

BEFORE  
THE OHIO POWER SITING BOARD

In the Matter of the Application       )  
of Kingwood Solar I LLC, for a       )  
Certificate of Environmental       ) Case No. 21-0117-EL-BGN  
Compatibility and Public Need       )

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**DIRECT TESTIMONY OF RONALD HEINIGER ON BEHALF OF CITIZENS  
FOR GREENE ACRES, INC., JENIFER ADAMS, P. CHANCE BALDWIN,  
JACOB CHURCH, VERITY DIGEL, JED HANNA, KRAJICEK FAMILY  
TRUST, JAMES JOSEPH KRAJICEK, KAREN LANDON, NICOLE MARVIN,  
CHAD MOSSING, KAREN MOSSING, NICHOLAS PITSTICK, KYLE SHELTON,  
MARLIN VANGSNESS, JEAN WEYANDT, AND JERALD WEYANDT**

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**Q.1. Please state your name.**

A.1. Dr. Ronnie W. Heiniger

**Q.2. What is your educational background?**

A.2. I have a Ph.D. in agronomy with training in crop simulation models, water relationships  
in agricultural cropping systems, site-specific crop management and sustainable  
agricultural practices.

**Q.3. What is your occupation?**

A.3. I am currently a professor of cropping systems at North Carolina State University and  
extension specialist for corn and small grains.

**Q.4. Please provide an overview of your occupational experience.**

A.4. My work focuses on applied agricultural systems. I have published extensively on  
nitrogen and nutrient management in agriculture using site-specific technologies and  
techniques, water uptake and use in corn, influence of temperature on corn and systems  
for mitigating high temperatures in cropping systems, the factors that influence tiller and

kernel number in wheat. My recent work has been devoted to improving drainage systems and controlling water runoff and infiltration on agricultural soils.

**Q.5. Have you been a member of any professional organizations related to your occupation?**

A.5. I am a member of the American Society of Agriculture, the Soil Science Society of America, the Crop Science Society of America, and the Soil Science Society of North Carolina.

**Q.6. What professional honors have you received?**

A.6. I have received the following honors:

NC Small Grain Growers Outstanding Service Award, 2015

Distinguished Service Award, NC Corn Grower's Association, 2012

Outstanding Extension Service Award, NCCES, 2008

Academy of Outstanding Faculty Engaged in Extension, NCCES, 2008

Distinguished Service Award, NC Corn Grower's Association, 2002

Gerald O. Mott Meritorious Graduate Research Award, CSSA, 1994

**Q.7. On whose behalf are you offering testimony in this case?**

A.7. I am offering testimony on behalf of Intervenor Citizens of Greene Acres, Inc., Jenifer Adams, P. Chance Baldwin, Jacob Church, Verity Digel, Jed Hanna, Krajicek Family Trust, James Joseph Krajicek, Karen Landon, Nicole Marvin, Chad Mossing, Karen Mossing, Nicholas Pitstick, Kyle Shelton, Marlin Vangness, Jean Weyandt, and Jerald Weyandt (collectively, "CGA").

**Q.8. Are you testifying today in your capacity as an employee of North Carolina State University?**

1 A.8. No, I am testifying for CGA in my personal capacity.

2  
3 **Q.9. What is the purpose of your testimony?**

4 A.9. The purpose of my testimony is to inform the Ohio Power Siting Board about flaws in the  
5 assumptions concerning drainage and runoff in the application of Kingwood Solar I LLC  
6 for a certificate of environmental compatibility. As shown in other solar projects that  
7 have been installed on agricultural land in the southeastern US the failure to properly  
8 calculate the time of concentration for precipitation and runoff has resulted in excessive  
9 runoff of surface water resulting in soil erosion and offsite impacts ranging from denial of  
10 use of property due to ponded water to impacts on downstream structures. This project is  
11 based on similarly flawed assumptions that need to be addressed before the project is  
12 built.

13 **Q.10. What, if any, professional experience do you have with drainage issues?**

14 A.10. As mentioned much of my current research involves measuring drainage coefficients on  
15 agricultural soils under differing conditions of slope, ground cover, and rainfall intensity.  
16 I have over 25 years of experience with drainage models and how these factors are  
17 addressed in these models. I have helped write software programs that can be used to  
18 assess drainage concerns and terrace and waterway designs on agricultural fields.

19 **Q.11. What, if any, professional experience do you have with drainage issues at solar**  
20 **projects that informs your testimony in this case?**

21 A.11. As part of a recent project which examined how no-till farming practices and heavy  
22 residue covers impact time of concentration of water following rainfall events and the  
23 amount of runoff water leaving the field my project tested the impact of solar panels on

1 water distribution and drainage on farmland. My experience with this project forms the  
2 basis for my testimony here.

3 **Q.12. Have you testified as an expert witness in any cases about the effects of solar**  
4 **projects on drainage?**

5 A.12. Yes. I have testified in over 10 cases over the past four to five years.

6 **Q.13. What have you done in order to prepare your testimony?**

7 A.13. I have examined the application for a certificate of environmental compatibility  
8 submitted by Kingwood Solar LLC and have read through the testimonies of Noah  
9 Waterhouse and Lee Saunders concerning their opinions on drainage and runoff from the  
10 sites.

11 **Q.14. What documents did you consult in preparing for your testimony?**

12 A.14. I examined a topographic map of the site, viewed recent aerial images, and compared  
13 these documents to the maps and documentation in the Kingwood Solar application.

14 **Q.15. Based on your experience and your review of Kingwood Solar's Application, do you**  
15 **have any concerns about the potential effects that the Kingwood Solar Project may**  
16 **have on drainage in the area?**

17 A.15. Yes, my calculations of time of concentration and its impact on the volume of water that  
18 will drain from the various parcels under solar panels indicates that this project, on  
19 average, will reduce the time of concentration of water (time required for rainfall falling  
20 on the highest point in the parcel to accumulate and leave the site) by over 50% resulting  
21 in a 22% increase in the volume of water draining from these parcels. This increase will  
22 most certainly increase downstream erosion and the amount of water flowing through  
23 adjacent properties.

1 **Q.16. What are the bases of your opinion?**

2 A.16. To test the impact of solar panels on rainfall impacts on the soil and the common  
3 coefficients used to calculate time of concentration and runoff, my research used a  
4 rainfall simulator to apply water to a field with a grass cover crop with and without the  
5 presence of solar panels. While the witnesses for Kingwood solar expressed the opinion  
6 that the presence of the solar panels would either not impact drainage or perhaps even  
7 reduce drainage this research showed that this is NOT the case. Even though they do not  
8 cover the entire field surface, the panels act as “concentrators” of rainfall, channeling  
9 water into the areas between the panels. This rapid concentration of rainfall overwhelms  
10 the ability of the soil to absorb water resulting in streams of water flowing across the soil  
11 surface with significantly higher velocity compared to the “sheet” flow found on the  
12 same soil with no solar panels. This higher velocity decreases the time of concentration  
13 of the water falling on the field and increases runoff. Current drainage coefficients used  
14 by the Soil and Water Conservation Service for vegetation under solar panels are  
15 inaccurate and need to be revised before more solar installations are constructed. The  
16 recent failure of a solar facility in Virginia to contain runoff water from a large solar farm  
17 resulting in severe soil erosion on surrounding lands and legal action by neighbors is an  
18 example of the failure of the current solar drainage designs based on flawed coefficients.

19 **Q.17. Based on your experience and your review of Kingwood Solar’s Application, do you**  
20 **have an opinion on whether the Application contains enough information to protect**  
21 **the community from the potential adverse effects that the Kingwood Solar Project**  
22 **may have on drainage in the area?**

23 A.17. Yes, I have an opinion on this topic.

1 **Q.18. What is your opinion?**

2 A.18. My opinion is that this application is missing the most recent data on the impact of solar  
3 panels on the hydrology of these fields. The Soil and Water Conservation Service is  
4 currently reviewing the data on the improved coefficients that we have submitted to them.  
5 This review should be completed prior to the SWP3 design stage. Otherwise the  
6 resulting BMPs proposed to reduce stormwater discharges will be insufficient to mitigate  
7 water flow or volume resulting in offsite erosion and property damage.

8 **Q.19. What are the bases of your opinion?**

9 A.19. My opinion is based on the results of the experimental tests that my project has  
10 conducted and on the slopes that I measured on the field parcels at this site.

11 **Q.20. What additional information is necessary to protect the community from the  
12 potential adverse effects that the Kingwood Solar Project may have on drainage in  
13 the area?**

14 A.20. This project should be placed on hold until the current review of new data concerning  
15 drainage coefficients under solar panels by the Soil and Water Conservation Service is  
16 complete.

17 **Q.21. If Kingwood Solar implements the requirements of Ohio EPA's general permit for  
18 stormwater discharges, would that prevent the potential drainage problems you  
19 have identified?**

20 A.21. No, Those requirements are based on inaccurate drainage coefficients and will result in a  
21 similar failure as that which occurred on Virginia.

22 **Q.22. Do you hold all of the opinions expressed in this testimony to a reasonable degree of  
23 scientific certainty?**

1 A.22. Yes.

2  
3 **Q.23. Does this conclude your direct testimony?**

4 A.23. Yes.

5 **CERTIFICATE OF SERVICE**

6  
7 I hereby certify that, on February 28, 2022, a copy of the foregoing written direct  
8 testimony was served by electronic mail on the following: Jodi Bair at  
9 [Jodi.Bair@ohioattorneygeneral.gov](mailto:Jodi.Bair@ohioattorneygeneral.gov); Daniel A. Brown at [dbrown@brownlawdayton.com](mailto:dbrown@brownlawdayton.com); Kevin  
10 Dunn at [kdd@planklaw.com](mailto:kdd@planklaw.com); John Hart at [jehartlaw@gmail.com](mailto:jehartlaw@gmail.com); Werner Margard III at  
11 Nathaniel B. Morse at [nbmorse@vorys.com](mailto:nbmorse@vorys.com); [Werner.Margard@ohioattorneygeneral.gov](mailto:Werner.Margard@ohioattorneygeneral.gov);  
12 Michael Settineri at [mjsettineri@vorys.com](mailto:mjsettineri@vorys.com); Lee Slone at [lee.slone@dinsmore.com](mailto:lee.slone@dinsmore.com); Charles  
13 Swaney at [cswaney@woh.rr.com](mailto:cswaney@woh.rr.com); David Watkins at [dw@planklaw.com](mailto:dw@planklaw.com); Anna Sanyal at  
14 [aasanyal@vorys.com](mailto:aasanyal@vorys.com); Nathaniel Morse at [nmorse@vorys.com](mailto:nmorse@vorys.com); Thaddeus Boggs at  
15 [tboggs@fbtlaw.com](mailto:tboggs@fbtlaw.com); Chad A. Endsley at [cendsley@ofbf.org](mailto:cendsley@ofbf.org); Amy M. Milam at  
16 [amilam@ofbf.org](mailto:amilam@ofbf.org); and Leah F. [Curtis at lcurtis@ofbf.com](mailto:Curtis@lcurtis@ofbf.com).

17 /s/ Jack A. Van Kley  
18 Jack A. Van Kley  
19

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Summary: Testimony of Ronald Heiniger electronically filed by Mr. Jack A. Van Kley  
on behalf of Citizens for Greene Acres & Its Member Intervenors