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October 26, 2018

Mr. Julian M. Suso, Town Manager  
Mr. Rod Palmer, Building Commissioner  
Town of Falmouth  
59 Town Hall Square  
Falmouth, MA 02540

Re: Wind Turbine Relocation Study  
Weston & Sampson Report October 12, 2018


Mr. Suso, Mr. Palmer,

This letter is respectfully submitted to the Town of Falmouth to provide a qualified professional opinion about the proposed relocation of Wind II. The original permittings for Wind I and Wind II (and NOTUS) resulted in neighbor complaints soon after start-up and were confirmed to exceed Falmouth's 40-dBA noise limit (turbines sited too close). Weston & Sampson's relocation recommendation for Wind II appears to be inconsistent with the Town 40 dBA noise limit and the 2017 Barnstable Superior Court Decision.

- 1. The distance to meet 40 dBA for Wind II, a Vestas V82 with sound power level of 110 dBA, is approximately 891 meters or 2923 feet. This is greater than the setback distances provided by the proposed new location. The proposed new location is still too close.**
- 2. At 2147 and 2244 feet listed in the subject report, the expected sound level is 43 dBA.**
- 3. Use of the proposed new location appears certain to result in the relocated wind turbine's maximum noise levels exceeding the Falmouth noise limit of 40 dBA.**
- 4. Use of the proposed new location appears certain to result in the relocated wind turbine's maximum noise levels exceeding established background sound levels of 27-28 dBA by over 10 dB, breaching State 10-dB noise limits.**

Supporting detail is provided below. Please contact me if you have any questions.

Respectfully Submitted,



Robert W. Rand, ASA, INCE

### Supporting detail

5. My work in professional acoustical consulting spans thirty-eight years with project experience in power generation, industrial and commercial noise and expert witness status established in hearings, testimony, and legal cases for aircraft and wind turbine noise. Peer-reviewed publications include papers for a 2011 noise survey of the NOTUS wind turbine.
6. Falmouth noise limit: 40 dBA, Article XXXIV, "Windmills" in Chapter 240, Zoning, in the Town of Falmouth bylaws, clarified in [1] that noise levels over 40 dBA "shall be excessive".
7. The subject report states "The location of AL-1 is approximately 2,147 feet from the nearest residential receptor to the north and approximately 2,244 feet from the nearest residential areas located south along Blacksmith Shop Road." [AL-1 is the proposed new location].
8. Wind II is a Vestas V82 1.65MW wind turbine with a maximum sound power level of 110 dBA re 1pW. Approximately 2625 feet is needed for 40 dBA for a sound power level of 108 dBA [1]. Greater distance is needed for a sound power level of 110 dBA.
9. The subject report's "Section 3.1 Sound Impacts" fails to properly assess the noise level increase above existing quiet background levels established by HMMH at 27-28 dBA [2].
10. State law 310 CMR 7.10 limits noise increase to 10 dB (Lmax) over the background level (L90). The maximum level allowed for Wind II is therefore 38 dBA at property lines. Quiet background occurs with wind shear; strong winds aloft, light to no winds near ground.
11. Regardless of wind-shear effects on lowering or raising the background sound level, the Falmouth noise limit of 40 dBA sets an upper limit for wind turbine noise at property lines.
12. Computations may be made to determine sound level at distance and distance associated to a sound level. ISO 9613-2 relates received noise level to sound power level and distance.

$$L_p = L_w - 20 \log(\text{distance, meters}) - 11, \text{ dB, and by equivalence,}$$
$$\text{Distance} = 10^{(L_w - L_p - 11)/20}, \text{ meters, where}$$

*L<sub>w</sub> is sound power level, dBA re 1pW,  
L<sub>p</sub> is received sound level, dBA re 20uPA, and  
1 meter = 3.28 feet.*

Ground absorption and atmospheric absorption factors are not included since winter-frozen conditions present hard ground and wind turbine noise is elevated and predominantly low frequency. Noise measurements of Wind I and NOTUS wind turbines during non-winter conditions have confirmed these factors may be excluded for estimating wind turbine sound level versus distance and this computation method is accurate within 1-2 dB. The general computation uncertainty is +/- 3 dB within 1000 meters (3280 feet).

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1. Memorandum of Decision, Superior Court Civil Action 2014-00003, filed June 20, 2017.  
2. Technical Memorandum to DEP from HMMH, Addendum to HMMH Report 304390, April 1, 2011.