

Town of Plymouth
Department of Inspectional Services

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August 9, 2018

Future Generation Wind LLC
C/O Con Edison
Joseph Sullivan, Asset Manager
100 Summit Lake Dr. Ste 210
Valhalla, NY 10595

Re: FGW Turbines; Plymouth

Dear Mr. Sullivan

Attached is a copy of the Massachusetts DEP technical review of your Sound Monitoring study. The review raises several questions and requires additional information in order to determine that the turbines are operating in compliance with Mass DEP noise policy and the Plymouth Zoning Bylaws. Please respond no later than September 15, 2018.

Please contact me if you have any questions. Thank you for your cooperation.

Sincerely,

Paul McAuliffe
Director of Inspectional Services

Cc: Town Manager
Zoning Board of Appeals



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

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Secretary

Martin Suuberg
Commissioner

August 2, 2018

Mr. Paul McAuliffe
Director of Inspectional Services
Town of Plymouth
26 Court Street
Plymouth, MA 02360

RE: *Future Generation Wind Turbines Compliance Sound Monitoring Study, May 2018*

Dear Mr. McAuliffe:

The Department of Environmental Protection (MassDEP), at your request, has conducted a technical review of the report titled *Future Generation Wind Turbines Compliance Sound Monitoring Study*, including associated appendices dated May 2018, and supplemental information titled *Future Generation Acoustic Study – Location 6* dated June 14, 2018 (together identified in this letter as the "Report"). The Report was prepared by Tech Environmental on behalf of conEdison pursuant to wind turbine permitting requirements by the Town of Plymouth.

In general, Tech Environmental's Report is comparable to other wind turbine sound studies that MassDEP has overseen or reviewed in the past. Based on our review of the Report, to assist the Town of Plymouth with this endeavor, MassDEP offers the following observations and suggestions:

1. The Sound Monitoring Protocol, dated April 2017, did not specify a commissioning phase, modeling, Noise Reduced Operation (NRO) modes, or curtailment plans, but all of these elements are included in the Sound Monitoring Study Report ("Report") and play a significant role in Tech Environmental's compliance determination. Because none of these elements were previously discussed with MassDEP or described in the Sound Monitoring Protocol, MassDEP was not given the opportunity to provide comments regarding any potential commissioning phase, modeling, Noise Reduced Operation (NRO) modes, or curtailment plans.

This information is available in alternate format. Contact Michelle Waters-Ekanem, Director of Diversity/Civil Rights at 617-292-5751.

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MassDEP Website: www.mass.gov/dep

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2. The Report references *"an initial sound monitoring as part of the commissioning of the turbines using several different wind speed and wind direction scenarios"* which occurred between May and August 2017. Sound monitoring results from the commissioning phase are not included in the Report. In order to fully interpret the testing results, on June 22, 2018, MassDEP requested via email a copy of the sound monitoring results from this commissioning phase, and requested that this data be presented in a similar manner as the compliance sound monitoring data is presented in the Report. On June 29, 2018, conEdison replied by declining MassDEP's request and stating that *"As shown in the report that was submitted to the Town of Plymouth, Future Generation Wind has met its obligation and demonstrated compliance with the Town of Plymouth's Zoning Bylaw's under section 205-73 D (8) and the Mass DEP Noise Policy"*. Therefore, MassDEP was not able to evaluate monitoring data associated with the commissioning phase.
3. Modeling was conducted by Tech Environmental to develop Noise Reduced Operation (NRO) modes and curtailment plans, but no sound monitoring data is presented in the Report needed to validate the modeling. Additional data/detail is needed to confirm that the NRO and curtailment periods are adequately established.
4. The Sound Monitoring Protocol, dated April 2017, called for completing sound monitoring during the quietest hours of the night (12:00 am through 4:00 am, +/- 1 hour). The reason for this is to evaluate the turbines under 'worst case conditions' (e.g. quietest ambient). The Sound Monitoring Protocol states that all turbines shall be ON when operational testing is performed. Section 4.3 of the protocol states: *"For the purposes of completing the sound monitoring during the quietest hours of the night (12:00 a.m. – 4:00 a.m., +/- 1 hour) at all locations, and consistent with the MassDEP wind turbine monitoring procedures, five-minute sampling with all turbines ON and all turbines OFF will be implemented."* This procedure appears to not have been followed since, according to the Report, Turbines #1 and #5 were not in operation during the compliance monitoring due to their curtailment. Had any potential commissioning phase, modeling, Noise Reduced Operation (NRO) modes, or curtailment plans been discussed prior, alternate language/provisions could have been provided in the Sound Monitoring Protocol to address these issues.
5. Table 7-1 of the Report details the curtailment schedule for Turbine #1 and #5. Due to Turbines #1 and #5 being curtailed during the targeted compliance monitoring period, no monitoring data is presented in the Report which demonstrates compliance when all four turbines are operating concurrently or any time when Turbines #1 and #5 are operating. Data must be presented in order to demonstrate compliance during 'worst case conditions' (e.g. quietest ambient) when all four turbines are scheduled to operate concurrently and under normal conditions per Table 7-1 of the Report. Data must also be presented in order to demonstrate compliance when all four turbines are scheduled to operate concurrently and under various NRO conditions per Table 7-1 of the Report.
6. Table 1-2 on Page 6 of the Report appears to be incorrect. Instead of representing Low power production, it represents Medium power production.

7. Page 21 of the Report indicates that Turbines #3 (T3) and #4 (T4) are equidistant from ML3, but then states that power production data for T4 will be presented (instead of T3) because T4 is slightly closer to ML3. To fully evaluate the data, power production data for both T3 and T4 should be presented in Tables 8-1, 8-2, and 8-3 in regards to ML3.
8. Neither the Report nor the Appendices show the data points collected during ambient sampling. Without this data set MassDEP cannot make a determination as to whether ambient sound levels were accurately established.
9. Compliance monitoring testing appears to have been conducted mostly during the 11PM to 1AM time period. Tech Environmental should provide evidence that demonstrates this time period is representative of 'worst case' or lowest background (ambient sound). MassDEP's experience with previous turbine sound studies indicates that a 2AM to 3:30AM period is the 'worst case' with lowest ambient sound. Available traffic data might help to define this issue.
10. The data presented in graphics that show turbine output and wind speed in the Report, Appendix F, are not labeled in a way to adequately determine the source of the data (e.g. single turbine? sum of all turbines?). MassDEP recommends that data be presented in tabular format showing the output data from each turbine during the sampling. This would show that all turbines were running "normally" per the claim in the operations table, and also that all turbines were "off" during sampling for background.
11. In the Report, Appendix E, it appears that several data points were excluded but they are not identified as such (i.e. circled data points). A tabular format, in lieu of the existing graphics, detailing exactly what data is included and excluded would allow MassDEP to evaluate that the high for each sampling period was selected appropriately. Specifically, when all four turbines are brought on to full power or shut down from full power, MassDEP would like to know what the difference is with the time appropriate L90.
12. During the 11:15 PM on 10/16/17 period when ML-5 sound level exceeded 10 dB(A) over ambient (refer to Appendix E), the closest turbine T-1 was scheduled to be off, but was presumably curtailed. The report references average power production of 1,069 kW ("medium" wind speed and power production) at the closest operating turbine, T3. It does not seem unreasonable to expect that there might be a combination of "high" hub height wind speed and power output, combined with quiet ground level conditions, that might result in future exceedance of 10 dB(A) over ambient. To that end, MassDEP asks the following: 1) are there low enough background levels to ultimately require curtailment of T3 for ML-5 impacts under some conditions? And 2) was this condition modeled as well?
13. MassDEP's practice has been to document sound readings to one decimal place, but the decimal has not been a significant factor in previous wind turbine sound studies.

Due to the issues outlined above, including but not limited to: critical testing data omitted from the Report and the format in which some data is presented, MassDEP is unable at this time to concur with Tech Environmental, Inc.'s conclusion presented in the Report that *"Based on the results of monitoring conducted during late August 2017 through March 2018, all four of the FGW wind turbines are in compliance with MassDEP Noise Policy broadband sound limit of 10 dBA above ambient.."*

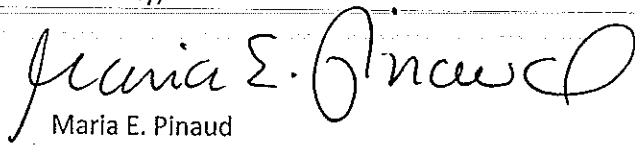
Therefore, in order for MassDEP to complete its evaluation of the Future Generation Wind Turbines sound monitoring study, MassDEP needs to review the following additional information, or technical justification needs to be presented for its exclusion, (note the following items are pertinent to monitoring locations #1 through #6):

- A. All sound monitoring data/results related to the commissioning phase presented in tabular format.
- B. Additional explanation of the modeling and any commissioning phase monitoring results used to develop Noise Reduced Operation (NRO) modes and curtailment plans.
- C. Data that shows compliance during 'worst case conditions' (e.g. quietest ambient) when all four turbines are scheduled to operate concurrently and under normal conditions per Table 7-1 of the Report; and data that shows compliance when all four turbines are scheduled to operate concurrently and under various NRO conditions per Table 7-1 of the Report.
- D. Corrected Table 1-2 representing low power production.
- E. Revised Tables 8-1, 8-2, and 8-3 that include, for ML3, average power production data and average hub height wind speed for both T3 and T4.
- F. The 1 second Leq sound levels used to determine ambient in tabular format, including any data points excluded from the L90 calculation shall be identified with an explanation.
- G. Data that demonstrates that the compliance monitoring was conducted during the 'worst case' or lowest background time period, and an explanation as to why later time periods (i.e. 2 am to 3:30 am) were not used.
- H. The data in Appendix E presented in tabular format detailing exactly what data is included and excluded.
- I. Similar to data presented in Appendix E, 1-second sound level data for Location #6 presented in tabular format detailing exactly what data is included and excluded.
- J. The data set in Appendix F presented in tabular format detailing output data from each turbine during the sampling.

- K. Similar to data presented in Appendix F, power production data for Location #6 presented in tabular format detailing output data from each turbine during the sampling.
- L. A response to the questions raised in Comment #12 above.

MassDEP appreciates your engagement in this matter and hopes that our technical review of the Report is helpful as you perform your own evaluation of the Report. Please do not hesitate to contact Daniel DiSalvio of my staff at (508) 946-2878 should you have any questions regarding this correspondence.

Sincerely,



Maria E. Pinaud
Deputy Regional Director
Bureau of Air and Waste

Ecc: MassDEP – SERO
Daniel DiSalvio