BEFORE THE OHIO POWER SITING BOARD

In the Matter of the Application of Ross County Solar, LLC for a Certificate of Environmental Compatibility and Public Need.	**)** **)** **)** **)**	**Case No. 20-1380-EL-BGN**

DIRECT TESTIMONY OF EDDIE DUNCAN

Q.1. Please state your name, title, and business address.

A.1. My name is Eddie Duncan. I am employed by Resource Systems Group, Inc. ("RSG") as a Senior Director and lead RSG's acoustics work. My business address is 55 Railroad Row, White River Junction, VT 05001.

Q.2. What are your duties as a Senior Director?

A.2. As Senior Director, I direct and manage projects related to acoustics and noise. This includes noise assessments for projects from a wide variety of sectors, including solar power development. I manage and mentor the acoustics staff, and am responsible for strategy and client relationships.

Q.3. What is your educational and professional background?

A.3. I am Board Certified in Noise Control Engineering by the Institute of Noise Control Engineering and am a member of the Acoustical Society of America where I served as a member of the Technical Committee on Architectural Acoustics for over 10 years. I received my Bachelor of Science in Engineering Science (B.S.) at Rensselaer Polytechnic Institute, Troy, New York in 2003 and a Master of Science in Environmental Studies (M.S.) at Green Mountain College, Poultney, Vermont in 2013.

I have 18 years of experience in the field of acoustics with much of that experience measuring, modeling, and analyzing noise from renewable energy sources and power

transmission projects. I have worked across many different public and private sectors including power transmission, renewable energy, transportation, public lands, recreation, mining, manufacturing, healthcare, education, and commercial and residential development.

Q.4. On whose behalf are you offering testimony?

A.4. I am testifying on behalf of the Applicant, Ross County Solar, LLC ("Applicant"), regarding its Application filed in Case No. 20-1380-EL-BGN.

Q.5. What is the purpose of your testimony?

A.5. The purpose of my testimony is to describe the noise assessment study included in the Application as Exhibit Q and to summarize the results of that study.

Q.6. Please describe the noise assessment study included in the Application.

A.6. RSG carried out a noise impact assessment for the Ross County Solar Project ("Project") to determine existing baseline acoustical conditions in the Project area and model sound emissions of the primary sound-producing Project components, namely inverters and transformers, so that projected sound levels could be compared to the existing acoustical conditions. Typical operations of the Project include transformers and inverters operating during the day, and only transformers operating at night. However, the inverters may operate sometimes at night to provide reactive power output. As such, the study assumed that all sources could operate at night.

The Project area is primarily agricultural with scattered residences and farmsteads throughout. A total of 205 sensitive receptors were included in the study, of which 199 were non-participating sensitive receptors. Background sound level monitoring was conducted at three locations. The three monitors were representative of residences (i) on

the eastern edge of the Project area along State Route 41; (ii) in the middle of the Project area that are set back further from State Route 41; and (iii) on the western edge of the Project area along Rapid Forge Road. Sound levels were continuously measured from June 25, 2020, through July 2, 2020. During analysis, sound level data was removed from the dataset to maintain integrity of the background sound levels during the periods that would cause false sound level readings or artificially high levels, such as wind speeds above 11 mph; precipitation and thunderstorm events; anomalous events; or equipment interactions by RSG staff, other people, or animals.

Q.7. What did the survey results indicate with respect to the sound levels that currently exist in the area?

A.7. Although there is a specific sound level limit for wind power projects within the Ohio Administrative Code, there is not one for solar power projects. The design goal for non-participating sensitive receptors used in the assessment of the Project is the measured ambient sound level plus 5 dBA for daytime and nighttime periods. Based on the background sound monitoring conducted at the three monitoring locations in the Project area, the average existing daytime and nighttime equivalent continuous sound levels (L_{eq}) in the area are 44 dBA and 39 dBA, respectively. This sets the daytime design goal at 49 dBA and the nighttime design goal at 44 dBA.

Q.8. What did your modeling results indicate with respect to the projected sound levels when the Project is in operation?

A.8. Sound propagation modeling was conducted at the 205 sensitive receptors (199 non-participating and 6 participating) throughout the Project Area, using the inverter with the highest sound emissions and substation transformer model that are representative of the

equipment that may be used for the Project. The modeling shows that all sensitive receptors are projected to be below the Project design goals. Notably, none of the non-participating sensitive receptors were modeled to receive a sound pressure level of over 40 dBA.

Q.9. Can mitigation be utilized in the event an operational noise issue developed?

A.9. Yes. In the unlikely event an operational noise issue developed, noise barriers could be strategically placed next to inverters to mitigate sound from propagating in specific directions. Alternatively, some inverter manufacturers have additional noise mitigation elements that could be installed to reduce the sound from specific inverters that need it. While these mitigation options may be available, our assessment does not include these elements as they were not necessary to meet the design goal of ambient sound levels plus 5 dB at non-participating receptors.

Q.10. Are there any other potential noise sources associated with the Project?

A.10. In addition to operational sound, a certain amount of unavoidable noise will be generated during construction. Construction activities include road construction, substation construction, trenching, inverter installation, piling, and racking. In any given area, construction will be relatively short in duration, particularly for road construction, trenching, piling, and racking. Construction equipment will be fitted with exhaust systems and mufflers to reduce exhaust noise. In addition, the material staging areas will be located away from sensitive receptors when feasible. To the extent possible, circular vehicular movements will be established to minimize the use of back alarms.

In an effort to further mitigate construction noise, the Applicant has committed in the Application that construction will take place between 7 a.m. and 7 p.m., or until dusk when sunset occurs after 7 p.m., though limited construction that does not contribute to excess

noise at sensitive receptors may occur outside of these hours. The Applicant also has committed (as indicated in Mr. Risse's testimony) to limiting pile driving operations to the hours of 9 a.m. to 7 p.m., Monday through Saturday, except in areas where pile driving noise will not exceed the daytime ambient Leq plus 10 dBA, within which pile driving may also occur between 7 a.m. and 9 a.m.

Q.11. How did you select the three monitoring locations?

A.11. I selected the areas of representative soundscapes in which we should do monitoring throughout the Project area, and then I worked with the Applicant to identify specific locations where we could gain site access. Each location was selected as representative of a given landscape or soundscape experienced by sensitive receptors in and around the Project area. We typically consider factors such as land use, road traffic, distance to roadways, population density, and distance to geographic features (rivers, relative elevation, ground cover, etc.). Consideration is also given to security of the monitoring equipment. In this case, the factors that affect the soundscape in the Project area are not too complex and the monitor location decisions were primarily driven by the location of the sensitive receptors and roadways. The distance a monitor is placed from a roadway is determined by the setback distance of sensitive receptors along the roadway. That is, monitors are placed at a setback distance similar to nearby sensitive receptors. The characteristics that are represented at each monitor location that played a role in monitor location selection are listed in the Table below:

Monitor	Factors for Selection	Distance to Nearest Road
A	-Eastern extent of the Project area. -Near the proposed substation.	164 feet

Monitor	Factors for Selection	Distance to Nearest Road
	-Setback from major collector road, comparable to setback distances for residences along major collector road.	
	-Nearest road classified as "major collector" by ODOT.	
B	-Middle of the Project area.	279 feet
	-Setback from local road, comparable to setback distances for residences along local road.	
	-Nearest road classified as "local" by ODOT.	
C	-Western extent of the Project area.	220 feet
	-Setback from major collector road, comparable to setback distances for residences along major collector road.	
	-Nearest road classified as "major collector" by ODOT.	

Q.12. Do you believe the three monitoring locations are representative of a significant amount of the Project area?

A.12. Yes. Monitor A is representative of the eastern extent of the Project area, Monitor B is representative of the middle of the Project area, and Monitor C is representative of the western extent of the Project area.

Q.13. Have you reviewed the Staff Report and Recommendation in this proceeding, including the condition sound modeling?

A.13. Yes, I have reviewed the Staff Report and Recommendation and Condition 16 which addresses pre-construction sound modeling. Condition 16 as recommended by Staff requires the Applicant to conduct additional sound modeling if the sound power output for the transformer and inverters selected for the project are higher than the sound power output data used in my sound modeling (the results of which are included in the Application). If sound power output data is not available, Staff recommends that an

operational noise test be done at one location to determine if operational sound levels are greater than the project area ambient Leq plus five dBA.

Q.14. Do you agree with Staff's recommendation?

A.14. While I understand the intent of Staff's condition, the condition should be revised as included in Mr. Risse's testimony to provide more clarity and allow for modeling across the entire Project Area rather than a specific test at one site. If data is not available for the transformer that the Project selects, we can rely on the NEMA TR1 standard. However, if data is not available from the manufacturer for the inverters, the next best approach is to use sound power data from a similar model. Once the final inverter is installed, sound level measurements can be made in close proximity to the installed inverter to determine whether modeling is necessary using the actual sound level measurements. Specifically, I recommend as follows;

- If transformer manufacturer data is not available, the model will be updated with sound emission data following the NEMA TR1 standard.
- If inverter manufacturer data is not available, a similar inverter model will be used to update the sound propagation model prior to construction.
- Once constructed, sound level measurements will be made in close proximity to the inverter to determine the sound power level of the installed inverter. If the sound power level of the installed inverter is 2 dBA or more above the sound power level used in the updated pre-construction model, then the sound propagation model will be updated to ensure project-wide compliance with the applicable sound level limit. If the sound power level is determined to be less than 2 dBA above the sound power level used in

the updated pre-construction model, then the project will be deemed in-compliance.

For those reasons, I agree with Mr. Risse that Condition 16 should be revised as follows:

> If the inverters or substation transformer chosen for the project have a higher sound power output than the models used in the noise model, the Applicant shall submit, 30 days prior to construction, the results from an updated noise model for the project using the expected sound power output from the models chosen for the project, to show that sound levels will not exceed the project area average daytime ambient level of 44 dBA plus five dBA at any nonparticipating sensitive receptor and will be submitted at least 30 days prior to construction. ~~If noise data is not available from the inverter or transformer manufacturer, an operational noise test may be performed to comply with this condition. The test must be performed during the on a sunny day in the months of May-August, at a distance equal to the minimum distance from an inverter to a non-participating residence. If the test shows the operational noise level is greater than project area ambient Leq level plus five dBA additional noise mitigation will be required. This condition is complied with if the test shows the operational noise level is less than project area ambient Leq level plus five dBA.~~ If transformer manufacturer data is not available, the model will be updated with sound emission data following the NEMA TR1 standard. If inverter manufacturer data is not available, a similar inverter model will be used to update the sound propagation model prior to construction. Once constructed, sound level measurements will be made in close proximity to the inverter to determine the sound power level of the installed inverter. If the sound power level of the installed inverter is 2 dBA or more above the sound power level used in the updated pre-construction model, then the sound propagation model will be updated to ensure project-wide compliance with the applicable sound level limit. If the sound power level is determined to be less than 2 dBA above the sound power level used in the updated pre-construction model, then the project will be deemed in-compliance.

Q.15. What are your overall conclusions regarding the potential noise impacts of the Project?

A.15. Sound emissions from photovoltaic projects are typically less than other power generation projects. In addition, most sound sources associated with solar power typically only produce sound during the day when the possibility of disturbance is less likely. Based on the survey of the existing environmental sound levels in the vicinity of the proposed Project area and conservative projections of the Project's future sound emissions, operational sound from the Project, whether created during the day or night, should not

result in an excess of the design goal of existing ambient sound levels plus 5 dBA. And as I noted above, mitigation to inverters can be implemented in the unlikely event an operational noise issue develops.

Q.16. Does this conclude your direct testimony?

A.16. Yes, it does.

CERTIFICATE OF SERVICE

The Ohio Power Siting Board's e-filing system will electronically serve notice of the filing of this document on the parties referenced in the service list of the docket card who have electronically subscribed to this case. In addition, the undersigned certifies that a courtesy copy of the foregoing document is also being served upon the persons below via electronic mail this 14th day of April 2021.

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Summary: Testimony Direct Testimony of Eddie Duncan electronically filed by Ms. Anna Sanyal on behalf of Ross County Solar, LLC