment



EDUCATION

Master's Diploma in Technology – Civil: Structures (1989)

National Higher Diploma (1987)

National Diploma (1986)

LANGUAGES

- English
- Afrikaans
- French (limited)

PROF AFFILIATIONS

- ECSA - Professional Engineering Technologist,
- SAICE - South African Institution of Civil Engineering - Member

COMPETENCES

- Structural Design (concrete and steel),
- Project and Construction Management

SOFTWARE

- MS Office
- MS Projects
- Micro Station and Autocad
- Prokon
- Model Maker

- *juwi Renewable Energies (Pty) Ltd - Outeniqua Wind Farm (North), Uniondale, Western Cape - transportation route assessment*
- *juwi Renewable Energies (Pty) Ltd - Wolf Wind Farm, Kleinpoort, Eastern Cape consisting of 25 Wind Turbine Generators - feasibility study for the access routes*
- *juwi Renewable Energies (Pty) Ltd - Outeniqua Wind Farm (South), Uniondale, Western Cape, 16 Wind Turbine Generators - feasibility study for the access routes*
- *UMOYA ENERGY (Pty) Ltd - Hopefield Wind Farm, approximately 6 km south-east of the town of Hopefield, Western Cape, consisting of 37, Vestas 1.8 MW WTG – ACS HV Yard and Substation.*
- *South Africa Mainstream Renewable Power Jeffreys Bay (Pty) Ltd - Jeffreys Bay Wind Farm, Humansdorp, Eastern Cape, consists of 60 Siemens 2.3 MW WTG - review the foundation design for the wind towers - review the designs for compliance to the national standards.*
- *juwi Solar ZA Construction 3 (Pty) Ltd - RustMo1, 6.8 MW PV Plant – Rustenburg, North-West - author services regarding access and internal gravel roads*
- *Barrick Africa (Pty) Ltd - Buzwagi Gold Mine in Tanzania – a feasibility study.*
- *juwi Renewable Energies (Pty) Ltd - Garob Wind Farm, Copperton, Northern Cape, consists of 46 Acciona 3.0 MW Wind Turbine Generators - transportation management plan.*
- *Slim Sun Swartland Solar Park - SlimSun Solar - 5 MW PV Plant – Malmesbury, Western Cape – ACS for HV Yard and Substation.*
- *Cennergi (Pty) Ltd - Kopleegte Switching Station at Amakhala Emoyen Phase 1, Bedford, Eastern Cape, consisting of 56 Nordex, 2,4 MW Wind Turbines Generators- ACS for HV Yard and Substation.*
- *EXXARO Resources Ltd And Watt Energy (Pty) Ltd - Wittekleibosch Switching Station at Tsitsikamma Community Wind Farm, Tsitsikamma, Eastern Cape, consists of 31 Vestas 3.0 MW WTG - ACS for HV Yard and Substation.*
- *Windlab Developments South Africa (Pty) Ltd - AMAKALA EMOYENI – Phase 2, Bedford, Eastern Cape, consisting of 66 WTG - feasibility study for access and internal road network*
- *Windlab Developments South Africa (Pty) Ltd – Phase 1, Bedford, Eastern Cape, consisting of 56 Nordex, 2,4 MW Wind Turbines Generators - feasibility study for access and internal road network*
- *IBEDRROLA - Klip Heuwel Switching Station at Caledon Wind Farm, Caledon, Western Cape, consisting of 9, Sinovel 3.0 MW Wind Turbines Generators – ACS for HV Yard and Substation.*
- *EXXARO Resources Ltd - Lephalale 60 MW PV Plant, 13 km north-west of the town of Lephalale, Limpopo - ACS for HV Yard and Substation.*
- *SASOL Technology - 3.6 MW PV Demonstration Plant – civil author services*
- *Solafrica Pty (Ltd) - Bokpoort CSP Project, a 50 MW Concentrating Solar Thermal Power Station (CSP – parabolic trough) located approximately 80 km east-south-east of Upington, Northern Cape - prepared enquiry documentation for the geotechnical investigation and topographic survey*