STATE OF VERMONT
PUBLIC UTILITY COMMISSION

Petition of Norwich Upper Loveland Solar LLC) For a certificate of public good pursuant to 30) V.S.A. §§ 248 and 8010, authorizing installation)	21-3587-NMP
and operation of a 500 kW (AC) photovoltaic) group net-metering system in Norwich Vermont)	

REBUTTAL TESTIMONY OF JENNIFER GOULET ON BEHALF OF STEVE GORMAN; JAY & HEATHER BENSON; JENNIFER & DANIEL GOULET; PROFESSOR JOY KENSETH; SAMIN KIM & JAYOUNG JOO; LARRY UFFORD

March 16, 2023

Ms. Goulet's rebuttal testimony responds to the rebuttal testimony of Martha Statskus and Dori Barton.

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1. Introduction

Q1. Please state your name, occupation, and business address.

A1. My name is Jennifer Goulet. I am a self-employed small business owner. My business address and residence is 185 Upper Loveland Road in Norwich, Vermont. I have previously submitted testimony and exhibits on behalf of the Norwich Neighbor Intervenors.

Q2. What is the purpose of your rebuttal testimony?

A2. My rebuttal testimony responds to the rebuttal testimony submitted by Martha Staskus and Dori Barton.

2. Rebuttal

a. Rebuttal of Martha Staskus's rebuttal testimony on Greenhouse Gas Emissions

Q3. On page nine, section D of her rebuttal testimony Ms. Statskus states:

> When compared with the 15,950 MT CO2e avoided emissions over the 25-year period of the Project as stated in my prefiled testimony and referenced in Ms. Goulet's report, Ms.Goulet herself demonstrates that the Project avoids more than 15 times the lifecycle missions its equipment creates (15,950 / 997 = 15.997994 times more avoided emissions).

How do you respond?

A3. Ms. Staskus has cherry-picked a number from the middle of an analysis. The analysis tallied the greenhouse gasses emitted during all stages of the Upper Loveland solar array's lifecycle, including forest carbon storage, site preparation, manufacture, installation and operation (p.23 - 24, Exhibit NN-JG-2). Ms. Staskus's rebuttal testimony omitted the majority of the carbon costs, those associated with forest carbon storage and site preparation. The total carbon footprint of the Upper Loveland solar array is estimated to be one quarter of its avoided emissions, 4,200 metric tons of carbon dioxide equivalents. If Vermont is to meet our carbon goals, we must acknowledge all carbon costs associated with renewable energy, including carbon stored in forests and site preparation, so that we can maximize avoided emissions.

b. Rebuttal of Martha Staskus's Rebuttal Testimony on Erosion Control

Q4. Ms. Staskus testified that the estimated impermeable surface of the proposed Upper Loveland solar array is 0.10 acres in size (page 9, line 5). What does this mean in terms of run off?

A4. Although Vermont may not consider solar panels to be impermeable surfaces, they do not absorb or ameliorate precipitation. Because the panels are nonporous, immobile and tilted they concentrate rainfall along their lower edges, much like a roof. The actual nonporous surface area of this installation, calculated based on the revised site plan (Exhibit NUL-MS-2) is approximately an acre. In comparison, 0.10 acres of impermeable surface sounds quite small. A simple volume calculation (LxWxH) converted to gallons, shows that one inch of rain falling on 0.10 acres of impermeable surface creates 2,715 gallons of runoff.[1] To visualize this amount, an equivalent volume of water would fill about 68 standard, 40 gallon bathtubs.

On average, Norwich receives 41.93 inches of precipitation annually.[2] Thus, 113,840 gallons of water will run off 0.10 acres of impermeable surface annually. To visualize this amount, an equivalent volume of water fills twelve, above-ground, backyard swimming pools (20 ft. diameter ,4 ft. height, 9,200 gal.). Keep in mind that this estimate does not include runoff from the panels themselves.

c. <u>Rebuttal of Dori Barton's Rebuttal Testimony on Habitat Blocks</u>

Q5. What do Biofinder's Habitat Block, Interior Forest Block and the Connectivity Block data represent and how accurate are they?

A5. The Interior Forest Blocks were developed from Sorenson and Osborne's Habitat Block Data, which were derived from 30m resolution land cover data published in

[1] https://water.usgs.gov/edu/activity-howmuchrain.html
[2] http://www.usa.com/rank/windsor-county-vt--average-precipitation--city-rank.htm?yr=9000&dis=&wist=&plow=&phigh=

2006 by NOAA's Coastal Change Analysis Program (CCAP)).[3] Each pixel represents a type of land cover on the Earth's surface, such as conifer forest or scrub/shrub.

The metadata notes the following constraint for using this data:

> Data set is not for use in litigation. While efforts have been made to ensure that these data are accurate and reliable, NOAA, cannot assume liability for any damages, or misrepresentations, caused by any inaccuracies in the data. NOAA makes no warranty, expressed or implied, nor does the fact of distribution constitute such a warranty.[4]

Despite NOAA's disclaimer, these data were developed for regulatory purposes of Act 174, which can lead to litigation. The Interior Forest Blocks are simply a selective display of the least fragmented Habitat Blocks.[5]

The Connectivity Blocks are also ***land cover data*** that were used to model wildlife movement. Wildlife movement data were not used to construct the model.[6] Instead, the modeling was based on assumptions that reflect our human values and perceptions of what landscape connectivity looks like. One assumption is only corridors that allow wildlife to move between contiguous landscape features, i.e. mountain ranges, are important.[7] Yet, many species, such as white-tailed deer, move easily through different land cover types, including forest, shrubland and fields. The movement paths of these species are ignored. Another assumption is that connectivity is only important at the

[3]https://anr.vermont.gov/sites/anr/files/maps/biofinder/BioFinder%203_%20Development%20Report%202019_FINAL.pdf p.17.
[4] https://www.fisheries.noaa.gov/inport/item/48333
[5] Sorenson, E., R. Zaino, J. Hilke and E. Thompson. 2015. Vermont Conservation Design: Maintaining and Enhancing an Ecologically Functional Landscape. Part I: Landscape Features Technical Report. Vermont Fish and Wildlife Department, Montpelier, Vermont. p. 4.
[6] https://anr.vermont.gov/sites/anr/files/maps/biofinder/BioFinder%203_%20Development%20Report%202019_FINAL.pdf, p. 22.
[7]https://anr.vermont.gov/sites/anr/files/maps/biofinder/BioFinder%203_%20Development%20Report%202019_FINAL.pdf, p. 24.

regional scale.[8] Local corridors that do not connect to the regional corridor shown in the model output are considered unimportant. The model also favors higher elevations over larger semi-developed river valleys. These assumptions create a biased model output that was used to rank the ecological importance of the Connectivity Blocks. The Surface Waters and Riparian Areas and the Riparian Connectivity components are thought to represent terrestrial wildlife movement at a local scale. However, many small headwater streams, such as the headwater stream in the proposed project area, are not included in this component[9]. For more on stream maps, see Q. 9, p. 9.

Ms. Barton mentions that the project area is located in a Habitat Block that received a moderately low ranking. This rank does not mean that this area is less important to wildlife. The low ranking means that the area does not conform to the model's assumptions about ecological importance. The area is located in a river valley, not on a mountain at high elevation. The block does not connect via contiguous habitat to the regional, statewide corridor shown by the model. Its small headwater stream is not mapped. Different assumptions or modeling techniques would create a totally different pattern of ecologically important corridors. So, how do we determine if the model output and rankings based on it are valid? Models are typically assessed using statistical analysis or ground-truthing. Yet, no statistics are presented nor was

[8]https://anr.vermont.gov/sites/anr/files/maps/biofinder/BioFinder%203_%20Development%20Report%202019_FINAL.pdf, p. 24.
[9] https://anr.vermont.gov/sites/anr/files/maps/biofinder/BioFinder%203_%20Development%20Report%202019_FINAL.pdf, p. 29.

field data were collected to ground-truth the Interior Forest,[10] Connectivity[11], or Habitat Block[12] modeling or rankings. In fact, users are warned that areas, such as the Upper Loveland Road project area:

> …that are not identified on any of the maps for landscape features may contain important forest blocks, habitats, natural communities, or other features. Although they are not identified as Highest Priority Landscapes, they too can be managed or conserved to contribute to an ecologically functional landscape.[13]

A final concern is that the geographic data used to make the Habitat, Interior Forest and Connectivity Blocks lack accuracy assessments. The accuracy of GIS datasets are assessed by comparing a newly produced dataset to ground-truthed data, or to another GIS dataset that is known to be accurate. Yet, neither the metadata nor the summary reports mention an accuracy assessment for these datasets. We do know that data quality diminishes as the user zooms in on a small area, such as the Upper Loveland Road project area. In fact, Biofinder warns the user

> Because of these accuracy issues at the local scale, BioFinder cannot replace site visits or site-specific data and analyses and should only be used to gain a general understanding of components ***likely*** to be at play.[14]

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[10] Sorenson, E., R. Zaino, J. Hilke and E. Thompson. 2015. Vermont Conservation Design: Maintaining and Enhancing an Ecologically Functional Landscape. Part I: Landscape Features Technical Report. Vermont Fish and Wildlife Department, Montpelier, Vermont.

[11] Sorenson, E. and R. Zaino. 2018. Vermont Conservation Design: Maintaining and Enhancing an Ecologically Functional Landscape Summary Report for Landscapes, Natural Communities, Habitats, and Species. Vermont Fish and Wildlife Department, Montpelier, Vermont.

[12] Sorenson, E and J. Osbourne. 2014. Vermont Habitat Blocks and Habitat Connectivity: An Analysis using Geographic Information Systems. Vermont Fish and Wildlife Department, Montpelier, Vermont.

[13] Sorenson, E. and R. Zaino. 2018. Vermont Conservation Design: Maintaining and Enhancing an Ecologically Functional Landscape Summary Report for Landscapes, Natural Communities, Habitats, and Species. Vermont Fish and Wildlife Department, Montpelier, Vermont. p.11.

[14] https://anr.vermont.gov/maps/biofinder/interpreting-results

In other words, site level data, such as that found in Exhibit NN-JG-2, provide a much more accurate assessment of the types of wildlife that use the project area and the value of that habitat to wildlife, regardless of whether it connects to a model output that humans have decided is ecologically important.

Q6. Will there be an adverse impact on wildlife in and around the proposed project area as a result of this project?

A6. Yes, absolutely. The project will destroy many red oaks and American beech trees that provide mast for a diverse wildlife community. In her rebuttal testimony, Ms. Barton minimizes the diverse wildlife community that uses the area. She spent two days, in the middle of summer, in the project area compiling her report. With all due respect, that is not nearly enough time to assess the wildlife present and their movement patterns. Exhibit NN-JG-2 documents recent observations of adults and juveniles as well as photos of scat, tracks, territorial markings, browse and more. These data demonstrate that the area is ecologically important for necessary wildlife including a white-tailed deer wintering area, black bear habitat and terrestrial refugia for Jefferson salamander. Bobcat, otter, moose, turkey, coyote, fisher and many other animals either live in or move through the area. Molly Housman who lives adjacent to the project area at 229 Upper Loveland Road, reported seeing a bobcat in her backyard just the other day (March 13, 2023).

d. Rebuttal of Dori Barton's Rebuttal Testimony on Stream Channels

Q7. Why call attention to the headwater stream and the snowmelt channel in Exhibit NN-JG-2 if the U.S. Army Corps of Engineers (USACE) determined they are not jurisdictional?

A7. First, it is my responsibility to relay the concerns of the Norwich Neighbors to the Commission. My neighbors and I remained concerned about runoff after learning the outcome of the USACE determination during discovery. Second, it is perfectly acceptable to respectfully disagree with a determination made by a government agency and to present the scientific evidence supporting your concerns.

Q8. Does the headwater stream described in Exhibit NN-JG-2 fit the Agency of Natural Resources's (ANR) criteria for perennial streams that Ms. Barton described in her rebuttal testimony?

A8. Yes. The headwater stream has defined bed and bank features. It moves sediment and runs continuously except during drought. These features were observed during the site visit as we walked along the stream through thick shrubs on the way back to the cars.

Q9. Why is the headwater stream not recognized by the ANR and the U.S. Army Corps of Engineers (USACE)?

A9. Many government agencies hesitate to take jurisdiction over landscape features, such as this headwater stream, that have not been mapped in GIS, despite the fact

that GIS data are often inaccurate at the site level. This headwater stream has not been mapped Vermont Hydrography Data (VHD) or the National Hydrology Dataset (NHD). Small headwater streams that run through conifer forest or thick shrub cover are notoriously difficult to map from aerial images. It was likely not spotted when the VHD were digitized from orthophotos, contours and multi-spectral photos. In fact, Biofinder warns the user:

> The Vermont Hydrographic Dataset 1:5,000 does not include many small headwater streams which are critically important habitat for some species and the primary source of cool water to lower stream segments.[15]

Similarly, at the Federal level, the stream's length is too short to have been included in the National Hydrology Dataset (NHD), which only represents streams longer than one mile.[16]

Q10. Why should the Commission care about this stream or the ephemeral/snowmelt channel if the ANR and the USACE have decided that they are not jurisdictional?

A10. Both channels perform important functions in the local landscape. Ecologically, headwater streams store, transform and transport organic material and nutrients, improving the water quality downstream waters and providing food for downstream inhabitants. Sediments and woody debris are also transported by headwater streams. These cool, shady streams also buffer the temperature of downstream waters. Aquatic

[15] https://anr.vermont.gov/sites/anr/files/maps/biofinder/BioFinder%203_%20Development%20Report%202019_FINAL.pdf, p. 29.
[16] http://cmap2.vims.edu/SAM/metadata/Hydrology.htm

insects and amphibians are dependent on headwater streams for habitat and for food. Cutting the surrounding forest will impair stream function.

> Without native vegetation, the health of headwater streams is compromised. Not only do the stream and its fish and wildlife lose important food sources, but the stream suffers more frequent and damaging floods, erosion, and poor water quality.[17]

If the snowmelt channel is buried under layers of mulch, chips, and soil how will downstream waters, such as Larry Uffer's pond be affected? Will deposition, turbidity, and temperature increase? How will the aquatic food chain be affected? Both channels also provide a path for excess water to drain from the small watershed in which the project area is located. Norwich is located in an area of water surplus. Usually, average annual precipitation exceeds evapotranspiration. Soils and forest vegetation store much of the excess water during the growing season. But, when the ground is frozen, precipitation and snowmelt can not be stored. The proposed project area is a north-sloping basin in which snowmelt waters drain from the steep sides via the ephemeral channel. Once construction is completed how will excess water drain? Will a new channel reestablish underneath the solar array? Will the current channel continue to function underneath thick layers of mulch and chips, causing soils to become waterlogged and unstable? Will the lack of drainage combined with large storm events cause Upper Loveland Road to wash out again?

[17] https://www.riverkeepers.org/wp-content/uploads/2016/06/healthy_headwaters_fact_sheet.pdf

3. Conclusion

Q11. Does this conclude your testimony?

A11. Yes.