STATE OF VERMONT
PUBLIC UTILITY COMMISSION

Petition of Northland Solar LLC for a Certificate of Public Good, pursuant to 30 V.S.A. § 248, authorizing the installation and operation of a 4.999 MW solar electric generation facility off Route 100 in Lowell, Vermont to be known as the "Northland Solar Project"	Case No. 25-2346

PREFILED TESTIMONY OF JEFFREY KOCH

On behalf of the Town of Lowell and The Lowell Graded School

March 25, 2026

Exhibits:

TL-JK-1 Grassland-Bird-Habitat-Conservation-Guidance-2021
TL-JK-2 Impact of Photovoltaics
TL-JK-3 Potential for Leaching
TL-JK-4 Indium
TL-JK-5 Antimony
TL-JK-6 Vermont Audubon Bobolink Project

Summary of Testimony:

Jeffrey Koch presents testimony about Grassland Birds and Soil and Water Quality addressing the criteria of 30 V.S.A. § 248(b)(5).

Prefiled Testimony of Jeffrey Koch

Q.1. Please state your name, address, and occupation.

A.1. Jeffrey Koch, 923 Buck Hill Road, Lowell, Vermont. Biology Instructor.

Q.2. Please describe your educational background and professional experience.

A.2. B.S. Secondary Education Penn State University, University Park, PA

M.S. Biology East Stroudsburg University, East Stroudsburg, PA

Adjunct Professor Community College of Vermont - Biology Instructor

Q.3. Have you testified before the Public Utility Commission?

Q.3. No.

Q.4. What is the purpose of your testimony?

Q.4. To address the impacts of the proposed solar project to populations of grassland birds, specifically the bobolinks, and how the proposed solar project may impact the soil, water quality, and health of the ecosystem.

Q.5. Please tell us about bobolinks and what is happening with their populations in Vermont.

A.5. As described by Vermont Audubon *Exhibit TL-JK-6*

- Bobolinks are known for their “R2-D2”-like song and their dramatic black and white plumage. Bobolinks have been in decline since the 1900's. Their decline has primarily

been due to changes in farming practices; fields are now mowed earlier and more often than they were in the past.

- Because Bobolinks nest on the ground, they are particularly vulnerable to haying practices. They return to Vermont from their wintering grounds in Central America and begin breeding in mid-late May. The young hatch in mid-June, which is usually the same time that farmers are cutting fields for the first time, therefore resulting in nest failures.
- Conserving Bobolink habitat will help other declining grassland bird species such as Eastern Meadowlark and Grasshopper Sparrow.

"Vermont's landscape is currently 75% forested. Grassland habitat is limited to 4% of Vermont's land area, one-quarter of the grassland habitat that existed 70 years ago (USDA 1946). Although natural forces such as fire and flooding can create and maintain grassland habitat, most of the habitat that exists today is the result of agricultural practices." *Exhibit TL-JK-1, p. 3*

Q.6. Why does this matter to Lowell?

A.6. Much of Lowell is forested and the open spaces such as this field are more limited. *Exhibit TL-JB-6.*

"Vermont's Grassland Bird Management and Recovery Plan (LaBarr et al. 2014) identifies habitat loss as the most significant factor responsible for grassland bird population declines in their breeding range": "Grassland birds migrate each spring from their wintering grounds in the southern U.S. and Central and South America to their breeding grounds in Vermont. These breeding grounds are almost exclusively agricultural fields or other human-altered grassland habitats. However, each year there are fewer of these habitats available to them.

Grasslands to which they once returned have become overgrown with woody vegetation, converted to row crops such as corn and legumes or developed into housing." *Exhibit TL-JK-1, pp. 3,4*

"Recently, an increasing number of large-scale solar energy projects have been proposed for development on Vermont's agricultural lands, including land with grassland bird nesting habitat characteristics. This trend may accelerate the loss of this necessary wildlife habitat, making it imperative that grassland habitat loss be appropriately considered in Act 250 and Section 248 proceedings. Review and consideration of impacts to grassland bird nesting habitat in the context of Vermont's land use regulations complements existing nonregulatory conservation initiatives such as the federal Farm Bill Grassland Reserve Program." *Exhibit TL-JK-1, p. 4*

Q.7. Do you have responses to the information about grasslands birds that was submitted by Petitioner?

A.7. This is an agricultural field and has been since 1902 and most likely even longer. There were multiple birds identified by Arrowwood Environmental in their Appendix 1 Grassland Bird Survey Memo *Exhibit NS-MLS-2 Appendix 1.* It states that two visits were made on May 31, 2024 and June 19, 2024.

I am using this evidence as I am not able to gather my own evidence as this case will be over before I could verify these results to be true and really showing all data that could be gathered.

Mr. Michael Lew-Smith, who holds a Masters in Plant Biology from the University of Minnesota, is one of the founders of the Vermont Vernal Pool Mapping Project, which mapped and assessed vernal pools across the state. In 2024, Mr. Lew-Smith only visited the site on two occasions for 2 hours on one occasion and less than two hours on another occasion. I find it very important to note that in this very limited time he noticed grassland birds of importance both times. This very well means the birds in question are not visiting and are not passing through but that this is their home and it is used for reproductive purposes.

I should also note that Mr. Lew-Smith found both male and females of the Bobolinks species. On May 31, 2024 he found 2 male Bobolinks and 1 Female. He found in estimation at least 6 Savannah Sparrows. Then on his very short visit June 19th, 2024 the same number of male and female Boblinks, only 1 savannah sparrow and 1 American Kestrel. I would dare say it would be easier to say the Savannah Sparrows were passing through but the Bobolinks had the same number each time.

"Bobolink as an Indicator Species for Grassland Bird Habitat Bobolink are one of the more common grassland bird species in Vermont, and their habitat preferences overlap to a large extent with most other grassland bird species that breed in the state, making them well suited to serve as an indicator of the habitat needs for this suite of species. The Vermont Fish and Wildlife Department (VFWD) therefore recognizes grassland bird habitat largely, but not exclusively, in the presence of Bobolink. Bobolinks are a high priority Species of Greatest Conservation Need in Vermont's 2015-2025 Wildlife Action Plan, due to their dependence on grassland, accelerated loss of this habitat, and continental population declines." *Exhibit TL-JK-1, p. 5*

Q.8. How can we attract more bobolinks to an area?

A.8. According to the Vermont Audubon, Bobolink Project to attract bobolinks:

- Manage the field to contain 50-75% grasses, with the remainder forbs such as goldenrod, asters and milkweed. This habitat structure is most attractive to grassland birds such as Bobolinks and meadowlarks. If the field is becoming infested with woody species and/or invasives such as wild parsnip or spotted knapweed, consider following Option B for a year or two so as to keep these species at bay and improve conditions for grassland birds.
- Remove hay after cutting to provide the best conditions for re-growth of grass. Birds will settle in greener fields in the spring.
- Maintain old fence posts to provide perches for singing male grassland birds and erect and maintain nest boxes to provide possible nesting habitat for cavity nesting species such as Eastern Bluebirds and Tree Swallows. Boxes should be cleaned every spring.
- If possible, maintain an uncut buffer of shrubby vegetation as the field transitions to the forested portions of the property. Transitioning from field to forest with a "soft" buffer of early successional shrub species can be a productive area for many bird species.

  Exhibit TL-JK-6

Q.9. If this land is developed we will lose the bobolinks and other grassland bird species.

A.9. I believe it is in the best interest of the Agency of Natural Resources and the Public Utility Commission to find this property to be of significance for the grassland birds and for it to remain undeveloped, denying the petition.

Q.10. What is a grassland bird habitat?

A.10. “The definition of Grassland Bird Habitat Grassland bird habitat supports successful reproduction, nesting, rearing of young, foraging, shelter, and cover (protection) for these birds. Research demonstrates that many grassland birds exhibit fidelity to an individual field, returning to the same field to breed year after year (Fajardo et al. 2009, Bollinger and Gavin 1989). In fact, this same research indicates that individuals exhibiting strong site fidelity tend to be more productive and successful breeders. Grassland bird habitat meets the definition of necessary wildlife habitat in that it is a landscape condition that is concentrated and easily identifiable, meaning it can be mapped as a discrete geographic area, and is essential for the reproductive success and survival of a suite of birds. The Agency defines grassland bird habitat for the purposes of this document as a field that:

- consists of greater than 20 acres,
- is sufficiently open to attract and retain nesting grassland birds (see Appendix C)
- is vegetated primarily with grasses (where forbs may also be present), • contains little to no woody vegetation, and
- has any of the following species present during their breeding season (approximately May 1 through July 31: Bobolink, Savannah Sparrow, Eastern Meadowlark, Grasshopper Sparrow, Upland Sandpiper, or Vesper Sparrow.

Exhibit TL-JK-1, p.5

Mr. Michael Lew-Smith found 3 Bobolinks possibly a mating pair, a Species of Greatest Conservation Need, 6 savannah sparrows, 1 American Kestrel also a Species of Greatest

Conservation Need on this property. *Exhibit NS-MLS-2 Appendix, 1, Grassland Bird Survey Memo*

Q.11. What is your opinion about mitigation?

A.11. I do not believe mitigation is the right process as it is payment to a boblink's fund to be used to protect grassland bird habitat somewhere else. That does not help *this* population of nesting bobolinks, nor does it benefit the Town of Lowell, the project neighbors, or the Orleans County region. This petition should be denied or more studies should be allowed to be done this spring and the hearing postponed until after lengthier more substantial findings can be put together.

Q.12. What is the significance of finding bobolinks on the proposed solar site?

A.12. This quote explains it. "Bobolinks return to Vermont each year following their 6000-mile journey from grasslands, both natural and agricultural, in South America. They nest throughout Vermont where suitable grassland habitat exists. Males arrive first in early- to mid-May to establish territories, followed by the females about a week later. Nonforested and non-developed landscapes are most desirable (Shustack et. al. 2010). Site selection criteria include topographic openness, distance from edge (forest edges, hedgerow vegetation, man-made structures such as buildings, fences, roads, and other infrastructure), and vegetative structure of the grassland (Fletcher and Koford 2003, Keyel et al. 2012, Keyel et al. 2013). Bobolinks prefer to nest in grasslands with vegetation that reaches a medium to tall height (e.g., uncut hay and alfalfa) and

few to no tall trees or other vertical structure within roughly 164 feet (50 meters) depending on topography." *Exhibit TL-JK-1, pp. 5,6*

It is important to note that Bobolinks return to Vermont and establish their nests for mating purposes in mid May. It is highly likely the Bobolinks in question were a mated pair.

Q.13. Would the proposed solar project have direct impacts on grassland habitat?

A.13. "Direct Impact: Direct impact is measured as the area of grassland habitat occupied by the project, or project components, which converts grassland to another use (e.g., structure, roads, lawns, tall visual landscaping). Solar panels and perimeter fencing that occupy air space above grassland fields are considered to constitute direct impact as well as tall plantings used for visual screening if planted in otherwise open habitat. Grassland birds are highly sensitive to vertical structure in their breeding habitat and will not utilize fields where obstructions, such as trees or solar panels, exist over the grasses." *Exhibit TL-JK-1, p.7*

This project has direct impact with solar panel structures, fences and tree plantings necessary to combat visual impacts.

Q.14. What is the process the Vermont Fish and Wildlife Department uses to evaluate solar project impacts on grassland habitat and how to mitigate those impacts?

A.14. "The stepwise mitigation process utilized by the Vermont Fish and Wildlife Department (VFWD) for other resources is appropriate for managing impacts to grassland habitat.

Steps 1 and 2 must be demonstrated before moving to step 3.

- 1. Avoid all direct and indirect impacts to grassland bird habitat, if possible, through site selection and design of the project. Is an alternate site, either within or outside of the host parcel, available and suitable for the project? If an alternate site is available, then neither direct nor indirect impacts should be allowed. If a suitable alternate site is not available, proceed to Step Two.
- 2. Minimize unavoidable project impacts to grassland bird habitat by adjusting the scope, scale, and design of the project. Will the project result in direct or indirect impacts to grassland bird habitat which has high value, is unique, or is irreplaceable on a regional basis? If yes, the habitat should be designated RC2 and neither direct nor indirect impacts should be allowed. If not, the habitat should be designated RC3 and the project will be further evaluated under Step Three.
- 3. Compensate for unavoidable impacts (Mitigation). Is the project developer willing to provide for mitigation to offset the project's impacts to grassland bird habitat? If yes, then apply the below mitigation requirements to establish the appropriate type and amount of mitigation. If no, then impacts, whether direct or indirect, should not be permitted and the Department's recommendation will reflect that position." *Exhibit TL-JK-1, p.8*

Q.15. What should be the result of the evaluation of grassland habitat mitigation of the proposed solar project ?

A.15. This habitat should be deemed an RC2 grassland bird habitat and not a photovoltaic solar panel field.

Q.16. Are there other issues related to the solar proposed project you would like to address?

A.16. Yes. The location of the proposed site may impact the soil, water quality, and health of the ecosystem along with drinking water supplies and more specifically the Lowell Graded School well source protection area.

According to a study in Poland; "Impact of photovoltaics on soil and water by metal(loid) including technology critical elements," by Yandem G, Grygoyć K, Jabłońska-Czapla M. photovoltaic farms also pose environmental risks. *Exhibit TL-JK-3*

The study goes on to say, "During their operational lifetime, PV panels can be damaged, potentially releasing hazardous materials into the environment. Additionally, stormwater runoff from solar installations may carry pollutants into soil and water sources. Mitigating these risks is crucial to ensuring that solar energy remains both sustainable and environmentally responsible." (Environ Geochem Health *Exhibit TL-JK-3*)

Q.17. What are the potential contamination risks to the agricultural soils and to local drinking water?

A.17. The study also aims to evaluate PV panels' environmental impact, especially on the soil in one of the oldest PV installations in Poland, comparing it with other sources of pollution in the region, such as mining. The researchers took the soil and water samples, underwent chemical analysis, statistical analysis, pollution indices assessment, and geospatial analysis to determine potential pollution sources for the observed elemental chemical matrix. Also, the chemical composition of PV material was analyzed.

The results of their study indicate that In and Sb are emerging pollutants at moderate levels, potentially originating from long-term use of PV installations. (Environ Geochem Health *Exhibit TL-JK-3*)

"Indium (In) is a soft, silvery-white, post-transition metal. It is a ductile, malleable metal. It is commonly used in indium tin oxide (ITO) for touchscreens and in various alloys. Antimony (Sb) is a lustrous, silvery-white metalloid. Known since ancient times, this brittle element is essential in flame retardants, lead-acid batteries, alloys, and plastics". (Royal Society of Chemistry).

In regards to indium, the Centers for Disease Control and Prevention (CDC) states the following: "Symptoms [of indium exposure] include irritation of eyes, skin, respiratory system; possible liver, kidney, heart, blood effects; pulmonary edema." *Exhibit TL-JK-5*. And in regards to antimony, the U.S. Department of Health and Human Services (HHS) reports: "The Department of Health and Human Services (HHS) has determined that antimony trioxide is a reasonably anticipated human carcinogen… breathing antimony dust can cause heart and lung problems, stomach pain, diarrhea, vomiting, and stomach ulcers." *Exhibit TL-JK-6*

In another environmental research study conducted by Robinson and Meindl (2019) on soil samples collected from beneath photovoltaic modules has confirmed elevated levels of Se, Sr, Li, Ni, and Ba; (Se (Selenium), Sr (Strontium), Li (Lithium), Ni (Nickel) and Ba (Barium), respectively), in areas near PV systems. *Exhibit TL-JK-4* Photovoltaic panels can contribute to soil contamination due to heavy metals like Cd, Pb, Ni, and As (Cadmium (Cd), Lead (Pb), Nickel (Ni), and Arsenic (As), respectively), present in them (Falfushynska, 2024). Rainfall can

expose these panels to become a source of heavy metal soil contamination (Yoon et al., 2021). *Exhibit TL-JK-3*

Suffice it to say, according to their research solar PV infrastructure does have impact on soil physical and chemical properties and suggests that lesser-studied metals such as germanium, gallium, tellurium and indium may also be released into the environment around "active" photovoltaic panels, including those used by private consumers and on farms. (Environ Geochem Health)

Contamination to the soil and potential significant impacts on water quality raises a red flag for the Lowell Graded School Well System ID 6650 source protection area. I have conducted research for my master's degree in biology on the mercury levels in aquatic invertebrates and fish species along the Susquehanna River in Pennsylvania and learned that harmful chemicals and toxins bioaccumulate or increase in percentage in organisms as you go up the food chain.

Q.18. What is your conclusion about the potential for degradation of soil and water quality if the solar array is constructed?

A.18. This location in Lowell, Vermont is a poor location for MHG to construct a photovoltaic field if the site construction and PV infrastructure have any possibility of degrading the soil and water quality in Lowell, especially to our youngest population of citizens at the Lowell Graded School where the chemicals discussed above could affect the students more quickly and have longer lasting impacts to their health. Harmful chemicals have the potential to bioaccumulate in people as well as our ecosystem.

Q.19. Does this conclude your testimony?

A.19. Yes.

AFFIDAVIT OF Jeffrey Koch

1. I have provided pre-filed testimony and exhibits in the above-captioned matter.
2. I have personal knowledge of the information provided in my pre-filed testimony.
3. I am able to testify as to the validity of the information contained in my pre-filed testimony and exhibits.
4. I declare that the foregoing statements are true and accurate to the best of my knowledge and belief. I understand that if the above statement is false, I may be subject to sanctions by the Commission pursuant to 30 V.S.A. § 30.

Dated at 923 Buck Hill Road Lowell, Vermont this 25th day of MARCH

Jeffrey Koch
Name