PROPOSED ABERDEEN WIND FACILITY 3 AND ASSOCIATED INFRASTRUCTURE, EASTERN CAPE PROVINCE

TRANSPORT STUDY

February 2023

Final Issue

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SYNOPSIS

Preparation of a Transport Study for the proposed wind energy facility, Aberdeen Wind Facility 3 and associated infrastructure, located approximately 20km west of the town of Aberdeen in the Eastern Cape Province, pertaining to all relevant traffic and transportation engineering aspects.

KEY WORDS:

Wind Energy Facility, Transport Study

QUALITY VERIFICATION

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

Verification	Capacity	Name	Signature	Date
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1 INTRODUCTION AND METHODOLOGY

1.1 Scope and Objectives

Aberdeen Wind Facility 3 (Pty) Ltd is proposing the development of a commercial Wind Energy Facility and associated infrastructure on a site located approximately 20km west of the town of Aberdeen in the Eastern Cape Province, as shown in **Figure 1-1.** The site is located within the Dr Beyers Naude Local Municipality in the Sarah Baartman District Municipality.

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

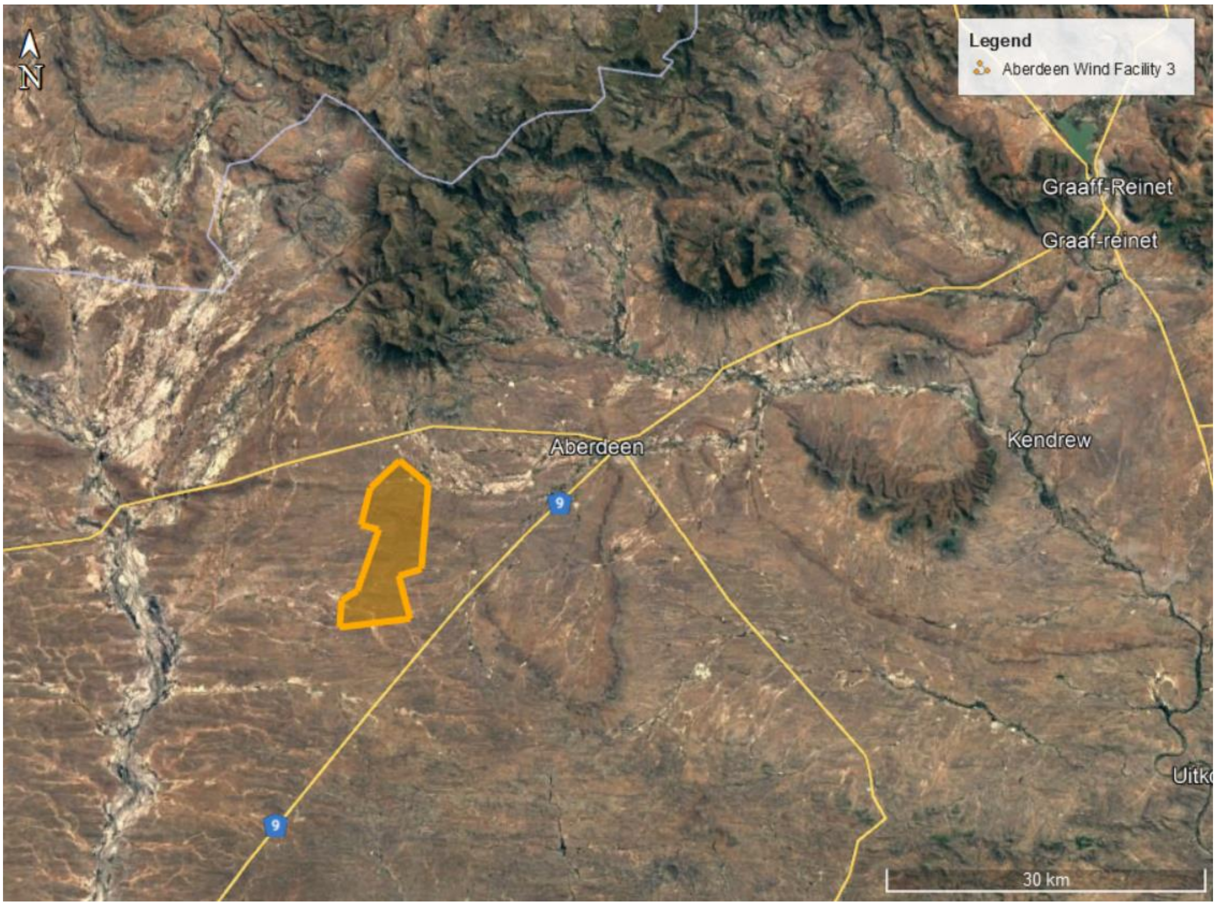


Figure 1-1: Locality Plan

The project is planned as part of a larger cluster of renewable energy projects, which includes two adjacent up to 240MW Wind Energy Facilities (Aberdeen Wind Facility 1 and Aberdeen Wind Facility 2), as shown in **Figure 1-2**.

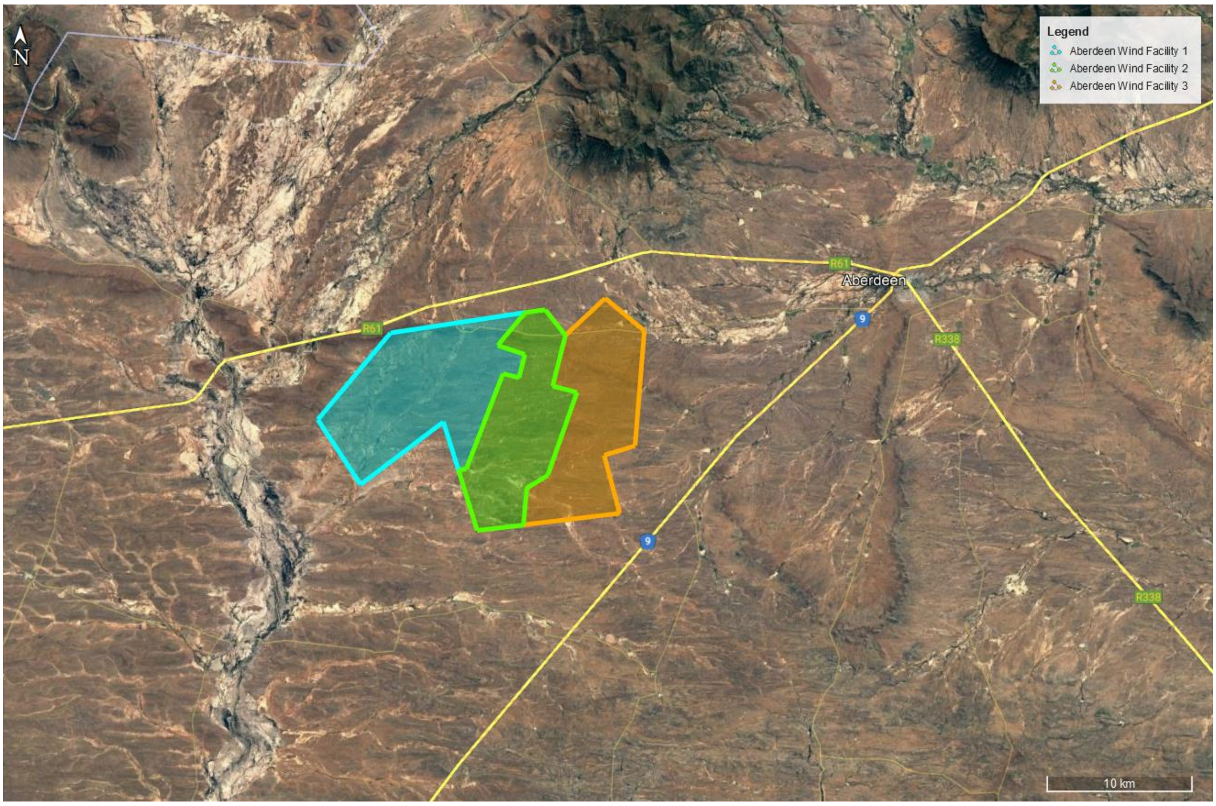


Figure 1-2: Aberdeen Wind Facilities 1, 2 and 3

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

General:

A specialist report prepared in terms of the Regulations must contain the following:

(a) details of-
- (i) the specialist who prepared the report; and
- (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;

(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;
(c) an indication of the scope of, and the purpose for which, the report was prepared;
  (cA) an indication of the quality and age of base data used for the specialist report
  (cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;
(d) the duration date and season of the site investigation and the relevance of the season to the outcome of the assessment;
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;
(g) an identification of any areas to be avoided, including buffers;
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;
(k) any mitigation measures for inclusion in the EMPr;
(l) any conditions for inclusion in the environmental authorisation;
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;
(n) a reasoned opinion-
  (i) whether the proposed activity, activities or portions thereof should be authorised; and (considering impacts and expected cumulative impacts).
  (iA) regarding the acceptability of the proposed activity or activities, and
  (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
(q) any other information requested by the competent authority.

Specific:

- Extent of the transport study and study area;
- The proposed development;
- Trip generation for the facility during construction, 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 operation 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 the 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 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 clearance along the haulage route is 5.2m for abnormal loads.
- The imported elements will be transported from the most feasible port of entry, which is deemed to be the Port of Ngqura in the Eastern Cape Province.
- 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.
- It is assumed that 40 - 50 full time employees with be stationed at the facility during operation.

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; 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 if components are imported to South Africa, it will be via the Port of Ngqura, which is located in the Eastern Cape. The Port is located approximately 290km from the proposed site. 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.

Alternatively, components can be imported via the Port of Saldanha in the Western Cape. The Port of Saldanha, located approximately 640km from the proposed site, is the largest and deepest natural port in the Southern Hemisphere able to accommodate vessels with a draft of up to 21.5m.

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 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.

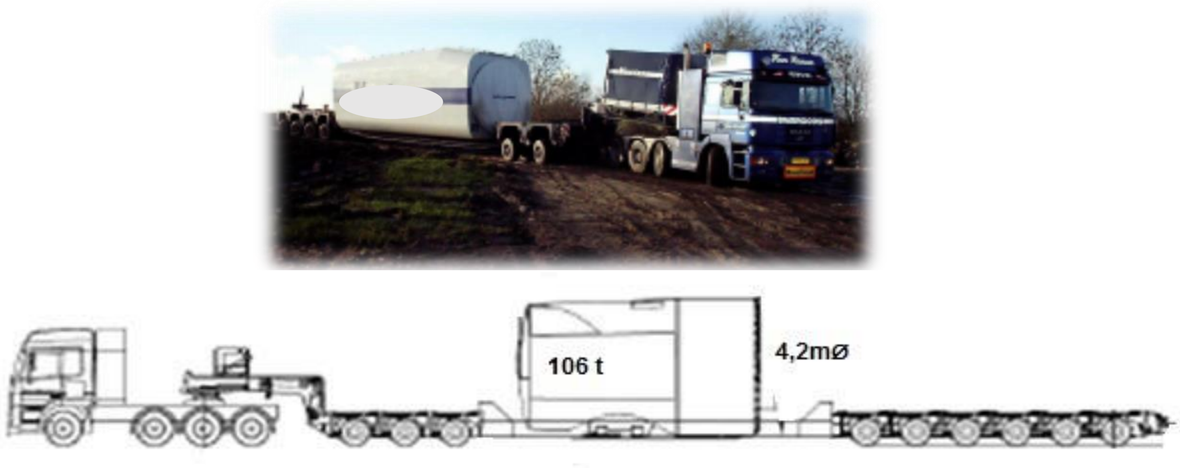


Figure 2-1: Example - Transporting the Nacelle

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 22m and will only be allowed under permit, provided the trailer is fitted with steerable rear axles or dollies.

For the candidate turbines of this study, the blades will be up to 100m long and will need to be transported individually (see example in **Figure 2-2** and **Figure 2-3**). At present, there are no suitable abnormal load trucks available within South Africa to transport such large blades and suitable trucks will therefore need to be sourced from overseas and shipped to South Africa.

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.

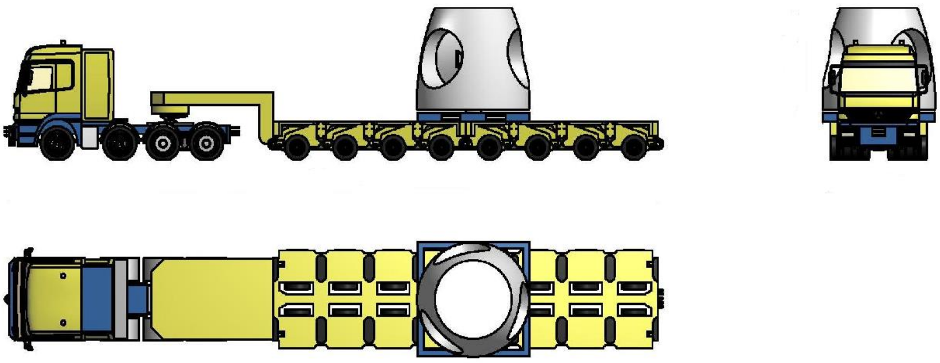


Figure 2-5: Transporting the Hub and Rotary Units

2.3.6.5 Transporting Cranes, Mobile Crane and other Components

One main crane and at least one supporting crane are required per wind turbine erection, with the auxiliary crane able to change position several times during the turbine erection.

This 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 Aberdeen Wind Facility 3 will be located west of Aberdeen, as shown in **Figure 3-1**. The proposed site is located north of the N9 and the R61 straddles the site on the northern boundary.

The project site comprises the following farm portions:

- Portion 1 of Farm Doorn Poort 93
- Portion 1 (Good Hope) of Farm 94
- Portion 3 (Remaining Extent) of Farm Kraai Rivier 149
- Farm Kraanvogel Kuil 155
- Portion 3 of Farm Wildebeest Poortje 153
- Portion 1 of Farm Kraay River Outspan 150
- Remainder of Farm Doorn Poort 93
- Portion 4 of Farm Sambokdoorns 92

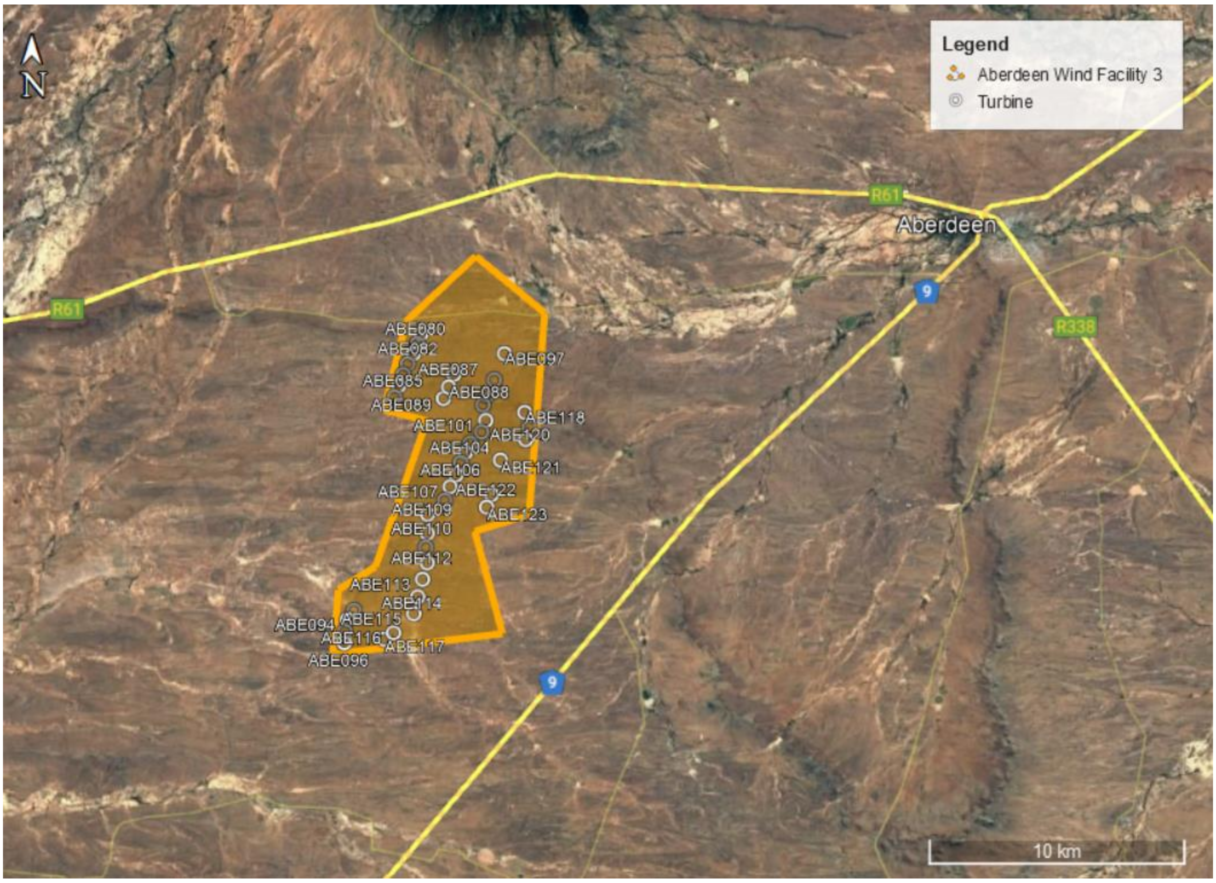


Figure 3-1: Aerial View of Proposed Aberdeen Wind Facility 3

The Aberdeen Wind Facility 3 will have a contracted capacity of up to 240MW and comprise up to 41 wind turbines with a capacity of up to 8MW each. The project will have a preferred project site of approximately 7225 ha, and an estimated disturbance area of up to 62 ha.

The Aberdeen Wind Facility 3 project site is proposed to accommodate the following infrastructure:

- Up to 41 wind turbines with a maximum hub height of up to 200m, rotor diameter of up to 200m, blade length of up to 100m and have a rotor tip height of up to 300m. The turbine foundations will have a combined permanent footprint of 6ha and 13ha for all turbine crane hardstands is required.
- Medium-voltage (MV) power lines internal to the wind farm will be trenched and located adjacent to internal access roads, where feasible.
- Up to 132KV on-site facility substation up to 2ha in extent.
- Battery Energy Storage System (BESS) with a footprint of up to 5ha.
- A main access road of ~9.6km in length and up to 10m in width.
- An internal road network between project components inclusive of stormwater infrastructure. A 12m wide road corridor may be temporarily impacted during construction and rehabilitated to 6m wide after construction.
- Gate house and security: up to 0.5ha
- Operation and Maintenance buildings (includes Control Centre, Offices, Warehouses, Workshop, Canteen, Visitors Centre, Staff Lockers, etc.): Up to 2ha
- Site camp up to 1 ha
- Construction laydown areas up to 9ha

The power generated from the project will be sold to Eskom and will feed into the national electricity grid. Ultimately, the project is intended to be a part of the renewable energy projects portfolio for South Africa, as contemplated in the Integrated Resource Plan.

3.2 National Route to Site

The most suitable port is the Port of Ngqura in Coega, which is located approximately 255km travel distance from the proposed development site. However, the Port of Saldanha can also be considered as an alternative. The Port of Saldanha is located approximately 680km travel distance from the proposed development site.

The preferred route for abnormal load vehicles will be from the port, heading north on the R75 and then onto the R329 at Wolwefontein. The vehicles will travel on R329 passing Klipplaat to Aberdeen and then continue on the R61 to the proposed site (see **Figure 3-2**).

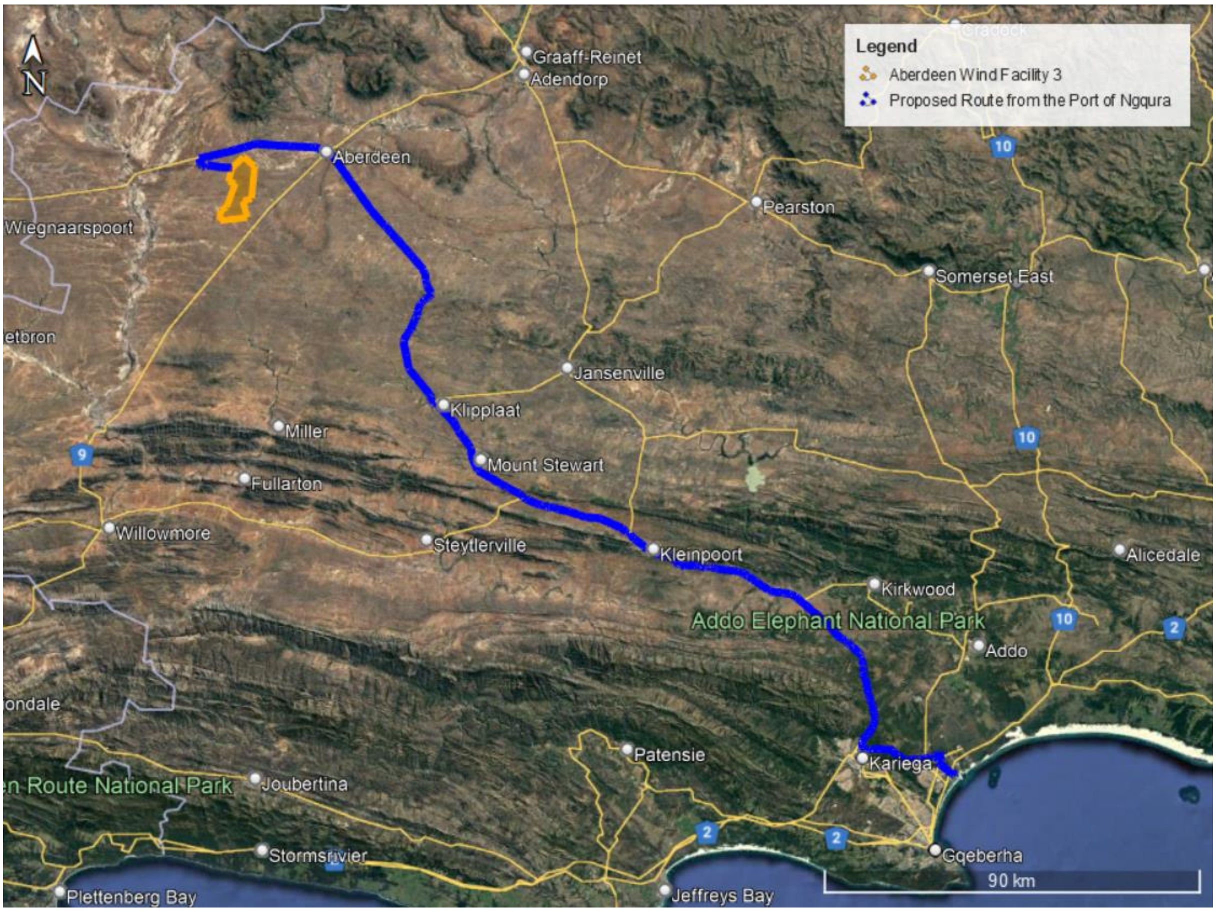


Figure 3-2: Preferred route from the Port to the Proposed Site

It is critical to ensure that the abnormal load vehicle will be able to move safely and without obstruction along the preferred routes. The preferred route should be surveyed to identify problem areas, e.g., intersections with limited turning radii, sections of the road with sharp horizontal curves or steep gradients and drainage structures, 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 components, to ensure that the delivery will occur without disruptions.

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.

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 temporarily or raised to accommodate the abnormal load vehicles.

3.3 Main Route to the Proposed Site

The site and route investigation showed that it will be possible to transport the wind turbine components by road to the proposed site. The site is accessed via the R61, as shown in **Figure 3-3** and **Figure 3-4.**

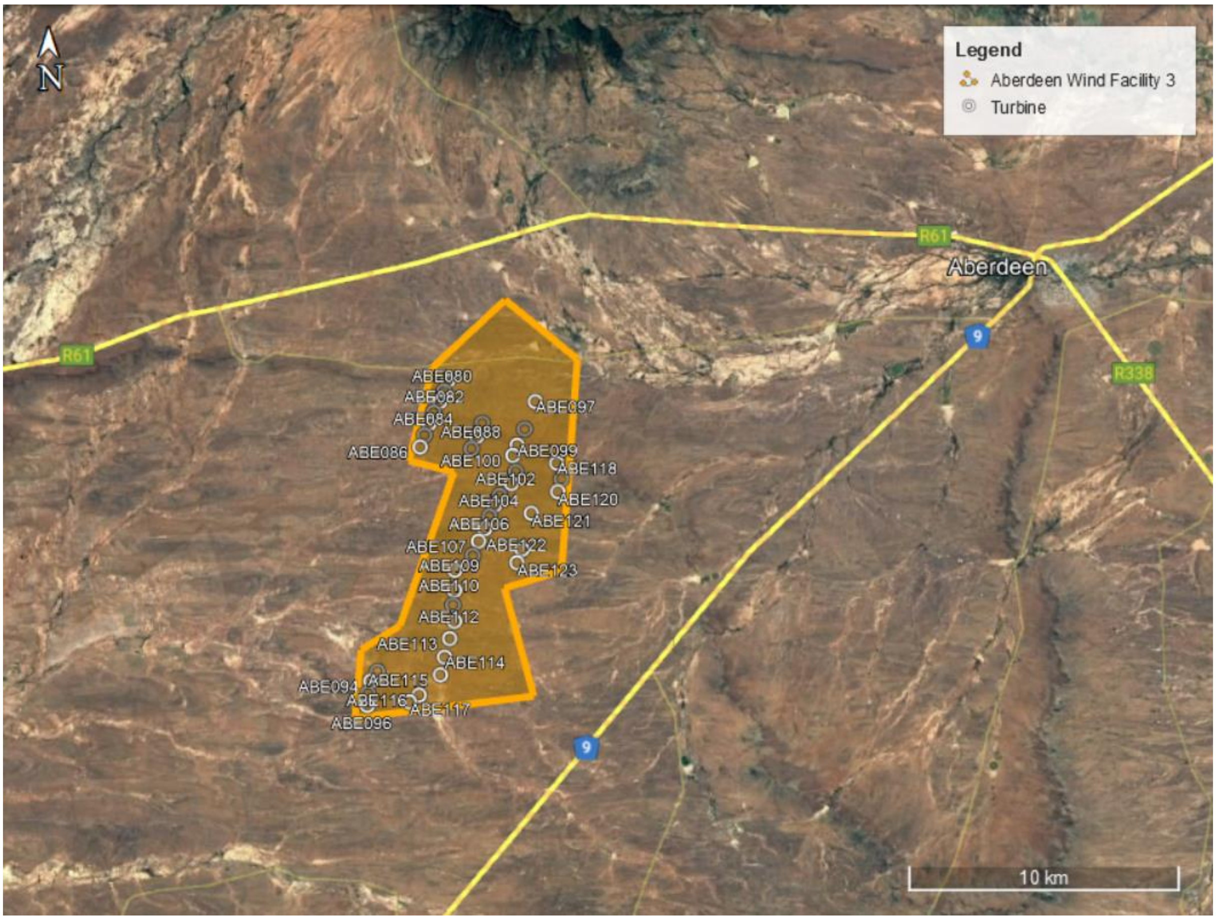


Figure 3-3: Proposed Main Route to the Proposed Site

Figure 3-4: R61 at the existing intersection with the internal gravel road (Proposed Site Access)

3.4 Proposed Access Point to the Proposed Facility

The proposed access point is an existing gravel access road located on the R61, as shown in **Figure 3-5** . The gravel road is well established (~10m wide excluding road reserve), however it's likely upgrades will be required at the access point off the R61 and potentially at water crossings The proposed access point will need to be upgraded to cater for the construction and abnormal load vehicles. Generally, the road width at the access point needs to be a minimum of 8m and the access roads on site a minimum of 4.5m (preferably 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 on site remain gravel.

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.

The geometric design constraints encountered due to the rolling, hilly topography of parts of the area should be taken into consideration by the geometric designer. The internal roads need to be designed with smooth, relatively flat gradients (recommended to be no more than 8%) to allow an abnormal load vehicle to ascend to the respective turbine locations.

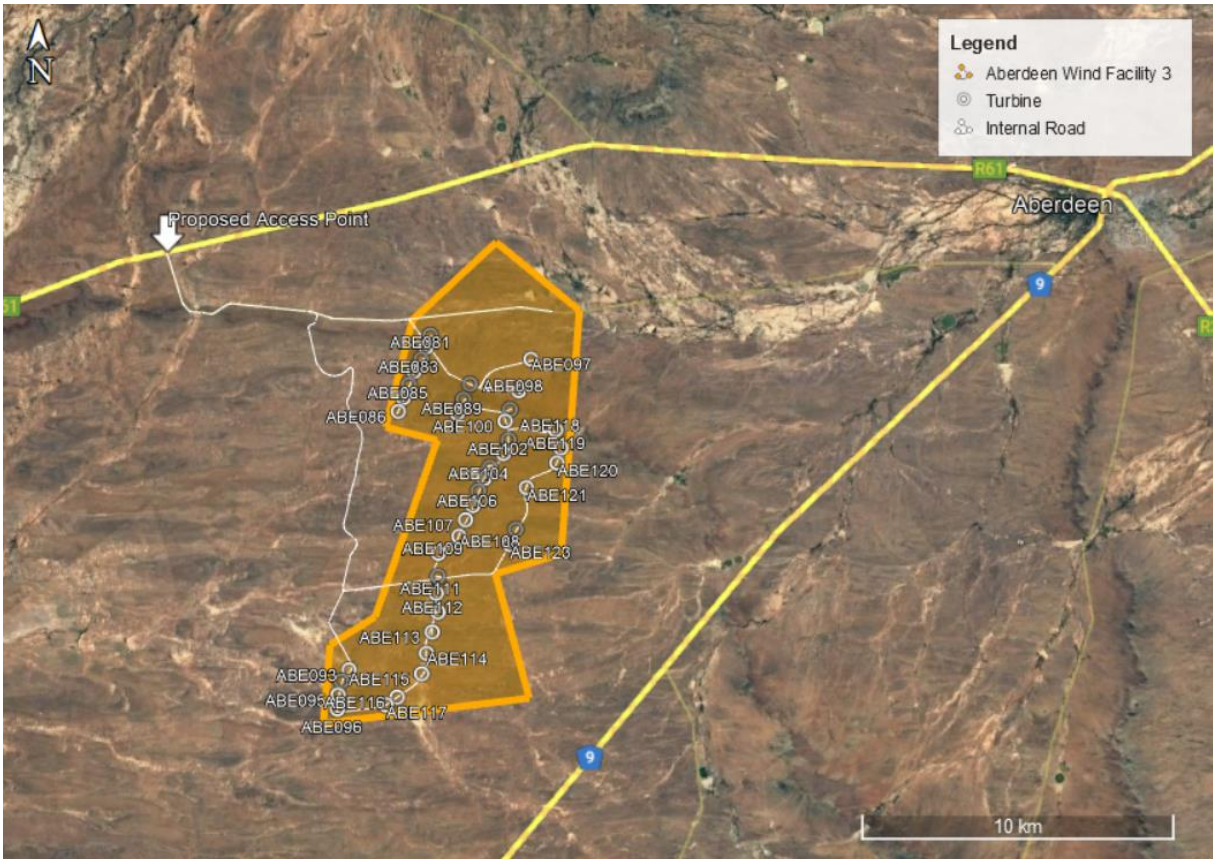


Figure 3-5: Proposed Access Point

3.5 Internal Roads

The internal road geometric design and layout need to be established at detailed design stage. Existing structures and services, such as drainage structures, signage, street lighting and pipelines will need to be evaluated if impacting on the roads. It needs to be ensured that 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.

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

The nearest towns in relation to the proposed development site are Aberdeen and Graaf-Reinet. The nearest major town, Beaufort West, is located approximately 117km from the proposed development site. It is envisaged that most materials, water, plant, services and people will be procured within a 100km radius of the proposed facility.

Concrete batching plants and quarries in the vicinity could be contracted to supply materials and concrete during the construction phase, which would reduce the impact on traffic on the surrounding road network. Alternatively, mobile concrete batching plants and temporary construction material stockpile yards could be commissioned on vacant land near the proposed site. Delivery of materials to the mobile batching plant and the stockpile yard could be staggered to minimise traffic disruptions.

4 APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

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

- Abnormal load permits (Section 81 of the National Road Traffic Act (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, dust and exhaust 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 40 - 50 full-time employees will be stationed on site. Based on experience with similar projects, the number of full-time employees is generally low and consequently, the associated trips are negligible. The traffic generated during this phase will be minimal and will have a nominal 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, dust and exhaust 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, dust and exhaust 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.

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 and one (1) abnormal load for the nacelle. All further components will be transported with normal limitation haulage vehicles. With approximately 14 abnormal loads trips (3 trips for blades, 10 trips for tower sections and 1 trip for the nacelle), the total trips to deliver the components of 41 turbines to the proposed site will be around 574 trips (14 trips x 41 turbines). This would amount to approximately 1.1 vehicle trips per day (574 trips / 24 months / 22 working days per month) for a construction period of 24 months. Should the turbines be delivered during an 18-month period, the vehicle trips would amount to 1.5 vehicle trips per day.

Several normal haulage vehicles will be required to transport materials, equipment, plant and staff to the site. The construction of roads and concrete footings will also have an impact on the surrounding road network as vehicles deliver materials to the site. A concrete footing (approximately 600 m^3) adds around 100 trips by concrete trucks to the surrounding road network. It is therefore advised to have concrete batching plants on site or in close vicinity to reduce trips.

The significance of the transport impact without mitigation measures during the construction and decommissioning phases can be rated as medium. However, considering that this is temporary and short term in nature, the impact can be mitigated to an acceptable level of low significance.

- *Proposed mitigation measures*
  - 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 near 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.

- *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)

The operational phase will not generate any significant traffic volumes. During operation, it is expected that maintenance and security staff will periodically visit the facility. It is assumed that approximately 40 - 50 full-time employees will be stationed on site. Based on experience with similar projects, the number of full-time employees is generally low and consequently, the associated trips are negligible. The traffic generated during this phase will be minimal and will not have an impact on the surrounding 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.

7 NO-GO ALTERNATIVE

The no-go alternative implies that the proposed development of the Aberdeen Wind Facility 3 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 facility. 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.**

8 IMPACT ASSESSMENT SUMMARY

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

8.1 Construction Phase

Table 8-1: Impact Rating - Construction Phase – Traffic Congestion

Nature: **Traffic congestion due to an increase in traffic caused by the transportation of equipment, material and staff to site**		
	Without mitigation	**With mitigation**
Extent	Low (2)	Low (1)
Duration	Short (2)	Short (2)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	**Medium (50)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Completely reversible	Completely reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: ▪ *Stagger component delivery to site* ▪ *Reduce the construction period* ▪ *The use of mobile batching plants and quarries in close proximity to the site* ▪ *Staff and general trips should occur outside of peak traffic periods.* ▪ *Regular maintenance of gravel roads by the Contractor during the construction phase.*		
Residual Impacts: *The proposed mitigation measures for the construction traffic will result in a reduction of the impact on the surrounding road network. Traffic will return to normal levels after construction is completed.*		

Table 8-2: Impact Rating - Construction Phase – Air Quality

Nature: **Construction traffic on roads will generate dust. Air quality will be affected by dust pollution**		
	Without mitigation	**With mitigation**
Extent	Low (1)	Low (1)
Duration	Short (2)	Short (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (36)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Completely reversible	Completely reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: ▪ *Dust Suppression of gravel roads during the construction phase, as required.* ▪ *Regular maintenance of gravel roads by the Contractor during the construction phase.*		
Residual Impacts: *Dust pollution during the construction phase cannot be completely mitigated but mitigation measures will significantly reduce the impact. Dust pollution is limited to the construction period.*		

Table 8-3: Impact Rating - Construction Phase – Noise Pollution

Nature: **Construction traffic on roads will generate noise i.e. Noise pollution due to increased traffic**		
	Without mitigation	**With mitigation**
Extent	Low (2)	Low (1)
Duration	Short (2)	Short (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (40)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Completely reversible	Completely reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: ▪ *Stagger component delivery to site* ▪ *Reduce the construction period* ▪ *The use of mobile batching plants and quarries in close proximity to the site* ▪ *Staff and general trips should occur outside of peak traffic periods*		
Residual Impacts: *Noise pollution during the construction phase cannot be completely mitigated but mitigation measures will significantly reduce the impact. Noise pollution is limited to the construction period.*		

8.2 Operational Phase

Table 8-4: Impact Rating – Operational Phase

IMPACT TABLE – OPERATIONAL PHASE
The traffic generated during this phase will be minimal and will have not have any impact on the surrounding road network.

8.3 Decommissioning Phase

Table 8-5: Impact Rating- Decommissioning Phase

IMPACT TABLE – DECOMMISSIONING PHASE
This phase will have a similar impact as the Construction Phase i.e., traffic congestion, air pollution and noise pollution, as similar trips/movements are expected.

9 CUMULATIVE IMPACTS

To assess the cumulative impact, it was assumed that all renewable energy projects within 50km 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. Only a handful of projects would be selected to enter into a power purchase agreement with Eskom, and construction is likely to be staggered depending on project-specific issues.

The Cumulative Map is attached as **Annexure C.** Projects in the area include the Aberdeen Wind Facilities 1 and 2, and the Eskom Aberdeen Wind Farm, located to the north of Aberdeen Wind Facilities 1, 2 and 3.

The construction and decommissioning phases are the only significant traffic generators for renewable energy projects. The duration of these phases is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). <u>Even if all renewable energy projects within the area are constructed 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.</u>

The assessments of cumulative impacts are collated in the table below.

Table 9-1: Cumulative Impact rating

Nature: *Traffic generated by the proposed development and the associated noise and dust pollution.*		
	Overall impact of the proposed project considered in isolation (post mitigation)	**Cumulative impact of the project and other projects in the area**
Extent	Low (1)	High (5)
Duration	Short (2)	Medium-term (3)
Magnitude	Low (4)	High (8)
Probability	Probable (3)	Improbable (2)
Significance	**Low (21)**	**Medium (32)**
Status (positive/negative)	Negative	Negative
Reversibility	Completely reversible	High
Loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Confidence in findings: High.		
Mitigation: ▪ *Stagger component delivery to site* ▪ *Dust suppression* ▪ *Reduce the construction period* ▪ *The use of mobile batch plants and quarries in close proximity to the site* ▪ *Staff and general trips should occur outside of peak traffic periods*		

10 ENVIRONMENTAL MANAGEMENT PROGRAM INPUTS

OBJECTIVE: 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. No traffic related mitigation measures are envisaged during the operational phase due to the negligible traffic volume generated during this phase.

Project component/s	Construction Phase traffic
Potential Impact	Dust and noise pollution due to increase in traffic volume
Activity/risk source	Transportation of material, components, equipment and staff to site
Mitigation: Target/Objective	Minimize impacts on road network and surrounding communities

Mitigation: Action/control	Responsibility	Timeframe
• Stagger component delivery to site • The use of mobile batch 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 • 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	• Holder of the EA	• Before construction commences and regularly during construction phase

Performance Indicator	Staggering or reducing the construction trips will reduce the impact of dust and noise pollution.
Monitoring	• Regular monitoring of road surface quality. • Monitoring congestion levels (increase in vehicle trips) • Apply for required permits prior to commencement of construction

11 CONCLUSION AND RECOMMENDATIONS

The potential traffic and transport related impacts for the construction, operation and decommissioning phases of the proposed Aberdeen Wind Facility 3 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 load vehicles was estimated and 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 40 - 50 full-time employees will be stationed on site. Based on experience with similar projects, the number of full-time employees is generally low and consequently, the associated trips are negligible. 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 medium 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 medium 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, dust and exhaust pollution will be higher during these phases. The duration of these phases is short term i.e., the impact of the Wind Facility 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 point to the proposed site has been assessed and was found to be acceptable from a transport engineering perspective.

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

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

12 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

13 ANNEXURES

Annexure A – SPECIALIST EXPERTISE

ADRIAN JOHNSON

Profession	*Professional Technologist*
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

ASSESSMENT OF IMPACTS

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

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

The **significance** is calculated by combining the criteria in the following formula:
S=(E+D+M)P
S = Significance weighting
E = Extent

D = Duration
M = Magnitude
P = Probability

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

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

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

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

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

Assessment of Cumulative Impacts

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

"Cumulative Impact", in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities[1].

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

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

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

Example of a cumulative impact table:

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

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

ENVIRONMENTAL MANAGEMENT PLAN TABLE FORMAT

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

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

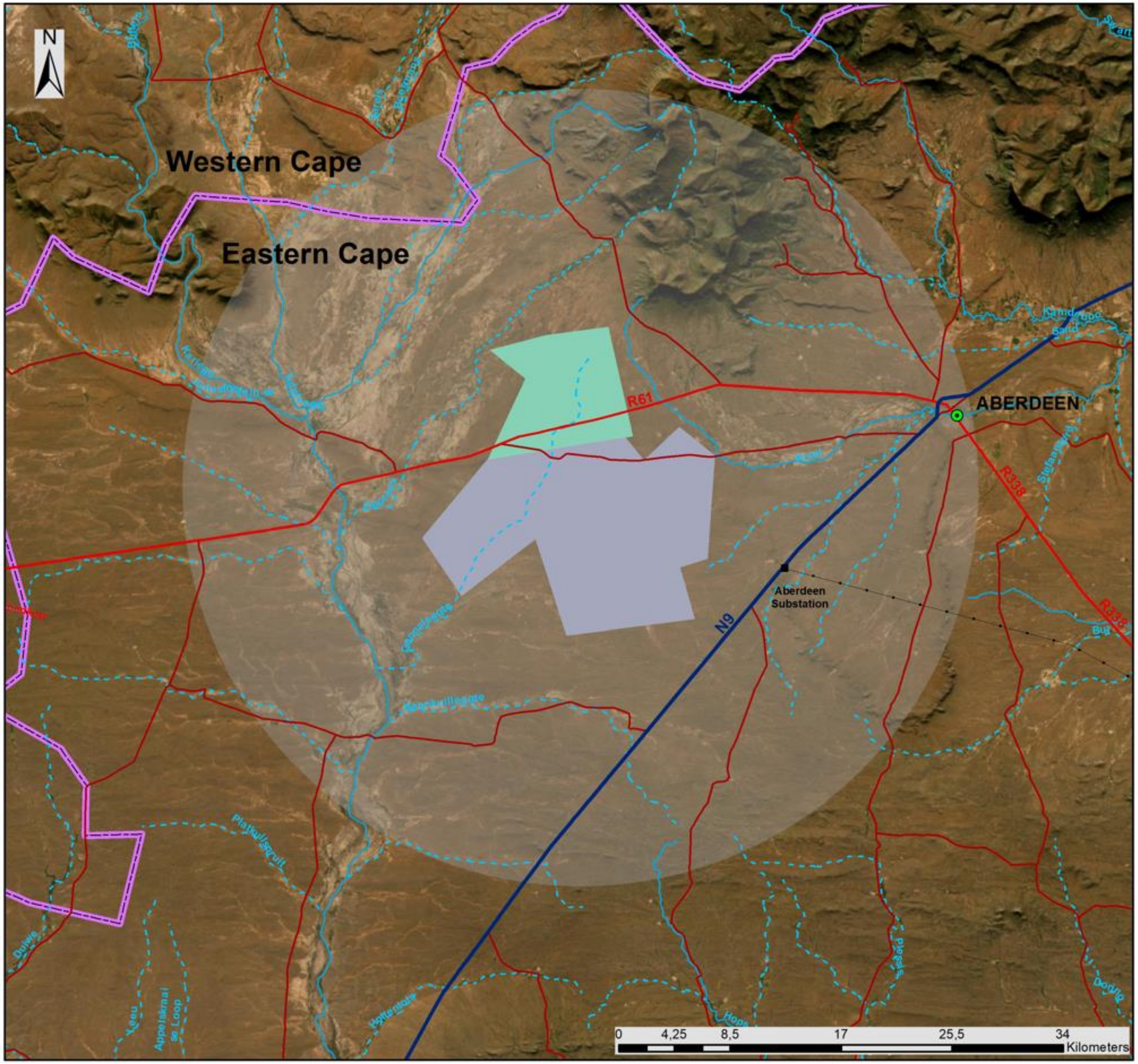
Project component/s	List of project components affecting the objective
Potential Impact	Brief description of potential environmental impact if objective is not met
Activity/risk source	Description of activities which could impact on achieving objective
Mitigation: Target/Objective	Description of the target; include quantitative measures and/or dates of completion

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

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

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

Annexure C – CUMULATIVE MAP



Aberdeen 1, 2 and 3 Wind Farm Cluster Eastern Cape Province

Cumulative Map

Legend

- Town
- Existing Substation
- Eskom Power Line (Existing)
- National Road
- Regional Road
- Main Road
- Perennial River
- Non Perennial River
- Provincial Boundary
- Facility 30km Radius

Proposed Development

- Aberdeen 1, 2 and 3 Development Area

Properties linked to Renewable Energy Facilities (REEA 2022 Q3)

- Eskom Aberdeen Wind Farm

Scale: 1:400 000
Projection: GCS_WGS_1984
Map Ref: Aberdeen Cumulative Map

savannah environmental