

**Comments of Richard Lampeter**

**Epsilon Associates, Inc.**

Complainants allege the Sound Study failed to meet all requirements of the facility's permit Conditions of the Final Order for Docket EL 19-003, specifically, that item A of Condition 26 of the Final Order requiring that the post construction monitoring survey be conducted following applicable ANSI methods was not met. This is incorrect for the following reasons.

1. The September 16, 2020 Protocol states: "The monitoring program will generally follow Method #1: "General method for routine measurements" in ANSI S12.18-1994 (R2019) "Procedures for Outdoor Measurement of Sound Pressure Level"." Several procedures in the standard that were implemented in the study are:

- a) There is no precipitation during the measurement period.
- b) The average ground level wind speed is 5 m/s (11.2 mph) or less.
- c) A source (wind turbine) sound is identified as "masked" by background sound levels and a wind turbine only level cannot be calculated when the total sound levels are within 4.0 dBA of the background sound level based on additional decibel precision.

According to ANSI S12.18 the sound level measurements are to be during a wind direction under which the measurement location is  $\pm 45$  degrees within the downwind direction of the sound source. Evaluating only downwind periods is not a specific requirement identified in the conditions of the Final Decision. In addition, according to a 2016 Massachusetts Clean Energy Center report on wind turbine acoustics, wind direction only affects sound levels by "generally less than 1 dB". Therefore, it is reasonable to include additional wind directions in the analysis when downwind periods meeting the other criteria are not present and potentially uncommon.

Complainants also allege the Sound Study failed to meet all requirements of the facility's permit Conditions of the Final Order for Docket EL 19-003, specifically, that item E of Condition 26 of the Final Order requiring the closest five wind turbines to be operating for evaluation periods and when at least the closest wind turbine is operating at a condition at full (within one decibel of maximum sound power levels) acoustic emissions. This is incorrect for the following reasons.

2. In both the 2020 (Epsilon report dated January 15, 2021) and 2021 (Epsilon report dated February 15, 2022) studies, a period was only considered for evaluation if at least the closest 5 wind turbines were operational. The electrical output from these wind turbines is presented for all periods of all locations in Appendix D of the 2021 study. The evaluations conducted in the 2020 Epsilon study reviewed only periods when electrical output at the closest wind turbine was at its rated maximum, i.e., 2,300 kW. This output was considered to provide 'worst-case' sound levels from the wind turbines. In the review of the 2020 study prepared by Hessler Associates, Inc., Mr. Hessler identified periods when wind turbines were operating below maximum output with exceedances. In order to consider periods which may not be a full power but still resulting elevated sound levels and to in the process minimize uncertainty due to variability in ambient conditions, the additional sound study was to, "focus on time periods near wind turbine shutdowns." Therefore, in order to address this requirement of the Mitigation Plan, the 2021 study did not evaluate all periods during high electrical output regardless of how many hours they were from the most recent shutdown which was the approach applied in 2020, but instead focused on periods in close proximity to a shutdown. Although a limitation on the wind turbine power output for evaluation periods was not set, there were multiple evaluation periods at all 5 locations with a wind turbine only and/or a total sound level under maximum output conditions at the closest wind turbine.

Complainants allege the sound study failed to meet the requirements of the mitigation plan approved by the Commission, in several ways and then offer additional comments. Complainants allege that the sound study did not comply with the shutdown requirement to shutdown at the specified times, 4 times per day in the two week period. Specifically the times specified in the Mitigation Plan: 1:00, 7:00, 13:00, 19:00. This is incorrect for the following reasons.

3. A total of 58 shutdowns were coordinated and performed by the NEER Renewable Operations Control Center (ROCC) during the measurement program targeting 1:00, 7:00, 13:00, and 19:00 daily. There were instances when the shutdown lasted longer than 10 minutes, but those additional periods were not identified as shutdown periods and were not used as part of the evaluation. There were three (3) scheduled shutdowns that were not implemented, or otherwise delayed; therefore, no evaluations were performed during these times. Consistent with the Order Granting Petition for Reconsideration and Order Granting Motion to Amend Sound Study Mitigation Plan in Part on Reconsideration, two wind turbines in the CRWII project were shut down at the same times since they are within approximately 1.75 miles of the measurement Location 6. These shutdowns were coordinated and performed by Xcel Energy.

Complainants allege the sound study did not comply with Page 3 of the Mitigation Memorandum submitted to the docket 1/19/21, where CRW states they will perform the study in the fall of 2021 during similar weather patterns and wind turbine output ranges that were present in October of 2020. This is incorrect for the following reasons.

4. A tabulated comparison of the meteorological conditions measured during the October 2020 and the 2021 studies is provided below. Temperatures measured at the onsite meteorological tower were very similar between the two programs with the same averages. The 2020 program had more 10-minute periods below freezing, but that program was also

approximately 5 days longer. Wind speeds at hub height were very similar between the program and had strong wind speeds ( $\geq 9$  m/s) for about the same percentage of the respective programs.

	Program Duration	Temperature @ HH (°F)				HH WS (m/s)				GL WS (m/s)			HH WD	WT 38 Output
		Avg.	Max.	Min.	Periods Below Freezing	Avg.	Max.	Min.	Periods $\geq 9$ m/s	Avg.	Max.	Min.	All 16 Sectors?	Range (kW)
2020	~20 Days	40	74	12	1,221 (42%)	9	23	1	1,290 (45%)	3	13	0	Yes	0 to 2300
2021	~15 Days	40	67	21	576 (27%)	9	29	1	983 (46%)	4	14	0	Yes	0 to 2300

Complainants allege the sound study did not comply with page 6, item 3, in Mitigation Memorandum, in that according to ANSI S12.18, the sound measurements are to be during a wind direction under which the measurement location is + or – 45 within the downwind direction of the sound source. This is incorrect for the following reasons.

5. Item 3 on page 6 in the Mitigation Memorandum does not reference ANSI standards. Condition 26 Part A of the Final Decision reads, “The post construction monitoring survey shall be conducted following applicable ANSI methods.” The September 16, 2020 Protocol states, “The monitoring program will generally follow Method #1: “General method for routine measurements” in ANSI S12.18-1994 (R2019) “Procedures for Outdoor Measurement of Sound Pressure Level”.” According to ANSI S12.18 the sound level measurements are to be during a wind direction under which the measurement location is  $\pm 45$  degrees within the downwind direction of the sound source. Evaluating only downwind periods is not a specific requirement identified in the conditions of the Final Decision. In addition, according to a 2016 Massachusetts Clean Energy Center report on wind turbine acoustics, wind direction only affects sound levels by

“generally less than 1 dB”. Therefore, it is reasonable to include additional wind directions in the analysis when downwind periods meeting the other criteria are not present and potentially uncommon.

6. Complainants allege the sound study not comply with the protocol extending from the second sound study, the study of 2020, in which the protocol states: On page 5, Sep 16, 2020, “The final decision requires that compliance evaluation periods be when the five closest wind turbines to the measurement locations are operating and when the absolute closest wind turbine is operating at a maximum sound power (within 1.0 dba)...” There was no action by the PUC to remove that requirement in the 2021 protocol. This is incorrect for the following reasons and as stated in **paragraph 2 above**.

Complainants alleged: “WIOM has no proven or claimed effect on noise reduction (Supported by GE Fact Sheet, copyright date of 2012, and GE Letter provided by CRW. (Attachment 3 and Attachment 4, respectively). They further state: “We do not know why there was project wide sound exceedance in the 2020 study. An offered speculation was blade stall due to icing or frost. The following is addresses these assertions.

7. The agreed upon approach as presented in the Mitigation Plan to address the sound exceedance included: The execution of mutually agreed on waivers of Condition No. 26 from the landowners at Locations 1-3; the use of WIOM; a commitment to conduct a follow-up sound study.

Complainants state: “Frost and/or icing is NOT an anomaly, it is common. (supported by GE Fact Sheet)” and “In the 2020 Sound Study, Location 3 (Mr. Welder) on October 22-23, the project was over 50 dBA, out of compliance by over 5 dBA for a non-participant home. Turbines were at full, or nearly full, power output when the high exceedance occurred. {See Attachments 5a and 5b of

this Complaint.) Thus, WIOM would do NOTHING to alleviate excessive noise because the turbines were NOT at low power, they were full, or nearly full, output.” The following addresses this assertion.

8. As described in the Motion for Approval, WIOM stabilizes blade pitch and works to prevent wind turbine stalling when there is a material amount of frost, ice, or dust on the blade.

Complainants state: “Also relevant to this complaint, is Condition 35, which pertains to icing” and that “If, in October and November of 2020, icing did occur, the turbines should have been shut down per Condition 35.” Complainants state: “Our Complaint brings to your attention item number 3 from Section 3, the shutdown requirements. The report by Epsilon, clearly notes three missed shutdowns. We assert there were more missed shutdowns, especially coordinating with Crowned Ridge 2, which affected the results of the study for Location 6, the home of Amber Christenson. The shutdown times were specified, by and through specifically listed times, in the Mitigation Plan, with the option for additional shutdowns to be requested by Epsilon if they felt additional shutdowns were needed.” The following addresses this assertion.

9. Specific to Location 6, there were three additional shutdowns which can be classified as “missed” as the shutdowns at CRW and CRWII did not occur simultaneously. These were at 7:30 on November 13, 7:10 on November 15, and 7:30 on November 17. This information is presented as part of Table 6-4 in the Sound Level Compliance Evaluation Report dated February 14, 2022. An additional shutdown planned at Location 6 for 13:00 on November 17 was not synchronized between CRW and CRWII; therefore, that period could not be used for additional evaluations. The 58 total shutdowns referenced previously include three shutdowns specific to

Location 6 only which were conducted at 19:00 on November 17, 1:00 on November 18, and 7:00 on November 18.

Complainants make reference to pages 6-8 of Epsilon's report to the Commission regarding shutdowns. The following addresses this assertion.

10. During the early hours of November 7, the winds were strong out of the south. Audio recordings from Location 6 from the 1:00 AM hour on November 7 include significant wind and/or tree noise and the wind turbines are not discernible as there were strong winds from the south. The Leq sound levels during this hour (2nd occurrence with output data due to DST) ranged from 46 to 47 dBA, which contain significant contribution from background. The winds decreased slightly over the next hour, and with the closest 5 wind turbines at maximum output, the Leq sound level at 3:00 AM and 3:10 AM is 43 dBA. This indicates that CRW conservatively is contributing no more than 43 dBA at this location and is in compliance. At Location 9, the ground level winds were stronger. Audio recordings include significant wind and/or tree noise and the wind turbines are not clearly discernible. Because wind speeds and gusts were strong at the ground, a wind turbine only sound level would likely not be able to be calculated even if background sound levels were measured.

Complainants state: "11/11 at 13:00, one of the crucial missed shutdowns. This shutdown would have been when turbines were at full power and it was listed by Epsilon as a potential icing period. The exact, or nearly exact, condition of Mr. Welder's sound exceedance in the 2020 study, or at least one of them. See Attachments 5a and 5b." The following addresses this assertion.

11. Similar to the previously discussed period, there were very strong winds on November 11, at 13:00. The wind was from the west with hub height winds at 18 m/s and the speed at Location 3A was 11 m/s, which is well above the ANSI threshold for sound

measurements. Location 6 is well shielded from westerly winds, but the trees there generate noise from that wind and impact the levels at the measurement location. This was confirmed with a review of the audio recordings, and wind turbine noise was not clearly discernible.

Complainants state: “If you look at Table D-2 of the Epsilon Report, there is NOT ONE scheduled shutdown lasting for just the required 10 minutes at (Location 6).” The following addresses this assertion.

12. The Final Decision states that the shutdown shall be “for a 10-minute period synchronized with the monitor’s clocks (starting, for example, at the top of the hour or 10 minutes after, 20 minutes after, etc.).” Wind turbines cannot shutdown or startup instantaneously; therefore, there will always be at least one ten-minute period preceding and following these 10-minute shutdowns for ramping down and ramping up, respectively. Additional time may have been needed by the operator given the number of wind turbines that were shut down during each event or conservatism applied by the operator to ensure that at least one full 10-minute period of a shutdown occurred. Shutdowns lasting less than 10 minutes would not have been accepted whereas these would contain contribution from the wind turbines.

Complainants state, “All shutdowns were much longer, and some did not happen at all, especially with coordination with CR2, as required.” The following addresses this assertion.

13. The report identifies shutdowns that were missed or delayed which resulted in CRII wind turbines not being shut down at the same time. These shutdowns were not utilized in the evaluations at Location 6. Although several shutdown periods were missed or delayed, there were 49 shutdown periods that were properly implemented for Location 6 following the equipment relocation.



Complainants state, “Even though these periods are not contaminated with turbine noise, Epsilon did not use these periods as evaluation periods.” The following addresses this assertion.

14. The sound level analysis in the 2021 study utilized shutdown periods that were implemented at their scheduled time, e.g., 1:00, 7:00, 13:00, or 19:00. If the shutdown was delayed, the first 10-minute period with all necessary wind turbines off was used. In instances where the wind turbines were shut down for more than one consecutive period, only 1 period was used, and the sound levels were not averaged.

Complainants state, “Dr. Hessler noted that he ‘averaged’ background noise during the shutdown period when Lindgren’s home was above 45 dBA. The ten minute periods as shown on the Table are already ‘averaged’ for the ten minute periods, but then Hessler Associates averaged the ‘average’ for two ten minute periods, thus diluting the true turbine noise vs background noise by dBA. This error put the dBA at 46, when it should have been shown to be 48 dBA, had the sample background noise not been diluted by averaging the averages of the two ten minute periods. The following addresses this assertion.

15. The comment above is addressed further in the Formal Complaint Attachment 2, page 3. Based on a review of the Hessler report, the comments appear to be relevant to the assessment of data from Location 9 on the early morning of November 8, 2021 (page 37 of Hessler report). Epsilon evaluated 11 periods surrounding the shutdown performed at 1:00 AM on November 8, 2021 at Location 9. The Leq during the shutdown was 36 dBA. Wind turbine only sound levels were calculated for the 6 periods preceding the shutdown, and these levels ranged from 43 to 45 dBA. The wind turbine only sound levels of the periods following the 1:00 shutdown period were identified as masked based on a review of the audio recordings where a distorted

signal was prevalent. This indicates strong ground-level winds at the microphone, and wind speeds were much stronger during the evaluation periods than the shutdown period at 1:00. Three (3) periods were during worst-case electrical output ( $\geq 2300$  kW) at the closest wind turbine, and the wind turbine only sound levels during these periods were no higher than 45 dBA or masked.

Complainants state, “Similarly, Table D-5 shows the Lindgren home, there is NOT ONE 10 minute shutdown, all shutdowns last longer.”

Please see paragraph 12 above for response.

Complainants state, “Shutdowns during this study were never less than twice the mandated shutdown time of ten minutes, and even 14 times the shutdown 10 minute requirement, and that is in addition to curtailments and shutdowns that lasted hours. Additionally shutdowns are not implemented November 17, 7:00 am, and November 17, 13:00 (1:00 pm). These shutdown periods were critical to the study because the turbines were at full power during these time periods and an evaluation of turbine noise vs background noise are crucial to the accuracy of the study.” The following addresses this assertion.

16. As noted above, the shutdown at 7:00 on November 17 was missed at Location 6 due to the delay in the shutdown resulting in the CRW and CRWII shutdowns not being synchronized. Similar to a previously discussed period (November 11 13:00), there were very strong winds on November 17, at 7:00. The wind was from the west with hub height winds that were as high as 17 m/s around the time of the scheduled shutdown and the wind speed at Location 3A was well above the ANSI threshold for sound measurements. Location 6 is well shielded from westerly winds, but the trees there generate noise from the wind and impact the levels at the measurement location. This was confirmed with a review of the audio recordings, and wind

turbine noise was not clearly discernible. As discussed above, an additional shutdown planned at Location 6 for 13:00 on November 17 was not synchronized between CRW and CRWII; therefore, that period could not be used for additional evaluations. Three subsequent additional shutdowns for Location 6 were implemented successfully. Wind speeds had increased both at the ground and at hub height since 7:00 AM on that morning with a hub height wind speed of 18 m/s and a ground level wind speed of 13 m/s at Location 3A. Winds at Location 6 were still shielded. Tree noise significantly impacted the sound levels during this timeframe as confirmed by audio recordings. The wind turbines were indiscernible. At 13:20 when CRW was shutdown, the Leq sound level was 58 dBA.

Complainants state: “At both locations (6 and 9), on November 15, the 7:00 shutdown was delayed (and also not a 10 minute shutdown). This delay is especially problematic for Location 6 because of the contamination of CR2 turbine noise.” The following addresses this assertion.

17. The report identifies shutdowns that were missed or delayed which resulted in CRII wind turbines not being shut down at the same time. These shutdowns were not utilized in the evaluations at Location 6 but were used for all other measurement locations during the 2021 program that did not require CRII shutdowns. Although several shutdown periods were missed or delayed, there were 49 shutdown periods that were properly implemented for Location 6 following the equipment relocation.

Complainants state: “As part of data gathering of study location 6, on the morning of November 11th, Amber Christenson documented the turbines being louder than the background sound of Location 6. The winds were from the west with possible icing conditions and the turbines were at approximately half power. This particular period was important to Ms. Christenson’s location because west, west southwest, and south southwest wind directions are particularly noisy at

Location 6. Even though turbines were at half power, they were much louder than the background environment, but as Ms. Christenson was outside making personal observations and recording the data, the turbines were suddenly turned off so the effects could not be further monitored. This event solidifies the importance of personal observations, and the ruinous effect the curtailments had on the sound study.” The following addresses this assertion.

18. It is unclear to which period(s) Ms. Christenson is referring, but an evaluation of periods on November 11 at Location 6 is provided in Table 7-2h of the report. All periods meeting the necessary criteria around the 1:00 and 7:00 shutdowns were masked. Four (4) of the 6 evaluation periods before the 1:00 shutdown were when the closest wind turbine was at maximum output. The Leq during these periods was 41-42 dBA with background sound included. This indicates compliance from CRW. The shutdown at 7:00 AM had an Leq sound level of 53 dBA with a high Lmax of 84 dBA. This period was adjusted for several brief loud events, potentially a bird or a dog, and the adjusted Leq was 49 dBA. This sound level does not have any contribution from the wind turbines and is over the limit of 45 dBA. Numerous other 10-minute periods on that morning were over 49 dBA when the closest 5 wind turbines were off due to the MISO curtailment. In all, wind conditions significantly contributed to the sound levels during these hours.

Complainants state: “Location 6, November 18th evaluation is questioned in this Complaint. The 1:00 period was evaluated, but neither Epsilon, nor Hessler address 7:00 shutdown vs the full power output noise at 7:40 am. Ms. Christenson is unaware if CR2 turbines were shutdown at 7:00 am on the 18th, but with or without CR2, there is an issue with the noise as shown on Table D-2, page 22. An excerpt is shown here, the 7:00 am shutdown, during a potential icing period, and the sound comparison of full turbine output 40 minutes later. Clearly, the turbines are adding

substantial noise to the environment. There was no curtailment of the project at 7:40 am. Curtailment started at 7:50, thus a reduction in noise. More ruinous effects to the validity of the study by the project curtailment. The following addresses this assertion.

19. The National Weather Service measured and observed some precipitation during several hours on and around the 7:00 AM shutdown on the morning of November 18. Per ANSI standards, sound levels measured during precipitation were not assessed. The audio recording at 7:40 AM contains loud and continuous bird chirping and wind noise. The wind turbines are indiscernible in the file. Around 10:00 AM on the same morning, under comparable wind conditions and high wind turbine output, Epsilon personnel performed auditory observations and noted that noise from wind through the tall trees was the primary and continuous sound source, and the wind turbines were inaudible.

Complainants state: “Our Complaint brings to your attention item number 4 from Section 3, turbine outputs. The Epsilon report states NUMEROUS times that the project was running abnormally. Again, we direct you to Attachment 1 to review the output references in the sound study submission. Such as this excerpt from page 6-7 of the Epsilon report, ‘Curtailments limited the electrical output of the site as a whole and SUBSTANTIALLY IMPACTED the TYPICAL OPERATION of the wind turbines.’” The following addresses this assertion.

20. As stated in the report, MISO curtailments impacted the operation of the wind turbines. These impacts were limited to periods when curtailments occurred. It is Epsilon’s understanding that the curtailments were based on decisions by MISO, were unscheduled (i.e., dependent upon real time conditions), and were out of the control of CRW operations. Even though these curtailments occurred throughout the program, a compliance evaluation was able to be conducted. Also as stated in the report, “the results of the measurement program show that

calculated wind turbine only sound pressure levels, under conditions meeting the established evaluation criteria, meet the sound level limits set forth in the SD PUC Final Decision for CRW at each of the measurement locations.”

Complainants state, “Also required to comply with the Mitigation Plan, Item 4, was similar weather. Icing or frost was ASSUMED, but the turbines were never reported to be shut down due to ICING, as required in Condition 35, and according to the Data Response to Ms. Christenson, WIOM engaged on SOME turbines, not all, and the WIOM engaged intermittently only ONCE, November 13, some turbines showing an ON for a couple of minutes, then OFF for a couple of minutes, then On again for a couple of minutes. IF there was a frost or icing event, it was insubstantial and short lived, not affecting all turbines in relation to a study location/home. The tables of the Epsilon report show that WIOM engaged ONLY at low power and only that short period time on SOME turbines. Our conclusion being that the Fact Sheet is correct, that WIOM is used at low power stalls to increase output, and that it would have had no effect on the issue of noise exceedance as shown in the 2020 study. The WIOM software is not a ‘fix’ for the noise issues in the project.”

Complainants also state, “Turbine outputs when WIOM did engage in the limited turbines: Lindgren’s Table D5, page 18, 5 closest turbines, when power was at 22-580 MW. Christenson’s Table D-2, page 15, 5 closest turbines, when power was 64-629 MW. Page 33, Epsilon 7-4.”  
Please see the paragraph 4 above for response.

Complainants state, “Location 8’s study was affected by nearby Turbine 71 being offline for approximately 18 hours during that time. (See Attachment 1, the final page, for Maintenance down times affecting the sound study.)” The following addresses this assertion.

21. Evaluations at Location 8 required wind turbines 81, 75, 76, 80, and 82 (5 closest) to be operational. Wind turbine 71 was not one of the closest 5 wind turbines to Location 8. Complainants state, “A disturbing issue regarding Location 8, is that it has no mailbox. If unoccupied, why was this an approved study location?” Additionally, they state, “This property has not been an occupied home for well over 30 years, perhaps well over 40. Why study an unoccupied property, when Mr. Welder’s home could have been studied as a comparison to the 2020 study? Why study an unoccupied property at all?” The following addresses this assertion.

22. Location 8 was selected to replace Location 2 from the 2020 study (46763 159th Street, Stockholm) as Crowned Ridge has executed a waiver of Condition No. 26 with the landowner at Location 2. Proximity to the original location, modeled sound level, and participation status were considered when selecting an alternate location. While not currently occupied, the structure has the potential to be occupied in the future. Location 8 was not selected as an alternate location to the Welder residence (Location 3 in 2020 study). It is Epsilon’s understanding that a waiver was in place with Mr. Welder and therefore that location was not included in the 2021 study.

Complainants state, “Compliance of Condition 26, Section A, requires the sound study be conducted following applicable ANSI methods. We bring attention to both the Epsilon and Hessler reports, reference was made to the reliance of audio files. There is no mention of what instrument or instruments recorded the audio, the quality, nor the format (WAV or MP3). Also, we question if the audio files were compressed when passed to Hessler and Associates? ANSI S12.9/ANSI S1.13 would require those recordings to be high quality recordings for compliance. We again refer you to Attachment 1-- Epsilon curtailment, tree/leaf noise and Maintenance Excerpts.” The following is offered in response. The following addresses this assertion.

23. As noted in the 2021 report, brief audio recordings were made by the sound level meters internally. The recordings were stored and exported from the sound level meter software as uncompressed WAV files, and files requested by Hessler Associates were sent in the same WAV format. The audio recordings were used for sound source identification only, e.g., leaf rustle, dog barks, not for determining sound levels.

Complainants state, “Another issue involving Condition 26, Item A pertaining to applicable ANSI rules, would be ANSI S12.9, Part 3 to exclude dbA corruption from audible natural sounds, by excluding octave bands from 2 kHz (kilohertz) thru 8 kHz, that would have excluded contamination from: insects, treefrogs, and leaf rustle, thereby reducing the large amount of masking that plagued these study results.” The following addresses this assertion.

24. Although ANSI S12.9 Part 3 describes the procedure identified above, this standard pertains to short-term attended measurements and this program was mostly unattended. ANSI standard S12.100-2014 discusses the removal of high frequency natural sounds (HFNS) from sound level measurements. The adjustment, called “ANS-weighting”, requires the removal of all sound level data from octave bands above the 1,000 Hz band. Sound from wind turbines is generally broadband in nature from the aerodynamic sound caused by the rotating blades. Therefore, performing ANS-weighting would not only remove HFNS but also remove some wind turbine contribution from the measured sound level and be unrepresentative of the full contribution from the project. Therefore, no ANS-weighting was performed for this sound study or prior post-construction studies performed for CRW.

Complainants state, “See Attachments 1 and 2 for notations by Epsilon and Dr. Hessler regarding tree/leaf noise. Below is a photo from Epsilon, page 6-12, showing leaves on the trees of Location



6. This photo is of trees on the west side of the property. Dr. Hessler, in the Hessler Associates report, refers to Location 6 trees as ‘barren’. In the second below, the tree that is casting a shadow on the equipment is fully leaved, and the trees you can see that are leaved are on the north side of the property. The second photo below was taken by Ms. Christenson. The following addresses this assertion.

25. The tall trees bordering the northern and western sides of the Location 6 property shown in the photos are partially foliated and contributed significantly to the sound levels measured at this location.

Complainants state, “And the third issue regarding complying with ANSI rules, according to ANSI S12.18, the sound measurements are to be during a wind direction under which the measurement location is + or – 45 within the downwind direction of the sound source. This rule was not applied according to Epsilon, stating it was not a specific condition of the Final Decision. We rely on Condition 26, Item A asserting that ANSI S12.18, like ALL APPLICABLE ANSI rules, must be applied to a sound study.”

In response, please see paragraph 1 above.

Complainants state, “Epsilon writes that the Mitigation Plan deviates from the second sound study and permit Conditions in a number of ways. We assert the two deviations listed below are in error: The Mitigation Plan should only focus on periods near shutdowns. The current Mitigation Plan does not set a limit on turbine outputs like the second sound study required (nearest turbine at full power). We assert these two claims are not correct. While it is true the mitigation plan suggested the study focus on times near shutdown periods, the analysis was not LIMITED to those periods.”  
The following addresses this assertion.

26. The Motion for Approval of Mitigation Plan dated March 18, 2021 states, “require that the study and report focus on time periods near wind turbine shutdowns”. Therefore, all periods meeting the necessary criteria that were also within approximately 1 hour of the start or completion of a scheduled shutdown were evaluated. The start and completion of each shutdown was defined by a window of time during which the wind turbines were either ramping down or ramping up based on a review of the SCADA data.

Complainants state, “The current mitigation plan was in addition to the second study’s protocol, it did not replace the second sound study’s protocol entirely.” The following is offered in response.

The following addresses this assertion.

27. As discussed in Section 4.1.3 of the 2021 report, the additional sound study, per the Mitigation Plan found within the Motion for Approval of Mitigation Plan dated March 18, 2021, was to use the protocols approved by the Commission on October 2, 2020, with the following changes:

- a. Perform the study at three locations;
- b. Require that the study and report focus on time periods near wind turbine shutdowns;
- c. Modify the wind turbine shutdown procedure to perform four shutdowns daily at 1:00 a.m., 7:00 a.m., 1:00 p.m., and 7:00 p.m. for wind turbines within 1.75 miles of a measurement location;
- d. Perform the study in the Fall of 2021 during similar weather patterns and wind turbine output ranges that were present in October of 2020; and

Attachment C

- e. Require that an acoustical consultant from Epsilon remain in Watertown, SD for the duration of the sound level measurement to allow for frequent personal observations during the performance of the sound study.

Per the Order, the number of measurement locations increased to four (4) with the addition of the Lindgren residence. The Order Granting Petition for Reconsideration and Order Granting Motion to Amend Sound Study Mitigation Plan in Part on Reconsideration added a fifth location, Ms. Christenson's residence.