Comments

Bourne Board of Health Meeting

August 8, 2018

By Chris Kapsambelis

My name is Chris Kapsambelis and I am a Bourne resident. I have a degree in Electrical Engineering and years back I served on the Bourne Selectmen's Energy Advisory Committee, where I became aware of the details related to the Future Generation Wind Turbine project near the border in Plymouth. I also attended BOH meetings leading to the BOH WECS bylaw and I am familiar with its content.

Since the FGW installation, some of the neighbors organized meetings which I attended and slowly moved into the role of technical advisor. At this point I am submitting a number of documents in support of my comments.

1. Comments, Bourne Board of Health Meeting August 8, 2018
2. Buzzards Bay Citizen Action Committee Noise Report
3. FUTURE GENERATION WIND TURBINES COMPLIANCE SOUND MONITORING STUDY, PLYMOUOTH, MASSACHUSETTS, MAY 2018 (FGW Noise Study)

Bourne By-Law Definitions

Cap Value: The value, measured in decibels, of the total amount of ambient noise plus the noise generated by a WECS.

Daytime: The period between the hours of 7:00 a.m. and 7:00 p.m., Monday through Friday, except holidays observed by the Town of Bourne.

Nighttime: The hours between 7:00 p.m. and 7:00 a.m. on weekdays, together with all hours on Saturday, Sunday, and holidays observed by the Town of Bourne.

Aerodynamic Amplitude Modulation (AAM): As related to wind turbines is the sound pressure from aerodynamic action of the turbine blades. This sound is sometimes distinguished as a swishing noise or thumping. AAM noise is characterized by the fluctuation in sound amplitude (rotational speed of the hub multiplied by the number of blades).

Nighttime with only two wind turbine on

I have studied the FGW noise study and I call attention to the fact that all that test data was collected at night, around midnight and early morning, with the two turbines nearest to residents turned off.

On pages 6.7.amd 8, at the Bourne locations ML-3, ML-4, and ML-5, on Morning Mist Lane and Head of the Bay Road, the Bourne nighttime cap value noise limit of 40 dB(A) is exceeded by the noise from the wind turbines alone, and by much larger margins when combined with the ambient to satisfy the Bourne definition of "Cap Value". Additionally, the Bourne WECS by-law further restricts noise to 6 dB(A) above ambient. The FGW Noise Study shows night time noise levels at the Bourne locations as high as 10 dB(A) above ambient. The mitigation plan of shutting down the nearest wind turbine for a portion of the `night is not enough to avoid Bourne WECS by-law limits. All four wind turbines must be turned off for periods as defined in the BOH WECS by-law of Nighttime

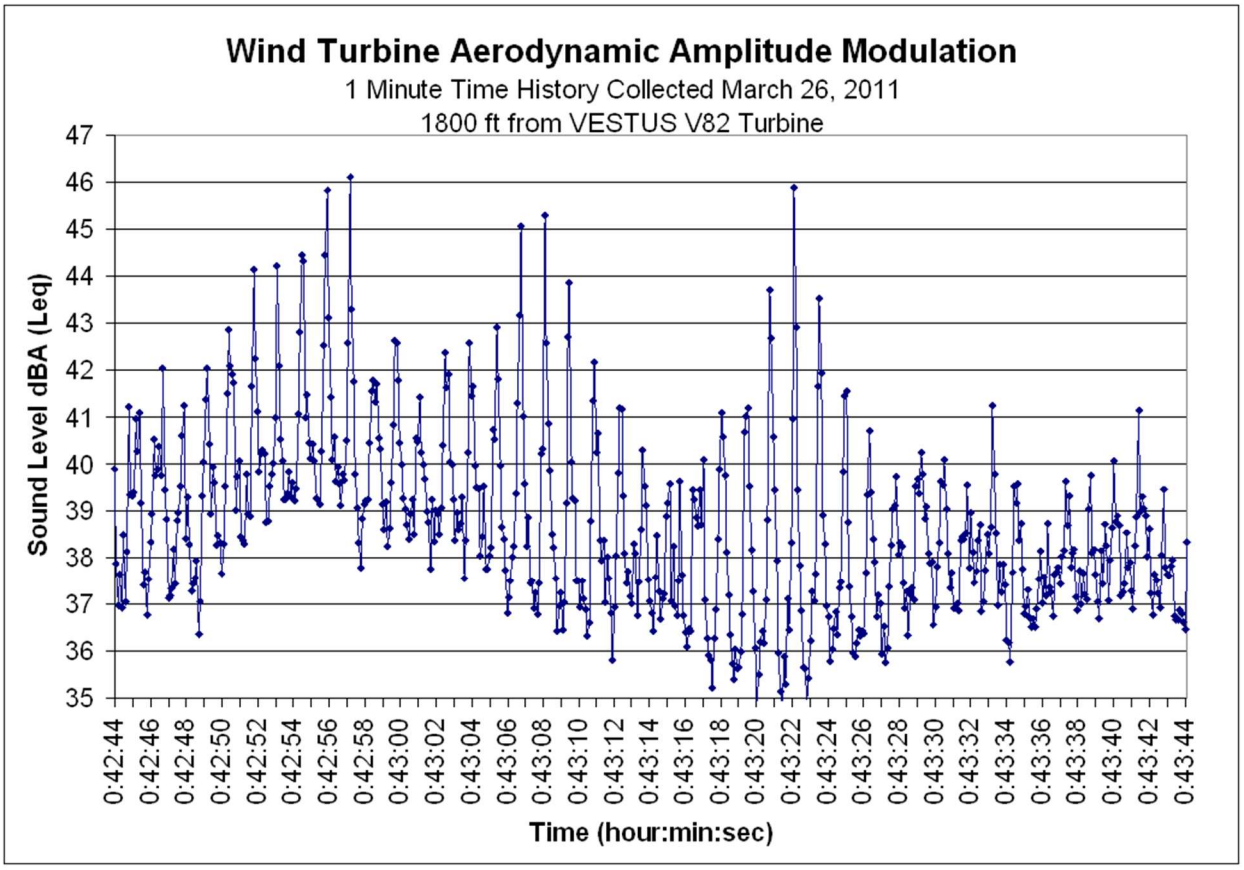
Daytime with all four wind turbine on

The FGW Noise Study contains no daytime WECS noise levels with all 4 wind turbines on. All the noise levels were captured at night with the two wind turbines nearest to residential areas turned off. Appendix E shows instances of Cap Values as high as 55 dB(A). We submit that daytime Cap Values with all four wind turbines operating will exceed the Bourne WECS limit of 65 dB(A). This is based on the general understanding that the daytime ambient is some 10 dB(A) higher than nighttime. Secondly, the nearest wind turbine, which is turned off at night, is operating at full power and noise in the daytime. The nearest daytime wind turbine is about 1/3 the distance closer than the nearest nighttime wind turbine. Given the values measured at night at three times the daytime distance, the application of the Inverse Square Law, which governs sound level vs distance, indicates that an increase of about 10 dB(A) can be expected from the nearest wind turbine. It is therefore, fair to assume that the noise from the additional daytime wind turbines combined with the added daytime ambient noise, exceeds the Bourne WECS by-law daytime limit of 65 dB(A), and at least the nearest wind turbines must be turned off completely. Furthermore, with all four wind turbines running the Bourne limit of 6 dB(A) above ambient increase will also be violated.

Aerodynamic Amplitude Modulation (AAM)

The FGW Noise Study fails to address Aerodynamic Amplitude Modulation. The authors, have defined a new metric, One-Second Leq. Leq is the steady-state sound level over a period of time (one second) that has the same acoustic energy as the fluctuating sounds that actually occurred during that one second period. Since Aerodynamic Amplitude Modulation fluctuates peak to trough at about a one second interval, the One-Second Leq metric filters out the peak to trough values to produce an average close to zero.

The graphic below was collected in Falmouth, MA 1800 ft from a wind turbine smaller than those used by FGW.



The maximum peak to trough measurement is more than 10 Db(A). It's safe to conclude that the larger FGW wind turbines, located closer, are generating Aerodynamic Amplitude Modulation greater than 4 Db(A) in violation of the Bourne WECS by-law.

Complaint Log

Shortly after the turbines began operations, I developed a system of data collection using a Google Form to log participant complaints over the internet directly onto a log file on Google Drive. The form can be installed onto any laptop, tablet, or smartphone of convenience.

The Buzzards Bay Citizens Action Committee (BBCAC) Report, previously submitted, has logged some 382 complaints. WECS noise has been frequently described as no louder than the common household refrigerator. Participants were asked to compare the WECS noise relative to that of a refrigerator. Keep in mind that refrigerator noise is hardly audible outside the Kitchen, while wind turbine noise coming from a long distance up high is equally audible in every room in the house.

MassDEP Regulations

Definitions (310 CMR 7.00)

- *Noise* is defined as "sound of sufficient intensity and/or duration as to cause a condition of air pollution."

- *Air pollution* means "the presence in the ambient air space of one or more air contaminants or combinations thereof in such concentrations and of such duration as to: (a) cause a nuisance; (b) be injurious, or be on the basis of current information, potentially injurious to human health or animal life, to vegetation, or to property; or (c) unreasonably interfere with the comfortable enjoyment of life and property or the conduct of business."

The FGW Noise Study errs in its conclusion that the FGW WECS are operated in compliance with MassDEP noise regulation 310 CMR 7.10. Early in the testing it was determined that the operation of all four wind turbines at night will not comply with state noise regulation. A mitigation plan was devised to turn off the two wind turbines nearest to residential areas for a portion of the night around midnight. All the test data was collected with only two wind turbines in operation. It has been the practice at MassDEP that if a source of noise complies with the regulation in the middle of the night, when ambient sound levels are at a minimum, compliance during the rest of the 24-hour day can safely be assured. Since no data was collected at night with all 4 wind turbines in operation, the assumption of compliance for the rest of the 24-hour day cannot be assured. Additional daytime testing is required to prove compliance with all 4 wind turbine running at full capacity.

The FGW Noise Study goes to great lengths to remove any existing contribution to the determination of maximum noise used to satisfy the MassDEP limitation of 10 dB(A) above ambient. This is an erroneous interpretation. By the definitions above, noise is and Air Pollutant, and Air Pollution is defined as combination of contaminants in the ambient air space. Therefore, the intent of the regulation is to limit the combined increase in noise to 10 dB(A) above ambient, and ambient is the residual sound level in the absence of all identifiable sources of noise.

The FGW Noise Study errs by including existing sources of noise pollution in the assessment of ambient, and excludes existing sources of noise pollution in the assessment of noise above ambient.

We request that the BOH raises these points with MassDEP and demands a reevaluation. In the meantime, the wind turbines should be turned off, and only allowed to run for any additional testing.