BEFORE
THE OHIO POWER SITING BOARD

In the Matter of the Application of **Union Ridge Solar, LLC** for a Certificate of Environmental Compatibility and Public Need for a Solar Facility Located in Licking County, Ohio.	))))	Case No. 20-1757-EL-BGN

DIRECT TESTIMONY OF

ISAAC OLD

on behalf of

Union Ridge Solar, LLC

September 2, 2021

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

A-1. My name is Isaac Old. I am a Senior Consultant at Resource Systems Group, Inc. ("RSG"). My business address is 55 Railroad Row, White River Junction, Vermont 05001.

Q-2. What is your education and professional background?

A-2. I have a Bachelor of Science degree in Physics from Centre College and a Master of Science degree in Architectural Acoustics from Rensselaer Polytechnic Institute. I received the Robert Bradford Newman Award for Merit in Architectural Acoustics for my thesis work at RPI.

I am an acoustician, specializing in noise assessments for environmental sound sources, and consultation on building acoustics, with more than ten years of experience. For environmental noise, I am involved in pre- and post-construction sound level measurement, sound propagation modeling, design of noise mitigation, and project management. For architectural acoustics, I am involved with design of acoustical treatments, room-acoustics modeling, and sound insulation modeling. I have worked on projects in many different industries including renewable energy, electrical transmission, institutions, parks and tourism, and residential developments. I am a member of the Acoustical Society of America, and a member of the Institute of Noise Control Engineering. I am FHWA Transportation Noise Model 2.5 certified. I have undertaken training courses in both the Cadna/A sound propagation modeling program and the sound level monitoring methods of the National Park Service (NPS).

I have extensive experience particular to renewable projects with involvement in more than 20 solar power project noise assessments for projects located in seven different states. I have presented five papers at national and international conferences on subjects relating to

wind turbine and solar power noise. I have been involved in preconstruction ambient sound level monitoring for at least 10 solar power projects. A copy of my resume is attached to my testimony as Attachment 1 hereto.

Q-3. Have you testified previously before the Ohio Power Siting Board?

A-3. Yes, in the Cases of Republic Wind (Case No. 17-2295-EL-BGN) and Ross County Solar (Case No. 20-1380-EL-BGN).

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

A-4. I am offering testimony on behalf of the applicant, Union Ridge Solar, LLC ("Applicant"), regarding its Application filed in Case No. 20-1757-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 N and to summarize the results of that study.

Q-6. Please describe the study you and your firm undertook on behalf of the Applicant.

A-6. RSG carried out a noise assessment of the Union Ridge Solar Project ("Project"). The first step of the assessment was to measure the existing ambient sound level in and around the project area. These measurements were used to calculate the expected sound level limit for the project at nearby sensitive receivers. Sound propagation modeling of the major sound producing equipment (inverters, transformers and trackers) was then carried out to estimate project sound levels at nearby sensitive receivers. Typical operations of the facility will include inverters, transformers, and trackers operating during the day and transformers and inverters at night. Although inverters generally do not operate at night we modeled them, in case they are used for VAR control.

The area is a mixture of agricultural and residential areas. There is a rail line that runs just to the north of the project. Roads run along the eastern and southern borders.

Background sound level monitoring was conducted at three locations. The three monitors were representative of residences (i) on the northwestern corner of the project area (Monitor A); (ii) in the eastern part of the project area along County Highway 39 (Monitor B); and (iii) in the southern part of the project area (Monitor C). Sound levels were continuously measured from September 29, 2020, through October 6, 2020. During analysis, some data was removed from the dataset to maintain integrity of the data. The background sound levels that were removed were measured 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. Please describe the result of the field surveys you conducted on the Project.

A-7. Background sound level monitoring results conducted at the three monitoring locations in the Project area indicated average existing daytime and nighttime equivalent continuous sound levels (Leq) of 45 dBA and 38 dBA respectively.

There is currently no specific sound level limit for solar power projects in Ohio Administrative Code, although there is one for wind power projects. The noise assessment derived the Project sound level design goal for non-participating sensitive receptors consistent with what is used for wind power projects and what has been used in prior solar power projects. This limit is the measured ambient sound level plus 5 dBA for daytime and nighttime periods. This sets the daytime design goal at 50 dBA and the nighttime design goal at 43 dBA.

Q-8. Please describe the modeling you performed for the Project.

A-8. Sound propagation modeling was conducted at 1,321 sensitive receptors located in and around the project area. Many of these receptors are in more consolidated residential areas outside of the immediate project area. Sound propagation modeling was performed using the ISO 9613-2 sound propagation modeling standard, as implemented in Datakustik's Cadna/A sound modeling package.

The project is expected to include up to 34 inverter skids spread throughout the Project Area and a main high-voltage transformer, though there are currently two proposed locations for the transformer. Each inverter skid includes an inverter and medium-voltage transformer. Approximately 3,874 tracking motors are expected. Sound emissions from all sources were analyzed in the assessment.

Representative equipment was modeled for the inverters and trackers, using manufacturer sound emissions data. The transformer was modeled using data from the manufacturer for the particular transformer that will be used for this project. Sound barriers were modeled surrounding some of the transformer/inverter pairs, and are described in the noise assessment.

Q-9. What did the modeling of the potential sound emissions from the Project indicate?

A-9. The modeling shows that all sensitive receptors are projected to be below Project design goals, with a maximum sound level of 49 dBA during the day and 43 dBA at night. The project design goals are 50 dBA during the day and 43 dBA at night. These design goals are 5 dB above the average daytime and nighttime ambient equivalent average sound levels and were calculated in a manner consistent with OPSB Code for wind power projects and OPSB precedent for solar power projects.

Q-10. Does this conclude your direct testimony?

A-10. Yes, it does. However, I reserve the right to offer supplemental testimony if necessary.

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing Testimony was served upon the parties of record listed below this 2nd day of September 2021 *via* electronic mail.

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ISAAC OLD

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EXPERIENCE | 10 Years

EDUCATION | MS, Architectural Acoustics, Rensselaer Polytechnic Institute
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BIO

Isaac Old is an acoustician, specializing noise assessments for environmental sound sources, and consultation on architectural spaces. For environmental noise, he is involved in pre- and postconstruction sound level measurement, sound propagation, design, and project management. For architectural acoustics, he is involved with design, room-acoustics modeling, and sound insulation modeling. Isaac has worked in many different industries including renewable energy, electrical transmission, academia, parks and tourism, and residential developments.

PROJECT EXPERIENCE

Wind Power Projects

Wind Turbine Vibration Analysis performed vibration modeling of a proposed wind power project. The goal was the see if the vibration was in a range that was theorized to have an impact on an endangered insect. Results were also compared with other sources of ground-borne vibration. (2018)

Three Waters Wind Performed preconstruction sound level monitoring for a proposed wind power project in southern Minnesota. Monitoring was performed consistent with Minnesota Department of Commerce guidelines. (2019)

Sugar Creek Wind Performed sound propagation modeling for a proposed Illinois. Assessed project sound emissions relative to Illinois Pollution Control Board (IPCB) octave band sound level limits. Summarized modeling results in a report that was submitted as part of the permit application. (2018)

Northwest Ohio Wind Prepared a noise assessment of the proposed Northwest Ohio Wind power project, located in northwestern Ohio. Performed background sound level monitoring to characterize the soundscape of the project area. Analyzed sound level measurements to derive the Ohio Power Siting Board (OPSB) sound level limit. Constructed a sound propagation model to predict sound levels due to the project in the surrounding areas. (2013)

Cattle Ridge Wind Performed preconstruction background sound level monitoring for a wind power project located in eastern South Dakota. The purpose of monitoring was to characterize the existing sound environment in the project area. (2016)

Wildflower Green Energy Farm Analyzed monitoring data and prepared a sound propagation model for a proposed combined solar and wind power project, located in California. (2011)

Green River Wind Performed preconstruction sound level monitoring for the proposed Green River Wind power project in Northern Illinois. (2016)

Emerson Creek Wind Conducted long-term sound level monitoring for the proposed Emerson Creek wind power project in Ohio. Analyzed data consistent with Ohio Power Siting Board (OPSB) precedent to derive the project sound level limit. (2018)

Deerfield Wind Provided support during the post-permitting design phase of the Deerfield Wind power project. Performed sound propagation modeling of proposed project layouts and assessed likely compliance of those layouts with exterior and interior sound level limits. After project construction, provided review and supervision of operational compliance monitoring performed by other consultants. (2010 to 2016)

MIT Wind Turbine Noise Literature Review Assisted with a review of scientific literature concerning wind turbine noise. Performed a search of relevant literature and drafted the section of the review relating to sound generation of wind turbines and measurements. (2013)

Georgia Mountain Community Wind Performed operational compliance monitoring of the Georgia Mountain Community Wind (GMCW) power project to assess compliance with permit conditions. This included performing Outdoor Indoor Transmission Loss (OITL) testing of a neighboring residence, to assess consistency with the indoor sound level limit. (2012 and 2013)

Dairy Air Wind Prepared a preconstruction noise impact assessment for a proposed wind power project, located in northern Vermont. Performed preconstruction long-term sound level monitoring to characterize the existing sound environment. Performed sound propagation modeling of the proposed project configuration consistent with Vermont Public Utilities Commission (PUC) regulations. Summarized results in a report the submitted as part of the permit application. Attended a public meeting for the project to answer acoustics questions. (2016 to 2019)

Oakfield Wind Monitoring Review – Provided review of operational compliance monitoring of the Oakfield Wind power project for the Town of Oakfield, Maine. Reviewed monitoring data and reports to assess consistence between agreements and regulations and how the monitoring was carried out. Assessed compliance of the project with Maine DEP regulations and permit conditions. (2016 to 2019)

Tuscola III Wind Prepared a noise modeling study for a proposed wind power project in Michigan. Performed sound propagation modeling to

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assess compliance of the project with three different sound level ordinances, one for each township the project was located in. Summarized modeling results in a report that was submitted as part of the permit application. (2016)

Kidder Hill Wind Prepared a noise impact assessment for a proposed wind power project in northern Vermont. Conducted long-term background sound level monitoring to characterize the existing sound environment and performed sound propagation modeling of proposed turbine arrays. Summarized findings in a noise study. (2015)

DeKalb Wind Performed preconstruction background sound level monitoring for a proposed wind power project in northern Illinois. Analyzed information submitted during county-level development of a sound level ordinance. (2018)

Crocker Wind Performed week-long background sound level monitoring for a proposed wind power project in South Dakota. Also assisted in answering South Dakota Public Utility Commission (SDPUC) questions about the noise study that was prepared for project permitting. (2016 and 2017)

Texas Turbine Sound Emissions Test Performed an IEC 61400-11 sound emissions test of a turbine at a wind farm in Texas. The purpose of the test was to check the consistency of turbine sound emission with manufacturer guarantees and characterize an abnormality in the sound produce by the turbine. Prepared a report summarizing findings. (2019)

Hoosac Wind Compliance Monitoring Performed operational compliance monitoring over a period of several weeks for the Hoosac Wind power project, located in western Massachusetts. Monitoring was performed consistent with Massachusetts Department of Environmental Protection (Mass DEP) requirements. Prepared a report summarizing monitoring results.

Republic Wind Prepared a noise assessment for a wind power project in Ohio. Preformed background sound level monitoring that was used to derive the Ohio Power Siting Board (OPSB) precedent sound level limit. Performed operational sound propagation modeling of a variety of turbine arrays and turbine models. Summarized monitoring and modeling in a report that was submitted for OPSB permitting. Provided written and live testimony during the hearing phase. (2016 to 2020)

Golden West Wind Conducted sound propagation modeling for a proposed 250 MW wind power project in Colorado. Studied compliance of the project with the area's property line noise standard, as well as impact on the surrounding structures. (2011)

Saddleback Ridge Wind Conducted sound propagation modeling for a proposed wind power project in Maine. Assessed compliance of the project with the Maine DEP noise standard. Aided in preparing a report comparing modeled impacts of construction and operation of the project to existing sound levels of the area. Performed post-construction monitoring to assess compliance with the Maine DEP noise standards. (2015)

Black Fork Wind Conducted sound propagation modeling for a proposed wind power project in Ohio. Helped to develop a turbine arrangement that complies with the Ohio Power Siting Board's (OPSB) precedent sound level limit. (2011)

Massachusetts Wind Power Project Prepared noise impact assessment for a proposed wind power project in Massachusetts. Performed analysis on monitored sound pressure level and wind speed data. Used measured data to compare modeled noise impacts with existing background sound levels and wind speed. Demonstrated in the report the probability of the proposed project exceeding Massachusetts' noise limit and precedents. Worked with developer to determine the financial impact of possible sound mitigation strategies. (2011)

Orion Misenheimer Solar Performed sound propagation modeling of a proposed solar power project in North Carolina. Provided in-person testimony for the local permitting hearing of the project. (2018 and 2019)

Stafford Hill Solar Performed sound propagation modeling of a proposed solar power project located in Rutland, Vermont. Modeled multiple solar array sources including: transformers, heat exchangers, and air-conditioning units. Summarized results in a memo that was submitted as part of Vermont's Section 248 permitting process. (2014)

Otter Valley Solar Performed a noise assessment of the Otter Valley Solar power project, located near Pittsford, VT. Performed sound propagation modeling of equipment associated with the proposed solar array and summarized results in a memo that was submitted to the Vermont Public Service Board. During permitting, provided pre-filed testimony in support of the project. (2016)

Grand Isle Solar Performed sound propagation modeling for a proposed five-megawatt solar farm, located in Grand Isle, Vermont. Services included modeling of project string inverters and transformer, and summarization of results in a memo for Vermont Public Service Board submission. (2015)

PUBLICATIONS

Old, I. "Human Health Hazard – The Shirley Wind Story." 8th International Conference on Wind Turbine Noise. Lisbon, Portugal: 12-14 June 2019.

Old, I. and Kaliski, K. "Wind Turbine Noise Dose Response – Comparison of Recent Papers." 7th International Conference on Wind Turbine Noise. Rotterdam, Netherlands: 2-5 May 2017.

Old, I. and Duncan, E., High Transmission Loss Glass Wall Design. Noisecon 2013. Denver, Colorado: 26-28 August 2013.

Kaliski, K., Old, I. and Blomberg, L., Sound Emissions from a Plug-in Electric Vehicle. Internoise 2012. New York, New York: 19-22 August 2012.

Old, I. Sound Transmission Loss Measurement: A Scale Model Approach. Rensselaer Polytechnic Institute, 2010.

PRESENTATIONS

Old, I., Eros, E., and Duncan, E., Wind Turbine Noise Ordinances: A Review of Selected State and Local Regulations, 161st Meeting of the Acoustical Society of America, May 2011.

LICENSES, CERTIFICATIONS, MEMBERSHIPS, AND AFFILIATIONS

- Associate, Acoustical Society of America
- Member, Institute of Noise Control Engineering
- FHWA Transportation Noise Model 2.5 Certified

Summary: Testimony of Isaac Old on behalf of Union Ridge Solar, LLC electronically filed by Teresa Orahood on behalf of Dylan F. Borchers