SITE SENSITIVITY VERIFICATION REPORT

FOR THE UJEKAMANZI WIND ENERGY FACILITY 1
NEAR AMERSFOORT, MPUMALANGA.

Date of Site Visit:	23/01/2023 – 27/01/2023
Specialist Name:	Dr Brett Williams
Professional Registration Number:	SAIOH 0221
Specialist Affiliation / Company:	Safetech
Specialist Topic:	Noise Impact Assessment
Proposed WEF Project Name:	Ujekamanzi Wind Energy Facilities

17 April 2023

Table of Contents

List of Figures

List of Tables

1. Introduction

ABO Wind renewable energies (Pty) Ltd proposes to develop the Ujekamanzi Wind Energy Facility 1 located near Amersfoort, Mpumalanga. The objective of this report is to present the client with a scoping-level evaluation of the noise sensitivities related to the proposed development. This information will assist the developers in making informed decisions regarding the layout of the Wind Turbine Generators (WTGs) within the project boundary, as depicted in Figure 1. The report will provide insights into potential noise-related impacts and inform the implementation of mitigation measures to minimize any adverse effects.

Ujekamanzi WEF 1 is one of two facilities in the area. The Ujekamanzi WEF 2 facility will be constructed adjacent to Ujekamanzi WEF 1, as shown in Figure 4 below. This report assesses the noise impacts relating only to Ujekamanzi WEF 1.

This site sensitivity report adheres to the guidelines set forth in the Environmental Assessment Protocols of the NEMA EIA Regulations (2014, with amendments) and the Protocol for Specialist Assessment and Minimum Report Content Requirements for Noise Impacts (GG 43110 / GNR 320, dated March 20, 2020). The report provides a comprehensive analysis of the potential noise impacts related to the proposed development and is in compliance with the relevant regulatory requirements.

The potential noise impacts from the construction and operation of the proposed development of the Ujekamanzi Wind Energy Facilities and Grid Connection will including the following:

- Construction equipment and vehicle noise
- Mechanical and aerodynamic noise from the operation of the various wind turbine components.

The impacts of mechanical and aerodynamic noise are described in detail below.

2. Description of Noise Impacts

Appendix F describes the Impact Rating Methodology that will be utilized during the EIA phase. It is not possible to provide a Noise Impact Rating at this stage as the layout of the Wind Turbine Generators has not yet been decided.

The sources of sounds emitted from operating wind turbines can be divided into two categories, firstly mechanical sounds, from the interaction of turbine components, and secondly aerodynamic sounds, produced by the flow of air over the blades and past the tower.

Mechanical Sounds

Mechanical sounds originate from the relative motion of mechanical components and the dynamic response among them. Sources of such sounds include:

- Gearboxes
- Main electrical generator
- Yaw Drives
- Cooling Fans and
- Auxiliary Equipment (e.g. hydraulic pumps).

Since the emitted sound is associated with the rotation of mechanical and electrical equipment, it tends to be tonal (of a common frequency), although it may also have a broadband component. For example, pure tones can be emitted at the rotational frequencies of shafts and generators, and the meshing frequencies of the gears.

In addition, the hub, rotor, and tower may act as loudspeakers, transmitting the mechanical sound and radiating it. The transmission path of the sound can be air-borne or structure-borne. Air-borne means that the sound is directly propagated from the component surface or interior into the air. Structure-borne sound is transmitted along other structural components before it is radiated into the air.

Figure 1 below shows the type of transmission path, and the sound power levels for the individual components for a wind turbine.

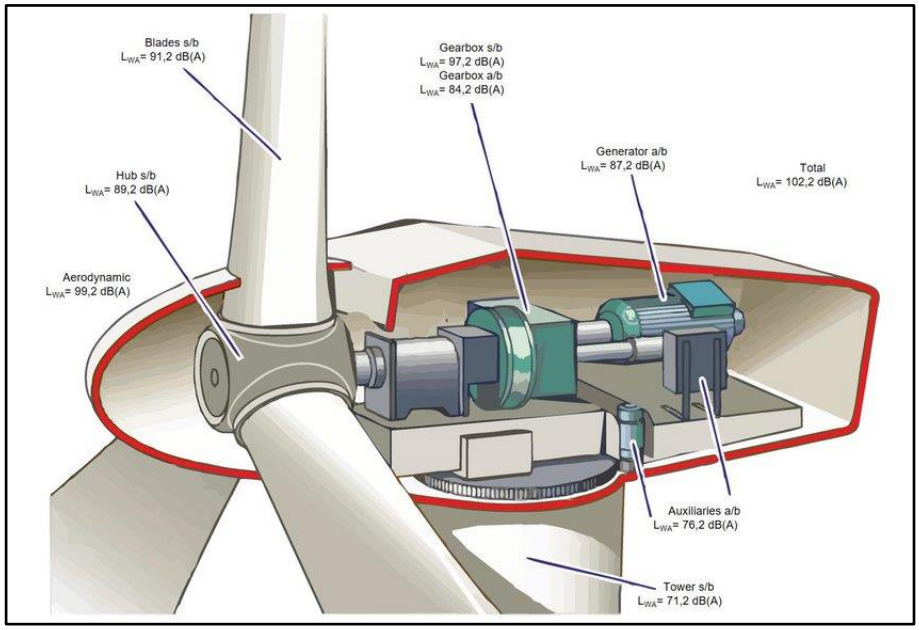

Figure 1: Typical Sound Power Levels of a Turbine (Moraleda 2019).

Aerodynamic Sound

Aerodynamic broadband sound is typically the largest component of wind turbine acoustic emissions. It originates from the flow of air around the blades, especially the downward moving blade. A large number of complex flow

phenomena occur, each of which might generate some sound (see Figure 2). Aerodynamic sound generally increases with rotor speed. The various aerodynamic sound generation mechanisms that must be considered are divided into three groups:

- Low Frequency Sound: Sound in the low frequency part of the sound spectrum is generated when the rotating blade encounters localized flow deficiencies due to the flow around a tower, wind speed changes, or wakes shed from other blades.
- Inflow Turbulence Sound: Depends on the amount of atmospheric turbulence. The atmospheric turbulence results in local force or local pressure fluctuations around the blade.
- Air foil Noise: This group includes the sound generated by the air flow right along the surface of the air foil. This type of sound is typically of a broadband nature, but tonal components may occur due to blunt trailing edges, or flow over slits and holes.

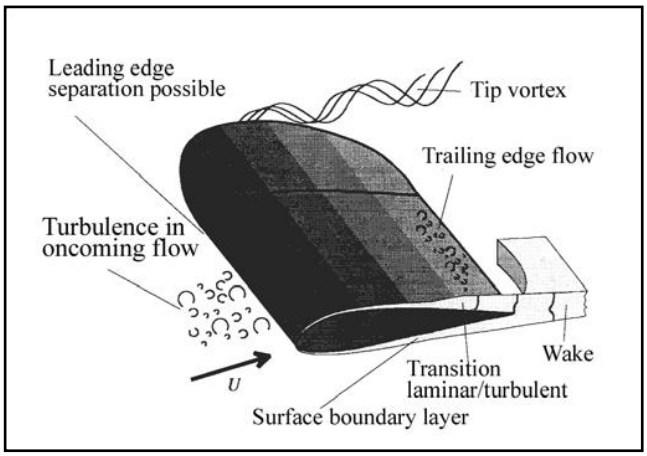

Figure 2: Sources of Aerodynamic Noise (Wagner 1996).

Modern air foil design takes all the above factors into account and is generally much quieter that the first generation of bade designs.

Residual Sound & Wind Speed

The ability to hear a wind turbine depends on the residual sound level[1]. When the background sounds and wind turbine sounds are of the same magnitude, the wind turbine sound may get lost in the background noise. Both the wind turbine sound power level and the residual sound pressure level will be functions of wind speed. Thus, whether the sound emitted from a wind turbine exceeds the residual sound level will depend on how each of these varies with wind speed.

[1] In laymans terms this is the “ambient sound or background noise” although this is defined diffenrently in environmental noise legislation.

The most likely sources of wind-generated sounds are interactions between wind and vegetation. Several factors affect the sound generated by wind flowing over vegetation. For example, the total magnitude of wind-generated sound depends more on the size of the windward surface of the vegetation than the foliage density or volume.

The sound level and frequency content of wind generated sound also depends on the type of vegetation. For example, sounds from deciduous trees tend to be slightly lower and more broadband than that from conifers, which generate more sounds at specific frequencies. The equivalent A-weighted broadband sound pressure generated by wind in foliage has been shown to be approximately proportional to the base 10 logarithm of wind speed.

Sound emitted from large modern wind turbines during constant speed operation tend to increase more slowly with increasing wind speed, than wind generated sound. As a result, wind turbine noise is more commonly a concern at lower wind speeds, and it is often difficult to measure sound from modern wind turbines above wind speeds of 8 m/s because the background wind-generated sound sometimes masks the wind turbine sound above 8 m/s.

It should be remembered that average sound level measurements might not indicate when a sound is detectable by a listener. Just as a dog's barking can be heard through other sounds, sounds with particular frequencies or an identifiable pattern may be heard through background sounds that is otherwise loud enough to mask those sounds. Sound emissions from wind turbines will also vary as the turbulence in the wind through the rotor changes. Turbulence in ground level winds will also affect a listener's ability to hear other sounds. Because fluctuations in ground level wind speeds will not exactly correlate with those at the hub height of the turbine, a listener might find moments when the wind turbine could be heard over the residual sound.

Low Frequency Noise and Infrasound

Infrasound was a significant characteristic of some wind turbine models that has been attributed to early designs in which turbine blades were downwind of the main tower. The effect was generated as the blades cut through the turbulence generated around the downwind side of the tower. Modern designs generally have the blades upwind of the tower. Wind conditions around the blades and improved blade design minimize the generation of the effect.

As depicted in Figure 3 below, low frequency pressure vibrations are typically categorized as low frequency sound when they can be heard near the bottom of human perception (10-200 Hz), and infrasound when they are below the common limit of human perception. Sound below 20 Hz is generally considered to be infrasound, even though there may be some human perception in that range. Because the ranges of low frequency sound and infrasound overlap it is important to understand how the terms are applied in a given context.

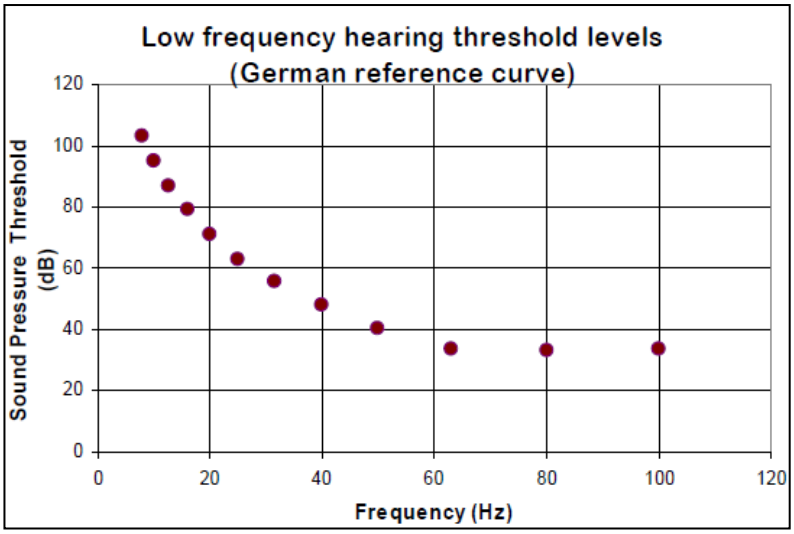

Figure 3: Low Frequency Hearing Threshold Levels

Infrasound is always present in the environment and stems from many sources including residual air turbulence from wind, ventilation units, waves on the seashore, distant explosions, traffic, aircraft, and other machinery. Infrasound propagates farther (i.e., with lower levels of dissipation) than higher frequencies. To place infrasound in perspective, when a child is swinging high on a swing, the pressure changes on their ears, from top to bottom of the swing, is nearly 120 dB(A) at a frequency of around 1 Hz.

Some characteristics of the human perception of infrasound and low frequency sound are:

- Low frequency sound and infrasound (2-100 Hz) are perceived as a mixture of auditory and tactile sensations
- Lower frequencies must be of a higher magnitude (dB) to be perceived, e.g., the threshold of hearing at 10 Hz is around 100 dB (see Figure 3 above)
- Tonality cannot be perceived below around 18 Hz and
- Infrasound may not appear to be coming from a specific location, because of its long wavelengths.

The primary human response to perceived infrasound is annoyance, with resulting secondary effects. Annoyance levels typically depend on other characteristics of the infrasound, including intensity, variations with time, such as impulses, loudest sound, periodicity, etc. Infrasound has three annoyance mechanisms:

- A feeling of static pressure
- Periodic masking effects in medium and higher frequencies; and
- Rattling of doors, windows, etc. from strong low frequency components.

Human effects vary by the intensity of the perceived infrasound, which can be grouped into these approximate ranges:

- 90 dB and below: No evidence of adverse effects'

- 115 dB: Fatigue, apathy, abdominal symptoms, hypertension in some humans
- 120 dB: Approximate threshold of pain at 10 Hz and
- 120 – 130 dB and above: Exposure for 24 hours causes physiological damage.

The typical range of sound power level for wind turbine generators is in the range of 100 to 105 dB(A) – a much lower sound power level (10 dB or more) than the majority of construction machinery such as bulldozers. For infrasound to be audible even to a person with the most sensitive hearing at a distance of 300 m would require a sound power level of at least 140 dB at 10 Hz and even higher emission levels than this at lower frequencies and at greater distances. There is no information available to indicate that wind turbine generators emit infrasound anywhere near this intensity.

3. Possible Mitigation Measures of Potential Noise Impacts

To mitigate the potential noise impacts of the proposed development, the following measures will be considered if needed:

- Construction Phase:
    - Conduct Noise Sensitivity Training for all construction staff where construction takes place close to sensitive receptors.
    - No construction should occur during night-time hours (22:00-06:00).
    - If possible, piling activities should occur during the hottest part of the day to take advantage of the unstable atmospheric conditions.
    - Residual Noise Monitoring should be conducted during the construction phase at sensitive NSAs.
- Operational Phase:
    - Wind Turbine Generators (WTGs) should not be placed within a no-go area of 500m to any occupied Noise Sensitive Area (NSA).
    - If the night-time noise rating limit for rural areas (35dB(A)) is exceeded, the WTGs could be operated in a lower power mode at certain wind speeds or be relocated further away from an NSA.

The potential noise mitigation measures will be determined during the final modelling and noise impact assessment phase.

4. Description of the Affected Environment

Figure 4 below shows the regional context, a total of 238 Noise Sensitive Areas (NSAs) were identified. The site study confirmed the primary land us of the area as agricultural. The farming activities are mixed-use consisting of cattle, sheep, game and crop production. The topography of the area is a combination of flat plains and undulating hills. The receptors identified during the desktop review and confirmed during the field study were mostly farmers and staff houses. Due to limited access, it was not feasible to confirm the occupancy of all structures identified.

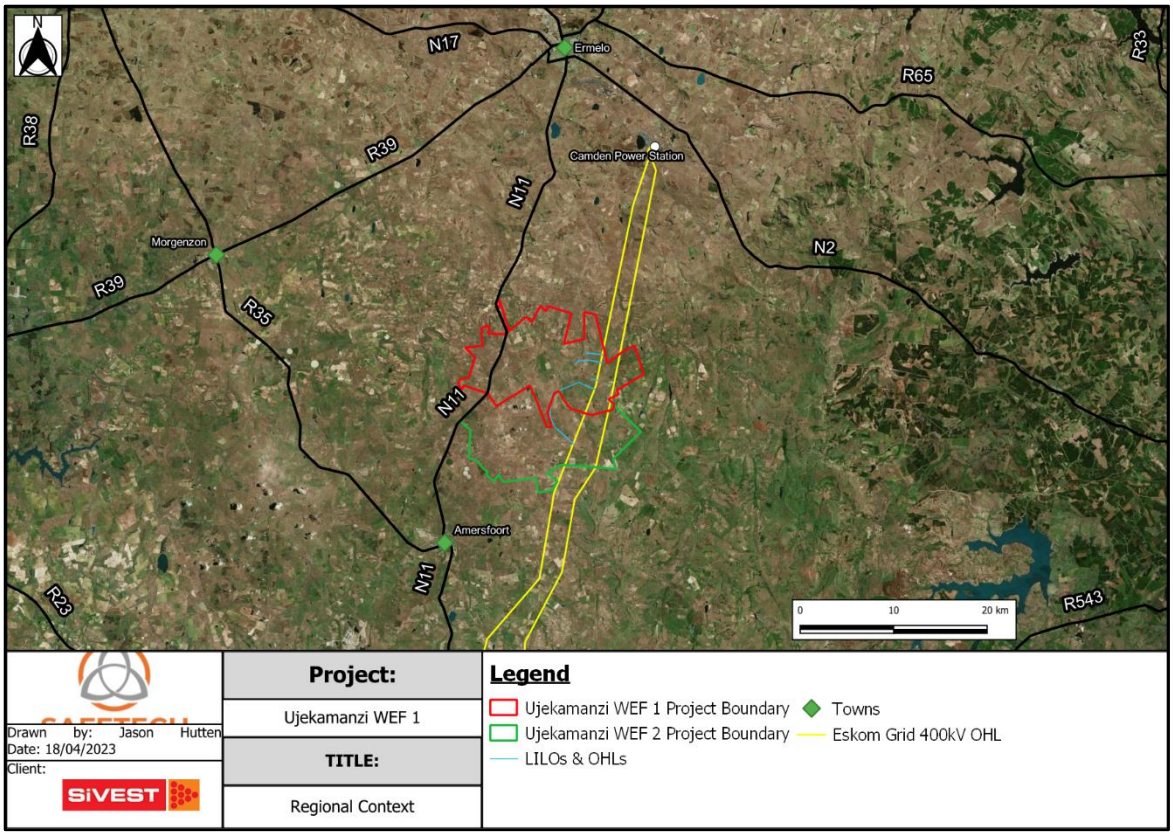

Figure 4: Ujekamanzi WEF 1 Regional Context

The noise emissions could have an impact on the residents at the NSA's. Figure 5 below shows the NSA's that are most likely to be impacted by the proposed Ujekamanzi WEF 1, including the 500m no-go buffer.

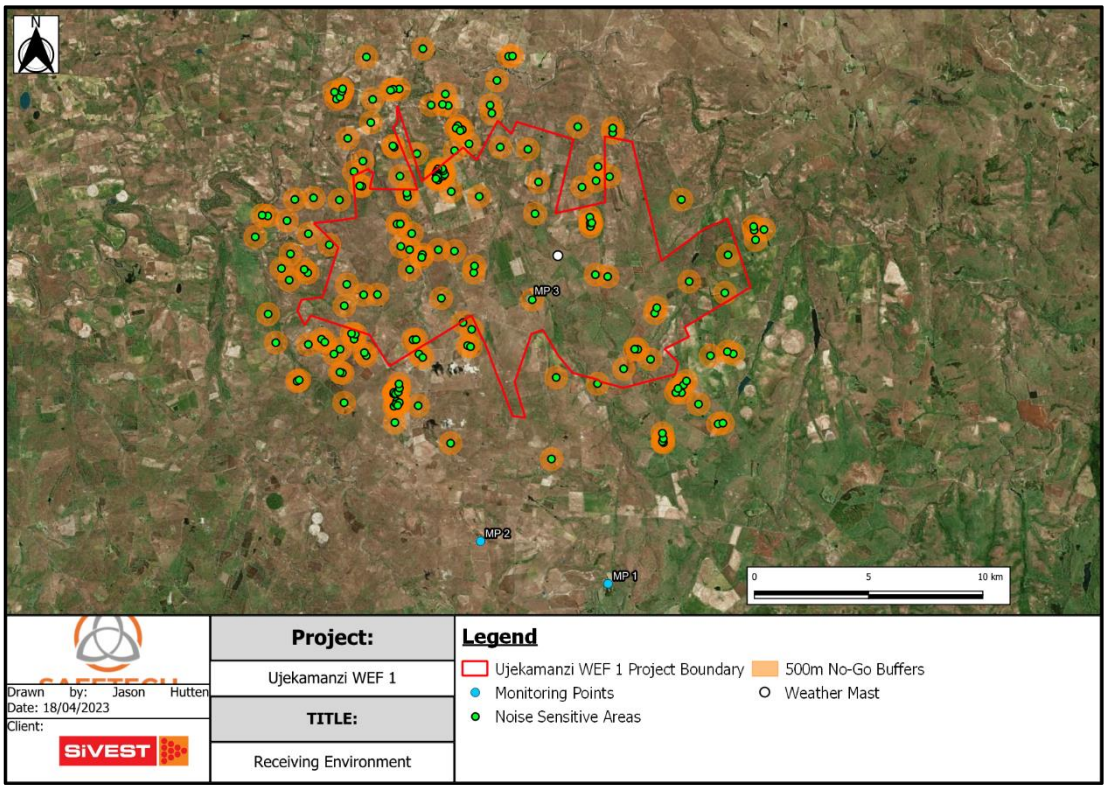

Figure 5: Ujekamanzi WEF 1 Noise Sensitive Areas

Three sessions of noise monitoring were conducted. The locations of the monitoring points (MP) are shown in Figure 5. The methodology and details of the field study are described in further details below.

5. Field Study

The field study validated the classification of the study area as a rural district. The land classification is primarily mixed-use agriculture activities. Table 1 below shows the SANS 10103:2008 guidelines for day and night noise limits. National and provincial standards classify noise levels exceeding 7dB(A) above the ambient noise levels as a disturbing noise.

Table 1: Noise limits for rural districts

Type of District	Equivalent Continuous Rating Level, $L_{Req.T}$ for Noise					
	Outdoors (dB(A))			Indoors, with open windows (dB(A))		
	Day-night	Daytime	Night-time	Day-night	Daytime	Night-time
Rural Districts	45	45	35	35	35	25

The field study was conducted from the 23rd of January 2023 to the 27th of January 2023 in accordance with SANS 10103:2008. The guidelines to determine the ambient noise levels of the area are described in the methodology below:

A long-term measurement was taken by placing a noise meter on a tripod and ensuring that it was placed at least 1.2 m from floor level and 3.5 m from any large flat reflecting surface. The 36-hour measurement time encompassed one "day" period (06:00-22:00) and two "night" periods (22:00-06:00). The noise meter was calibrated before and after the survey. At no time was the difference more than one decibel (dB) (Note: If the difference between measurements at the same point under the same conditions is more than 1 dB, then this is an indication that the noise meter is not properly calibrated). The weighting used was on the A scale and the meter was placed on "fast", which is the preferred method as per SANS 10103:2008, the measurement and rating of environmental noise. The meter was fitted with a windscreen, which is supplied by the manufacturer. The windscreen is designed to reduce wind noise around the microphone and not bias the measurements.

The results of the baseline residual noise monitoring for the three monitoring points are illustrated in Figures 6 to 8 below. The noise profiles during the time of the monitoring were typical of the rural landscape. Noise sources included birds chirping, occasional cars passing by wind, farming activities and rustling of leaves from surrounding vegetation.

The instrumentation that was used to conduct the study is as follows:

Rion NL-62 and UC-59L Integrating Sound Level Meter with built-in ⅓-Octave Filter and ½" Microphone with NC-74 Sound Calibrator:

- Type 1, Rion NL-62, NH-26, UC-59L Integrating Sound Level Meter with built-in ⅓-Octave Filter and ½" Microphone.
- Serial no.: 00420125; 01697; 00840.
- Calibrated by: M and N Acoustic Services cc on 20 July 2022 (calibration due July 2023 as per SANS 10083:2013).
- Certificate number: L85185.
- Total uncertainty of measurements: Integrating Sound Level Meter: Refer to calibration certificate. ½" Microphone: ± 0.5 dB. Built-in ⅓-Octave Filter: ± 0.5 dB.

Rion NC-74, NC-74-002 Sound Calibrator:

- Serial no.: 34425540.
- Calibrated by: M and N Acoustic Services cc on 20 July 2022 (calibration due July 2023).
- Certificate number: L85186
- Total uncertainty of measurements: Sound Calibrator: ± 0.5 dB

Calibration certificates are available on request.

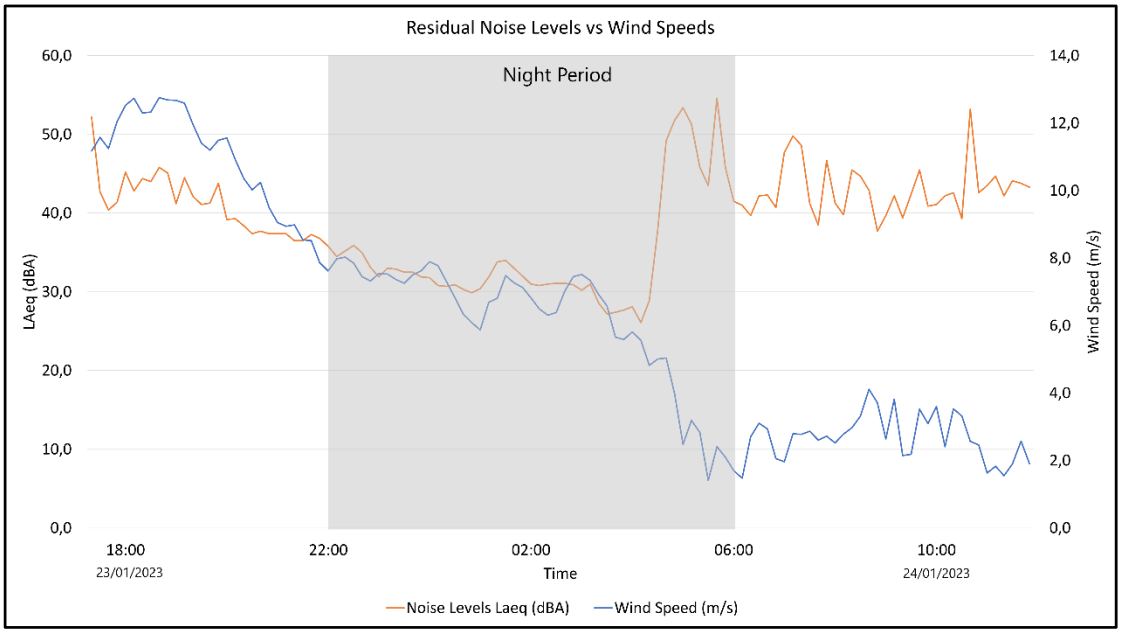

Figure 6: Monitoring Point 1 Residual Noise Levels vs Weather Conditions

For MP 1 above, the L_{Aeq} value for the daytime period was **43.9 dB(A)**. The L_{Aeq} value for the night-time period was **43.4 dB(A)**.

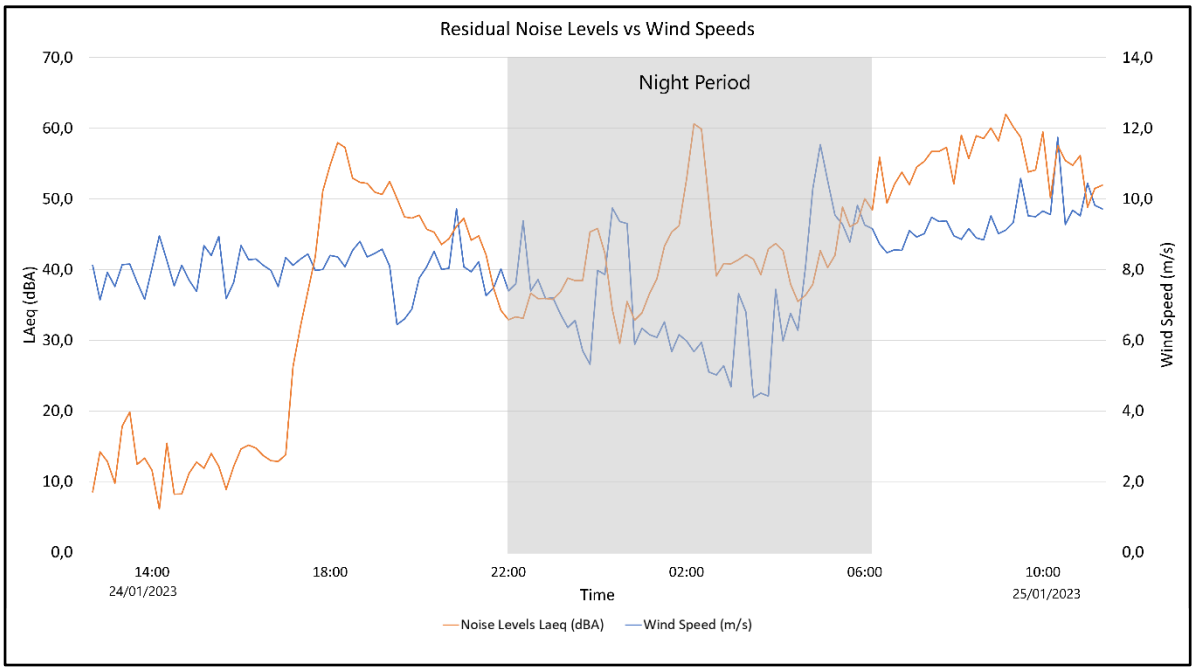

Figure 7: Monitoring Point 2 Residual Noise Levels vs Weather Conditions

For MP 2 above, the L_{Aeq} value for the daytime period was **45.4 dB(A)**. The L_{Aeq} value for the night-time period was **44.9 dB(A)**.

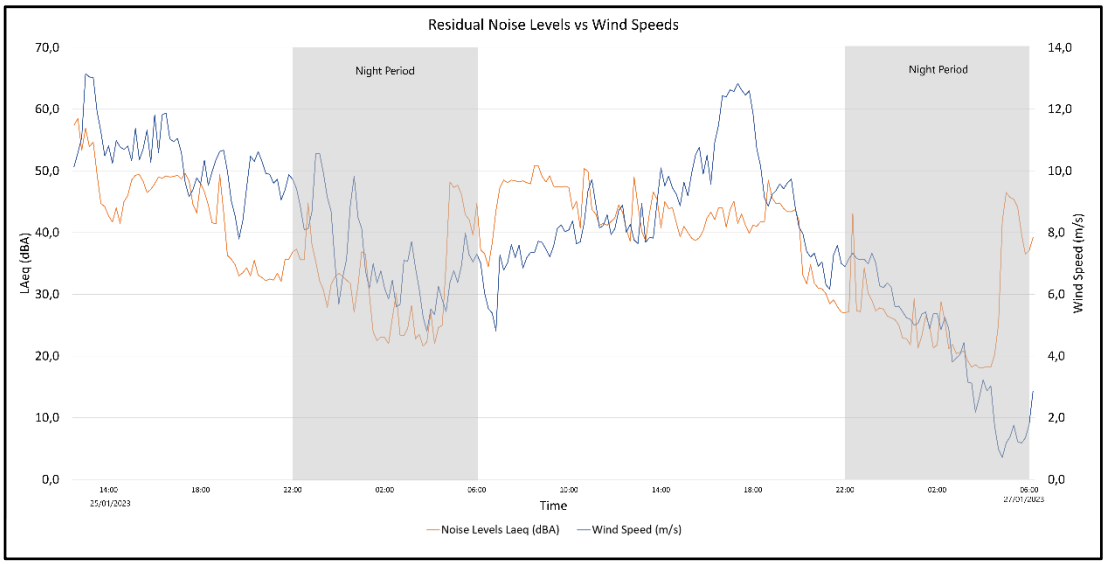

Figure 8: Monitoring Point 3 Ambient Noise Levels vs Weather Conditions

For MP 3 above, the L_{Aeq} value for the daytime period was **49.2 dB(A)**. The L_{Aeq} value for the night-time period was **37.7 dB(A)**.

The weather data for the monitoring period was supplied by the client. The coordinates of the weather station are: 26° 49' 41.09" S; 29° 59' 43.14" E.

6. Cumulative Study

As per the Screening Report, there is one Solar PV energy project proposed within 35km of the Ujekamanzi WEF 1 development. The cumulative impacts of the proposed 65MW Solar PV Facility at Majuba Power Station (DFFE Ref No.: 14/12/16/3/3/2/752) will not need to be assessed as it is approximately 30km from the Ujekamanzi WEF 1 site. At this distance, the noise impacts will be negligible due to noise attenuation. The cumulative noise impacts from the operation of the two Ujekamanzi Wind Energy Facilities will be assessed.

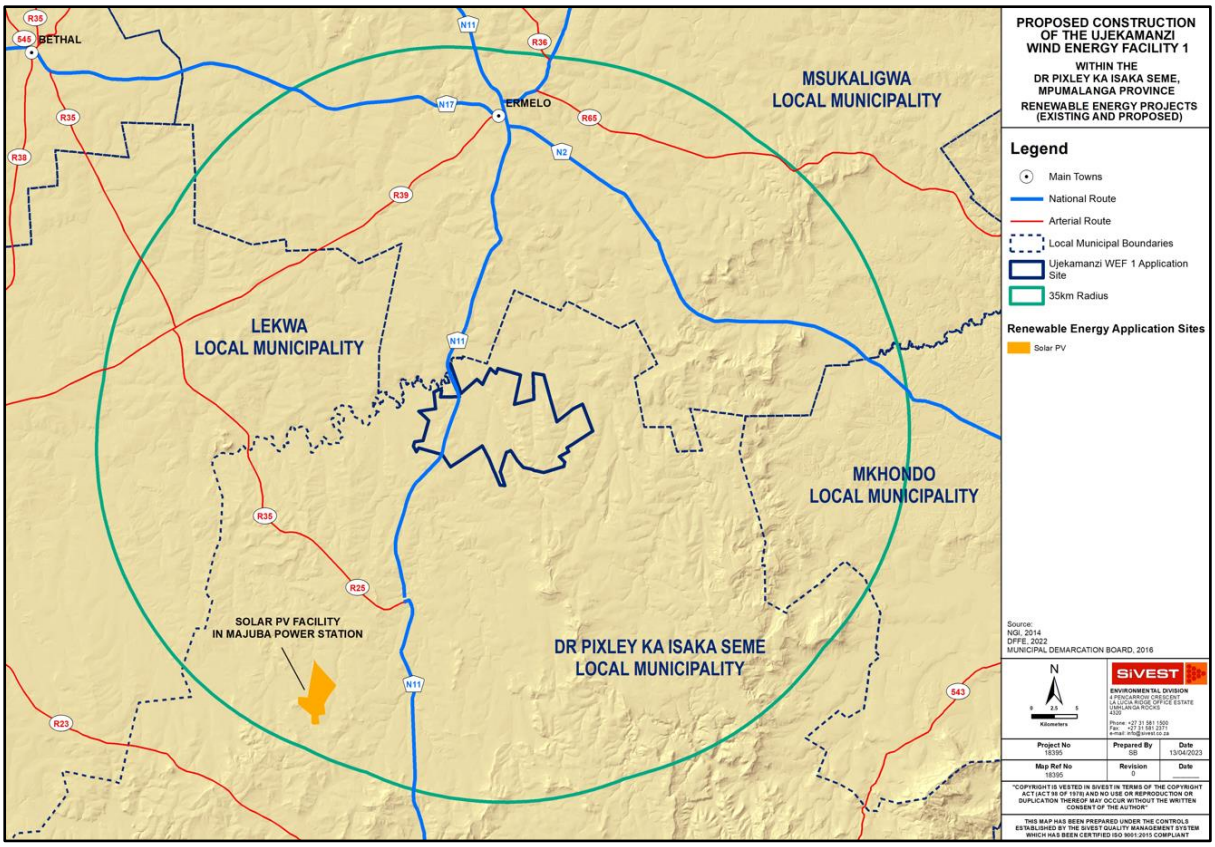

Figure 9: Cumulative Impacts

7. Grid Connection and Auxiliary Infrastructure

From a noise perspective, no impacts are anticipated from the operation of the grid connection and auxiliary infrastructure. Therefore, a separate noise impact assessment will not be required. The noise impacts arising from the construction of the grid connections and auxiliary infrastructure will be assessed as part of the Full Impact Assessment of the Wind Energy Facilities (internal roads and turbines).

8. Screening Tool

Figure 10 below shows the noise themed sensitivities shown in the screening tool. Not all sensitive receptors shown below were included as NSAs as no structures could be observed during the desktop review of the satellite imagery. The desktop review and field study confirmed that the sensitivity rating produced by the screening tool is accurate and the site sensitivity is classified as very high for the noise theme.

MAP OF RELATIVE NOISE THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Area of low sensitivity
Very High	Potential temporarily or permanently inhabited residence

Page 20 of 23

Disclaimer applies
20/04/2023

Figure 10: Noise Themed Sensitivities

9. Legal Requirements

As part of the noise impact assessment, relevant noise related legislation and standards will be identified. Where applicable the following standards will also be consulted:

- South Africa - GNR.154 of January 1992: Noise control regulations in terms of section 25 of the Environment Conservation Act (ECA), 1989 (Act No. 73 of 1989).
- South Africa - GNR.155 of 10 January 1992: Application of noise control regulations made under section 25 of the Environment Conservation Act, 1989 (Act No. 73 of 1989).
- South Africa – GNR. 320 of 20 March 2020: Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes under Sections 24(5)(a) and (h) of the National Environmental Management Act, 1998 (Act no. 107 of 1998).
- SANS 10103:2008 Version 6 - The measurement and rating of environmental noise with respect to annoyance and to speech communication.
- SANS 10357:2004 Version 2.1 - The calculation of sound propagation by the Concawe method.
- International Finance Corporation – 2007 General EHS Guidelines: Environmental Noise.

10. Conclusion

The following is concluded and verified:

- The project site is situated in a rural district.
- The project could impact on several noise sensitive areas.
- It is recommended that a 500m no-go buffer be placed around all occupied noise sensitive receptors for planning purposes. The WTG layout for the proposed Ujekamanzi WEF 1 should adhere to this recommendation.

The proposed mitigations measures of the potential noise impacts have been described in Section 3.

It is recommended that a full noise impact assessment, that includes emission modelling be conducted. A comprehensive report will be provided that will include noise mitigation measures to be included in the environmental management plan as well as predicted noise levels during the construction and operation phase.

Dr Brett Williams

APPENDIX A – NOISE & WEATHER DATA

The table below shows the consolidated noise levels (as a ten-minute average) and wind speeds recorded during the field study from the 23rd of January 2023 to the 27th of January 2023.

Date & Time	Noise Levels L_{Aeq} (dBA)	Wind Speed at 120m (m/s)
2023/01/23 17:30	52,2	11,18
2023/01/23 17:40	42,7	11,58
2023/01/23 17:50	40,4	11,25
2023/01/23 18:00	41,4	12,05
2023/01/23 18:10	45,2	12,53
2023/01/23 18:20	42,8	12,74
2023/01/23 18:30	44,4	12,30
2023/01/23 18:40	44,0	12,33
2023/01/23 18:50	45,8	12,76
2023/01/23 19:00	45,1	12,69
2023/01/23 19:10	41,2	12,68
2023/01/23 19:20	44,5	12,59
2023/01/23 19:30	42,1	11,95
2023/01/23 19:40	41,1	11,40
2023/01/23 19:50	41,3	11,20
2023/01/23 20:00	43,8	11,49
2023/01/23 20:10	39,2	11,56
2023/01/23 20:20	39,3	10,92
2023/01/23 20:30	38,4	10,37
2023/01/23 20:40	37,4	10,02
2023/01/23 20:50	37,7	10,24
2023/01/23 21:00	37,4	9,49
2023/01/23 21:10	37,4	9,06
2023/01/23 21:20	37,4	8,94
2023/01/23 21:30	36,5	8,99
2023/01/23 21:40	36,5	8,54
2023/01/23 21:50	37,3	8,52
2023/01/23 22:00	36,8	7,86
2023/01/23 22:10	35,8	7,62
2023/01/23 22:20	34,5	7,98
2023/01/23 22:30	35,2	8,03
2023/01/23 22:40	35,9	7,86
2023/01/23 22:50	35,0	7,45
2023/01/23 23:00	33,1	7,32
2023/01/23 23:10	31,9	7,54
2023/01/23 23:20	33,0	7,53
2023/01/23 23:30	32,9	7,37

Date & Time	Noise Levels L_{Aeq} (dBA)	Wind Speed at 120m (m/s)
2023/01/23 23:40	32,5	7,25
2023/01/23 23:50	32,5	7,50
2023/01/24 00:00	31,9	7,63
2023/01/24 00:10	31,8	7,89
2023/01/24 00:20	30,8	7,78
2023/01/24 00:30	30,7	7,30
2023/01/24 00:40	30,9	6,83
2023/01/24 00:50	30,3	6,34
2023/01/24 01:00	29,9	6,09
2023/01/24 01:10	30,4	5,87
2023/01/24 01:20	31,9	6,69
2023/01/24 01:30	33,8	6,81
2023/01/24 01:40	34,0	7,48
2023/01/24 01:50	33,0	7,26
2023/01/24 02:00	32,0	7,13
2023/01/24 02:10	31,0	6,82
2023/01/24 02:20	30,8	6,49
2023/01/24 02:30	31,0	6,31
2023/01/24 02:40	31,1	6,39
2023/01/24 02:50	31,1	7,03
2023/01/24 03:00	30,9	7,45
2023/01/24 03:10	30,2	7,52
2023/01/24 03:20	31,0	7,34
2023/01/24 03:30	28,6	6,93
2023/01/24 03:40	27,2	6,58
2023/01/24 03:50	27,4	5,66
2023/01/24 04:00	27,7	5,59
2023/01/24 04:10	28,1	5,81
2023/01/24 04:20	26,1	5,57
2023/01/24 04:30	28,9	4,82
2023/01/24 04:40	37,9	5,01
2023/01/24 04:50	49,2	5,04
2023/01/24 05:00	51,8	3,98
2023/01/24 05:10	53,4	2,48
2023/01/24 05:20	51,3	3,19
2023/01/24 05:30	45,8	2,83
2023/01/24 05:40	43,5	1,41
2023/01/24 05:50	54,6	2,41
2023/01/24 06:00	45,8	2,10
2023/01/24 06:10	41,5	1,70
2023/01/24 06:20	41,0	1,48
2023/01/24 06:30	39,7	2,70
2023/01/24 06:40	42,2	3,11

Date & Time	Noise Levels L_{Aeq} (dBA)	Wind Speed at 120m (m/s)
2023/01/24 06:50	42,3	2,94
2023/01/24 07:00	40,7	2,06
2023/01/24 07:10	47,7	1,97
2023/01/24 07:20	49,8	2,80
2023/01/24 07:30	48,6	2,78
2023/01/24 07:40	41,2	2,87
2023/01/24 07:50	38,5	2,61
2023/01/24 08:00	46,7	2,73
2023/01/24 08:10	41,3	2,52
2023/01/24 08:20	39,8	2,78
2023/01/24 08:30	45,5	2,97
2023/01/24 08:40	44,7	3,31
2023/01/24 08:50	42,9	4,12
2023/01/24 09:00	37,7	3,71
2023/01/24 09:10	39,7	2,64
2023/01/24 09:20	42,2	3,82
2023/01/24 09:30	39,4	2,15
2023/01/24 09:40	42,4	2,19
2023/01/24 09:50	45,5	3,52
2023/01/24 10:00	40,9	3,10
2023/01/24 10:10	41,1	3,60
2023/01/24 10:20	42,2	2,41
2023/01/24 10:30	42,6	3,54
2023/01/24 10:40	39,3	3,32
2023/01/24 10:50	53,2	2,57
2023/01/24 11:00	42,6	2,46
2023/01/24 11:10	43,5	1,63
2023/01/24 11:20	44,7	1,83
2023/01/24 11:30	42,2	1,55
2023/01/24 11:40	44,1	1,90
2023/01/24 11:50	43,8	2,58
2023/01/24 12:00	43,3	1,91
2023/01/24 12:10	N/A	2,74
2023/01/24 12:20	N/A	1,18
2023/01/24 12:30	N/A	2,16
2023/01/24 12:40	40,6	1,71
2023/01/24 12:50	35,7	2,84
2023/01/24 13:00	39,6	2,57
2023/01/24 13:10	37,6	1,95
2023/01/24 13:20	40,7	3,57
2023/01/24 13:30	40,8	3,97
2023/01/24 13:40	38,2	2,49
2023/01/24 13:50	35,8	2,66

Date & Time	Noise Levels L_{Aeq} (dBA)	Wind Speed at 120m (m/s)
2023/01/24 14:00	40,2	2,32
2023/01/24 14:10	44,8	1,22
2023/01/24 14:20	41,3	3,09
2023/01/24 14:30	37,7	1,65
2023/01/24 14:40	40,6	1,65
2023/01/24 14:50	38,5	2,24
2023/01/24 15:00	36,9	2,55
2023/01/24 15:10	43,4	2,38
2023/01/24 15:20	42,0	2,79
2023/01/24 15:30	44,7	2,43
2023/01/24 15:40	35,9	1,78
2023/01/24 15:50	38,2	2,43
2023/01/24 16:00	43,4	2,92
2023/01/24 16:10	41,4	3,03
2023/01/24 16:20	41,5	2,95
2023/01/24 16:30	40,6	2,73
2023/01/24 16:40	39,9	2,59
2023/01/24 16:50	37,6	2,57
2023/01/24 17:00	41,7	2,76
2023/01/24 17:10	40,6	5,26
2023/01/24 17:20	41,5	6,41
2023/01/24 17:30	42,2	7,39
2023/01/24 17:40	39,9	8,36
2023/01/24 17:50	40,0	10,22
2023/01/24 18:00	42,0	10,96
2023/01/24 18:10	41,8	11,59
2023/01/24 18:20	40,4	11,45
2023/01/24 18:30	42,7	10,59
2023/01/24 18:40	44,0	10,47
2023/01/24 18:50	41,8	10,44
2023/01/24 19:00	42,3	10,19
2023/01/24 19:10	42,9	10,13
2023/01/24 19:20	40,5	10,50
2023/01/24 19:30	32,2	10,01
2023/01/24 19:40	33,0	9,49
2023/01/24 19:50	34,4	9,46
2023/01/24 20:00	38,8	9,54
2023/01/24 20:10	40,4	9,14
2023/01/24 20:20	42,6	9,06
2023/01/24 20:30	40,0	8,71
2023/01/24 20:40	40,2	8,88
2023/01/24 20:50	48,6	9,23
2023/01/24 21:00	40,4	9,45

Date & Time	Noise Levels L_{Aeq} (dBA)	Wind Speed at 120m (m/s)
2023/01/24 21:10	39,7	8,83
2023/01/24 21:20	41,1	8,95
2023/01/24 21:30	36,3	8,42
2023/01/24 21:40	37,4	7,48
2023/01/24 21:50	40,1	6,84
2023/01/24 22:00	37,0	6,58
2023/01/24 22:10	38,0	6,66
2023/01/24 22:20	46,9	6,62
2023/01/24 22:30	37,0	7,33
2023/01/24 22:40	38,6	7,18
2023/01/24 22:50	35,9	7,18
2023/01/24 23:00	36,0	7,16
2023/01/24 23:10	33,7	7,37
2023/01/24 23:20	31,8	7,76
2023/01/24 23:30	32,8	7,69
2023/01/24 23:40	28,5	7,69
2023/01/24 23:50	26,6	9,07
2023/01/25 00:00	39,9	9,17
2023/01/25 00:10	39,3	8,46
2023/01/25 00:20	48,7	6,86
2023/01/25 00:30	46,8	5,91
2023/01/25 00:40	46,5	7,09
2023/01/25 00:50	29,4	6,57
2023/01/25 01:00	31,7	6,77
2023/01/25 01:10	30,8	7,32
2023/01/25 01:20	30,4	7,74
2023/01/25 01:30	32,6	8,66
2023/01/25 01:40	28,4	9,06
2023/01/25 01:50	30,8	9,24
2023/01/25 02:00	29,9	10,57
2023/01/25 02:10	28,4	12,13
2023/01/25 02:20	29,7	11,98
2023/01/25 02:30	25,5	9,94
2023/01/25 02:40	25,1	7,82
2023/01/25 02:50	26,4	8,17
2023/01/25 03:00	23,4	8,16
2023/01/25 03:10	36,6	8,28
2023/01/25 03:20	34,0	8,43
2023/01/25 03:30	21,9	8,29
2023/01/25 03:40	22,5	7,85
2023/01/25 03:50	22,1	8,58
2023/01/25 04:00	37,2	8,74
2023/01/25 04:10	29,9	8,53

Date & Time	Noise Levels L_{Aeq} (dBA)	Wind Speed at 120m (m/s)
2023/01/25 04:20	33,8	7,59
2023/01/25 04:30	31,4	7,09
2023/01/25 04:40	40,3	7,27
2023/01/25 04:50	51,4	7,58
2023/01/25 05:00	57,7	8,54
2023/01/25 05:10	52,6	8,05
2023/01/25 05:20	47,7	8,41
2023/01/25 05:30	46,4	9,77
2023/01/25 05:40	43,9	9,21
2023/01/25 05:50	49,1	9,33
2023/01/25 06:00	46,3	10,01
2023/01/25 06:10	45,8	9,68
2023/01/25 06:20	43,6	11,18
2023/01/25 06:30	42,4	9,88
2023/01/25 06:40	42,8	10,42
2023/01/25 06:50	42,7	10,76
2023/01/25 07:00	45,5	10,40
2023/01/25 07:10	44,6	10,90
2023/01/25 07:20	45,1	11,06
2023/01/25 07:30	47,4	11,34
2023/01/25 07:40	46,8	11,35
2023/01/25 07:50	46,9	11,46
2023/01/25 08:00	44,8	10,42
2023/01/25 08:10	44,3	11,81
2023/01/25 08:20	45,8	11,14
2023/01/25 08:30	44,5	11,79
2023/01/25 08:40	44,2	11,71
2023/01/25 08:50	47,6	12,01
2023/01/25 09:00	45,1	11,64
2023/01/25 09:10	45,6	12,40
2023/01/25 09:20	46,7	12,04
2023/01/25 09:30	52,9	11,75
2023/01/25 09:40	47,6	10,76
2023/01/25 09:50	47,5	10,82
2023/01/25 10:00	48,3	11,89
2023/01/25 10:10	47,8	10,04
2023/01/25 10:20	58,7	11,51
2023/01/25 10:30	46,4	11,09
2023/01/25 10:40	48,4	10,95
2023/01/25 10:50	47,6	11,23
2023/01/25 11:00	52,2	9,77
2023/01/25 11:10	49,1	10,30
2023/01/25 11:20	48,6	10,39

Date & Time	Noise Levels L_{Aeq} (dBA)	Wind Speed at 120m (m/s)
2023/01/25 11:30	N/A	11,04
2023/01/25 11:40	N/A	10,40
2023/01/25 11:50	N/A	10,50
2023/01/25 12:00	N/A	10,37
2023/01/25 12:10	N/A	9,67
2023/01/25 12:20	N/A	9,73
2023/01/25 12:30	57,4	10,13
2023/01/25 12:40	58,5	10,59
2023/01/25 12:50	53,3	11,08
2023/01/25 13:00	56,9	13,16
2023/01/25 13:10	53,9	13,04
2023/01/25 13:20	54,7	13,03
2023/01/25 13:30	49,4	11,92
2023/01/25 13:40	44,7	11,27
2023/01/25 13:50	44,2	10,48
2023/01/25 14:00	42,7	10,81
2023/01/25 14:10	41,7	10,24
2023/01/25 14:20	44,0	10,98
2023/01/25 14:30	41,5	10,77
2023/01/25 14:40	45,0	10,70
2023/01/25 14:50	46,0	10,80
2023/01/25 15:00	48,5	10,33
2023/01/25 15:10	49,3	11,38
2023/01/25 15:20	49,4	10,35
2023/01/25 15:30	48,3	10,71
2023/01/25 15:40	46,5	11,32
2023/01/25 15:50	47,0	10,28
2023/01/25 16:00	47,9	11,81
2023/01/25 16:10	49,0	10,59
2023/01/25 16:20	48,8	11,82
2023/01/25 16:30	49,2	11,87
2023/01/25 16:40	49,0	11,04
2023/01/25 16:50	49,1	10,95
2023/01/25 17:00	49,3	11,05
2023/01/25 17:10	48,7	10,59
2023/01/25 17:20	49,6	9,62
2023/01/25 17:30	48,4	9,16
2023/01/25 17:40	44,6	9,39
2023/01/25 17:50	43,2	9,78
2023/01/25 18:00	48,0	9,58
2023/01/25 18:10	46,6	10,34
2023/01/25 18:20	44,5	9,53
2023/01/25 18:30	41,6	9,97

Date & Time	Noise Levels L_{Aeq} (dBA)	Wind Speed at 120m (m/s)
2023/01/25 18:40	41,4	10,36
2023/01/25 18:50	49,4	10,63
2023/01/25 19:00	43,3	10,67
2023/01/25 19:10	36,3	9,99
2023/01/25 19:20	35,7	9,03
2023/01/25 19:30	34,8	8,54
2023/01/25 19:40	33,0	7,79
2023/01/25 19:50	33,5	8,39
2023/01/25 20:00	34,3	9,45
2023/01/25 20:10	33,0	10,48
2023/01/25 20:20	35,5	10,31
2023/01/25 20:30	33,1	10,63
2023/01/25 20:40	32,7	10,30
2023/01/25 20:50	32,2	9,91
2023/01/25 21:00	32,5	9,89
2023/01/25 21:10	32,3	9,60
2023/01/25 21:20	33,4	9,73
2023/01/25 21:30	32,1	9,06
2023/01/25 21:40	35,7	9,39
2023/01/25 21:50	35,7	9,88
2023/01/25 22:00	36,9	9,72
2023/01/25 22:10	37,3	9,42
2023/01/25 22:20	35,6	8,84
2023/01/25 22:30	35,6	8,09
2023/01/25 22:40	44,8	8,12
2023/01/25 22:50	38,1	8,67
2023/01/25 23:00	35,3	10,55
2023/01/25 23:10	32,2	10,57
2023/01/25 23:20	30,7	9,93
2023/01/25 23:30	27,9	9,15
2023/01/25 23:40	31,6	8,69
2023/01/25 23:50	32,8	7,02
2023/01/26 00:00	33,4	5,67
2023/01/26 00:10	32,9	6,54
2023/01/26 00:20	32,3	7,12
2023/01/26 00:30	31,8	8,87
2023/01/26 00:40	27,1	9,83
2023/01/26 00:50	31,4	8,49
2023/01/26 01:00	36,9	8,14
2023/01/26 01:10	36,5	6,76
2023/01/26 01:20	30,0	6,19
2023/01/26 01:30	23,9	6,99
2023/01/26 01:40	22,5	6,37

Date & Time	Noise Levels L_{Aeq} (dBA)	Wind Speed at 120m (m/s)
2023/01/26 01:50	23,1	6,76
2023/01/26 02:00	23,0	6,19
2023/01/26 02:10	22,0	5,84
2023/01/26 02:20	26,2	6,46
2023/01/26 02:30	30,1	5,59
2023/01/26 02:40	23,4	5,67
2023/01/26 02:50	23,3	7,10
2023/01/26 03:00	24,5	7,08
2023/01/26 03:10	28,2	7,71
2023/01/26 03:20	22,8	6,86
2023/01/26 03:30	23,5	6,16
2023/01/26 03:40	21,6	5,27
2023/01/26 03:50	22,3	4,79
2023/01/26 04:00	27,1	5,53
2023/01/26 04:10	22,0	5,33
2023/01/26 04:20	24,6	6,26
2023/01/26 04:30	25,0	5,82
2023/01/26 04:40	35,1	5,44
2023/01/26 04:50	48,2	6,38
2023/01/26 05:00	47,3	6,77
2023/01/26 05:10	47,7	6,38
2023/01/26 05:20	46,2	6,93
2023/01/26 05:30	42,9	7,98
2023/01/26 05:40	42,1	7,28
2023/01/26 05:50	39,6	7,06
2023/01/26 06:00	44,7	7,30
2023/01/26 06:10	37,2	7,01
2023/01/26 06:20	36,6	6,05
2023/01/26 06:30	34,5	5,54
2023/01/26 06:40	38,3	5,39
2023/01/26 06:50	43,6	4,82
2023/01/26 07:00	47,3	7,28
2023/01/26 07:10	48,5	6,78
2023/01/26 07:20	48,1	7,01
2023/01/26 07:30	48,5	7,61
2023/01/26 07:40	48,4	7,19
2023/01/26 07:50	48,2	7,60
2023/01/26 08:00	48,4	6,85
2023/01/26 08:10	48,1	7,18
2023/01/26 08:20	47,9	7,36
2023/01/26 08:30	50,8	7,35
2023/01/26 08:40	50,8	7,72
2023/01/26 08:50	49,1	7,69

Date & Time	Noise Levels L_{Aeq} (dBA)	Wind Speed at 120m (m/s)
2023/01/26 09:00	48,2	7,46
2023/01/26 09:10	49,2	7,22
2023/01/26 09:20	47,5	7,56
2023/01/26 09:30	47,4	8,12
2023/01/26 09:40	47,4	8,25
2023/01/26 09:50	47,5	8,03
2023/01/26 10:00	47,3	8,09
2023/01/26 10:10	43,8	8,38
2023/01/26 10:20	45,1	7,63
2023/01/26 10:30	40,7	7,70
2023/01/26 10:40	50,4	8,32
2023/01/26 10:50	49,9	9,36
2023/01/26 11:00	43,8	9,72
2023/01/26 11:10	43,0	8,94
2023/01/26 11:20	41,2	8,15
2023/01/26 11:30	41,5	8,24
2023/01/26 11:40	41,2	8,58
2023/01/26 11:50	41,8	7,94
2023/01/26 12:00	42,4	8,13
2023/01/26 12:10	44,5	8,72
2023/01/26 12:20	43,3	8,88
2023/01/26 12:30	40,5	8,01
2023/01/26 12:40	38,6	8,27
2023/01/26 12:50	49,0	7,77
2023/01/26 13:00	44,4	7,64
2023/01/26 13:10	40,2	8,94
2023/01/26 13:20	38,7	7,69
2023/01/26 13:30	43,1	7,84
2023/01/26 13:40	46,6	7,82
2023/01/26 13:50	45,4	9,01
2023/01/26 14:00	40,8	10,10
2023/01/26 14:10	45,0	9,51
2023/01/26 14:20	43,9	9,83
2023/01/26 14:30	44,0	9,44
2023/01/26 14:40	41,6	9,24
2023/01/26 14:50	39,3	8,87
2023/01/26 15:00	41,0	9,63
2023/01/26 15:10	40,0	9,19
2023/01/26 15:20	39,1	9,93
2023/01/26 15:30	38,7	10,51
2023/01/26 15:40	39,2	10,77
2023/01/26 15:50	40,3	9,89
2023/01/26 16:00	42,4	10,50

Date & Time	Noise Levels L_{Aeq} (dBA)	Wind Speed at 120m (m/s)
2023/01/26 16:10	43,3	9,57
2023/01/26 16:20	42,1	10,92
2023/01/26 16:30	44,0	11,48
2023/01/26 16:40	44,0	12,43
2023/01/26 16:50	40,9	12,40
2023/01/26 17:00	43,7	12,62
2023/01/26 17:10	45,1	12,57
2023/01/26 17:20	41,5	12,84
2023/01/26 17:30	43,0	12,62
2023/01/26 17:40	41,2	12,46
2023/01/26 17:50	39,9	12,59
2023/01/26 18:00	41,2	11,85
2023/01/26 18:10	41,0	10,72
2023/01/26 18:20	41,8	10,15
2023/01/26 18:30	41,8	9,13
2023/01/26 18:40	48,5	8,86
2023/01/26 18:50	45,6	9,24
2023/01/26 19:00	44,7	9,36
2023/01/26 19:10	44,8	9,58
2023/01/26 19:20	43,9	9,42
2023/01/26 19:30	43,4	9,61
2023/01/26 19:40	43,4	9,73
2023/01/26 19:50	43,7	8,84
2023/01/26 20:00	41,9	8,17
2023/01/26 20:10	33,1	7,97
2023/01/26 20:20	31,7	7,39
2023/01/26 20:30	34,8	7,21
2023/01/26 20:40	31,8	7,33
2023/01/26 20:50	31,0	6,91
2023/01/26 21:00	30,9	7,05
2023/01/26 21:10	30,1	6,31
2023/01/26 21:20	28,5	6,16
2023/01/26 21:30	29,1	7,27
2023/01/26 21:40	28,0	7,59
2023/01/26 21:50	27,1	7,00
2023/01/26 22:00	27,0	6,90
2023/01/26 22:10	27,2	7,16
2023/01/26 22:20	43,1	7,34
2023/01/26 22:30	27,3	7,16
2023/01/26 22:40	27,2	7,12
2023/01/26 22:50	34,3	7,13
2023/01/26 23:00	30,2	6,99
2023/01/26 23:10	29,0	7,33

Date & Time	Noise Levels L_{Aeq} (dBA)	Wind Speed at 120m (m/s)
2023/01/26 23:20	27,3	7,01
2023/01/26 23:30	27,8	6,27
2023/01/26 23:40	27,6	6,22
2023/01/26 23:50	26,5	6,37
2023/01/27 00:00	26,2	6,24
2023/01/27 00:10	25,9	5,60
2023/01/27 00:20	25,0	5,61
2023/01/27 00:30	22,9	5,43
2023/01/27 00:40	22,8	5,24
2023/01/27 00:50	21,8	5,20
2023/01/27 01:00	29,3	5,00
2023/01/27 01:10	21,3	5,06
2023/01/27 01:20	23,3	5,36
2023/01/27 01:30	26,5	5,43
2023/01/27 01:40	24,8	4,89
2023/01/27 01:50	21,3	5,38
2023/01/27 02:00	21,8	5,38
2023/01/27 02:10	28,8	4,86
2023/01/27 02:20	25,6	5,25
2023/01/27 02:30	21,2	4,89
2023/01/27 02:40	21,9	3,81
2023/01/27 02:50	20,4	3,94
2023/01/27 03:00	20,6	4,05
2023/01/27 03:10	20,8	4,43
2023/01/27 03:20	19,2	3,16
2023/01/27 03:30	18,2	3,12
2023/01/27 03:40	18,6	2,18
2023/01/27 03:50	18,1	2,65
2023/01/27 04:00	18,1	3,22
2023/01/27 04:10	18,3	2,87
2023/01/27 04:20	18,2	3,02
2023/01/27 04:30	20,2	1,73
2023/01/27 04:40	25,2	0,97
2023/01/27 04:50	41,8	0,71
2023/01/27 05:00	46,5	1,18
2023/01/27 05:10	45,7	1,38
2023/01/27 05:20	45,4	1,76
2023/01/27 05:30	44,1	1,22
2023/01/27 05:40	39,8	1,18
2023/01/27 05:50	36,5	1,34
2023/01/27 06:00	37,1	1,79
2023/01/27 06:10	39,2	2,87

APPENDIX B – FIELD STUDY PHOTOS

APPENDIX C – SPECIALIST DECLARATION

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Proposed Ujekamanzi Wind Energy Facilities near Amersfoort, Mpumalanga– Noise Impacts Assessment

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

Details of Specialist, Declaration and Undertaking Under Oath

Page 1 of 3

1. SPECIALIST INFORMATION

Specialist Company Name:	Safetech			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	Non-compliant	Percentage Procurement recognition	0%
Specialist name:	Dr Brett Williams			
Specialist Qualifications:	PhD Environmental Management – Occupational Hygienist			
Professional affiliation/registration:	Member SA Institute of Occupational Hygienists			
Physical address:	64 Worraker Street, Newton Park, PE			
Postal address:	PO Box 27607, Greenacres			
Postal code:	6057	Cell:	082 550 2137	
Telephone:	041 365 6846	Fax:		
E-mail:	Brett.williams@safetech.co.za			

2. DECLARATION BY THE SPECIALIST

I, _____Brett Williams_____, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

Safetech

Name of Company:

16/2/2023

Date

Details of Specialist, Declaration and Undertaking Under Oath

Page 2 of 3

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Brett Williams, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Safetech

Name of Company

16/2/2023

Date

Signature of the Commissioner of Oaths

ANNEKIE VAN ONSELEN
COMMISSIONER OF OATHS
PRACTISING ATTORNEY
70 WORRAKER STREET, NEWTON PARK
PORT ELIZABETH, 6045

16/2/2023

Date

APPENDIX D – ASSESSMENT PROTOCOL

Part A of the Assessment Protocols published in GN 320 on 20 March 2020 (i.e. Site sensitivity verification is required where a specialist assessment is required but no specific assessment protocol has been prescribed) is applicable where the DEFF Screening Tool has the relevant themes to verify.

Accordingly, Specialists must please provide a site sensitivity verification report containing the information outlined below.

Introduction

Provide a brief description of the project and then add statement regarding the undertaking of site sensitivity verification report, for example:

In accordance with Appendix 6 of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations of 2014, a site sensitivity verification has been undertaken in order to confirm the current land use and environmental sensitivity of the proposed project area as identified by the National Web-Based Environmental Screening Tool (Screening Tool).

Site sensitivity verification

The specialist must:

- *Provide a description of how the site sensitivity verification was undertaken, for example:*
  - *desk top analysis, using satellite imagery.*
  - *preliminary on-site inspection; and*
  - *any other available and relevant information.*

Outcome of site sensitivity verification

Provide a concise description of the findings of the site sensitivity verification.

National environmental screening tool

Provide a description of the sensitivities identified by the Screening Tool for the relevant theme. Compare the findings of the tool with the findings of the site verification exercise to:

- *confirm or dispute the current use of the land and the environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc.*
- *include a motivation and evidence (e.g., photographs) of either the verified or different use of the land and environmental sensitivity.*

Conclusion

Provide a brief statement confirming that the site sensitivities identified in the specialist study have been verified.

APPENDIX E – SPECIALIST DETAILS

Dr Brett Williams

Name of Organization:	Safetech
Position in Firm:	Owner
Date of Birth:	21/04/1963
Years with Firm:	30
Nationality:	South African

MEMBERSHIP OF PROFESSIONAL BODIES

- Southern African Institute of Occupational Hygienists
- Institute of Safety Management
- Mine Ventilation Society
- National Clean Air Association

BIOGRAPHICAL SKETCH

Brett Williams has been involved in Health, Safety and Environmental Management since 1987. He has been measuring noise related impacts since 1996. Brett is the owner of Safetech who have offices in Pretoria and Port Elizabeth. He has consulted to many different industries including, mining, chemical, automotive, food production etc. He is registered with the Department of Labour and Chamber of Mines to measure environmental stressors, which include chemical monitoring, noise, and other physical stresses.

PROJECT EXPERIENCE

Dr Williams has been assigned to various projects to assess environmental noise impacts. The list below presents a selection of Brett Williams' project experience, relevant to noise:

- Arcus Gibb – Kouga Wind Energy Project
- CSIR – Umgeni Water Desalination Plant
- CSIR – Saldanha Desalination Plant
- CSIR – Atlantis Gas to Power Project (current)
- CSIR – Walvis Bay Port Extension
- CSIR – Noise Impact Study of Namwater Desalination Plant
- CSIR – Kouga Wind Energy Project
- CSIR – Wind Current Wind Energy Project
- CSIR – Langefontein Wind Energy Project
- CSIR – Mossel Bay Wind Energy Project
- CSIR – Coega IDZ Wind Energy Project
- CSIR – Baakenskop Wind Energy Project
- CSIR – Biotherm Wind Energy Project
- CSIR – Innowind Mossel Bay

- CSIR – Langefontein Wind Energy Project
- CSIR – Bulk Manganese Terminal (Port of Ngqura)
- CSIR – Phyto Amandla Biodiesel Project
- CSIR – Vleesbaai Wind Energy Project
- CSIR - Kudusberg Wind Energy Project
- CES – Coega IDZ Gas to Power Project (Current)
- CES – Coega IDZ Wind Energy Project
- CES – Middleton Wind Energy Project
- CES – Waainek Wind Energy Project
- CES – Ncora Wind Energy Project
- CES – Qunu Wind Energy Project
- CES – Nqamakwe Wind Energy Project
- CES – Plan 8 Wind Energy Project
- CES – Qumbu Wind Energy Project
- CES – Peddie Wind Energy Project
- CES – Cookhouse Wind Energy Project
- CES – Madagascar Heavy Minerals
- CES – Richards Bay Wind Energy Project
- CES – Hluhluwe Wind Energy Project
- CEN – Kwandwe Airport Development Project
- CEN – Swartkops Manganese Project
- CEN – N2 Petro Port Project
- SiVest - Rondekop Wind Energy Project
- SRK – Roodeplaat Wind Energy Project
- Savannah - Witberg Wind Energy Project
- Savannah - Kareebosch Wind Energy Project

TERTIARY EDUCATION

- PhD - University of Pretoria (Environmental Management)
- Various Health & Safety Courses.
- National Diploma Health & Safety Management
- Harvard University – Applications of Industrial Hygiene Principles – including noise
- United States EPA Pollution Measurement course conducted at the University Of Cincinnati (EPA Training Centre)
- US EPA Air Dispersion Modelling Training Course
- Master of Business Administration (University of Wales) with dissertation on environmental reporting in South Africa.
- Environmental Auditor (ISO 14001:2004)

APPENDIX F – IMPACT RATING METHODOLOGY

1 ENVIRONMENTAL IMPACT ASSESSMENT (EIA) METHODOLOGY

The Environmental Impact Assessment (EIA) Methodology assists in evaluating the overall effect of a proposed activity on the environment. Determining of the significance of an environmental impact on an environmental parameter is determined through a systematic analysis.

1.1 Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale (i.e. site, local, national or global), whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in **Table 1**.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

1.2 Impact Rating System

The impact assessment must take account of the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the various project stages, as follows:

- Planning;
- Construction;
- Operation; and
- Decommissioning.

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

The significance of Cumulative Impacts should also be rated (As per the Excel Spreadsheet Template).

1.2.1 Rating System Used to Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the possible mitigation of the impact. Impacts have been consolidated into one (1) rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 1: Rating of impacts criteria

ENVIRONMENTAL PARAMETER		
A brief description of the environmental aspect likely to be affected by the proposed activity (e.g. Surface Water).		
ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity (e.g. oil spill in surface water).		
EXTENT (E)		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY (P)		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY (R)		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES (L)		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION (D)		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.		

1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
INTENSITY / MAGNITUDE (I / M)		
Describes the severity of an impact (i.e. whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily).		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
SIGNIFICANCE (S)		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula: **Significance = (Extent + probability + reversibility + irreplaceability + duration) x magnitude/intensity.**		

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact Significance Rating	Description
5 to 23	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
5 to 23	Positive Low impact	The anticipated impact will have minor positive effects.
24 to 42	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
24 to 42	Positive Medium impact	The anticipated impact will have moderate positive effects.
43 to 61	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
43 to 61	Positive High impact	The anticipated impact will have significant positive effects.
62 to 80	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
62 to 80	Positive Very high impact	The anticipated impact will have highly significant positive effects.

The table below is to be represented in the Impact Assessment section of the report. The excel spreadsheet template can be used to complete the Impact Assessment.

Table 2: Rating of impacts template and example

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Construction Phase																				
Vegetation and protected plant species	Vegetation clearing for access roads, turbines and their service areas and other infrastructure will impact on vegetation and protected plant species.	2	4	2	2	3	3	39	-	Medium	Outline/explain the mitigation measures to be undertaken to ameliorate the impacts that are likely to arise from the proposed activity. These measures will be detailed in the EMPr.	2	4	2	1	3	2	24	-	Low
Operational Phase																				
Fauna	Fauna will be negatively affected by the operation of the wind farm due to the human disturbance, the presence of vehicles on the site and possibly by noise generated by the wind turbines as well.	2	3	2	1	4	3	36	-	Medium	Outline/explain the mitigation measures to be undertaken to ameliorate the impacts that are likely to arise from the proposed activity. These measures will be detailed in the EMPr.	2	2	2	1	4	2	22	-	Low
Decommissioning Phase																				
Fauna	Fauna will be negatively affected by the decommissioning of the wind farm due to the human disturbance, the presence and operation of vehicles and heavy machinery on the site and the noise generated.	2	3	2	1	2	3	30	-	Medium	Outline/explain the mitigation measures to be undertaken to ameliorate the impacts that are likely to arise from the proposed activity. These measures will be detailed in the EMPr.	2	2	2	1	2	2	18	-	Low

Cumulative																				
Broad-scale ecological processes	Transformation and presence of the facility will contribute to cumulative habitat loss and impacts on broad-scale ecological processes such as fragmentation.	2	4	2	2	3	2	26	-	Medium	**Outline/explain the mitigation measures to be undertaken to ameliorate the impacts that are likely to arise from the proposed activity. These measures will be detailed in the EMPr.**	2	3	2	1	3	2	22	-	Low

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