Proposed St Helena Community Wind Farm Development

Noise Impact Assessment: Scoping

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1. INTRODUCTION

The establishment of a community wind farm has been proposed for St Helena Bay in the Western Cape. This proposed wind farm will consist of between 10 to 35 turbines, with a total expected generation capacity approximately 30 MW.

DDA Environmental Engineers was appointed to provide input regarding noise to the Scoping and Environmental Impact Assessment (EIA) phases of the proposed St Helena Wind Farm.

This scoping report identifies the noise-related issues and impacts that are likely to occur in the surrounding environment and suggests the approach to their assessment in the EIA phase. The main aims of the noise scoping study are outlined below:

- Describe the noise environment that may be affected by the proposed activity.
- Identify all related noise legislation and guidelines that have been considered in the preparation of the scoping report and which are to be used in the noise impact assessment of the EIA phase.
- Highlight potential noise impacts that should be investigated further during the EIA process.
- Describe the methodology to be followed for the assessment of the noise impacts in the EIA phase.

1.1 Study Area

The proposed wind farm is located 120km north-west of Cape Town, within the Saldanha Bay Municipality. The site, currently Langeklip Farm (Erf 47) lies between Vredenburg and Laingville in St Helena Bay, Western Cape (see Figure 1-1). The total size of the farm is 744 ha.

The project site is surrounded by farm lands, with the closest community being Laingville, approximately 3 km away. Potentially noise-sensitive receptors around the proposed site include communities and local dwellings in:

- Laingville;
- West Point;
- Brandhuis;
- St Helena Bay;

- Vredenburg; and
- Farm houses around the wind farm site.

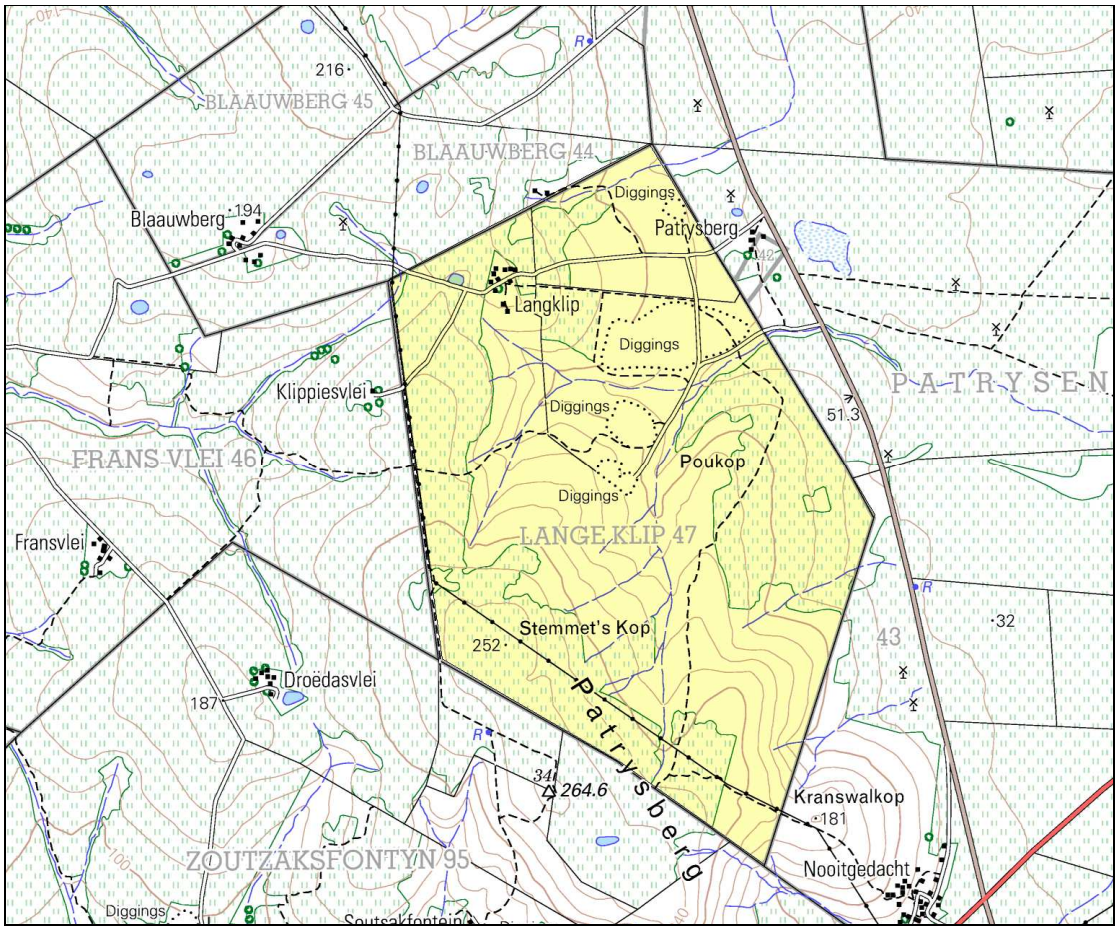

Figure 1-1. St Helena Wind Farm Locality Map

1.2 Wind Turbine Equipment

The wind turbine equipment has not yet been determined. However, wind turbines with generation capacity of 0.85 MW and 3 MW are considered. Turbines will be mounted on steel towers about 50 m or 100 m high. Turbines have a rotor with three blades, each approximately 25 m or 45 m long. Each turbine, with the underground base and the crane lifting pad, is expected to occupy an area of approximately 15 by 15 metres.

The wind turbine sound power under different wind speeds, that will be used for the sound propagation modelling, will be obtained from the manufacturer when the turbine type and generation capacity is finalised by the project's design engineers.

2. NOISE IMPACTS

2.1 Noise Emission Sources

The wind farm project will introduce noise sources into the local rural noise environment. The project's main noise sources and activities include:

- The construction equipment and activities during the construction phase.
- The wind turbines during the operational phase.

2.2 Construction

Noise associated with construction activities is generally of local extent and short duration. The construction operations are not expected to have any significant impact on the nearest local dwellings or residential communities. The noise impact, therefore, is expected to be of low significance and will be quantified in detail in the EIA phase.

2.3 Operation

The introduction of the wind turbines could have a noise impact, as a result of the increase of the noise levels within and around the wind farm site due to their operation.

The noise emission information under various wind speeds will be utilised in 3-dimensional noise propagation modelling, in order to determine the resulting operational sound pressure levels and assess the cumulative noise impact.

From past experience and noise emission data from various turbine manufacturers, it is anticipated that the overall spectrum of wind turbines will be broad band, with no prominent third octave bands. Therefore, under normal operation, the wind turbines are not expected to generate any clearly audible tones or impulses that may cause community responses at lower noise levels. This, however, will be verified once the sound power spectrum data is available from the manufacturer and/or by direct measurements, if deemed necessary.

The duration of the noise impact is expected to be long-term, i.e. for the duration of the operational life of the project. The impact is expected to be of low to medium significance, and together with its extent will be assessed in detail in the EIA phase of the project.

3. EXISTING ENVIRONMENT, LEGISLATIVE CONTEXT AND GUIDELINES

3.1 Meteorology

St Helena Bay has a Mediterranean climate, and receives most of its rainfall during winter. The average midday temperatures for St Helena range from 17℃ in July to 27℃ in February.

The most predominant wind in the area is from the south, with a 38% occurrence frequency, and the second most predominant from the south-east, with a 12% occurrence. More than 50% of the time, the wind speed is greater than 5 m/s, and about 5% of the time the wind speed is greater than 10 m/s.

The wind speed and direction patterns, the meteorological conditions, as well as the ground elevations of the area will be taken into consideration in the 3-dimensional sound propagation calculations in the detailed EIA phase.

3.2 Existing Noise Environment

The proposed wind farm site is situated in a rural area, where little vehicular traffic is anticipated along the local road network. The Velddrift Road (R399) and the St Helena Main Road are close to the site and, together with human activities, are expected to dominate the local noise environment.

Based on the South African Bureau of Standards (SABS) 10103 of 2008, the guidelines for typical outdoor noise levels of a rural area are 45 dB(A) during the day and 35 dB(A) at night. The ambient noise levels in relevant noise-sensitive areas will be determined via noise measurements during the EIA phase.

3.3 Relative Legislation and Noise Level Guidelines

Nationally, noise is regulated in terms of the 1992 promulgated Noise Control Regulations of the Environmental Conservation Act of 1989 (Act No. 73 of 1989). The responsibility of the administration of the Noise Control Regulations is at provincial level. In the Western Cape, noise is regulated by the Noise Control Regulations promulgated in Provincial Notice 627, published in Provincial Gazette 5309 of 20 November 1998 (hereinafter referred to as the “Noise Control Regulations”).

In terms of section 3(c) of the Noise Control Regulations:

> "No person shall make changes to existing facilities or existing use of land or buildings or erect new buildings, if these will house or cause activities that will, after such changes or erection, cause a "disturbing noise", unless precautionary measures to prevent the disturbing noise have been taken to the satisfaction of the local authority."

In terms of section 4 of the Noise Control Regulations:

> "No person shall make, produce or cause a disturbing noise, or allow it to be made, produced or caused by any person, animal, machine, device or apparatus or any combination thereof."

The following definitions in section 1 of the Noise Control Regulations are relevant:

> "Disturbing noise" means a "noise level" that exceeds the "ambient sound level" measured continuously at the same measuring point by 7 dB or more.
>
> "Ambient sound level" means the reading on an integrating impulse sound level meter taken at a measuring point in the absence of any alleged disturbing noise, at the end of a total period of at least 10 minutes after such meter was put into operation.
>
> "Noise level" is defined in the Noise control Regulations as ".the reading on an integrating sound level meter taken at a measuring point in the presence of any alleged disturbing noise at the end of a total period of at least 10 minutes after such meter was put in operation, and, if the alleged disturbing noise has a discernible pitch, for example, a whistle, buzz, drone or music, to which 5 dBA is added."

The Noise Control Regulations stipulate that for industrial noise the local authority may designate an area as "controlled" if the calculated or measured noise level exceeds 61 dB(A) and define noise as "disturbing" if it causes the ambient noise level to increase by 7 dB(A) or more.

In addition, the South African National Standards (SANS) has issued guidelines for the determination of the noise impact in various districts and the assessment of the expected community response due to changes in the noise environment: SANS Code of Practice 10103:2008 'The measurement and rating of environmental noise with respect to annoyance and to speech communication'. This Code of Practice follows the World Health Organisation (WHO) recommendations and is generally utilised in EIA studies in South Africa.

The new draft noise control regulations for the Western Cape are currently out for discussion. In these regulations, it is stipulated that the maximum permissible noise levels at the boundary of an industrial plant are 70 dB (A) during daytime and 60 dB (A) during night-time, in accordance with the guidelines provided in the SANS Code of Practice

10103:2008. For other districts, such as the rural environment around the wind farm site, it follows the recommendations of the same Code of Practice (Provincial Gazette No 6412, of 25 January 2007).

The noise measurements and impact assessment will be conducted in accordance with the current Western Cape Noise Control Regulations of 1998. In addition, the above-mentioned SANS and WHO guidelines will also be taken into consideration in the EIA phase.

4. WAY FORWARD

The noise impact assessment study of the EIA phase will:

- Determine the existing noise levels within and around the perimeter of the proposed wind farm site, as well as in the surrounding communities and sensitive receptors in the extended area.
- Create a representative 3-dimensional noise model, in order to simulate the sound propagation and determine the resulting sound levels due to the proposed project.
- Determine the noise impacts based on the current Western Cape legislation and international guidelines.
- Identify potential noise emission reduction opportunities and cost-effective emission abatement strategies for the construction and operational phases of the project.
- Provide recommendations regarding the optimum turbine sitting, noise monitoring positions and the establishment of a noise monitoring programme.

4.1 Study Methodology

The baseline noise study will be based on noise measurements in accordance with the current Western Cape Noise Control Regulations, as well as SANS 10103: 2008 and SANS 10328:2008.

An initial assessment of the site will be performed, in order to determine the optimum selection of the noise measurement points. The noise measurements will be made during daytime and night-time hours, in order to generate results comparable to legislation and the Codes applicable at the time of the survey.

All measurements will be A-weighted equivalent sound pressure levels obtained with I-time weighting or those required by the applicable standard. The occurring maximum and minimum levels during the measurement period will also be recorded. Abnormal disturbances, such as loud noise generation in close proximity or sudden noise bursts that affect the measurement, will be discarded.

For the modelling of the 3-dimensional sound propagation, the internationally recognised CADNA software will be used. The noise contours from all the noise sources will be generated for day- and night-time conditions. This will enable various scenarios to be realised and tested to optimise layouts of potentially noisy activities and equipment and determine the resulting noise levels in the extended area.

The model utilises standard and user-defined sound power profiles, as well as detailed terrain elevations and potential site buildings as input. The profile and noise calculation algorithms are based on several guidance documents that address atmospheric absorption, noise attenuation and screening, in accordance with the SANS Codes.

The main output from the model will be noise exposure contours for land use compatibility mappings and impact assessment. The model supports 16 different pre-defined noise metrics such as A-Weighted, C-Weighted, and user-defined metrics may also be created from these families.

The noise levels at specific positions, such as dwellings, guest houses or other sensitive locations can also be predicted. For these grid points, the model reports detailed information to the analyst for the determination of the cumulative noise levels and noise impact at each location.

The predicted noise levels will then be compared against current legislated limits, as well as local and international guidelines, in order to quantify the noise impacts in the surrounding areas. Based on the expected locations with maximum impact, an appropriate noise monitoring programme will be presented, in order to ensure future compliance with noise guidelines.

REFERENCES

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