

DNV GL – ENERGY ADVISORY AMERICAS

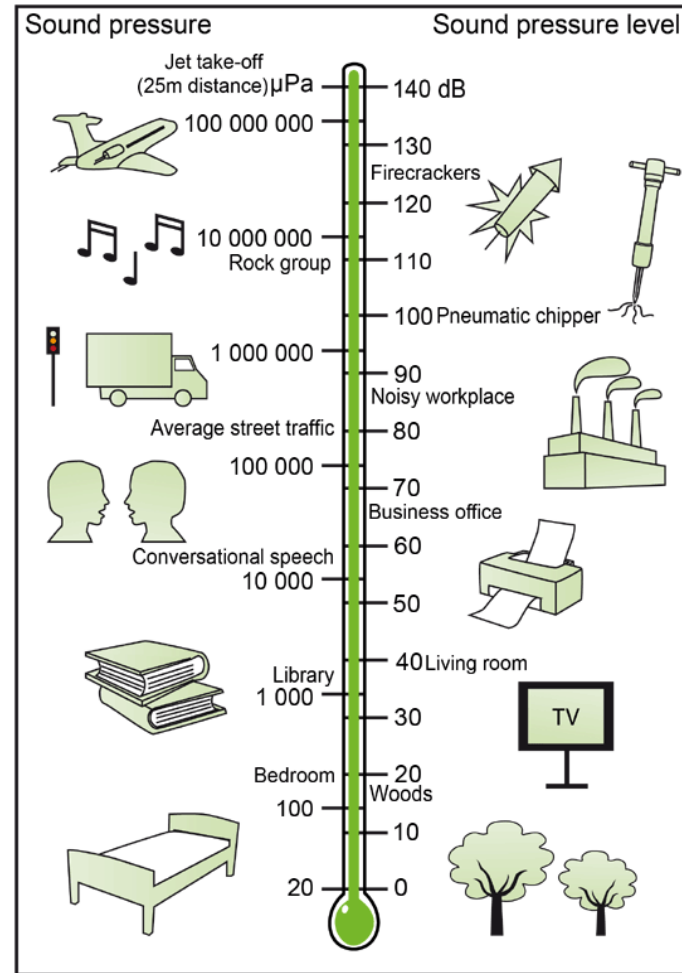
# Bright Stalk Wind Farm Sound Impact Assessment

McLean County Zoning Board of Appeals Hearing, 8 February 2018

**Shant Dokouzian, P.Eng.**  
**Senior Project Manager & Principal Engineer**

# Introduction to Wind Farm Sound

- Sound is measured in decibels.
- 0 dB is the threshold of human hearing.
- Wind Farm sound is caused by:
  - Mechanical noise originating from the wind turbine nacelle (gear box, HVAC, etc.);
  - Aerodynamic noise from the air passing through the turbine blades; and
  - Transformer noise located at the project substation.



# Applicable Regulations

- Sound is regulated by the Illinois Pollution Control Board (IPCB).
- The Project is subject to IPCB regulations.
- IPCB Sound limits depend on the “Class” of land receiving the sound, and the limits are set at various sound frequencies, measured in hertz.

Octave band center frequency (Hz)	Class A Land	
	Daytime limit (dB lin)	Nighttime limit (dB lin)
31.5	75	69
63	74	67
125	69	62
250	64	54
500	58	47
1000	52	41
2000	47	36
4000	43	32
8000	40	32

Land Classification	General Summary
<b>Class A</b>	<b>Residences</b>
<b>Class B</b>	<b>Sales / Service Buildings</b>
<b>Class C</b>	<b>Agricultural, Industrial, Utility</b>

# Overview of Sound Modelling Methodology

- Sources of sound:
  - Fifty-eight V136 3.6 MW turbines at an 82 meter hub height.
  - One 250 MVA, 345 kV substation transformer.
- Points of reception (residences):
  - 124 points of reception were identified in the vicinity of the Project.
  - All points of reception were considered Class A, with the most stringent noise limits.
- Conservative assessment methodology:
  - The sound pressure level at each point of reception was calculated based on the ISO 9613-2 model.
  - Modelling takes into account real life parameters such geometrical divergence, atmospheric absorption, and ground effects.
  - Atmospheric parameters are set to favorable sound propagation, including downwind conditions, which means the results of this modelling are likely to be conservative.
  - Sound attenuation from foliage or trees not accounted for.

# Measures Taken to Minimize Sound from Bright Stalk

- The model assumes that blade serration is applied to 27 turbines in order to reduce sound emissions.
- Conservative modelling.
- Transformer with reduced sound specifications was chosen for analysis.



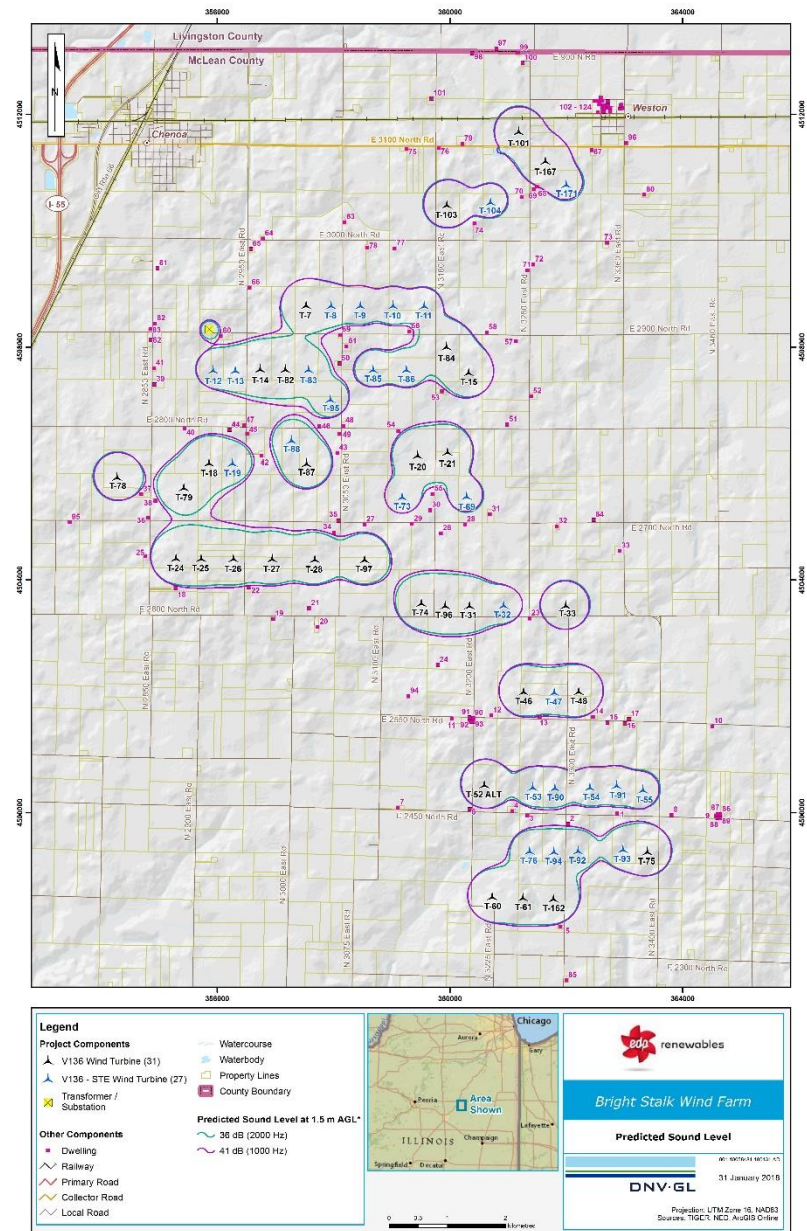
Source:  
<http://www.rechargenews.com/wind/1201009/in-pictures-first-vestas-v136-rises>

## Vestas V136 3.6 MW acoustic emission summary

Frequency [Hz]	Octave Band Sound Levels [dBA]									Broadband
	31.5	63	125	250	500	1000	2000	4000	8000	
<b>V136-3.6 Mode P01 (without Serration)</b>	85.4	87.4	95.3	95.8	100.3	104.2	103.3	88.9	62.1	<b>108.2</b>
<b>V136-3.6 Mode P01 STE (with Serration)</b>	77.7	88.0	93.4	97.4	99.0	99.9	99.0	91.2	71.6	<b>105.5</b>

# Bright Stalk Sound Modelling Results

- Modelled sound levels fall within IPCB limits for all 124 receptors.
- The results of DNV GL's modelling show that the Bright Stalk wind farm will be in compliance with IPCB sound requirements.



# Questions?

## **Contact Information:**

Shant Dokouzian, P.Eng.  
Senior Project Manager & Principal Engineer  
DNV GL  
[shant.Dokouzian@dnvgl.com](mailto:shant.Dokouzian@dnvgl.com)