PROPOSED SOYUZ 3 WIND ENERGY FACILITY, NORTHERN CAPE

TRANSPORT IMPACT ASSESSMENT

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Final Issue

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SYNOPSIS

Preparation of a Transport Study for the Proposed Soyuz 3 Wind Energy Facility, located near Britstown in the Northern Cape Province, pertaining to all relevant traffic and transportation engineering aspects.

KEY WORDS:

Transport Study, Wind Energy Facility

QUALITY VERIFICATION

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

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PROPOSED SOYUZ 3 WIND ENERGY FACILITY TRANSPORT IMPACT ASSESSMENT

TABLE OF CONTENTS

TABLES

FIGURES

ANNEXURES

PROPOSED SOYUZ 3 WIND ENERGY FACILITY
TRANSPORT IMPACT ASSESSMENT

1 INTRODUCTION AND METHODOLOGY

1.1 Scope and Objectives

Soyuz 3 (Pty) Ltd is proposing the development of a commercial Wind Energy Facility (WEF) and associated infrastructure on a site located approximately 35 km south of Britstown within the Emthanjeni Local Municipality and the Pixley ka Seme District Municipality in the Northern Cape Province, as shown in **Figure 1.1.**

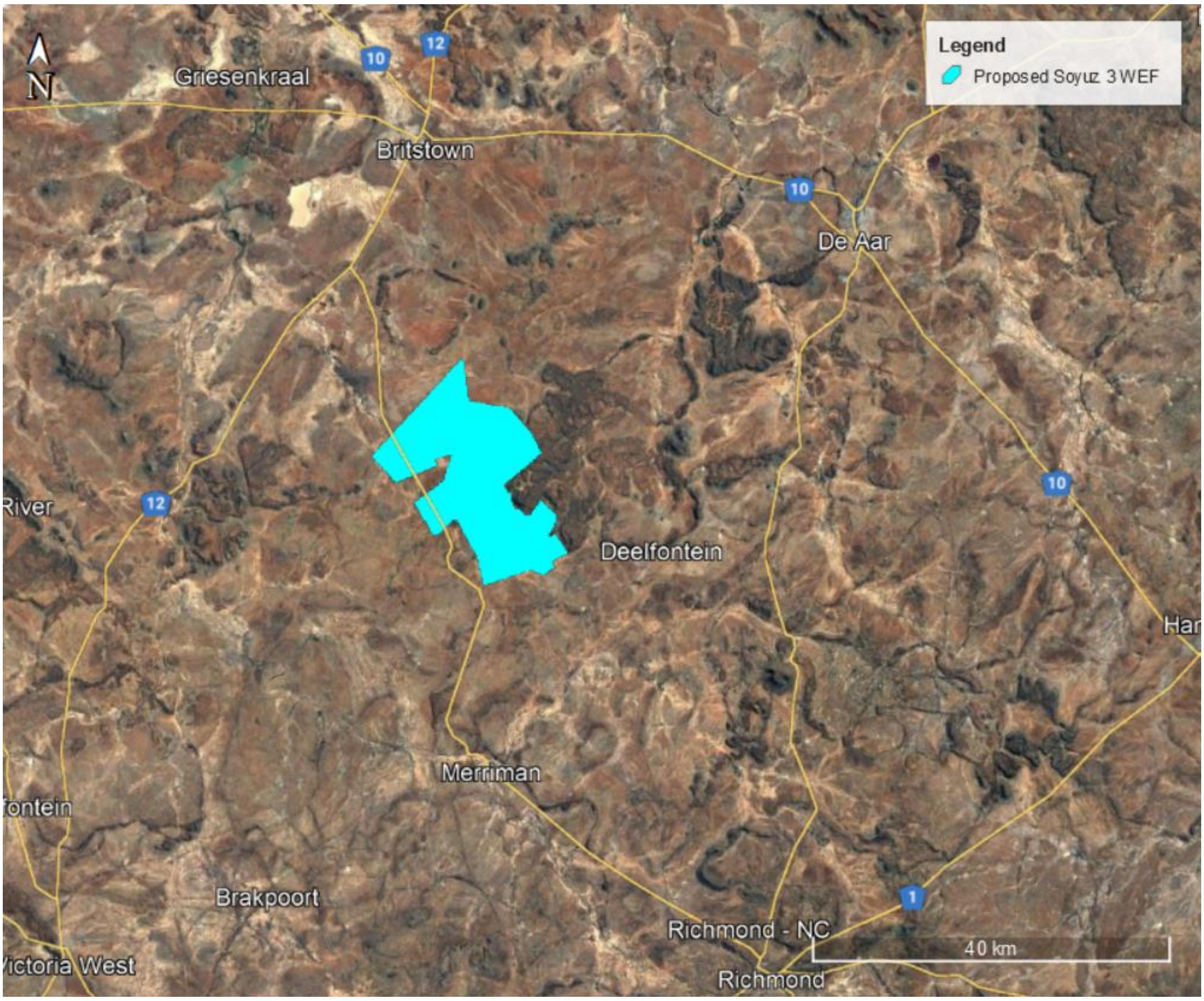

Figure 1-1: Aerial View of the Proposed Soyuz 3 WEF Site

Five additional WEF's are concurrently being considered on the surrounding properties and are assessed by way of separate impact assessment processes contained in the 2014 Environmental Impact Assessment Regulations (GN No. R982, as amended) for listed activities contained in Listing Notices 1, 2 and 3 (GN R983, R984 and R985, as amended). These projects are known as Soyuz 1 WEF, Soyuz 2 WEF, Soyuz 4 WEF, Soyuz 5 WEF and Soyuz 6 WEF.

A preferred project site with an extent of approximately 125 000 ha has been identified as a technically suitable area for the development of the six WEF projects. It is proposed that each WEF will comprise up to 75 turbines with a contracted capacity of up to 480 MW. It is anticipated that each WEF will have an actual (permanent) footprint of up to 150 ha.

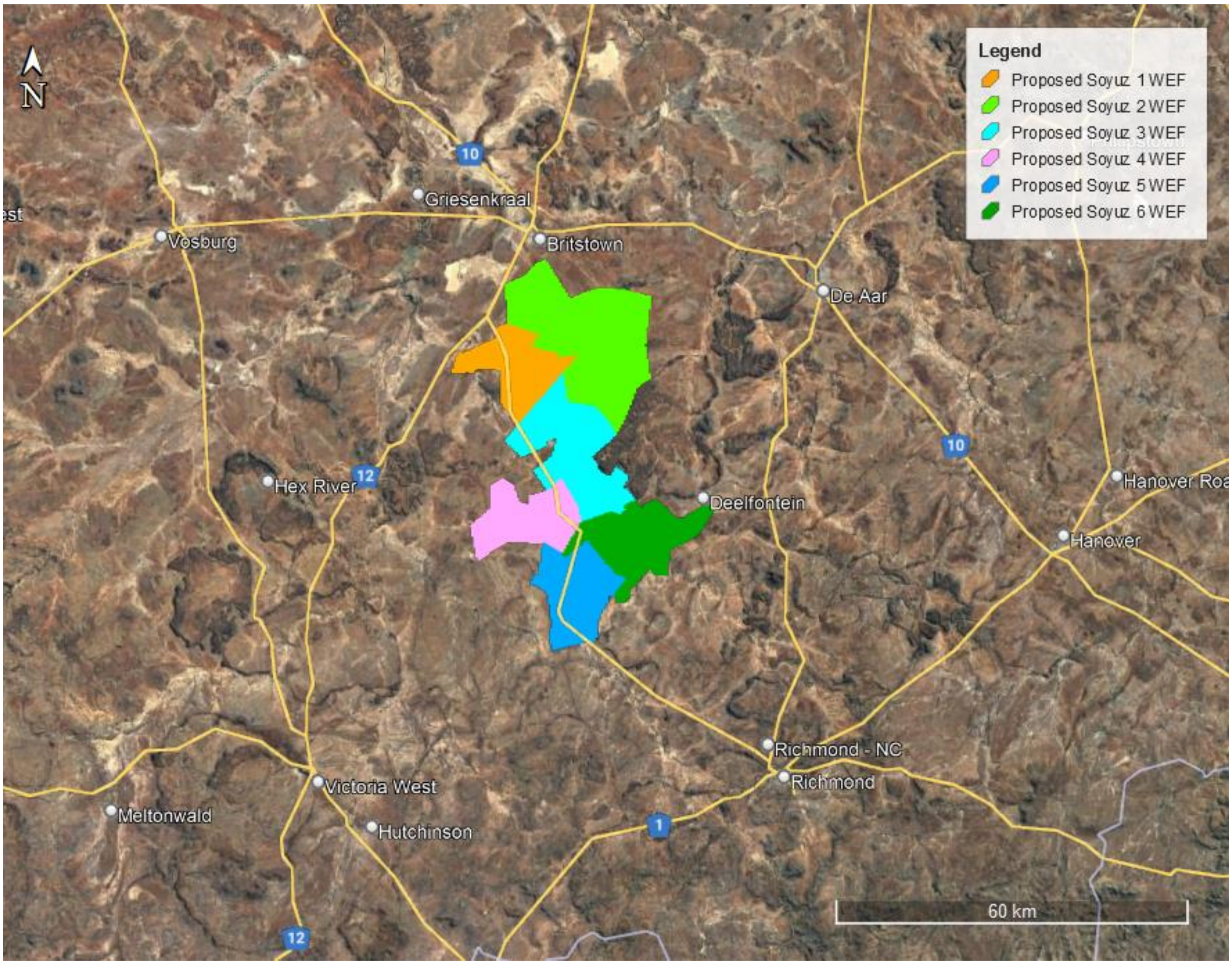

Figure 1-2: Aerial view of the proposed Soyuz 1 to 6 WEF sites

As part of the environmental impact process, the services of a Transportation Specialist are required to conduct the Transport Study for the proposed facility.

The following two main transportation activities will be investigated:

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

The transport study will aim to provide the following objectives:

- Recommend a preliminary route for the transportation of the components to the proposed site.
- Recommend a preliminary transportation route for the transportation of materials, equipment and people to site.

- Recommend alternative or secondary routes where possible.

1.2 Terms of Reference

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

General:

- an indication of the methodology used in determining the significance of potential environmental impacts;
- a description of all environmental issues that were identified during the environmental impact assessment process;
- an assessment of the significance of direct, indirect and cumulative impacts in terms of the following criteria:
  - the *nature* of the impact, which shall include a description of what causes the effect, what will be affected and how it will be affected;
  - the *extent* of the impact, indicating whether the impact will be local (limited to the immediate area or site of development), regional, national or international;
  - the *duration* of the impact, indicating whether the lifetime of the impact will be of a short-term duration (0–5 years), medium-term (5–15 years), long-term (> 15 years, where the impact will cease after the operational life of the activity) or permanent;
  - the *probability* of the impact, describing the likelihood of the impact actually occurring, indicated as improbable (low likelihood), probable (distinct possibility), highly probable (most likely), or definite (impact will occur regardless of any preventative measures);
  - the *severity/beneficial scale*, indicating whether the impact will be very severe/beneficial (a permanent change which cannot be mitigated/permanent and significant benefit, with no real alternative to achieving this benefit), severe/beneficial (long-term impact that could be mitigated/long-term benefit), moderately severe/beneficial (medium- to long-term impact that could be mitigated/ medium- to long-term benefit), slight or have no effect;
  - the *significance*, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high;
  - the *status*, which will be described as either positive, negative or neutral;
  - the *degree* to which the impact can be reversed;
  - the *degree* to which the impact may cause irreplaceable loss of resources; and
  - the *degree* to which the impact can be *mitigated.*
- a description and comparative assessment of all alternatives identified during the environmental impact assessment process;
- recommendations regarding practical mitigation measures for potentially significant impacts, *for inclusion in the Environmental Management Programme (EMPr);*
- an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;
- a description of any assumptions, uncertainties and gaps in knowledge;
- an environmental impact statement which contains:
  - a summary of the key findings of the environmental impact assessment; and
  - an assessment of the positive and negative implications of the proposed activity.

Specific:

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

1.3 Approach and Methodology

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

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

This transport study was informed by the following:

Site Visit and Project Assessment

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

The transport study considered and assessed the following:

Traffic and Haul Route Assessment

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

Site layout, Access Points and Internal Roads Assessment per Site

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

1.4 Assumptions, knowledge gaps and limitations

The following assumptions and limitations apply:

- This study is based on the project information provided by the Client.
- According to the Eskom Specifications for Power Transformers (Eskom Power Series, Volume 5: Theory, Design, Maintenance and Life Management of Power Transformers), the following

dimensional limitations need to be kept when transporting the transformer – total maximum height 5 000mm, total maximum width 4 300mm and total maximum length 10 500mm.

- Maximum vertical height clearances along the haulage route is 5.2m for abnormal loads.
- The imported elements will be transported from the most feasible port of entry, which is deemed to be Port of Ngqura in the Eastern Cape.
- If any elements are manufactured within South Africa, these will be transported from their respective manufacturing centers, which would be either in the greater Johannesburg, Cape Town or Pinetown/Durban.
- All haulage trips on the external road network will occur on either surfaced national and provincial roads or existing gravel roads.
- Material for the construction of internal access roads will be sourced locally as far as possible.

1.5 Source of Information

Information and software used in the transport study includes:

- Project Information provided by the Client;
- Google Earth .kmz provided by the Client;
- Google Earth Satellite Imagery;
- Road Traffic Act, 1996 (Act No. 93 of 1996)
- National Road Traffic Regulations, 2000
- SANS 10280/NRS 041-1:2008 - Overhead Power Lines for Conditions Prevailing in South Africa
- The Technical Recommendations for Highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads
- Information gathered during the site visit undertaken on 5 September 2019; and
- Project research of all available information.

2 DESCRIPTION OF PROJECT ASPECTS RELEVANT TO THE STUDY

2.1 Port of Entry

It is assumed that the wind turbine components will be imported to South Africa via the Port of Ngqura in Coega, which is located near Port Elizabeth in the Eastern Cape. The Port of Ngqura is a world-class deep-water transshipment hub offering an integrated, efficient and competitive port service for containers on transit. The Port forms part of the Coega Industrial Development Zone (CIDZ) and is operated by Transnet National Ports Authority.

2.2 Selected Candidate Turbine

The possible range of wind turbines varies largely with various wind turbine manufacturers operating worldwide. The project information states that a turbine with a hub height of up to 160m and a rotor diameter of up to 200m is to be considered.

In general, each turbine unit consists of a tower, a Nacelle (final weight dependent on the supplier and whether the nacelle has gears or not) and rotor blades.

2.3 Transportation requirements

2.3.1 Abnormal Load Considerations

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

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

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

2.3.2 Further Guideline Documentation

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

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

2.3.3 Permitting – General Rules

The limits recommended in the TRH 11 guideline document are intended to serve as a guide to the Permit Issuing Authorities. It must be noted that each Administration has the right to refuse a permit application or to modify the conditions under which a permit is granted. It is understood that:

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

2.3.4 Load Limitations

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

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

2.3.5 Dimensional Limitations

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

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

2.3.6 Transporting Wind Turbine Components

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

2.3.6.1 Nacelle

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

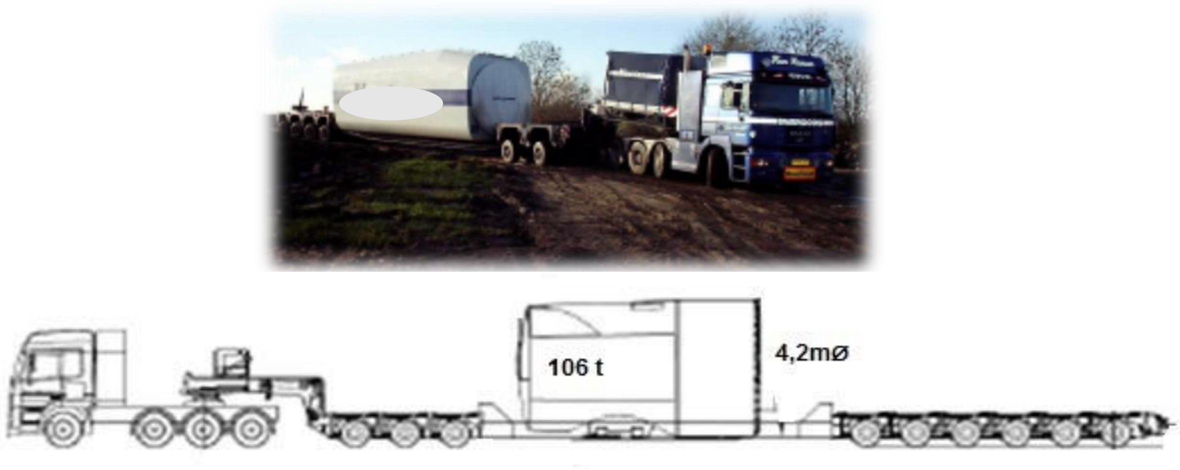

Figure 2-1: Example - Transporting the Nacelle

2.3.6.2 Blades

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

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

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

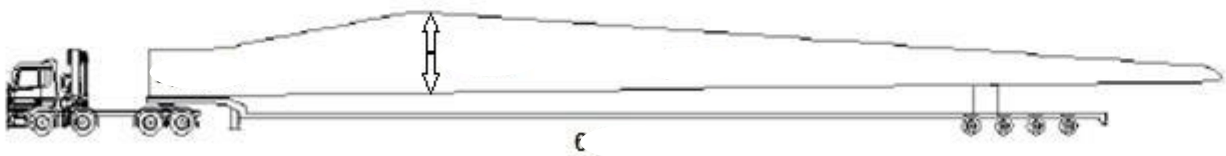

Figure 2-3: Example of Blade Transport

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

2.3.6.3 Tower Sections

Steel towers generally consist of 20m long sections, the number of sections being dependent on the selected hub height. A hub height of 200 metres would therefore consist of approximately 10 tower sections. Each section is transported separately to site on a low-bed trailer. Depending on the trailer configuration and height when loaded, some of these components may not meet the dimensional limitations (height and width) but will be permitted under certain permit conditions.

Figure 2-4: Example – Transportation of Tower Sections

2.3.6.4 Turbine Hub and Rotary Units

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

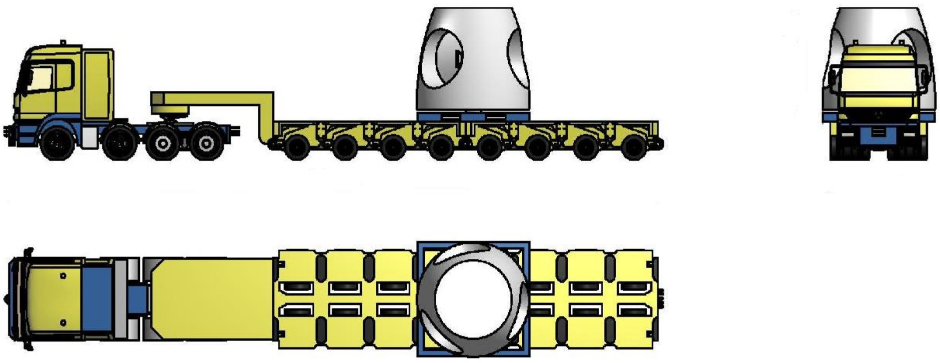

Figure 2-5: Transporting the Hub and Rotary Units

2.3.6.5 Transporting Cranes, Mobile Crane and other Components

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

2.3.6.6 Cranes for Assembly and Erection on Site

<u>Option 1: Crawler Crane & Assembly Crane</u>

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

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

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

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

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

<u>Option 2: GTK 1100 Crane & Assembly Crane</u>

The GTK 1100 hydraulic crane was used for the assembly of the single wind turbine at Coega (see example in picture below). The GTK 1100 was designed to lift ultra-heavy loads to extreme heights.

Figure 2-6: Example - Cranes at work

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

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

2.3.6.7 Cranes at Port of Entry

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

Figure 2-7: Example - Cranes at Port of Entry

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

2.3.6.8 Transporting Other Plant, Material and Equipment

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

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 Description of the site

The proposed Soyuz 3 WEF will be located south of Britstown in the Northern Cape within the Emthanjeni Local Municipality and the Pixley ka Seme District Municipality in the Northern Cape Province, as shown in **Figure 3-1**. The gravel minor regional road R398 traverses the southern boundary of the site.

The Soyuz 3 WEF project site covers approximately 23 800 ha and comprises the following farm portions:

- Portion 4 of the Farm No. 143
- Remaining Extent of Portion 1 of the Farm No. 143
- Portion 9 of the Farm Combuisfontein No. 142.
- Portion 8 of the Farm Combuisfontein No. 142
- Portion 4 of the Farm Combuisfontein No. 142
- Portion 3 (a portion of Portion 1) of the Farm Combuisfontein No. 142
- Portion 6 (a portion of Portion 1 – Gemsbokdam) of the Farm Combuisfontein No. 142
- Portion 2 of the Farm Combuisfontein No. 142
- Portion 2 of the Farm No. 2
- Portion 0 of Farm No. 144.
- Portion 1 of the Farm No. 2
- Remaining Extent of the Farm No. 2
- Remaining Extent of Portion 13 of the Farm Welgedagt No. 3

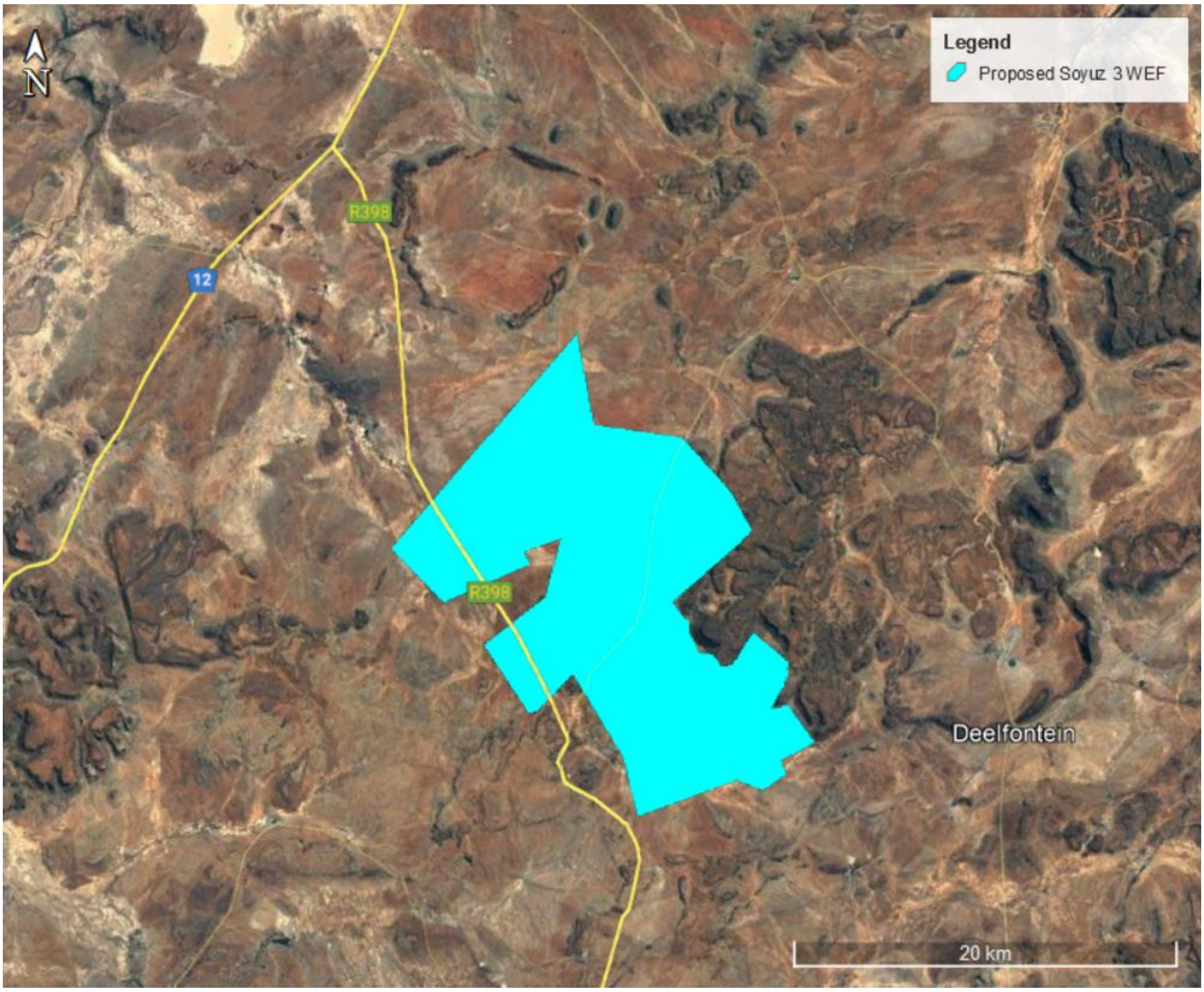

Figure 3-1: Aerial View of Proposed Soyuz 3 WEF

The Soyuz 3 WEF project site is proposed to accommodate the following infrastructure, which will enable the wind farm to supply a contracted capacity of up to 480 MW:

- Up to 75 wind turbines with a maximum hub height of up to 160 m and a rotor diameter of up to 200 m;
- A transformer at the base of each turbine;
- Concrete turbine foundations of up to 1024 m^2 each;
- Permanent Crane hardstand / blade and tower laydown area / crane boom erection area with a combined maximum footprint 5000 m^2 at each WTG;
- Temporary concrete batch plants to be located at the construction camp area and the satellite laydown areas;
- Battery Energy Storage System (with a footprint of up to 5 ha);
- Internal up to 132 kV overhead lines between substations. A 300m wide corridor (150m on either side of the proposed route) has been considered to allow for any technical and environmental sensitivity constraints identified during micro-siting prior to layout

finalisation. Permanent service roads will be required for the construction and maintenance of the overhead lines. In areas where these overhead lines do not follow an existing or proposed road, additional roads of up to 3m in width will be required. Temporary construction areas beneath each overhead line tower position will also be required;

- Medium voltage (33 kV) cables/powerlines running from wind turbines to the facility substations. The routing will follow existing/proposed access roads and will be buried where possible. If the use of overhead lines is required, the Avifaunal Specialist will be consulted timeously to ensure that a raptor friendly pole design are used, and that appropriate mitigation is implemented pro-actively.
- Up to six permanent met masts;
- Three substations and operation and maintenance facilities (up to 4 ha each) as well as a laydown area (8 000 m^2) at each substation for the electrical contractor. Operation and maintenance facilities include a gate house, security building, control centre, offices, warehouses and workshops.
- Three temporary main construction camp areas (up to 12.25 ha each);
- Twelve temporary satellite laydown areas (5 000 m^2 each).
- Access roads to the site and between project components inclusive of stormwater infrastructure. A 200 m road corridor is being applied for to allow for slight realignments pending technical and environmental sensitivity constraints identified during micro-siting prior to layout finalisation. The final road will have maximum width of 12 m (within the 200 m corridor).

3.2 National Route to Site

The Port of Ngqura is located approximately 563km travel distance from the proposed Soyuz 3 WEF.

The preferred route for the abnormal load vehicles, shown in **Figure 3-2**, will be from the Port of Ngqura, heading north on the N10 passing Cradock and Middelburg to Britstown. At Britstown, the vehicle will head south on the N12 and the R398 to the proposed site

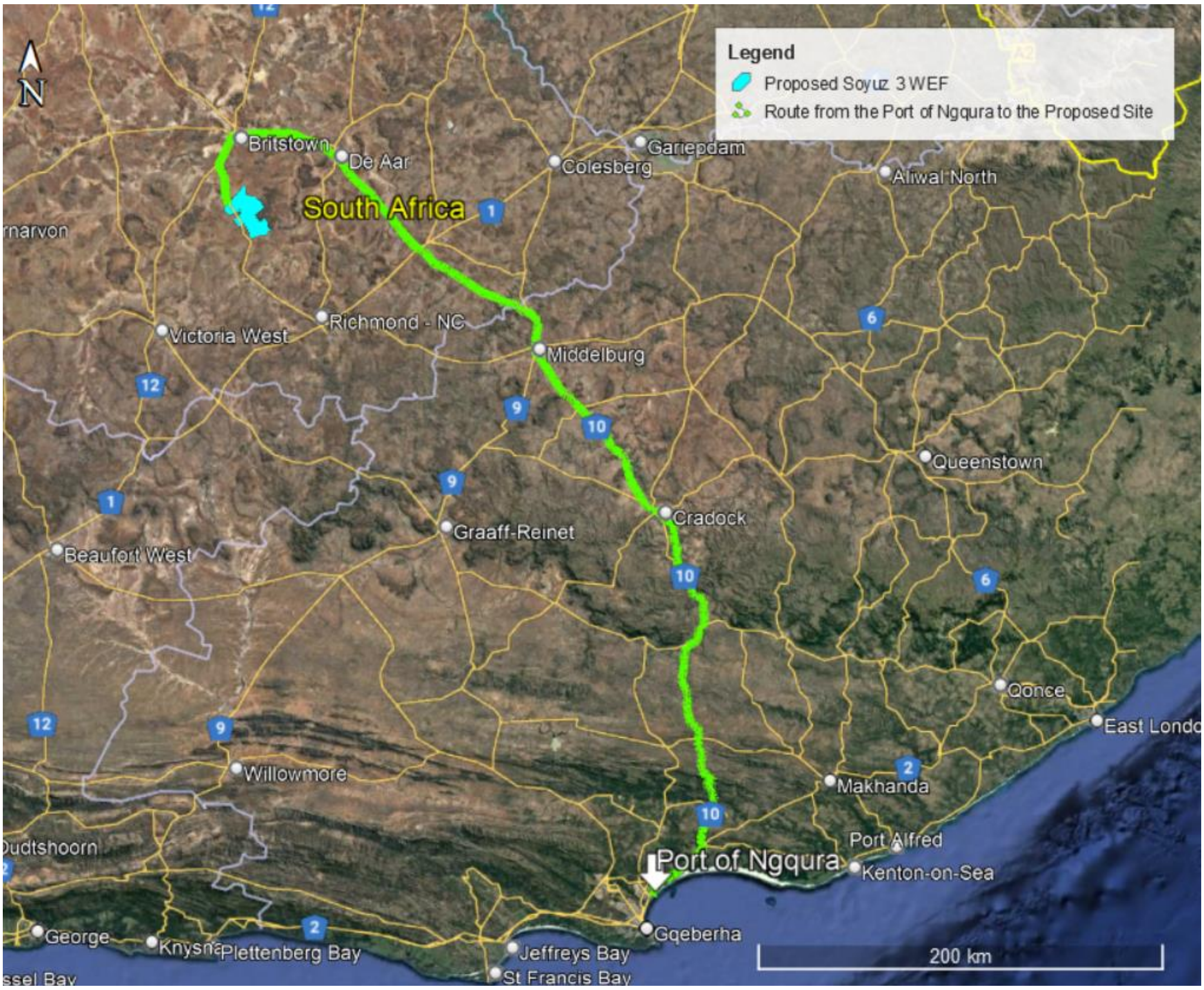

Figure 3-2: Preferred route from the Port to the Proposed Site

It is critical to ensure that the abnormal load vehicles will be able to move safely and without obstruction along the route. It is therefore recommended to undertake a "dry-run" prior to the transportation of any turbine components with the largest abnormal load vehicle, after the road modifications have been implemented, to ensure that the delivery of the turbines will occur without disruptions.

3.3 Proposed Main Routes and Access Points to the Proposed Site

Access to the proposed turbine locations will be provided via an existing road, located north-west of the site boundary along the minor regional route R398, and the internal road network, as shown in **Figure 3-3**. Minor regional route R398 is a gravel road which provides a link between Britstown and Richmond. The traffic volumes along R398 are low, with the residents in the area being the main road users. It is recommended to consolidate the access points i.e., provide fewer access points along the R398 by connecting turbines via the internal road network. It is also recommended that appropriate warning signs be used along the R398 to alert road users of access points.

A second existing road to the south of the site (see **Figure 3-4**) can provide access, however, this existing road is located on a curve and intersects with the R398 at an angle, which affects the sight lines of drivers. Should this existing road be used during the construction phase, appropriate warning signs should be used to alert road users or the east approach is to be redesigned to intersect with the R398 at a 90 degree angle. Alternatively, the southern portion of the site can be accessed via the access point to the north of the site and the internal road network.

It should be noted that the road authority such as the Northern Cape Provincial Government's Department of Roads and Public Works will assess each application for access along public roads before approval is granted.

The access points to the site will need to accommodate construction and abnormal load vehicles. A minimum road width of 8m is recommended for the access points and the internal roads can have a minimum width of 5m. The radius at the access point needs to be large enough to allow for all construction vehicles to turn safely. It is recommended that the access point be surfaced, and the internal access roads can be surfaced or gravel.

It is recommended that site accesses be access controlled. The type of access control will determine the required stacking distance. The stacking distance is measured between the access boom and the kerb/road edge of the external road. For example, for a boom-controlled access, this boom will need to be moved sufficiently into the site to allow for at least one abnormal vehicle to stack in front of the boom without impeding on external traffic. It is recommended that the site access be controlled via a boom and gatehouse. It is also recommended that security staff be stationed on site at the access booms during construction. A minimum stacking distance of 25m should be provided between the road edge of the external road and the boom.

All road markings and signage need to be in accordance with the South African Road Traffic Signs Manual (SARTSM). Temporary road signage along the R398 will assist in alerting drivers of accesses ahead, where abnormal vehicles turn.

It needs to be ensured that any gravel road sections remain in good condition and will need to be maintained during the additional loading of the construction phase and reinstated after construction is completed.

It should be noted that any low hanging overhead lines (lower than 5.1m), e.g. Eskom and Telkom lines, along the proposed route would have to be moved or raised to accommodate the abnormal load vehicles.

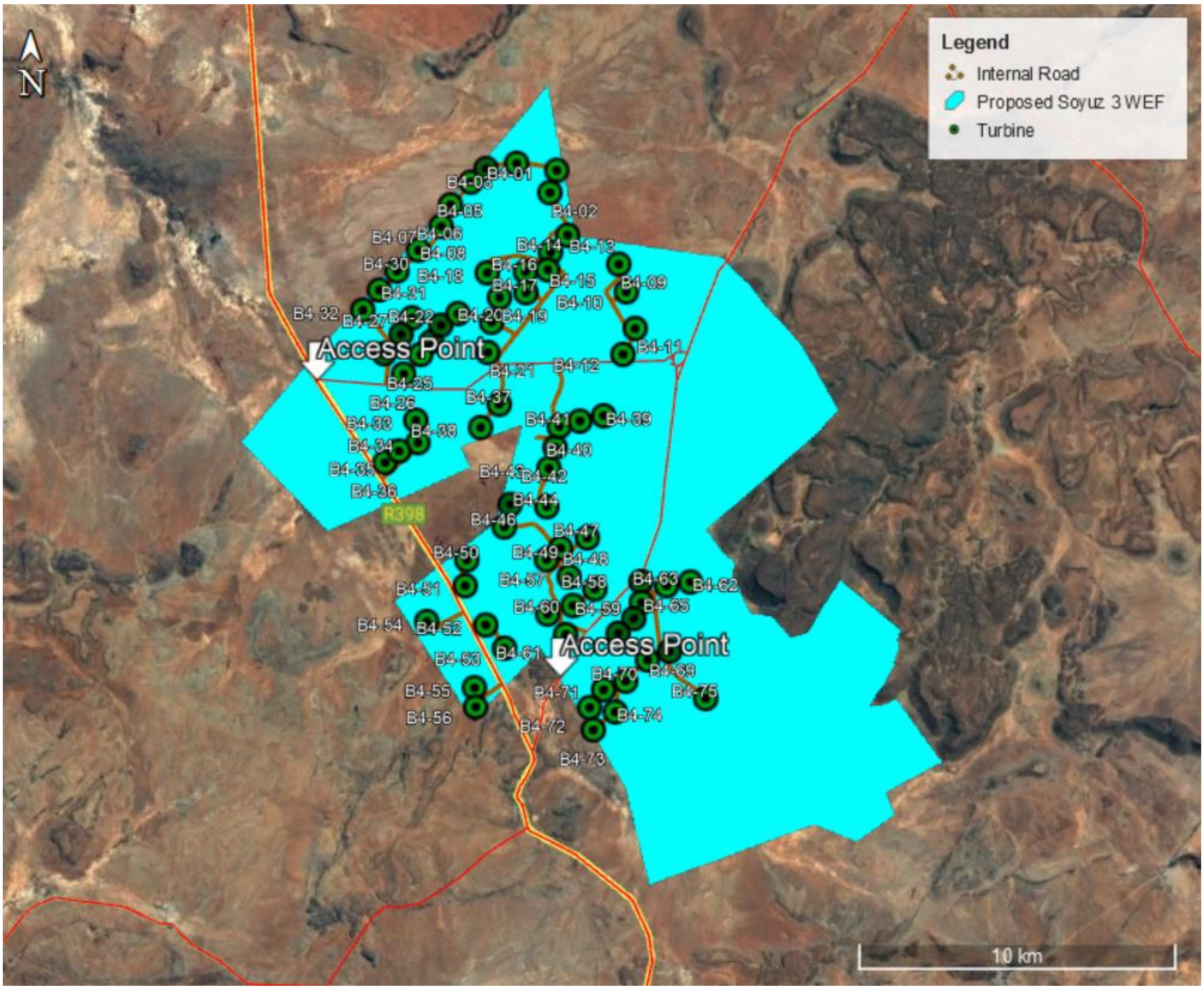

Figure 3-3: Proposed access points

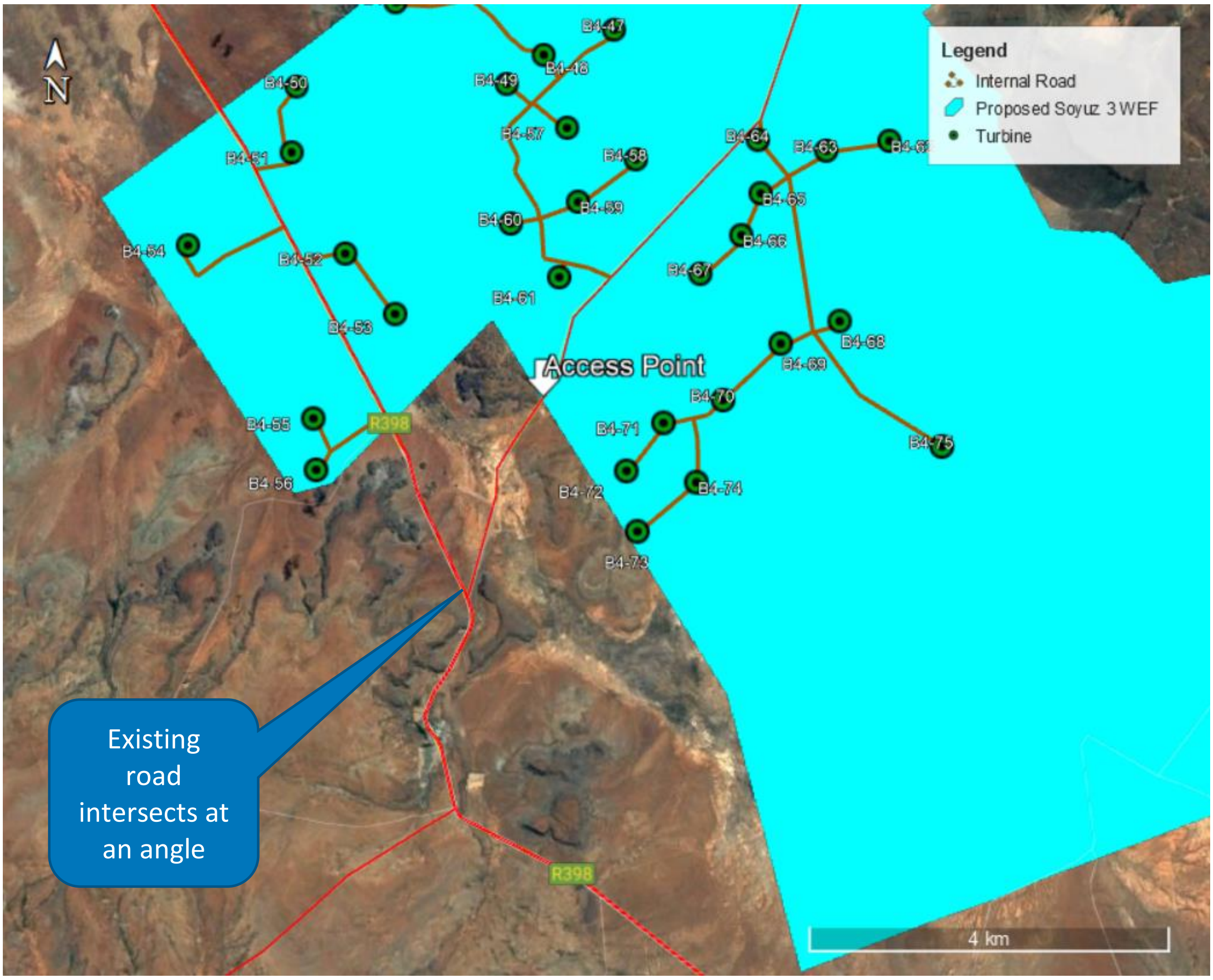

Figure 3-4: Proposed access point

3.4 Internal Roads

The preliminary internal road network is shown in **Figure 3-5**. The internal road geometric design and layout needs to be established at detailed design stage. Existing structures and services, such as drainage structures, signage, street lighting and pipelines will need to be evaluated if impacting on the roads. It needs to be ensured that any gravel sections remain in good condition and will need to be maintained during the additional loading of the construction phase and then reinstated after construction is completed. The gravel roads will require regular grading with a grader to obtain a flat even surface.

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

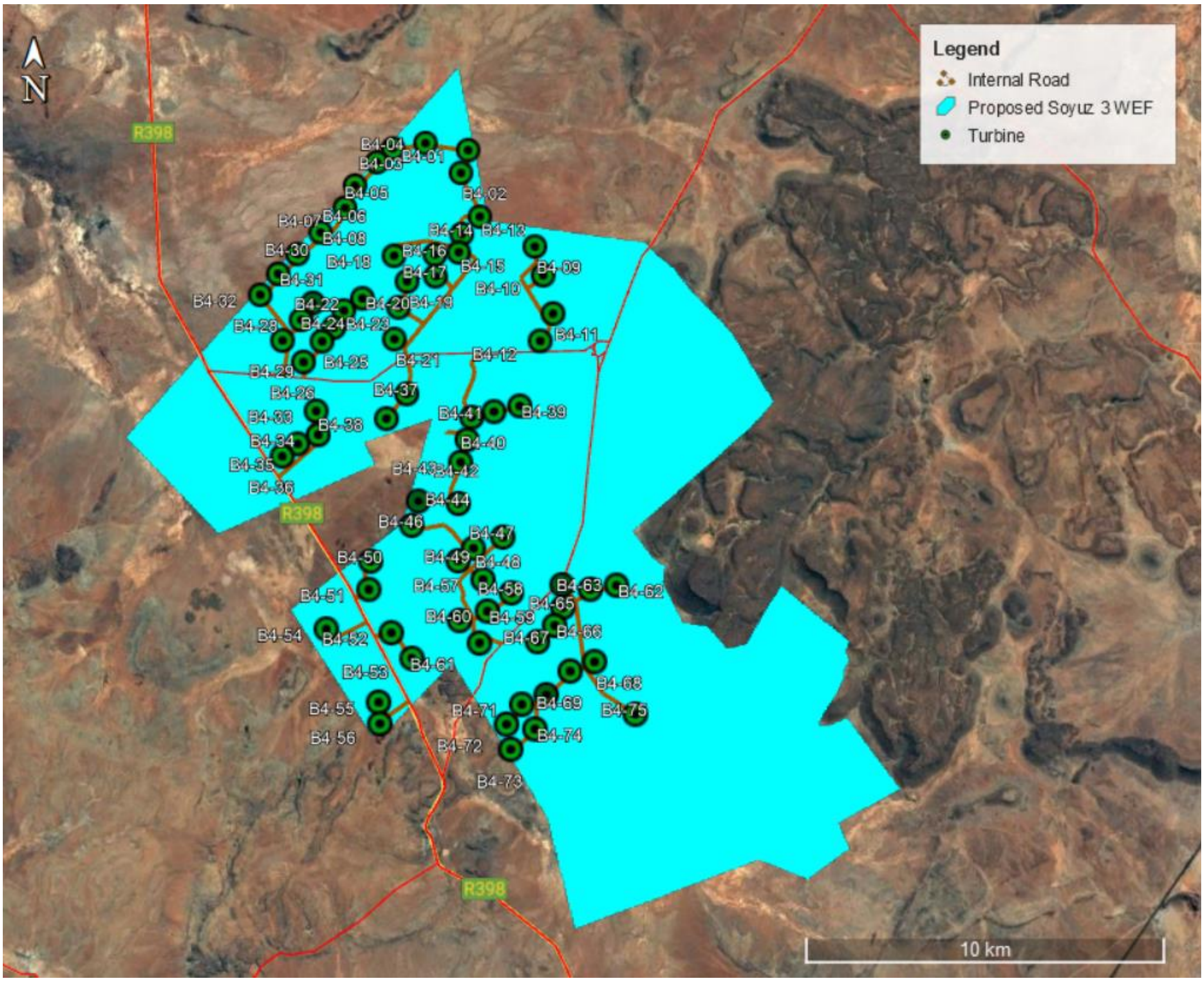

Figure 3-5: Internal roads

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

The nearest towns in relation to the proposed WEF are Britstown and De Aar. It is envisaged that most materials, water, plant, services and people will be procured within a 60km radius of the proposed WEF.

4 APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

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

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

5 IDENTIFICATION OF KEY ISSUES

5.1 Identification of Potential Impacts

The potential transport related impacts are described below.

5.1.1 Construction Phase

Potential impact

- Construction related traffic
- The construction traffic would also lead to noise and dust pollution.
- This phase also includes the construction of roads, excavations, trenching and ancillary construction works that will temporarily generate the most traffic.

5.1.2 Operational Phase

During operation, it is expected that staff and security will visit the facility. Approximately 20 full-time employees (Subject to change. However, based on experience with similar projects, the number of full-time employees is generally low and consequently, the associated trips are negligible) will be stationed on site.

The traffic generated during this phase will be minimal and will not have an impact on the surrounding road network.

5.1.3 Decommissioning Phase

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

5.1.4 Cumulative Impacts

- Traffic congestion/delays on the surrounding road network.
- Noise and dust pollution

6 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

6.1 Potential Impact (Construction Phase)

Nature of the impact

- Potential traffic congestion and delays on the surrounding road network and associated noise and dust pollution.

Significance of impact without mitigation measures

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

6.1.1 Estimated peak hour traffic generated by Soyuz 3 WEF

Construction machinery

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

Component Delivery

It is expected that the delivery of the components to the site during the construction phase will not result in a significant increase in traffic.

For the transportation of the turbines to the proposed site, it was assumed that the turbine blades will be transported to site individually.

Consequently, for each steel wind turbine three (3) abnormal loads will be required for the blades, 10 abnormal loads for the tower sections, one (1) abnormal load for the rotor unit and one (1) abnormal load for the nacelle. All further components will be transported with normal limitation haulage vehicles. With approximately 15 abnormal loads trips (3 trips for blades, 10 trips for tower sections, 1 trip for the rotor unit and 1 trip for the nacelle), the total trips to deliver the components of 75 turbines to the proposed site will be around 1 125 trips (15 trips x 75 turbines). This would amount to less than 3 vehicle trips per day (1 125 trips / 18 months / 22 working days per month) for a construction period of 18 months. For a 12-month construction period, the vehicle trips would amount to less than 5 vehicle trips per day.

In addition to the turbine component delivery trips, one (1) abnormal load is estimated for the transformer.

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

Construction workers trips

The number of construction personnel is affected by project programming, however, the estimate from experience with similar developments is at 200 to 250 workers.

It is further assumed from experience with similar projects that approximately 50% will be low skilled workers (construction labourers, security staff etc.), ~30% semi-skilled workers (drivers, equipment operators etc.) and approximately 20% skilled personnel (engineers, land surveyors, project managers etc.).

Typically, contractors arrange transportation for site workers. Assuming the low skilled and semi-skilled labourers can commute by bus with a 60-passenger capacity, four (4) busses can be assumed for low skilled and semi-skilled labourers. Should minibus taxis be preferred by the contractor, a total of around 15 minibus taxis can be assumed. The skilled labourers are conservatively assumed to travel by passenger car (50 trips).

For rural environments it is further estimated that the peak hour trips are around 20-40% of the average daily traffic (i.e., 22 peak hour trips).

Material delivery

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

Heavy vehicles (turbine foundations): A concrete footing (approximately 650m^3) adds around 108 trips by concrete trucks to the surrounding road network. Concrete batching plants on site or in close vicinity to the site are therefore recommended to reduce trips.

Heavy vehicle (road layer works): Assuming a typical 0.2m gravel wearing course and a 10m road width, 2m^2 of gravel wearing course is assumed for the purpose of the trip estimate. For the anticipated 125km internal road network, around 25 000m^3 will be required. Typically, 1 trip/6m^3 can be assumed for material delivery, which results in a total of 4 167 trips, resulting in average 17 daily trips for a 12-month construction period. To reduce these trips, material excavated for the turbine foundation may be used.

Heavy vehicles (laydown area material): 1 trip/6m^3 is assumed. With an envisaged 27000m^2 laydown area and an assumed 0.2m gravel wearing course is assumed, total 26 daily trips are estimated for laydown area material delivery.

It must be noted that the above is an estimation for average daily trips. Vehicle trips for material delivery will vary depending on the construction task/program, fuel supply arrangements, as well as distance from the material source to the site. Project planning can be used to reduce material delivery during peak hours.

6.1.2 Proposed mitigation measures

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

- The delivery of wind turbine components to the site must be staggered and trips must be scheduled to occur outside of peak traffic periods.
- Dust suppression of gravel roads during the construction and decommissioning phases, as required.
- Regular maintenance of gravel roads by the Contractor during the construction and decommissioning phases.
- The use of mobile batching plants and quarries on or in close proximity to the site would decrease the impact on the surrounding road network.
- Staff and general trips should occur outside of peak traffic periods as far as possible.
- Any low hanging overhead lines (lower than 5.1 m) e.g. Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles.
- The preferred route should be surveyed to identify problem areas e.g. intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, that may require modification. After the road modifications have been implemented, it is recommended to undertake a "dry-run" with the largest abnormal load vehicle, prior to the transportation of any turbine components, to ensure that the delivery of the turbines will occur without disruptions. This process is to be undertaken by the haulage company transporting the components and the contractor, who will modify the road and intersections to accommodate abnormal vehicles. It needs to be ensured that the gravel sections of the haulage routes remain in good condition and will need to be maintained during the additional loading of the construction phase and reinstated after construction is completed.
- Design and maintenance of internal roads. The internal gravel roads will require grading with a road grader to obtain a flat even surface and the geometric design of these gravel roads needs to be confirmed at detailed design stage. This process is to be undertaken by a civil engineering consultant or a geometric design professional. The road designer should take cognizance that roads need to be designed with smooth, relatively flat gradients to allow an abnormal load vehicle to ascend to the top of a hill.

6.1.3 Significance of impact with mitigation measures

The proposed mitigation measures for the construction traffic will result in a minor reduction of the impact on the surrounding road network, but the impact on the local traffic will remain low as the existing traffic volumes are deemed to be low. The dust suppression, however, significantly reduces the impact.

6.2 Potential Impact (Operational Phase)

It is assumed that approximately 20 full-time employees will be stationed on site during the operational phase of the facility. Assuming 40% of trips occur during the peak hour, approximately 8 peak hour trips are estimated for the operational phase.

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

6.3 Potential Impact (Decommissioning Phase)

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

6.4 Cumulative Impacts

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

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

For this project, the following *proposed* renewable energy developments are located in a 100 km radius from Soyuz 3 WEF:

- Soyuz 1 WEF (DFFE Ref: 14/12/16/3/3/2/2205)
- Soyuz 2 WEF (DFFE Ref: 14/12/16/3/3/2/2206)
- Soyuz 4 WEF (DFFE Ref: 14/12/16/3/3/2/2208)
- Soyuz 5 WEF (DFFE Ref: 14/12/16/3/3/2/2209)
- Soyuz 6 WEF (DFFE Ref: 14/12/16/3/3/2/2210)
- Taibu's North WEF (DFFE Ref: TBA)
- Taaibos South WEF (DFFE Ref: TBA)
- Soutrivier Central WEF (DFFE Ref: TBA)
- Soutrivier South WEF (DFFE Ref: TBA)
- Soutrivier North WEF (DFFE Ref: TBA)
- Mainstream Victoria West Wind and Solar (DFFE Ref: 12/12/20/1788)
- Modderfontein Solar PV Facility (DFFE Ref: 14/12/16/3/3/1/917)
- Noblesfontein Wind Energy Facility (DFFE Ref: 12/12/20/1993/2) (operational)
- Ishwati Emoyeni Wind Energy Facility (DFFE Ref: 14/12/16/3/3/2/411)
- Brakpoort PV Solar PV Facility (DFFE Ref: 14/12/16/3/3/2/331)
- Nuweveld North Wind Energy Facility (DFFE Ref: 14/12/16/3/3/2/2042)
- Nuweveld West Wind Energy Facility (DFFE Ref: 14/12/16/3/3/2/2043)
- Nuweveld East Wind Energy Facility (DFFE Ref: 14/12/16/3/3/2/2044)
- De Aar Wind Energy Facility 1 (DFFE Ref: 12/12/20/2463/1)
- De Aar Wind Energy Facility 2 (DFFE Ref: 12/12/20/2463/2

The cumulative impacts are of temporary nature and are rated as **high-negative** if no mitigation measures are implemented

6.5 No-Go Alternative

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

7 IMPACT ASSESSMENT SUMMARY

The assessment of impacts and recommendation of mitigation measures as discussed in Chapter 6 are collated in the tables below. The assessment methodology is attached as **Annexure B**.

Table 7-1: Impact Summary Table (Construction Phase)

POTENTIAL ISSUES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
SPECIALIST IMPACT ASSESSMENT													
TRAFFIC & TRANSPORT RELATED IMPACTS													
Noise and Pollution	During the construction phase, some dust and noise pollution will be generated through heavy vehicles travelling toward and from the site.	Negative	Direct	Moderate	Study Area	Short-term	Definite	Reversible	Resource will not be lost	Achievable	MODERATE-NEGATIVE	▪ Stagger turbine component delivery to site ▪ Reduce the construction period ▪ Stagger the construction of the turbines ▪ The use of mobile batch plants and quarries in close proximity to the site would decrease the impact on the surrounding road network. ▪ Staff and general trips should occur outside of peak traffic periods ▪ Maintenance of haulage routes. ▪ Design and maintenance of internal roads. ▪ Schedule abnormal loads to outside peak traffic periods.	LOW - NEGATIVE
Traffic Impacts	Trips will increase during the construction period, which is of temporary nature (for the duration of the construction period).	Negative	Direct	Moderate	Regional	Short-term	Definite	Reversible	Resource will not be lost	Achievable	MODERATE-NEGATIVE		LOW-NEGATIVE
Traffic Impacts and associated noise and dust pollution	The cumulative impact assumes that all approved developments will be constructed at the same time, which would increase noise, pollution and traffic on surrounding roads for the construction period.	Negative	**Cumulative**	Moderate	Regional	Long-term	Possible	Irreversible	Resource will not be lost	Achievable	HIGH - NEGATIVE	▪ Only some of these developments will be successful at the respective bidding round and then constructed in agreement with the road authorities. ▪ Scheduling of heavy and abnormal vehicles for the developments need to be planned and agreed upon between developers of any projects located within a 50km radius. ▪ Stagger turbine component delivery to site ▪ Reduce the construction period ▪ Stagger the construction of the turbines ▪ The use of mobile batch plants and quarries in close proximity to the site would decrease the impact on the surrounding road network. ▪ Staff and general trips should occur outside of peak traffic periods ▪ Maintenance of haulage routes. ▪ Design and maintenance of internal roads. ▪ Schedule abnormal loads to outside peak traffic periods.	MODERATE - NEGATIVE

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

POTENTIAL ISSUES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
SPECIALIST IMPACT ASSESSMENT													
TRAFFIC & TRANSPORT RELATED IMPACTS													
Noise and Pollution	Very little noise and pollution is expected during the operation of the WEF.	Negative	Direct	slight	Study Area	Short-term	Definite	Reversible	Resource will not be lost	Achievable	LOW-NEGATIVE	▪ Schedule any trips arising for maintenance of wind turbines or other components outside peak traffic periods.	LOW - NEGATIVE
Traffic Impacts	Trips for the operational phase will be limited to permanent staff and maintenance.	Negative	Indirect	Slight	Regional	Short-term	Definite	Reversible	Resource will not be lost	Achievable	LOW-NEGATIVE		LOW-NEGATIVE
Traffic Impacts and associated noise and dust pollution	The cumulative impact assumes that all approved developments will be operational at the same time, which would increase noise, pollution and traffic on surrounding road network.	Negative	**Cumulative**	Moderate	Regional	Long-term	Possible	Irreversible	Resource will not be lost	Achievable	MODERATE - NEGATIVE		LOW-NEGATIVE

Table 7-3: Impact Summary Table (Decommissioning Phase)

POTENTIAL ISSUES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
SPECIALIST IMPACT ASSESSMENT													
TRAFFIC & TRANSPORT RELATED IMPACTS													
Noise and Pollution	During the decommissioning phase, some dust and noise pollution will be generated through heavy vehicles travelling toward and from the site.	Negative	Direct	Moderate	Study Area	Short-term	Definite	Reversible	Resource will not be lost	Achievable	MODERATE-NEGATIVE	▪ Stagger turbine component delivery to site ▪ Reduce the decommissioning period ▪ Stagger the decommissioning of the turbines ▪ The use of mobile batch plants and quarries in close proximity to the site would decrease the impact on the surrounding road network. ▪ Staff and general trips should occur outside of peak traffic periods ▪ Maintenance of haulage routes. ▪ Design and maintenance of internal roads. ▪ Schedule abnormal loads to outside peak traffic periods.	LOW - NEGATIVE
Traffic Impacts	Trips will increase during the decommissioning period, which is of temporary nature (for the duration of the decommissioning period).	Negative	Direct	Moderate	Regional	Short-term	Definite	Reversible	Resource will not be lost	Achievable	MODERATE-NEGATIVE		LOW-NEGATIVE
Traffic Impacts and associated noise and dust pollution	The cumulative impact assumes that all approved developments will be decommissioning at the same time, which would increase noise, pollution and traffic on surrounding roads for the decommissioning period.	Negative	**Cumulative**	Moderate	Regional	Long-term	Possible	Irreversible	Resource will not be lost	Achievable	HIGH - NEGATIVE	▪ Only some of these developments will be successful at the respective bidding round and then constructed in agreement with the road authorities. ▪ Scheduling of heavy and abnormal vehicles for the developments need to be planned and agreed upon between developers of any projects located within a 50km radius. ▪ Stagger turbine component delivery to site ▪ Reduce the construction period ▪ Stagger the construction of the turbines ▪ Staff and general trips should occur outside of peak traffic periods ▪ Maintenance of haulage routes. ▪ Design and maintenance of internal roads. ▪ Schedule abnormal loads to outside peak traffic periods.	MODERATE - NEGATIVE

7.1 Impact Assessment Summary

The overall impact significance findings, *after* the implementation of the proposed mitigation measures, are shown in **Table 7-4** below.

Table 7-4: Overall Impact Significance (Post Mitigation)

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

8 ENVIRONMENTAL MANAGEMENT PROGRAM INPUTS

It is recommended that dust suppression and maintenance of gravel roads form part of the EMPr. This would be required during the Construction phase where an increase in vehicle trips can be expected.

Table 8-1: EMPr Input

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	***Frequency***	***Responsibility***
A. CONSTRUCTION PHASE					
A.1. TRAFFIC IMPACTS					
Increase in traffic will lead to dust and noise pollution.	Minimize impacts on road network and surrounding area.	▪ Stagger component delivery to site. ▪ The use of mobile batching plants and quarries near the site would decrease the impact on the surrounding road network. ▪ Dust suppression ▪ Reduce the construction period as far as possible.	▪ Regular monitoring of road surface quality. ▪ Apply for required permits prior to commencement of construction.	▪ Before construction commences and regularly during construction phase.	▪ EPC and/or Contractor

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	***Frequency***	***Responsibility***
		▪ Maintenance of gravel roads. ▪ Apply for abnormal load permits prior to commencement of delivery via abnormal loads. ▪ Assess the preferred route and undertake a 'dry run' to test. ▪ Staff and general trips should occur outside of peak traffic periods as far as possible. ▪ Any low hanging overhead lines (lower than 5.1m) e.g. Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles, if required.			

B. OPERATIONAL PHASE					
B.1. MAINTENANCE OF GRAVEL ROADS					
Dust pollution and road deterioration	Minimize impacts on road network and surrounding area.	▪ Dust suppression ▪ Maintenance of gravel roads.	▪ Regular monitoring of road surface quality.	▪ Regularly during operational phase.	▪ Client/Facility Manager

9 CONCLUSION AND RECOMMENDATIONS

The potential traffic and transport related impacts for the construction, operation and decommissioning phases of the proposed Soyuz 3 WEF were identified and assessed.

- The main impact on the external road network will be during the construction phase. This phase is temporary in comparison to the operational period. The number of abnormal loads vehicles was estimated and to be found to be able to be accommodated by the road network.
- During operation, it is expected that maintenance and security staff will periodically visit the facility. It is assumed that approximately 20 full-time employees (Subject to change. However, based on experience with similar projects, the number of full-time employees is generally low and consequently, the associated trips are negligible) will be stationed on site. The traffic generated during this phase will be minimal and will not have an impact on the surrounding road network.
- The traffic generated during the construction phase, although significant, will be temporary and impacts are considered to be negative and of moderate significance before and of **low significance** after mitigation.
- The traffic generated during the decommissioning phase will be less than the construction phase traffic and the impact on the surrounding road network will also be considered negative and of moderate significance before and of **low significance** after mitigation.

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

- Dust suppression
- Component delivery to/ removal from the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
- The use of mobile batching plants and quarries near the site would decrease the impact on the surrounding road network.
- Staff and general trips should occur outside of peak traffic periods.
- A "dry run" of the preferred route.
- Design and maintenance of internal roads.
- Any low hanging overhead lines (lower than 5.1m) e.g. Eskom and Telkom lines, along the proposed routes will have to be moved or raised to accommodate the abnormal load vehicles.

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

The access points to the proposed site have been assessed and all were found to be acceptable from a transport perspective.

The development is supported from a transport perspective provided that the recommendations and mitigations contained in this report are adhered to.

The potential impacts associated with proposed Soyuz 3 WEF and associated infrastructure are acceptable from a transport perspective and it is therefore recommended that the proposed facility be authorised.

10 REFERENCES

- Google Earth Pro
- Gouws. S: "Concrete Towers – a business case for sustained local investment", Concrete growth, www.slideshare.net/SantieGouws/concrete-towers-a-business-case-for-sustainedinvestmentrev-5
- Road Traffic Act, 1996 (Act No. 93 of 1996)
- National Road Traffic Regulations, 2000
- SANS 10280/NRS 041-1:2008 - Overhead Power Lines for Conditions Prevailing in South Africa
- The Technical Recommendations for Highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads

11 ANNEXURES

Annexure A – SPECIALIST EXPERTISE

ADRIAN JOHNSON

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

SUMMARY OF EXPERIENCE

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

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

PROFESSIONAL REGISTRATIONS & INSTITUTE MEMBERSHIPS

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

EDUCATION

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

SPECIFIC EXPERIENCE (Selection)

JG Afrika (Pty) Ltd (Previously Jeffares & Green (Pty) Ltd)
September 2022 – Date
Position – Head of Transport

JG Afrika (Pty) Ltd (Previously Jeffares & Green (Pty) Ltd)
2017 – June 2022
Position – Senior Technologist (Traffic and Transportation Engineering)
Various Transport Impact Statements (TIA) and Traffic Impact Statements (TIS) for private clients including:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Annexure B – ASSESSMENT METHODOLOGY

Impact Assessment Approach & Methodology

Aims of Environmental Impact Assessment

The aim of Environmental Impact Assessments is determine the consequences of proposed developments on the environments to better inform decision-making and the management of natural and social systems. The assessment identified and assessed impacts across four phases of development, namely:

- The Planning and Design Phase;
- The Construction Phase;
- The Operational Phase; and
- The Decommissioning Phase.

Evaluation Criteria

CES has developed an evaluation criteria of impacts in accordance with the requirements outlined in Appendix 2 of the EIA Regulations (2014, as amended). This scale takes into consideration the following variables:

- Nature: negative or positive impact on the environment.
- Type: direct, indirect and/or cumulative effect of impact on the environment.
- Significance: The criteria in **Table** are used to determine the overall significance of an activity. The impact effect (which includes duration; extent; consequence and probability) and the reversibility/mitigation of the impact are then read off the significance matrix in order to determine the overall significance of the issue. The overall significance is either negative or positive and will be classified as low, moderate or high.
- Consequence: the consequence scale is used in order to objectively evaluate how severe a number of negative impacts might be on the issue under consideration, or how beneficial a number of positive impacts might be on the issue under consideration.
- Extent: the spatial scale defines the physical extent of the impact.
- Duration: the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.
- Probability: the likelihood of impacts taking place as a result of project actions arising from the various alternatives. There is no doubt that some impacts would occur (e.g. loss of vegetation), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development and alternatives. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.
- Reversibility: The degree to which an environment can be returned to its original/partially original state.
- Irreplaceable loss: The degree of loss which an impact may cause.
- Mitigation potential: The degree of difficulty of reversing and/or mitigating the various impacts ranges from very difficult to easily achievable. The four categories used are listed and explained in **Table** below. Both the practical feasibility of the measure, the potential cost and the potential effectiveness is taken into consideration when determining the appropriate degree of difficulty.

Table 1: Ranking of Evaluation Criteria

NATURE	
Positive	Beneficial/positive impact.
Negative	Detrimental/negative impact.
TYPE	
Direct	Direct interaction of an activity with the environment.
Indirect	Impacts on the environment that are not a direct result of the project or activity.
Cumulative	Impacts which may result from a combination of impacts of this project and similar related projects.
DURATION	
Short term	Less than 5 years.
Medium term	Between 5-20 years.
Long term	More than 20 years.
Permanent	Over 40 years or resulting in a permanent and lasting change that will always be there.
EXTENT	
Localised	Impacts affect a small area of a few hectares in extent. Often only a portion of the project area.
Study area	The proposed site and its immediate environments.
Municipal	Impacts affect the municipality, or any towns within the municipality.
Regional	Impacts affect the wider district municipality or the Eastern Cape Province as a whole.
National	Impacts affect the entire country.
International/Global	Impacts affect other countries or have a global influence.
CONSEQUENCE	
Slight	Slight impacts or benefits on the affected system(s) or party(ies).
Moderate	Moderate impacts or benefits on the affected system(s) or party(ies).
Severe/ Beneficial	Severe impacts or benefits on the affected system(s) or party(ies).
PROBABILITY	
Definite	More than 90% sure of a particular fact. Should have substantial supportive data.
Probable	Over 70% sure of a particular fact, or of the likelihood of that impact occurring.
Possible	Only over 40% sure of a particular fact, or of the likelihood of an impact occurring.
Unsure	Less than 40% sure of a particular fact, or of the likelihood of an impact occurring.
REVERSIBILITY	
Reversible	The activity will lead to an impact that can be reversed provided appropriate mitigation measures are implemented.
Irreversible	The activity will lead to an impact that is permanent regardless of the implementation of mitigation measures.
IRREPLACEABLE LOSS	
Resource will not be lost	The resource will not be lost/destroyed provided mitigation measures are implemented.
Resource will be partly lost	The resource will be partially destroyed even though mitigation measures are implemented.
Resource will be lost	The resource will be lost despite the implementation of mitigation measures.
MITIGATION POTENTIAL	
Easily achievable	The impact can be easily, effectively and cost effectively mitigated/reversed.
Achievable	The impact can be effectively mitigated/reversed without much difficulty or cost.
Difficult	The impact could be mitigated/reversed but there will be some difficultly in ensuring effectiveness and/or implementation, and significant costs.
Very Difficult	The impact could be mitigated/reversed but it would be very difficult to ensure effectiveness, technically very challenging and financially very costly.

Table 2: Description of significance ratings.

Significance Rating		Description
LOW NEGATIVE	**LOW POSITIVE**	The impacts on this issue are acceptable and mitigation, whilst desirable, is not essential. The impacts on the issue by themselves are insufficient, even in combination with other low impacts, to prevent the development being approved. Impacts on this particular issue will result in either positive or negative medium to short term effects on the social and/or natural environment.
MODERATE NEGATIVE	**MODERATE POSITIVE**	The impacts on this issue are important and require mitigation. The impacts on this issue are, by themselves, insufficient to prevent the implementation of the project, but could in conjunction with other issues with moderate impacts, prevent its implementation. Impacts on this particular issue will usually result in either a positive or negative medium to long-term effect on the social and/or natural environment.
HIGH NEGATIVE	**HIGH POSITIVE**	The impacts on this issue are serious, and if not mitigated, they may prevent the implementation of the project (if it is a negative impact). Impacts on this particular issue would be considered by society as constituting a major and usually a long-term change to the (natural and/or social) environment, and will result in severe effects or if positive, substantial beneficial effects.

Assessment of Cumulative Impacts

In terms of the NEMA EIA Regulations (2014), a cumulative impact are defined as:
"The past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities".

Project induced cumulative impacts should be considered, along with direct and indirect impacts, in order to better inform the developer's decision making and project development process. Cumulative impacts may be categorised into one or more of the following types:
Additive: the simple sum of all the effects (e.g. the accumulation of ground water pollution from various developments over time leading to a decrease in the economic potential of the resource);
Synergistic: effects interact to produce a total effect greater than the sum of individual effects. These effects often happen as habitats or resources approach capacity (e.g. the accumulation of water, air and land degradation over time leading to a decrease in the economic potential of an area);
Time crowding: frequent, repetitive impacts on a particular resource at the same time (e.g. multiple boreholes decreasing the value of water resources);

- **Neutralizing:** where effects may counteract each other to reduce the overall effect (e.g. infilling of a wetland for road construction, and creation of new wetlands for water treatment); and,
- **Space crowding:** high spatial density of impacts on an ecosystem (e.g. rapid informal residential settlement).

Cumulative impacts are, however, difficult to accurately and confidently assess, owing to the high degree of uncertainty, as well as their often being based on assumptions. It is therefore difficult to provide as detailed an assessment of cumulative impacts as is the case for direct and indirect project induced impacts. This is usually because of the absence of specific details and information related to cumulative impacts. In these situations, the EAP will need to ensure that any assumptions made as part of the assessment are made clear. Accordingly, this includes an overview and analysis of cumulative impacts related to a variety of project actions, and does not provide a significance rating for these impacts, as was done for direct project induced impacts. The objective is to identify and focus on potentially significant cumulative impacts so these may be taken into consideration in the decision-making process. It is important to realise these constraints, and to recognise that the assessment will not, and indeed cannot, be perfect. The potential for cumulative impacts will, however, be considered, rather than omitted from the decision making-process and is therefore of value to the project and the environment.

No-go Alternative Impact Approach

It is mandatory to consider the "no-go" option in the EIA process. The "no-go" alternative refers to the current status quo and the risks and impacts associated with it. Some existing activities may carry risks and may be undesirable (e.g. an existing contaminated site earmarked for a development). The no-go is the continuation of the existing land use, i.e. maintain the status quo.

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

Requirements of Appendix 6 (Specialist Reports) of Government Notice R326 (Environmental Impact Assessment (EIA) Regulations of 2014, as amended)	***Section where this has been addressed in the Specialist Report***
1. (1) A specialist report prepared in terms of these Regulations must contain - *a) details of -* *i. the specialist who prepared the report; and* *ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;*	*Annexure A*
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	*Annexure D*
c) an indication of the scope of, and the purpose for which, the report was prepared;	*Section 1*
(cA) an indication of the quality and age of base data used for the specialist report;	*n/a*
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	*Section 6*
d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	*n/a*
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	*Section 1 and Annexure B*
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	*Section 3*
g) an identification of any areas to be avoided, including buffers;	*Section 3*
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	*n/a*
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	*Section 1*
j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	*Section 5*
k) any mitigation measures for inclusion in the EMPr;	*Section 8*
l) any conditions for inclusion in the environmental authorisation;	*n/a*
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	*Section 8*
n) a reasoned opinion- *i. whether the proposed activity, activities or portions thereof should be authorised;* *(iA) regarding the acceptability of the proposed activity or activities; and* *ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;*	*Section 9*
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	*n/a*
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	*n/a*
q) any other information requested by the competent authority.	*n/a*
(2) Where a government notice 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*

Annexure D – SPECIALIST DECLARATION

SPECIALIST DECLARATION

I, **ADRIAN JOHNSON**, as the appointed independent specialist, in terms of the 2014 EIA Regulations, hereby declare that I:

- I act as the independent specialist in this application;
- I perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I have no vested interest in the proposed activity proceeding;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- I have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- all the particulars furnished by me in this specialist input/study are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist: ________________________________

Name of Specialist: ADRIAN JOHNSON

Date: 28 FEBRUARY 2023