

DRAFT SCOPING REPORT

COMBINED ENVIRONMENTAL IMPACT ASSESSMENT FOR THE UMSINDE EMOYENI WIND ENERGY FACILITY PHASE 1 & 2 AND ASSOCIATED ELECTRICAL GRID CONNECTION PHASE 1 & 2 WESTERN CAPE & NORTHERN CAPE

Appendix 11.1: Noise Assessment – Legislation and Guidance



1. The Republic of South Africa Constitution Act ("the Constitution")

The environmental right contained in section 24 of the Constitution provides that everyone is entitled to an environment that is not harmful to his or her well-being. In the context of noise, this requires a determination of what level of noise is harmful to the well-being of humans. The general approach of the common law is to define an acceptable level of noise as that which the reasonable person can be expected to tolerate in the particular circumstances. The subjectivity of this approach can be problematic, however, which has led to the development of noise standards (see Section 0).

"Noise pollution" is specifically included in Part B of Schedule 5 of the Constitution, which means that noise pollution control is a local authority competence, provided that the local authority concerned has the capacity to carry out this function.

2. The Environment Conservation Act

The Environment Conservation Act ("ECA") allows the Minister of Environmental Affairs and Tourism ("now the Minister of Water and Environmental Affairs") to make regulations regarding noise, among other concerns. The Minister has made noise control regulations under the ECA, adopted in Provincial Notice 627 of 1998 by the Western Cape Provincial Authority.

2.1 National Noise Control Regulations: GN R154 of 1992 (NCR)

In terms of section 25 of the ECA, the national noise-control regulations (GN R154 in *Government Gazette* No. 13717 dated 10 January 1992) were promulgated. The NCRs were revised under Government Notice Number R. 55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations.

Subsequently, in terms of Schedule 5 of the Constitution of South Africa of 1996 legislative responsibility for administering the NCR was devolved to provincial and local authorities. The Western Cape has promulgated Provincial Noise Control Regulations.

The regulations uses the $L_{Aeq,impulse}$ descriptor to define ambient sound and noise levels.

2.2 Western Cape Provincial Noise Control Regulations: PN 627 of 1998

The control of noise in the Western Cape is legislated in the form of the Noise Control Regulations of the Environment Conservation Act No. 73 of 1989 applicable to the Province of the Western Cape, Provincial Notice 627 of 20 November 1998.

In terms of Regulation 2 (d) of the Noise Control Regulations:

"A local authority may, before changes are made to existing facilities or existing use of land or buildings, or before new buildings are erected, in writing require that noise impact assessments or tests be conducted to the satisfaction of the local authority by the owner, developer, tenant or occupant of the facilities, land or buildings and that reports or certificates relating to the noise impact be submitted to the local authority, to the satisfaction of the local authority, by the owner, developer, tenant or occupant."

In terms of Regulation 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 Regulation 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."

As with the NCR a "Disturbing noise" is defined as any means a noise that would increase the ambient sound level at the same measuring point by 7 dB or more.

The regulations uses the $L_{Aeq,impulse}$ descriptor to define ambient sound and noise levels.

2.3 The National Environmental Management Act

The National Environmental Management Act ("NEMA") defines "pollution" to include any change in the environment, including noise. A duty therefore arises under section 28 of NEMA to take reasonable measures while establishing and operating the WEF to prevent noise pollution occurring. NEMA sets out measures which may be regarded as reasonable. They include measures:

1. to investigate, assess and evaluate the impact on the environment;
2. to inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment;
3. to cease, modify or control any act, activity or process causing the pollution or degradation;
4. to contain or prevent the movement of;
5. to eliminate any source of the pollution or degradation; or
6. to remedy the effects of the pollution or degradation.

2.3.1 National Environmental Management: Air Quality Act ("AQA")

Section 34 of the National Environmental Management: Air Quality Act (Act 39 of 2004) makes provision for:

1. the Minister to prescribe essential national noise standards -
 - (a) for the control of noise, either in general or by specified machinery or activities or in specified places or areas; or
 - (b) for determining –
 - (i) a definition of noise; and
 - (ii) the maximum levels of noise.
2. When controlling noise the provincial and local spheres of government are bound by any prescribed national standards.

This section of the Act is in force but no such standards have yet been promulgated.

An atmospheric emission license issued in terms of section 22 may contain conditions in respect of noise. This however will not be relevant to the WEF.

2.4 Draft Model Air Quality Management By-law for adoption and adaptation by Municipalities

Draft model air quality management by-laws for adoption and adaptation by municipalities was published by the Department of Environmental Affairs in the Government Gazette of 15 July 2009 as General Notice (for comments) 964 of 2009. Section 18 specifically focuses on Noise Pollution Management, with sub-section 1 stating:

"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 draft regulations differs from the current provincial Noise Control Regulations as it defines a disturbing noise as a noise that is measurable or calculable of which the rating level exceeds the equivalent continuous rating level as defined in SANS 10103.

2.5 Noise Standards

Four South African Bureau of Standards (SABS) scientific standards are considered relevant to noises from a Wind Energy Facility. They are:

- SANS 10103:2008. 'The measurement and rating of environmental noise with respect to annoyance and to speech communication'.
- SANS 10210:2004. 'Calculating and predicting road traffic noise'.
- SANS 10328:2008. 'Methods for environmental noise impact assessments'.
- SANS 10357:2004. 'The calculation of sound propagation by the Concave method'.

The relevant standards use the equivalent continuous rating level as a basis for determining what is acceptable. The levels may take single event noise into account but single event noise by itself does not determine whether noise levels are acceptable for land use purposes. The recommendations that the standards make are likely to inform decisions by authorities but non-compliance with the standards will not necessarily render an activity unlawful *per se*.

3. International Guidelines

While there exist a number of international guidelines and standards that could encompass a document in itself, the three mentioned below were selected as they are used by different countries in the subject of environmental noise management, with the last two documents specifically focussing on the noises associated by wind energy facilities.

3.1 Guidelines for Community Noise (WHO, 1999)

The World Health Organization's (WHO) document on the *Guidelines for Community Noise* is the outcome of the WHO- expert task force meeting held in London, United Kingdom, in April 1999. It is based on the document entitled "Community Noise" that was prepared for the World Health Organization and published in 1995 by the Stockholm University and Karolinska Institute.

The scope of WHO's effort to derive guidelines for community noise is to consolidate actual scientific knowledge on the health impacts of community noise and to provide guidance to environmental health authorities and professionals trying to protect people from the harmful effects of noise in non-industrial environments.

Guidance on the health effects of noise exposure of the population has already been given in an early publication of the series of Environmental Health Criteria. The health risk to humans from exposure to environmental noise was evaluated and guidelines values derived. The issue of noise control and health protection was briefly addressed.

The document uses the L_{Aeq} and $L_{A,max}$ descriptors to define noise levels with the instrument likely using the "Fast"-time weighting. This document was important in the development of the SANS 10103 standard.

3.2 The Assessment and Rating of Noise from Wind Farms (ETSU, 1997)

This report describes the findings of a Working Group on Wind Turbine Noise, facilitated by the United Kingdom Department of Trade and Industry. It was developed as an Energy Technology Support Unit¹ (ETSU) project. The aim of the project was to provide information and advice to developers and planners on noise from wind turbines. The report represents the consensus view of a number of experts (experienced in assessing and controlling the environmental impact of noise from wind farms). Their findings can be summarised as follows:

1. Absolute noise limits applied at all wind speeds are not suited to wind farms; limits set relative to the background noise (including wind,) are more appropriate;
2. $LA_{90,10mins}$ is a much more accurate descriptor when monitoring ambient and turbine noise levels;
3. The effects of other wind turbines in a given area should be added to the effect of any proposed wind energy facility, to calculate the cumulative effect;
4. Noise from a wind energy facility should be restricted to no more than 5 dBA above the current ambient noise level at a NSD. Ambient noise levels is measured onsite in terms of the $LA_{90,10min}$ descriptor for a period sufficiently long enough for a set period;
5. Wind farms should be limited to within the range of 35 dBA to 40 dBA (day-time) in a low noise environment. A fixed limit of 43 dBA should be implemented during all night time noise environments. This should increase to 45 dBA (day and night) if the NSD has financial investments in the wind energy facility; and
6. A penalty system should be implemented for wind turbine/s that operates with a tonal characteristic.

This is likely the guideline used in the most international countries to estimate the potential noise impact stemming from the operation of a Wind Energy Facility. It also recommends an improved methodology (compared to a fixed upper noise level) on determining ambient sound levels in periods of higher wind speeds, critical for the development of a wind energy facility. Because of its international importance, the methodologies used in the ETSU R97 document will be recommended in this Scoping Report for implementation during the Environmental Noise Impact Assessment phase should projected noise levels (from the proposed WEF at PSRs) exceed the zone sound levels as recommended by SANS 10103:2008.

The document uses the $L_{Aeq,f}$ and LA_{90} descriptors to define noise levels using the "Fast"-time weighting.

3.3 Noise Guidelines for Wind Farms (MoE, 2008)

This document establishes the sound level limits for land-based wind power generating facilities and describes the information required for noise assessments and submissions under the Environmental Assessment Act and the Environmental Protection Act, Canada.

The document defines:

¹ ETSU was set up in 1974 as an agency by the United Kingdom Atomic Energy Authority to manage research programmes on renewable energy and energy conservation. The majority of projects managed by ETSU were carried out by external organizations in academia and industry. In 1996, ETSU became part of AEA Technology plc which was separated from the UKAEA by privatisation.

- Sound Level Limits for different areas (similar to rural and urban areas), defining limits for different wind speeds at 10 m height, refer also Table 1²;
- The Noise Assessment Report, including:
 - Information that must be part of the report;
 - Full description of noise sources;
 - Adjustments, such as due to the wind speed profile (wind shear);
 - The identification and defining of potential sensitive receptors;
 - Prediction methods to be used (ISO 9613-2);
 - Cumulative impact assessment requirements;
 - It also defines specific model input parameters;
 - Methods on how the results must be presented; and
 - Assessment of Compliance (defining magnitude of noise levels).

Table 1: Summary of Sound Level Limits for Wind Farms (MoE)

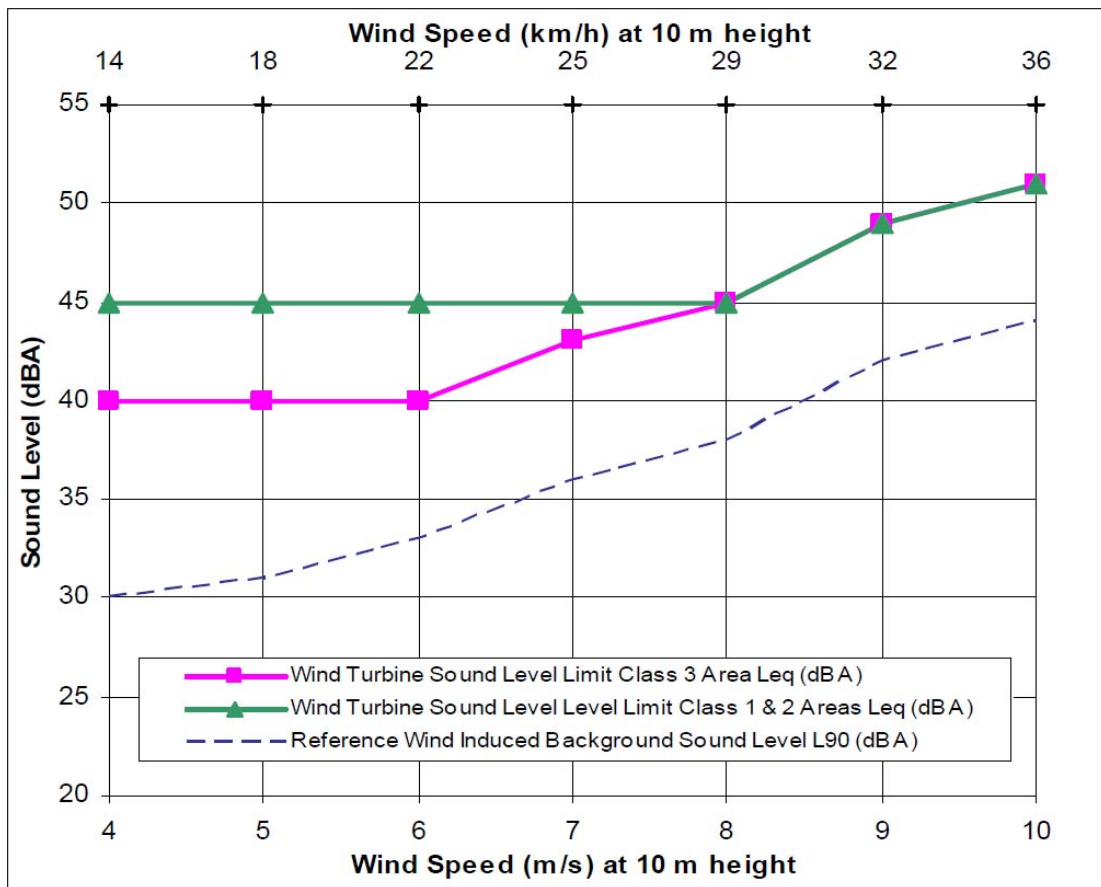
Wind speed (m/s) at 10 m height	4	5	6	7	8	9	10
Wind Turbine Sound Level Limits, Class 3 Area, dBA	40	40	40	43	45	49	51
Wind Turbine Sound Level Limits, Class 1 & 2 Areas, dBA	45	45	45	45	45	49	51

The document used the $L_{Aeq,1h}$ noise descriptor to define noise levels. It is not clear whether the instrument must be set to the "Fast" or "Impulse" time weighing setting, but, as the "Fast" setting is used in most international countries it is assumed that the instrument will be set to the "Fast" setting.

It should be noted that these Sound Level Limits are included for the reader to illustrate the criteria used internationally. Due to the lack of local regulations specifically relevant to wind energy facilities this criteria will also be considered during the determination of the significance of the noise impact. These limits are not legislated in South Africa but will be considered as best practice.

²The measurement of wind induced background sound level is not required to establish the applicable limit. The wind induced background sound level reference curve was determined by correlating the A-weighted ninetieth percentile sound level (L90) with the average wind speed measured at a particularly quiet site. The applicable Leq sound level limits at higher wind speeds are given by adding 7 dB to the wind induced background L90 sound level reference values

Figure 0.1: Summary of Sound Level Limits for Wind Turbines (MoE Canada)



3.4 Equator Principles

The Equator Principles (EPs) are a voluntary set of standards for determining, assessing and managing social and environmental risk in project financing. Equator Principles Financial Institutions (EPFIs) commit to not providing loans to projects where the borrower will not or is unable to comply with their respective social and environmental policies and procedures that implement the EPs.

The Equator Principles were developed by private sector banks and were launched in June 2003. The banks chose to model the Equator Principles on the environmental standards of the World Bank and the social policies of the International Finance Corporation (IFC). 67 financial institutions (October 2009) have adopted the Equator Principles, which have become the de facto standard for banks and investors on how to assess major development projects around the world. The environmental standards of the World Bank have been integrated into the social policies of the IFC since April 2007 as the International Finance Corporation Environmental, Health and Safety (EHS) Guidelines.

3.5 IFC: General EHS Guidelines – Environmental Noise Management

These guidelines are applicable to noise created beyond the property boundaries of a development that conforms to the Equator Principle.

It states that noise prevention and mitigation measures should be applied where predicted or measured noise impacts from a project facility or operations exceed the applicable noise level guideline at the most sensitive point of reception. The preferred

method for controlling noise from stationary sources is to implement noise control measures at source.

It goes as far as to proposed methods for the prevention and control of noise emissions, including:

- Selecting equipment with lower sound power levels;
- Installing silencers for fans;
- Installing suitable mufflers on engine exhausts and compressor components;
- Installing acoustic enclosures for equipment casing radiating noise;
- Improving the acoustic performance of constructed buildings, apply sound insulation;
- Installing acoustic barriers without gaps and with a continuous minimum surface density of 10 kg/m² in order to minimize the transmission of sound through the barrier. Barriers should be located as close to the source or to the receptor location to be effective;
- Installing vibration isolation for mechanical equipment;
- Limiting the hours of operation for specific pieces of equipment or operations, especially mobile sources operating through community areas ;
- Re-locating noise sources to less sensitive areas to take advantage of distance and shielding;
- Placement of permanent facilities away from community areas if possible;
- Taking advantage of the natural topography as a noise buffer during facility design;
- Reducing project traffic routing through community areas wherever possible;
- Planning flight routes, timing and altitude for aircraft (airplane and helicopter) flying over community areas; and
- Developing a mechanism to record and respond to complaints.

It sets noise level guidelines (see Table 2) as well as highlighting the certain monitoring requirements pre- and post-development.

Table 2: IFC Table 7.1-Noise Level Guidelines

Receptor type	One hour L _{Aeq} (dBA)	
	Daytime 07:00 - 22:00	Night-time 22:00 – 07:00
Residential; institutional; educational	55	45
Industrial; commercial	70	70

The document uses the L_{Aeq,1 hr} noise descriptors to define noise levels. It does not determine the detection period, but refers to the IEC standards, which requires the fast detector setting on the Sound Level Meter during measurements for Europe.