

## Soil Testing Requirements

Comments to Spotsylvania Planning Commission, April 4, 2018

First I would like to thank the members of the Spotsylvania planning commission for taking time out of their lives to look after the best interests of our residents.

I'd like to discuss a significant concern with a type of soil that is present in this region, and the serious environmental consequences that can occur if sulfidic soils are disturbed by excavation or regrading of the soil, especially how this may be caused by building a MASSIVE solar power farm.

I have provided you with a copy of an article that describes two LOCAL case studies where VERY serious problems were encountered. One case study covers the construction of Stafford Airport in the late 1990s. Extensive regrading was performed to level the site for the long runway. Excavations up to 25 meters were performed to level off ridges. Sulfidic soils were exposed and spread across the site. Later tests of the soil found extremely low pHs ranging from 1.8 to 5.3 with an average of 3.0. SEVERE AND EXPENSIVE DAMAGE RESULTED. Vegetation would not grow on the soil. Galvanized steel pipes and concrete lined ditches were corroding from the acidic runoff. Years of treatments and reclamation was required.

The second case study in the article is a housing development in Fredericksburg. Similar problems were encountered in 2003 when a major land disturbance exposed a layer of sulfidic soil. SOIL WAS SO ACIDIC THAT Grass would not grow on the lawns of the new homes.

In response, Fredericksburg adopted a new ordinance to reduce exposure of sulfidic materials during construction. The "Acid Sulfate Soils Testing Policy specifies that soils must be tested for pH and potential acidity to the maximum depth of the excavation to ensure that acidity levels are appropriate to support vegetation and to minimize damage to water quality and building materials." We don't know if there is a similar policy in place in Spotsylvania County BUT THIS IS VITAL TO CONSIDER.

We understand that sPower is planning to conduct a "shovel test" across the site in the near future. We recommend that the County require sPower to test soil to the maximum depth of excavation at each location. If sPower is planning to significantly regrade portions of the site, then understanding the composition of the layers of soil that will be exposed is critical, TO AVOID DANGEROUS AND EXPENSIVE CONTAMINATION OF RUNOFF, GROUNDWATER AND SURFACE SOIL OF THOUSANDS OF ACRES OF LAND.

Dr. Katherine Lovello  
11210 Fawn Lake Parkway  
Spotsylvania, VA 22551  
540-412-5032

# Active Acid Sulfate Soils

## in the Upper Coastal Plain of Virginia:

### Two Reclamation Case Studies

In the eastern United States, the primary area of concern over acid rock drainage has been upon the Appalachian coal basin and associated pyritic overburden and coal waste materials (Sobek et al. 2000; Daniels and Stewart 2000). However, sulfidic deposits that give rise to active acid sulfate soils upon exposure to aerobic conditions are found in various geologic and geomorphic settings across the state of Virginia (Orndorff and Daniels 2004). In many of these settings, construction of highways, as well as commercial and residential sites, has resulted in localized acid rock drainage (ARD) problems. Increased development, along with wetland excavation and the ever-deeper nature of road cuts, has resulted in several new problem exposures, particularly of sulfide-bearing Tertiary sediments in the Upper Coastal Plain. Exposure of these sediments results in localized ARD that threatens water quality, in addition to the active acid sulfate soils that present problems for fill stability, integrity of building materials, and vegetation management.

Exposure of acid generating geologic materials during construction is a relatively new problem in Virginia. Although problematic roadcuts have been identified across the state for over 30 years, ARD

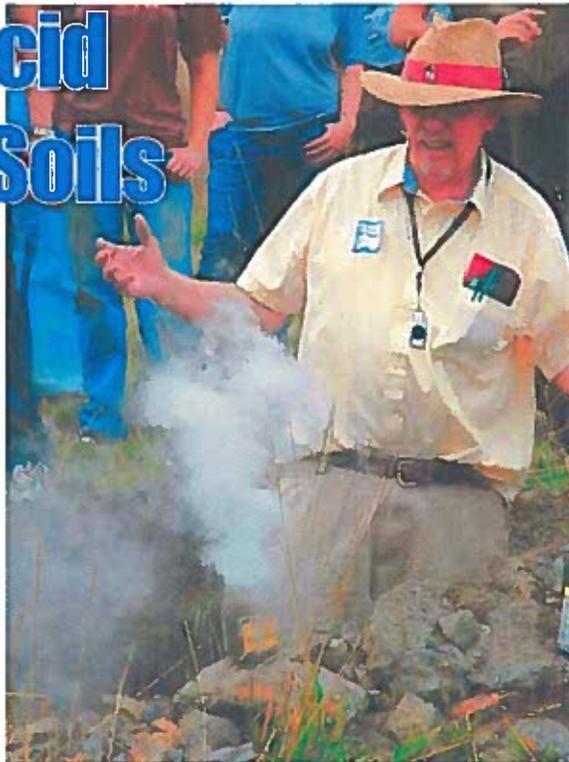


Figure 1. Dr. Delvin S. Fanning demonstrates the violent oxidation reaction of sulfidic Tertiary sediments (sulfidic materials by Soil Taxonomy) with 30% hydrogen peroxide for participants of an acid sulfate soils tour for the World Congress of Soil Science, July 8, 2006.

problems associated with disturbance of Tertiary marine sediments for commercial and residential construction have become recognized mainly in the past decade. Consequently, most people involved in land development in this region are unaware of the problems associated with sulfide oxidation until they are encountered firsthand. Few developers have experience with acid sulfate soils and thus reclamation efforts have fallen to soil scientists with experience with such soils at Virginia Tech and the University of Maryland.

When notified of a possible acid sulfate site, current standard protocol by Virginia Tech is to conduct a field investigation, procure soil and drainage samples, complete laboratory analyses, and develop a reclamation prescription based on sample characteristics and site specific conditions. The prescriptions are largely based on values for peroxide potential acidity (PPA) – a procedure used to predict liming requirements based on the total acidity produced after complete oxidation of a sample by hydrogen peroxide (Barnhisel and

Harrison 1976). Fertilization needs also are addressed, and incorporation of organic amendments or topsoil covers is typically recommended, but not always essential for reclamation success. Emphasis is placed on the importance of thoroughly incorporating the lime to at least 15 cm, and on seeding only during established planting dates in the fall or spring. Two examples where this process has been completed include Stafford Regional Airport (SRAP) in Stafford, Va., and the Great Oaks subdivision in Fredericksburg, Va., as described subsequently in this report.

### Stafford County Regional Airport (SRAP)

Construction of SRAP in the late 1990s exposed over 150 hectares of lower Tertiary age Coastal Plain sediments, most of which qualified as *sulfidic materials* (which acidify to pH 4 or less upon exposure to oxidizing conditions – some at SRAP acidified to less than 2 pH) as defined by *Soil Taxonomy* (Soil Survey Staff 2006). The airport runway was constructed through a deeply dissected landscape and long spur ridges were excavated to depths > 25 meters, exposing significant volumes of gray to dark gray (Munsell chromas of 1 or less) sulfidic sediments which show the presence of pyrite (FeS<sub>2</sub>) by giving a violent heat and fume generating reaction with 30 percent hydrogen peroxide as demonstrated in Figure 1. This material was placed into intervening valley fills to support the runway, and excess was placed into several large, steeply sloping excess spoil fills along a first-order stream draining the eastern section of the site. The sulfidic nature of these materials was unfortunately not recognized until after final grading was completed, so the acid-forming *sulfidic materials* were not isolated away from drainage and, in fact, were essentially scattered randomly and thoroughly throughout the site. There is also anecdotal (personal communication) evidence that the contractors involved thought the dark colored materials were high in organic matter and, therefore, intentionally tried to spread them across the final revegetation surface.

An initial site visit in December 2001 revealed classic symptoms of active acid sulfate soils and acid sulfate weathering. The slopes were barren of vegetation and white salt efflorescences were prominent, as well as sulfurous odor that likely came from sulfur dioxide (not hydrogen sulfide

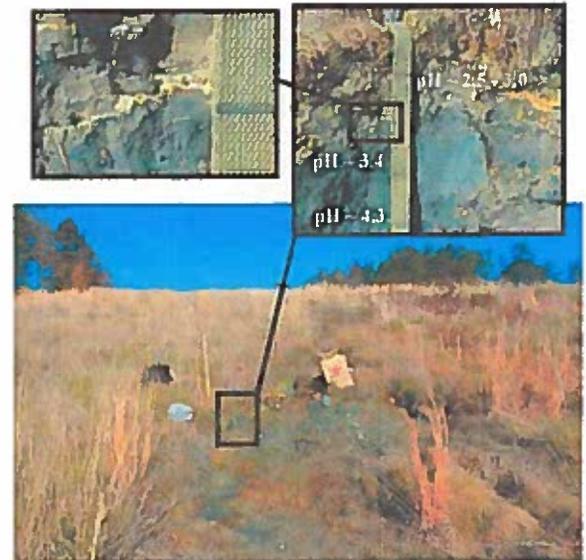


Figure 2. Photos of gullies from year 2005 on a reclaimed scalded land surface (engineering cut) with 25% slope at SRAP. The gullies have exposed dark gray sulfidic sediments. The details of a soil profile along the gully (10 cm increments on the tape) are shown to the upper right. Jarosite (a pale yellow mineral that formed on faces of the newly formed soil structure after the new land surface was made in 2001) is shown within the profile in a close-up to the upper left.

that emanates from tidal marsh environments). A detailed discussion of the active acid sulfate soils at SRAP can be found in Fanning et al. (2004). Concrete lined drainage ditches and culverts throughout the airport were iron-stained from acid drainage, and the cement compounds were noticeably etched and degraded. Galvanized steel pipes in stormwater basins below the site were severely corroded, releasing large volumes of sulfidic sediments into the receiving floodplain.

In December 2001, surface soils across the site were mapped into 40 units and sampled. Soil pH ranged from 1.8 to 5.3 with an average of 3.0. Peroxide potential acidities ranged from 0 to 42 Mg calcium carbonate equivalence (CCE) per 1000 Mg material, with an average of 9.6. This is equivalent to approximately 22 Mg CCE per hectare (incorporation depth of 15 cm). We recommended that the site be variably limed to each sampling cell's requisite CCE requirement, fertilized appropriately, treated with an organic soil amendment, and seeded to acid- and

salt-tolerant grasses and legumes, based upon our experience with sulfidic coal waste revegetation (Daniels et al. 2000). The airport opted to use lime-stabilized biosolids (sewage sludge) which are essentially an "all-in-one" treatment and, more importantly, were free of cost. In comparison, purchasing and applying agricultural lime, fertilizer and compost was estimated to cost over \$2 million. The biosolids were supplied by the Blue Plains water treatment facility in Washington D.C., and several smaller regional treatment plants.

The recommendations described above were completed during the spring of 2002. Due to late seeding (past mid-April) and an exceptionally hot and dry summer, the site required overseeding in September, but by late October 2002 the airport was fully revegetated (> 90 percent living cover). Surface soil samples collected one, two and 3.5 years following reclamation, indicated average post-amendment pH across the site was > 6.0. To date, the vegetative cover has been maintained successfully without further amendment, however, highly acidic

outcrop and seep areas on steep cut and fill slopes continue to demand intensive spot-liming and mulch treatments over time (Figure 2).

Throughout the reclamation period, water quality was monitored from several locations in and around the airport. Due to the naturally acidic nature of the soils within this watershed, background surface water (i.e., two streams draining into the airport) had pH values in the 4 to 5 range, and dissolved Fe concentrations less than 5 mg/L. In comparison, water discharging from the airport in early 2002 was highly acidified (pH < 3.5) and high in dissolved metals and S. Water quality responded quickly to the application of biosolids with pH increasing and dissolved metals decreasing. Since the reclamation work was completed through to the last sampling date in March 2006, water discharging from the airport typically has had pH values > 5 and metals and S concentrations have remained relatively low.

The only water quality data of concern, post-biosolids treatment, is the fact that the May through October 2002 samplings

revealed significant levels of ammonium-N discharging from the airport. Current USEPA (1999) water quality criteria for ammonia indicate that all of our observations were significantly less than acute toxicity criteria (e.g., 36 mg/L at pH 7.0) but were approaching or significantly above the chronic effects level of approximately 4.0 mg/L. We believe the long-term impact from N losses was minimal compared to the potential environmental cost of taking no action.

#### Great Oaks Subdivision

Construction of the Great Oaks subdivision in Fredericksburg, Va., began in 2001. Problems arose in 2003 when major land disturbance exposed sulfide-bearing Tertiary marine sediments. Unaware of acid sulfate soil issues, the developer proceeded as usual with final grading, which resulted in variable dispersion of *sulfidic materials* throughout the newly constructed soils. Residents began moving into the development in early 2004. Researchers at Virginia Tech became aware of the site in August 2005 after being contacted by a

concerned resident who could not establish a lawn (Figure 3). During the initial site visit, visual signs of acid sulfate weathering were only moderately evident. Surface soils consisted dominantly of "bright" oxidized colors (browns, yellows and reds) typically not associated with sulfidic soils. Reduced gray sediments indicative of *sulfidic materials* were observed, but seemed minimal. Some lawns were patchy, and iron staining on sidewalks was present, but not extensive. By the following summer these indicators were much more readily apparent with approximately 30 lots affected by acid sulfate weathering with the presence of active acid sulfate soils (Figure 4).

Although this site initially appeared only moderately impacted, the presence of sulfide-bearing sediments was enough to affect soil properties, plant growth and water quality. Peroxide potential acidity values for grab samples of surface soils were as high as 85 Mg CCE/ha, however, one solid dark gray clod found on the surface of one yard yielded a value of over 2,240 Mg CCE/ha. Although we believe this sample was an exception, it helps explain

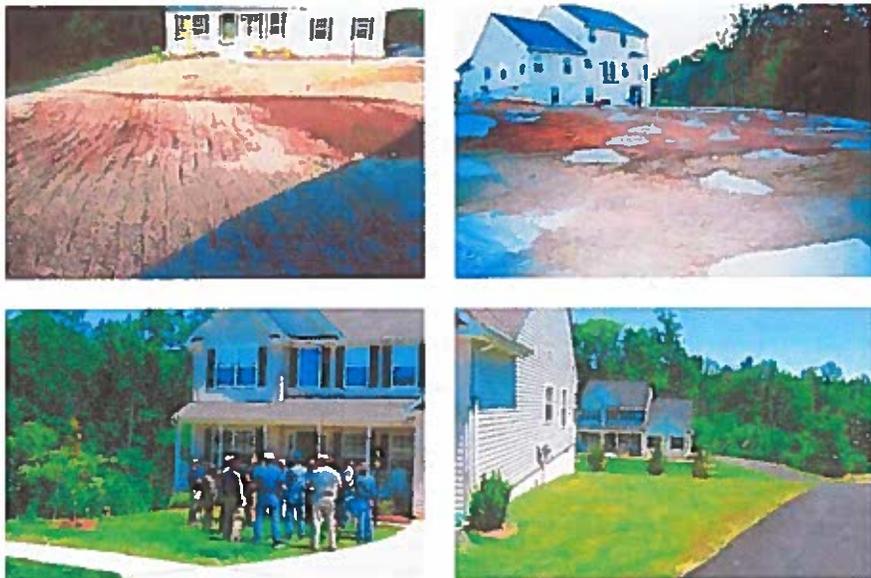


Figure 3. Reclamation at Great Oaks subdivision in Fredericksburg, Va. A lawn covered with dead turf in the summer of 2005 (upper left) was treated that fall with applications of heavy lime (upper right), phosphorus and compost to achieve a successful cover (bottom) by the spring of 2006.



Figure 4. Dead turf and iron-stained concrete sidewalks and street gutters on a lot in the Great Oaks subdivision in May 2006 (top), and preliminary revegetation success a year later after reclamation measures were completed by the developer (bottom).

why some PPA values may be higher than expected given overall oxidized appearance of the soil and the seemingly low quantities of reduced gray sediments. Based on composite samples, a reclamation prescription was developed which included heavy liming (56 Mg/ha), phosphorus fertilization (336 kg/ha), and if possible an organic amendment such as compost – all to be incorporated to a depth of 15 cm. Due to the location in a residential neighborhood, application of biosolids (sewage sludge) was not an option. The reclamation work on one lot (Figure 3) was completed in fall 2005, and a grass cover was established by the following spring. As of our last field visit (October 2007), the grass continued to persist with few patchy areas.

Since spring 2006, the developer has applied a less intensive reclamation protocol to many of the acid sulfate affected properties at Great Oaks. Preliminary success of these measures in May 2007 is shown in Figure 4, but most of these lawns suffered an almost complete dieback of vegetation over the summer of 2007. Residents should still be concerned about possible acid sulfate corrosion of concrete and metal pipes on their properties and possible continued detrimental acid sulfate effects upon the quality of surface and ground waters within and leaving Great Oaks. Local water quality impacts (yellow boy, etc.) to a draining stream are clearly apparent in the field. On a positive note, the developer reportedly applied a protective

asphalt base existing on all home foundations at the time of construction, and it is hoped this will prove acid-resistance over the long term.

Active measures taken by homeowners allowed Great Oaks to become the subdivision that made a difference. A resident whose property was affected by acid sulfate soils was elected to the Fredericksburg city council in 2006. He helped pass a city ordinance to reduce exposure of sulfidic materials from new construction. The new Acid Sulfate Soils Testing Policy specifies that soils must be tested for pH and potential acidity to the maximum depth of excavation to ensure that acidity levels are appropriate to support vegetation and to minimize damage to water quality and building materials. This is the first such ordinance in the mid-Atlantic region, and it will hopefully set a standard for other localities. The policy, which was effective as of March 2007, is available at [www.cses.vt.edu/revegetation/remediation.html](http://www.cses.vt.edu/revegetation/remediation.html)

Unfortunately, developers and engineers continue to expose *sulfidic materials* during earth-moving activities, unaware of or ignoring the pernicious chemical and mineralogical nature of these soils and sediments. Virginia Tech has been involved in an intensive outreach/extension effort to inform the development and engineering communities of the dangers of disturbing sulfidic materials, but the vast majority have not been trained and do not recognize these materials in the field. Similar acid forming materials underlie much of the mid-Atlantic Middle and Upper Coastal Plain at depths ranging from -5 meters to -15 meters and pose a distinct threat whenever deep excavations are executed. Hopefully, ordinances such as the one developed by Fredericksburg, will bring enhanced awareness of the need to prevent the exposure of sulfide-bearing soil materials that lurk at some depth within the soil-geologic column in many parts of the world. ■

## References

Barnhisel, R.I. and J. Harrison. 1976. Estimating lime requirement by a modified hydrogen peroxide potential acidity method. Unpublished method for KY Agr. Ex. Sta., Soil Testing Laboratory, Lexington, KY.

Daniels, W.L. and B.R. Stewart. 2000. Reclamation of Appalachian coal refuse disposal areas. p. 433-460. In R.I. Barnhisel, R.G. Darmody, W.L. Daniels (ed.) Reclamation of Drastically Disturbed Lands. Agron. Monogr. 41, ASA and SSSA, Madison, WI.

Daniels, W. L., Li, R. S., and Stewart, B. R. 2000. Influence of liming and topsoil on vegetative growth and leaching potentials of acid coal refuse. *Transactions, Soc Mining Metallurgy and Explor.* 308:25-31.

Fanning, D.S., C. Coppock, Z.W. Orndorff, W.L. Daniels and M.C. Rabenhorst. 2004. Upland active sulfate soils from construction of new Stafford County Airport, Virginia, USA. *Aust. J. Soil Res.* 42:527-536.

Orndorff, Z.W. and W.L. Daniels. 2004. Evaluation of acid-producing sulfidic materials in Virginia highway corridors. *Env. Geo.* 46:209-216

Sobek, A. A., Skousen, J. G., and Fisher Jr, S. E. 2000. Chemical and physical properties of overburdens and mine soils. in *Reclamation of Drastically Disturbed Lands* (Eds: R.I. Barnhisel, R.G. Darmody and W. L. Daniels), Monograph #41, pp 77-104, (American Soc Of Agronomy: Madison WI).

Soil Survey Staff. 2006. Keys to Soil Taxonomy. Tenth Edition. USDA Natural Resources Conservation Service, Washington DC. Available at [http://soils.usda.gov/technical/classification/tax\\_keys/](http://soils.usda.gov/technical/classification/tax_keys/)

USEPA. 1999. Update of Ambient Water Quality Criteria for Ammonia. EPA-822-R-99-014. Available at <http://www.epa.gov/waterscience/standards/ammonia/99update.pdf> (accessed 15 Jan 2007) USEPA, Office of Water, Washington D.C.



**PHC Reclamation, Inc.**  
Complete Engineering, Design and Construction Management Services for Reclamation, Revegetation and Restoration of Mineblnds and Other Disturbed Sites

Traditional Reclamation Services:  
Wetland Upland, Reforestation and Revegetation Services  
Hazardous Mine Site Mitigation and Closure  
Stabilization of Mine Site Historic Structures  
Hydrothermal Fungus, PU (polyurethane foam) Closures  
For more information visit us at: [www.phcreclamation.com](http://www.phcreclamation.com)



**BKS Environmental Associates, Inc.**  
• Reclamation Planning •  
• Baseline Assessments • Environmental Monitoring

**BRENDA SCHLADWEILER, Ph. D.**  
P.O. Box 3467 • Gillette, WY 82717-3467 • (307) 686-0800 • Fax (307) 686-0880  
P.O. Box Lerame, WY 82073-0574  
e-mail: [bksenvironmental@vcn.com](mailto:bksenvironmental@vcn.com)  
[www.bksenvironmental.com](http://www.bksenvironmental.com)



**KEEPERS OF THE SOIL.**

- Reclamation
- Wildlife Habitat
- Prairie Improvement
- Revegetation
- Soil/Streambank Stabilization
- Native Grasses
- Wildflowers

**Native GRASS SEEDS FOR RECLAMATION**  
50+ Years Experience  
Regionally Adapted Seed  
Prepaid Freight 200+plb lbs.

**CONSERVATION PARTNERS**

**BAMERT**  
TRUSTWORTHY

*Native is Natural.*  
SPECIALIZING IN NATIVE GRASSES

**1-800-262-9892**  
Muleshoe, TX 79347  
806-272-5506  
[www.bamertseed.com](http://www.bamertseed.com)  
Email: [natives@bamertseed.com](mailto:natives@bamertseed.com)

**GEO SEER LLC Report on Hydrology and Erosion Issues**  
**Comments to Spotsylvania Planning Commission. April 4, 2018**

We are providing you with a report by Scott King of GEO SEER LLC titled "sPower Proposed Solar Power Site; Issues in Hydrology and Erosion" dated 3/21/2018.

I will read the first two paragraphs of his cover letter:

"As a Certified Geospatial Analyst and an Image Scientist (CGP) of twenty-six years advising government agencies, businesses and investment groups on the feasibility and footprint of powerplants globally, I have assess the current sPower proposed site in Spotsylvania County.

Using local GIS files, Digital Elevation Maps (DEM), Imagery and distributed water sample data from the United States Geological Survey (USGS), I have determined that the local aquifer is not robust enough to sustain industrial taps in quantity to supply water to a solar power site of the proposed magnitude. These findings have been detailed in a hydrology and erosion study titled "sPower Proposed Solar Power Site: Issues in Hydrology and Erosion."

He goes on to say that these issues are not insurmountable, and there are several alternative ways to obtain the water needed.

The USGS data clearly indicates that ground water levels in this area are trending downward. In the case of neighboring Louisa County "water levels are trending severely below historic norms."

We are very concerned that the large quantities of water needed by sPower during construction and operation will have dire consequences. We understand that sPower would become the largest commercial consumer of well water in the County. Wells in the area could become unusable, which would either require drilling new deeper wells, or would require the County to supply water to the residents in this area. In addition, further reducing ground water levels could dry up the 12-15 springs that supply water to Fawn Lake and other water bodies in the area. If the level of Fawn Lake starts dropping because of loss of spring water, then the lake would quickly become unusable, which would have a disastrous impact on our community.

We ask the County to prohibit sPower from obtaining their water from wells, and instead require them to use alternative means to obtain the water needed for their proposed project.



# GEO SEER LLC

Scott King

Image Scientist

9641 Norroway Lane  
Spotsylvania VA, 22551  
(540)276-1680  
Scott.king@geo-seer.com

21 March 2018

Mr. Mueller,

As a Certified Geospatial Analyst and an Image Scientist (CGP) of twenty-six years advising government agencies, businesses and investment groups on the feasibility and footprint of powerplants globally, I have assessed the current sPower proposed site in Spotsylvania County.

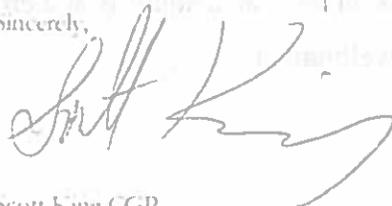
Using local GIS files, Digital Elevation Maps (DEM), Imagery and distributed water sample data from the United States Geological Survey (USGS), I have determined that the local aquifer is not robust enough to sustain industrial taps in quantity to supply water to a solar power site of the proposed magnitude. These findings have been detailed in a hydrology an erosion study titled *sPower Solar Power Site: Issues in Hydrology and Erosion*.

These issues are not insurmountable and may be overcome with the proper use of site-engineered bioswales, solar powered dehumidifiers, underground cisterns and retention ponds. Many sites globally utilize these capture aids in retain water for site maintenance and other utility.

A site-engineered water retention system addresses other issues such as runoff and erosion, along with saturation of the soil in such quantities as to prevent routine maintenance, lowers insurance rates for fire and flood, and provides areas for growth of native wetland vegetation.

The current plan, as provided by sPower, would lead to the collapse of the area aquifer, sink holes and increased costs to residents, agricultural areas and the county as additional more expensive wells will be required, and other environmental impacts managed.

Sincerely,



Scott King CGP



# GEO SEER LLC

## sPower Proposed Solar Power Site

Issues in Hydrology and Erosion

3/21/2018



### Summary

There are two main environmental issues of the sPower proposed site other than the depletion of an area carbon sink. The issue are the impacts on local area aquifers and erosion. Both issues can be controlled with the appropriate site development.

## Local Hydrology

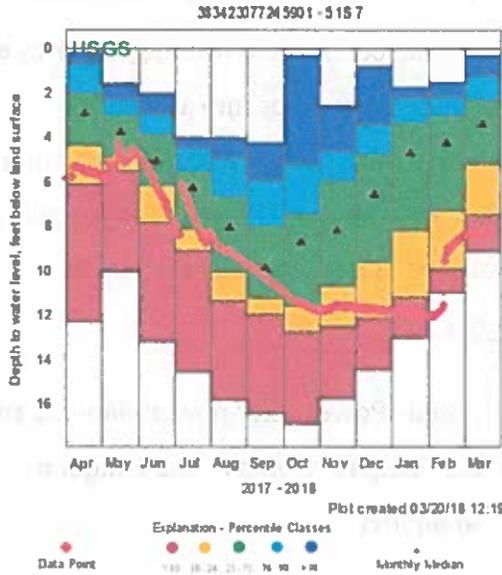
The USGS has a distributed water database that is locally managed. Surface water, groundwater, and water quality data are compiled from these local, distributed databases into a national information system. The groundwater database contains records from about 850,000 wells that have been compiled during groundwater hydrology studies over the past 100 years. Information from these wells is served via the Internet through the National Water Information System (NWIS) Web Interface. <https://groundwaterwatch.usgs.gov/>

The four closest ground water monitoring sites to the proposed sPower solar power plant are in Prince William County, Louisa County, Orange County and Fauquier County. The Fauquier County site is the only monitored well setting on a national aquifer.

Except for Fauquier County, all the data collected over the last 47 years indicate a continuing decrease in water levels in this area of Virginia. The two counties bounding Spotsylvania County, Orange and Louisa Counties, both indicate trends in the tenth percentile or below. In the case of Louisa water levels are trending severely below historic norms.

The sPower proposed site is in the Po River-Robertson Run (*HUC 12 020801050102 VAHU6 Y039*) hydrology area of the York River watershed. The Po River-Robertson Run area is supported by local weather and is not supported by a large underground reservoir. This means that the impact of industrial scale water usage by local tap, such as proposed by sPower, would be a significant impact and probable cause of depletion of the local area water reserves.

Site Statistics



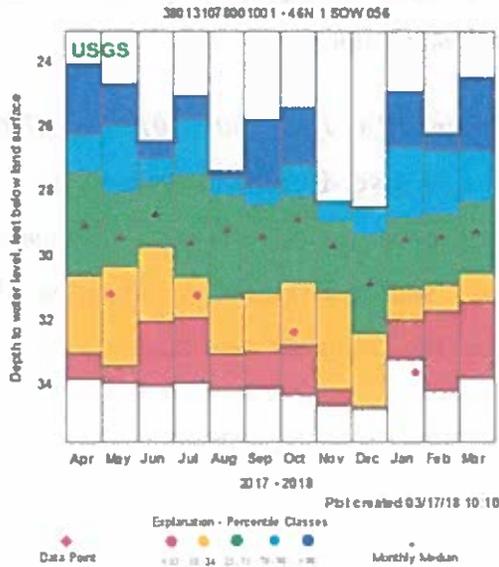
Most recent data value: **8.31** on 3/20/2018  
 Period of Record Monthly Statistics for 383423077245901  
 Depth to water level, feet below land surface  
 All Approved Continuous & Periodic Data Used In Analysis  
 Note: **Highlighted** values in the table indicate closest statistic to the most recent data value.

Month	Lowest Median	10th %ile	25th %ile	50th %ile	75th %ile	90th %ile	Highest Median	Number of Years
Jan	12.96	11.13	8.13	4.69	3.31	2.20	1.71	36
Feb	10.95	9.86	7.23	4.24	3.00	2.15	1.49	30
Mar	<b>9.08</b>	<b>7.46</b>	5.17	3.36	2.32	1.19	0.29	34
Apr	12.27	6.07	4.32	2.88	1.98	0.62	0.14	35
May	10.03	5.47	4.88	3.75	3.00	2.24	1.52	28
Jun	13.19	7.82	6.11	5.02	3.87	2.91	1.99	37
Jul	14.56	9.06	8.11	6.27	5.53	4.44	3.99	32
Aug	15.77	11.30	10.03	8.02	6.68	4.88	3.97	31
Sep	16.41	11.94	11.20	9.82	7.95	5.86	4.24	32
Oct	16.88	12.71	11.57	8.68	7.41	5.14	0.27	37
Nov	15.75	12.42	10.63	8.16	5.93	4.57	2.52	32
Dec	14.43	12.10	9.56	6.56	4.73	3.37	0.77	36

Statistics Options  
 View monthly/year statistics

Figure 1 USGS Water level Prince William County Site 383423077243077245901-51S7

Site Statistics



Most recent data value: **33.61** on 1/22/2018  
 Period of Record Monthly Statistics for 380131078001001  
 Depth to water level, feet below land surface  
 All Approved Continuous & Periodic Data Used In Analysis  
 Note: **Highlighted** values in the table indicate closest statistic to the most recent data value.

Month	Lowest Median	10th %ile	25th %ile	50th %ile	75th %ile	90th %ile	Highest Median	Number of Years
Jan	<b>33.22</b>	32.01	31.03	29.49	28.85	26.62	24.90	22
Feb	34.20	31.72	30.93	29.40	28.73	26.75	26.20	21
Mar	33.80	31.43	30.55	29.25	28.35	26.73	24.44	21
Apr	33.82	33.04	30.62	29.09	27.44	26.25	24.04	21
May	33.95	33.44	30.34	29.45	28.06	25.97	24.65	21
Jun	34.02	32.04	29.72	28.70	27.76	26.98	26.43	22
Jul	33.94	31.94	30.67	29.62	27.49	25.74	25.03	21
Aug	34.17	33.05	31.30	29.21	28.16	27.57	27.40	22
Sep	34.12	32.99	31.15	29.39	28.42	27.86	25.75	21
Oct	34.30	32.76	30.84	28.88	28.21	27.16	25.40	36
Nov	34.63	34.14	31.15	29.69	28.97	28.33	28.33	16
Dec	34.78	34.68	32.42	30.86	29.38	28.52	28.48	10

Statistics Options  
 View monthly/year statistics

Figure 2 USGS Water level Louisa County Site 380131078001001-46N 1 SOW 056

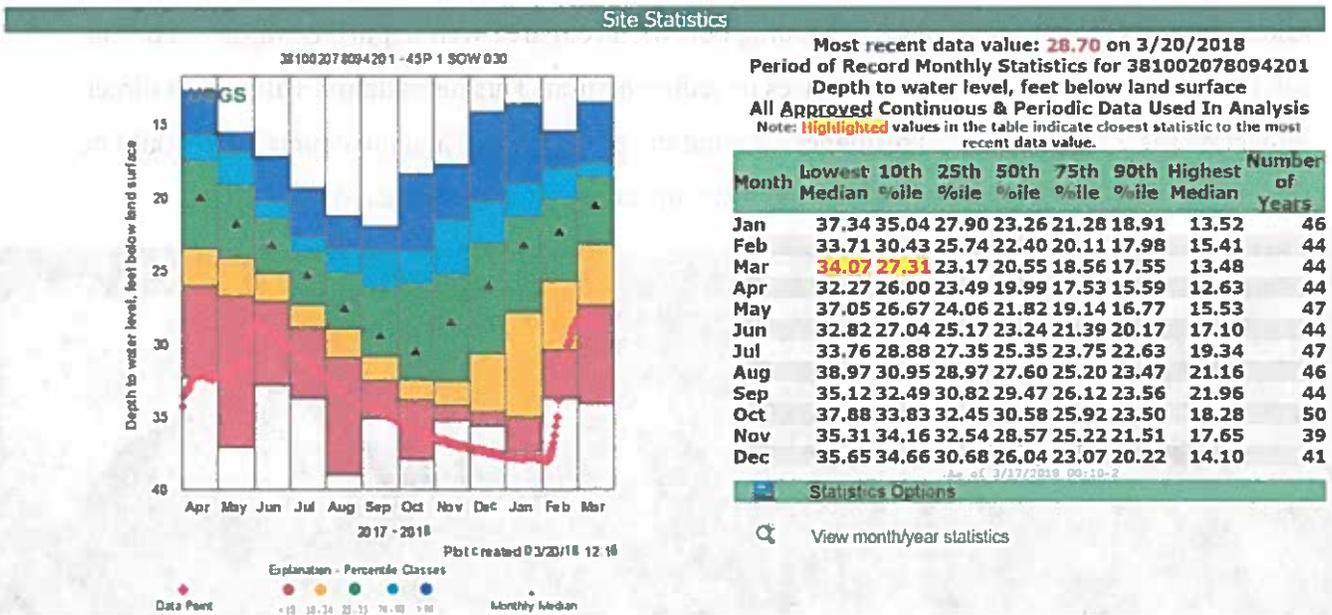


Figure 3 USGS Water Level Orange County Site 381002078094201-45P 1 SOW 030

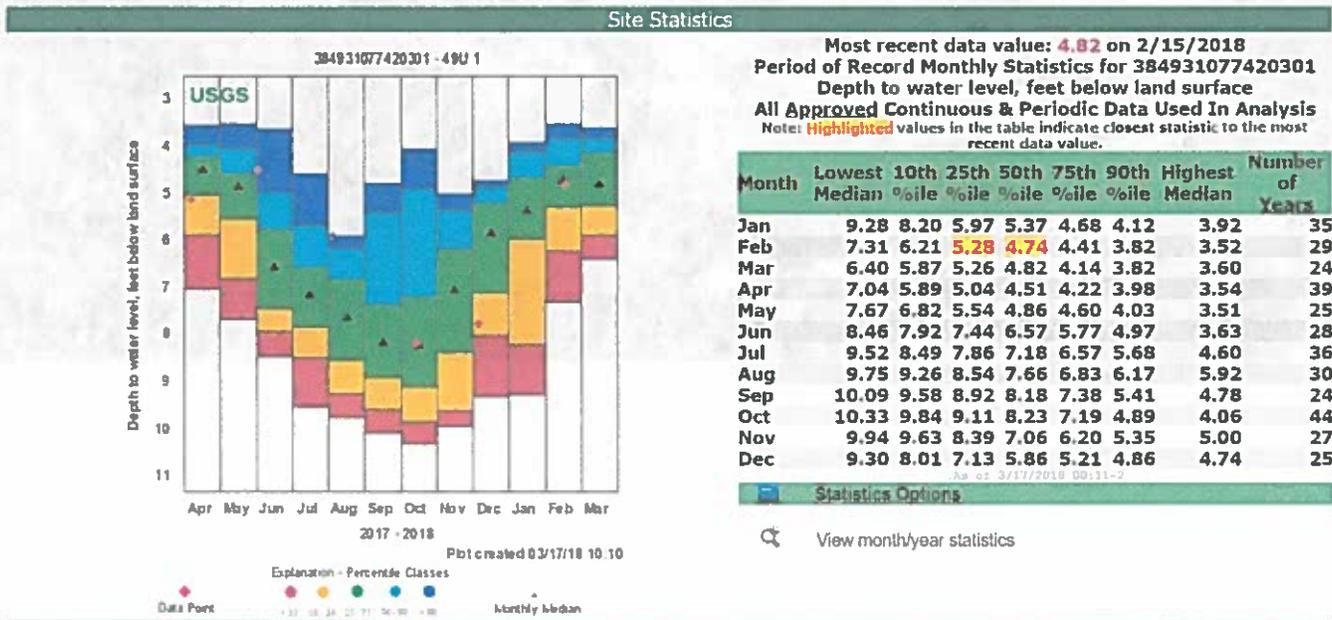


Figure 4 USGS Water Level Fauquier County Site 384931077420301-49U1

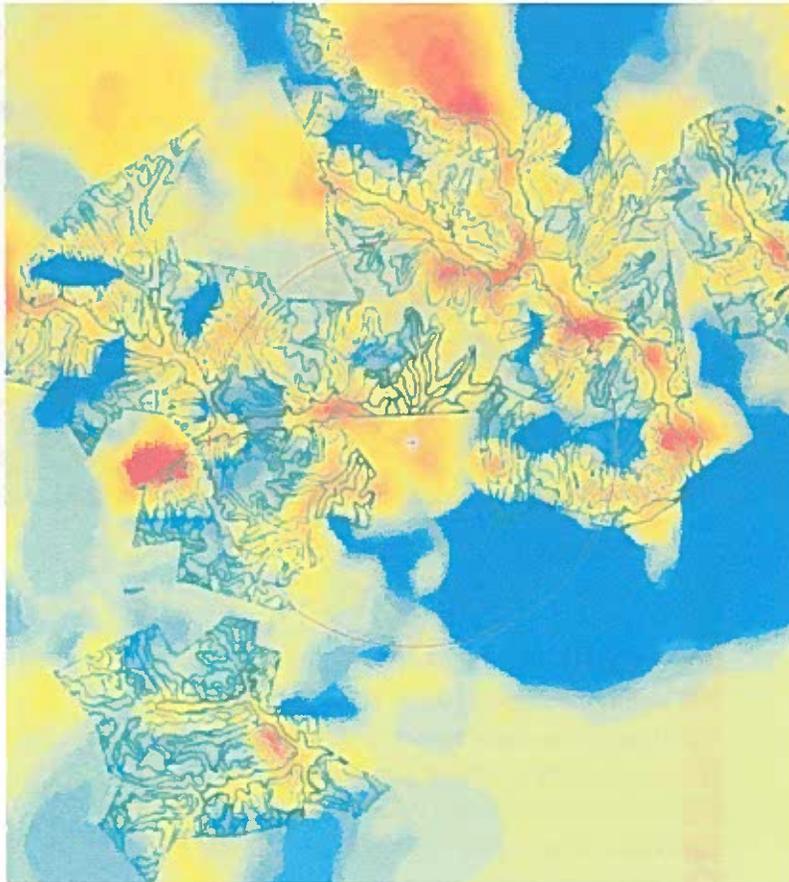
Likely impacts include water levels dropping below current area well depths, collapse of current sub terrain localized aquifers and increases in sedimentation. This degradation will have a direct impact on the 2,674 (Figure 4) residences around the proposed site and the county as it would be required to supply water and sewage to the residents and agriculture affected.



Figure 4 2,674 Households around the proposed site

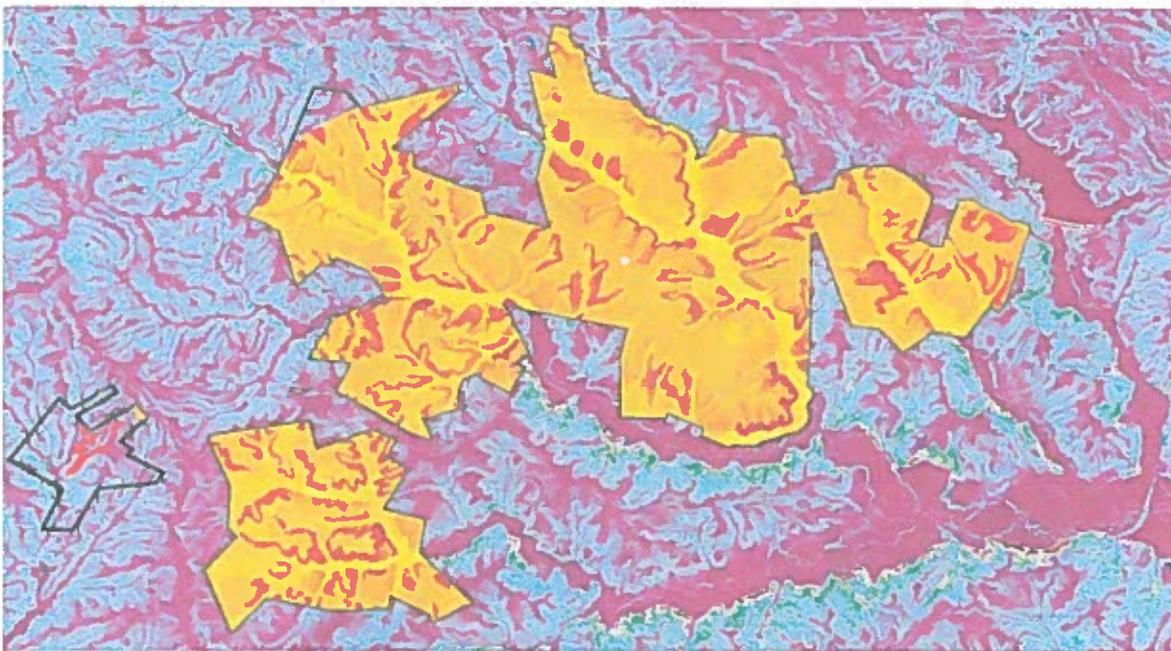
## Erosion of the Local Area

The map in *Figure 5* consists of a National Elevation Dataset base layer downloaded from the United States Geological Survey (USGS). The NED layer n39w078 provides a 3m elevation profile of Spotsylvania County. Also included are the areas sPower is proposing as the three-site configuration for the solar power plant. From the Spotsylvania County GIS office came the county soil map. The Po River-Robertson Run (*HUC 12 020801050102 VAHU6 YO39*) hydrology area of the York River watershed from USGS is included. The map in *Figure 5* shows areas of erosion throughout the proposed site. In red and yellow are the areas currently under threat and eroding while blue indicates soil stability. The current proposed sPower site plan is to disturb areas currently stable by creating a contiguous area with a gentle slope for the panel arrays. This will greatly increase the erosion throughout the area.



*Figure 5 Site erosion due to slope and soil type*

The map *Figure 6* is of the proposed sPower solar power plant site depicting slope, soil by type and area hydrology. None of the primary soils on the proposed site area are hydric, meaning the soils do not absorb water. This map is the true indicator of a massive potential for erosion with the current sPower site plan across approximately 10 square miles of Spotsylvania County. Since none of the area soil is hydric, water from seasonal rain showers and snow storms will not percolate through the soil, instead they will pool on the top shelf and runoff down slope. Terrain slope analysis of the area proves a range of 5-45 degrees of angle across the local area with little exception.



*Figure 6 Soil by type in relation to slope and hydrology*

- Fluvaquents-Udifulvents complex
- Aquults, loamy-Margo complex, 2 to 7 percent slopes
- Catharpin silt loam, 2 to 7 percent slopes
- Tatum loam, 7 to 15 percent slopes, eroded
- Fluvanna fine sandy loam, 7 to 15 percent slopes, eroded
- Nason silt loam, 15 to 25 percent slopes, eroded
- Nason silt loam, 15 to 25 percent slopes, eroded
- Nason silt loam, 7 to 15 percent slopes, eroded
- Nason silt loam, 7 to 15 percent slopes, eroded
- LaRoque loam, 25 to 55 percent slopes

These issues are not insurmountable and may be overcome with the proper use of site-engineered bioswales, solar powered dehumidifiers, underground cisterns and retention ponds. Many solar power sites globally utilize these capture aids to retain water for site maintenance and other utility.

A site-engineered water retention system addresses other issues such as runoff and erosion, along with saturation of the top layers of soil in such quantities as to prevent routine maintenance, lowers insurance rates for fire and flood, and provides areas for growth of native wetland vegetation.

The current plan, as provided by sPower, would lead to the collapse of the area aquifer, sink holes, mass erosion and increased costs to residents, agricultural areas and Spotsylvania County as additional more expensive wells (or installation of county water utility lines) will be required, and other environmental impacts managed.



## **Daniel Kulig Comments to Spotsylvania Planning Commission 4/4/2018**

I would like to address my concern for the potential of Erosion and Storm Water Damage to the properties, wetlands and tributaries of Fawn Lake, from the construction and operation of the Spotsylvania Solar Energy Center.

In their original Special Use Permit filing and in their current update SUP18-0001, sPower indicates that they intended to employ a planting of a native seed mix for site stabilization following construction. No other methods of Erosion Control or Storm Water Management are included nor are mitigation plans for the construction period specifically addressed.

As indicated in the Site Plan Exhibit Item EX1-7, the topographical gradient for the site shows a fairly pronounced downhill slope from Site A towards Fawn Lake properties. The streams and wetlands internal to all of the sites will also be impacted by heavy storm water based on the topography.

At a similar, but much smaller solar installation (only 200 acres by Coronal Energy) in Essex County, major erosion and storm water damage has occurred to the surrounding area and in particular to the watershed and wetlands around the site and to county highways. Essex County and the Virginia Department of Environmental Quality were addressing the damage as of March. In addition, an Engineering firm specializing in Erosion Control has been brought in to assist in the stabilization.

A similar event could in fact occur here; to the wetlands within and to the properties surrounding Sites A, B, and C unless specific mitigation plans are developed and executed.

In their comments to the State Commerce Commission regarding sPowers application, the Department of Environmental Quality(DEQ) and the Office of Storm Water Management(OSM) stated several recommendations concerning Project-Specific Plans that should be executed. DEQ recommended the development and submission of Project-Specific Erosion and Sediment Control Plans(ESC) and Project-Specific Storm Water Management Plans(SWM). DEQ stated that local ESC and SWM requirements must be requested through the locality (Spotsylvania County).

I request that the Spotsylvania County Planning Commission and the Board of Supervisors require sPower to submit Site-Specific, detailed, Erosion and Sediment Control Plans and Site-Specific, detailed, Storm Water Management Plans to the County for review and approval prior to the completion of the Permit Evaluation Phase of the SUP process.

Thank You,  
Daniel A. Kulig  
10520 Wildbrooke Court  
Spotsylvania, VA 22551  
540-972-9320

**Project Decommissioning and Site Restoration Plan**  
**Comments to Spotsylvania Planning Commission, April 4, 2018**

Thank you for the opportunity to comment on sPower's Decommissioning and Site Restoration Plan, dated March 2018. There are some aspects of the plan that do not comply with the County Ordinance for Solar Energy Facilities (CA17-0009), and some areas where I think the ordinance should be revised.

Provisions 11 through 18 pertain to decommissioning and site restoration.

Provision 11 requires the plan to be "executed and notarized by the landowner(s), applicant, and any other responsible party". The plan only refers to Sustainable Power Group (sPower). Another company will buy the land (Sustainable Property Holdings, and five new Special Purpose Entities have been created to own and operate different portions of the project. The County should evaluate whether all of the other entities should be listed as responsible parties, or if they are adequately covered as subsidiaries of Sustainable Power Group.

Provision 11d requires that the estimated costs be calculated by a licensed engineer. There is no certification provided for their costs in Attachment A of the Plan.

Provisions 12 and 13 pertain to the surety and updating it every two years. I recommend that the ordinance be revised to clarify that the surety must remain in place until the County agrees that the decommissioning work is complete and the site has been restored satisfactorily. Note that this work could take two years or more following the termination of operations.

Provision 14 states that the site is deemed abandoned after one year of inoperable status. In my view, this is too long to have 1.8 million solar panels containing toxic materials sitting idly on the site. The County should review this length of time due to the significant risks involved. In addition, the County should clarify that portions of the site may be deemed abandoned. sPower should not be allowed to delay decommissioning activities by simply keeping a small portion of the facility operating.

Provision 15 should be revised to require the equipment to be removed on an urgent basis. Presumably, this equipment will not be maintained, and broken panels will not be removed after the operations have been terminated.

Provision 16 is ambiguous about whether the landowner will be held liable. We recommend clarifying the wording to ensure all responsible parties including the landowner are held liable.

**sPower Project Decommissioning and Site Restoration Plan Comments:**

Section 1.1 – should name all responsible parties, as indicated above

Section 1.2 – we object to the term "scattered single-family residences". There are communities that surround this project.

Section 1.3 – the site consists of 6350 acres, not 3500 acres

Section 1.5 – should be revised to also address decommissioning of portions of the facilities, not just the entire facility.

Section 2.2.3 – the plan should be checked for compliance with the County ordinance. This is one example where any extension of the 12 month decommissioning period must be approved by the County.

Section 3.2 Performance Bond -- The County should review the one year renewal period. The bond must survive bankruptcy by at least two years. It is doubtful that a bankrupt LLC will be able to renew the surety bond.

Attachment A Cost Estimate – this cost estimate is outrageously low. They estimate that they will dismantle and remove all of the equipment for \$750,000. That is less than \$0.50 per panel. Just look at all of the steps specified in Section 1.5. At just \$10 per panel, this estimate would be over \$18 million. They also need to remove hundreds of thousands of posts that were driven into the ground and miles of fencing and wiring. They also need to account for the cost of recycling the materials as specified in the Plan. The cost of recycling the panels could be a significant cost in itself. The County should require a detailed cost estimate that is certified by a licensed engineer.

David G Hammond  
11416 Seymour Lane  
Spotsylvania, VA 22551  
540-972-1240

To April 4, 2018 Spotsylvania County Planning Commission

My name is Irvin Boyles, I live at 11501 General Wadsworth Drive at Fawn Lake in Spotsylvania County. My home is separated from the proposed Site A for the Solar Farm project by a narrow neck of the Lake and some Fawn Lake residences across the Lake. We have been blessed by having active management of the Lake environment to earn praise by the Virginia Department of Game and Inland Fisheries of having one of the cleanest and purist lakes in the State of Virginia. And we want to keep it that way, and request due diligence by this Commission and other reviews up through the hearing by the SSC in May to ensure measures are taken during the installation, operation, maintenance, and eventual decommissioning of the project to prevent or contain potential contaminants, algae, and other pollutants into our Lake, feeder waterways, and the aquifer supplying the springs that feed the Lake and wells in the area.

As everyone knows, the photovoltaic cells in solar panels contain Cadmium, a known carcinogen. A solar farm this large and all of the accompanying equipment to tie into the electric grid is a natural attraction to lightning strikes. Because there will be no high structures like buildings or trees where the solar farm will be located, there is increased risk of solar panels being struck by lightning causing overcurrents and surge overvoltages that can break down the structure of panels and allow leakage or even vaporization of Cadmium and other elements. Breakage of solar panels can also occur from tornado force winds, and other natural phenomena such as large hail stones; any of which can damage to or cause degradation of the panels, and release Cadmium and other toxic materials into the aquifer, other waterways, and into the land itself. It should also be noted that degradation of solar photovoltaic cells can also be caused by temperature, UV, humidity, and mechanical or chemical erosions and electrical stress. Such situations are believed inevitable due to the large number of solar panels projected for this installation, and I urge the County to insure acceptable and approved "Emergency Response Action Plan" is in place before any construction is allowed to proceed. It should identify all required emergency responders, their contact information, their responsibilities needed to contain contaminants, and how to contact residents who may be affected by such situations; and that it be coordinated with all surrounding communities. (NOTE: This is different than the "Emergency Response Plan indicated in Section 3.5 of the Special Use Permit Application Spotsylvania Solar Energy Center A in the event of wildfires).

And further, I urge the County require sPower to maintain an insurance policy adequate to cover any and all expenses that might be incurred by residents of Fawn Lake and surrounding areas due to damages, injuries, and cleanup expenses, as well as to the Lake and aquifer as a result of such incidences.

Irvin Boyles  
11501 General Wadsworth Drive  
Spotsylvania VA 22551  
540-972-4404  
Irv.boyles@verizon.net

facility complete and gain approval from all applicable state agencies of a "stormwater management plan", as referenced herein, before final approval is given to any of the applicants in this case?



Sign

James Smith - Fawn Lake  
10813 Perrin Circle  
Spotsy. Va. 22551  
Q. 540-972-0115

A. Yes. The extraordinary size of this project and the high degree of potential for out-of-control drainage from the Project sites into Fawn Lake, Oakley Forest and other neighboring properties would appear to necessitate approval of a stormwater management plan by the agencies responding to the matter in the DEQ document, including any additional recommendations that the Division of Inland Game and Fisheries may suggest to the JA. To do otherwise, e.g. to avoid constructing drainage ditches, surface water holding ponds, etc., over a ten (10) square mile territory contiguous to the adjoining creeks and the Po, Mattaponi and York River watersheds would be reckless on its face. The JA should provide to the Commission and all applicable agencies an assessment of the soil and level of imperviousness that could pose a threat involving the movement of tons of sludge through the project sites (which include streams extending into the above-mentioned watersheds) and into neighboring properties. There is no "minimal" probability that can be attached to this type of occurrence (the JA and DT state there will be "minimal environmental damage") and the tons of sludge flowing into the Rappahannock watershed from a solar farm in Essex County extending over only 200 acres (less than 6% of this Project) is only the latest illustration of the very unique circumstances presented by the soils, topography and other environmental factors within the Project sites in Spotsylvania County (see the February, 2018 article "Green solar farm is turning an Essex County watershed brown", by Mark Holmberg, wtvr.com). Residents of Essex County complained that the excavation wasn't planned and/or executed properly and that the mud was an issue from the start. The Commission and the relevant state agencies should learn from this experience that proper mitigation of such an occurrence needs to be made at the very beginning of construction and not after all vegetation, holding back surface waters, is removed. This respondent would like to share with the Commission an opinion that out-of-state contractors brought in to do construction of the facility may not have full knowledge of the unique environmental and weather conditions they will face, especially when all similarly sized solar power plants have been constructed in more level, desert-like areas miles from human interaction in the West/Southwest U.S. and other similar places in the world. It is therefore only reasonable and prudent that approval of a stormwater management plan be given by all relevant state agencies and submitted to the Commission before the Commission issues a final approval of this Project, in whole or in phases.

Q. Do you request the Commission to require that all owners and operators (and other companies exercising control in fact through financing or other means over the actions of such owners and operators) to be bound by the requirements made in item eight (8) of the DEFINITIONS AND PLE (as applicable) of each phase of the solar facility complete and gain approval from all applicable state agencies of a "controlled

**Kevin & Debra McCarthy**  
**11400 Meade Pointe**  
**Spotsylvania VA 22551**  
[kjmmusic@gmail.com](mailto:kjmmusic@gmail.com)  
[dlmccar212@aol.com](mailto:dlmccar212@aol.com)

**Remarks to County Planning Commission by Kevin McCarthy**  
**April 4, 2018**

Good evening. My name is Kevin McCarthy; my wife Debra and I are residents of Fawn Lake.

We urge the Spotsylvania County Planning Commission and the Board of Supervisors to place a moratorium on any construction of solar energy facilities until such time as the appropriate due diligence can be completed.

Specifically, we request the following:

- First, that the Planning Commission and/or the Board of Supervisors secure **INDEPENDENT** professional analysis and assessment of the environmental, health, safety, financial and economic impact that a solar farm of the magnitude contemplated would have on Spotsylvania County, its residents, landowners, homeowners, taxpayers and businesses. Such assessment and report should not be provided to the county by those seeking special land use permits, but rather should be secured separately by the county directly, with reimbursement to the county from the applicant or applicants.
- Second, that the Planning Commission and/or Board of Supervisors prepare, publish and deliver to all constituencies previously mentioned a thorough Cost / Benefits report, detailing exactly how this proposed solar facility will benefit the residents of Spotsylvania County.

Until such studies and reports are completed, we urge the Planning Commission and Board of Supervisors to halt any further consideration of the sPower proposed facility and enact a moratorium on any other such development.

Thank you.

## Who is Responsible?

### Comments to Spotsylvania Planning Commission, April 4, 2018

I am confused by the maze of Limited Liability Companies, Special Purpose Entities, subsidiaries, and subsidiaries of subsidiaries that sPower operates under. This confusion is intentional, and they are being successful.

For example, their original application form to the County states that the Applicant is "sPower Development Company, LLC (d/b/a sPower)". In their recent Decommissioning and Site Restoration Plan they state that "Sustainable Power Group (sPower) or its successor in interest will be responsible for ..." the decommissioning. Note that different companies are both referred to as sPower.

We understand that the Applicant is actually Sustainable Power Group. However the application and narrative documents have not been revised to reflect that change.

To further add to the confusion, the Applicants to the State Corporation Commission are five new Special Purpose Entities that are being established specifically to become owners and operators of the solar facility:

- + Pleinmont Solar 1, LLC – 75 MW
- + Plenmont Solar 2, LLC – 240 MW
- + Highlander Solar Station 1, LLC – 165 MW
- + Richmond Spider Solar, LLC – 20 MW
- + Highlander IA, LLC is the entity that will be owned by the four above entities and will enter into the interconnection agreement for the project

In the SCC documents, sPower indicates that the corporate entity is FTP Power LLC, and that they do business as (d/b/a) sPower. They also refer to Sustainable Power Group as sPower.

We also understand Sustainable Property Holdings, LLC will buy the land. Therefore, the land owner is different than the solar facility owner/operators and is not listed as an applicant for either the County or State.

The company is a maze of subsidiaries, and subsidiaries of subsidiaries. The County should ensure that the sPower corporate entity retains liability if one of their subsidiaries engaged in this project financially fails and is unable to fulfill their obligations.

TO: Spotsylvania County Planning Commission

My name is:

William B. Parsons  
11322 Fawn Lake Parkway  
Spotsylvania, VA. 22551

I would like the Commission to know that I am not opposed Solar Power, but from reports that I have read there are potential issues with this particular project that could have long lasting negative impacts on people and the environment in the surrounding area and possibly bodies of water further away.

The report that I will reference was prepared by Scott King, a Certified Geospatial Analyst and Image Scientist of GEO SEER LLC.

I would ask that the Spotsylvania Planning Commission and County Supervisors consider Mr. Kings analysis that:

- > Local aquifer, by itself, is not robust enough to support a proposed project of this magnitude.
- > Erosion control and runoff will be an issue if a proper containment plan is not implemented.

Without a well designed/engineered plan, chemicals and contaminants will enter into the aquifer impacting human drinking water and wildlife habitats, recreational areas, etc.

Mr. King summarizes by stating that these issues are not insurmountable and can be managed and overcome with proper analysis and engineering techniques.

These issues must be addressed by SPower in their scope and plan for this project and approved by Environmental experts in the field. If these issues are left unaddressed in their scope, the long term financial impact to Spotsylvania County could be significant.

Thank you,

William B. Parsons

# GEO SEER LLC

Scott King

Image Scientist

9641 Nottoway Lane  
Spotsylvania VA, 22551  
(540)276-1680  
Scott.king@geo-seer.com

SPower Proposed Solar Power Site

21 March 2018

Mr. Mueller,

As a Certified Geospatial Analyst and an Image Scientist (C.G.P.) of twenty-six years advising government agencies, businesses and investment groups on the feasibility and footprint of powerplants globally, I have assessed the current sPower proposed site in Spotsylvania County.

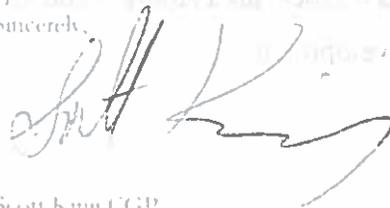
Using local GIS files, Digital Elevation Maps (DEM), Imagery and distributed water sample data from the United States Geological Survey (USGS), I have determined that the local aquifer is not robust enough to sustain industrial taps in quantity to supply water to a solar power site of the proposed magnitude. These findings have been detailed in a hydrology and erosion study titled *sPower Solar Power Site Issues in Hydrology and Erosion*.

These issues are not insurmountable and may be overcome with the proper use of site-engineered bioswales, solar powered dehumidifiers, underground cisterns and retention ponds. Many sites globally utilize these capture and retain water for site maintenance and other utility.

A site-engineered water retention system addresses other issues such as runoff and erosion, along with saturation of the soil in such quantities as to prevent routine maintenance, lowers insurance rates for fire and flood, and provides areas for growth of native wetland vegetation.

The current plan, as provided by sPower, would lead to the collapse of the area aquifer, sink holes and increased costs to residents, agricultural areas and the county as additional more expensive wells will be required, and other environmental impacts managed.

Sincerely,



Scott King C.G.P.



These issues are not insurmountable and may be overcome with the proper use of site-engineered bioswales, solar powered dehumidifiers, underground cisterns and retention ponds. Many solar power sites globally utilize these capture aids to retain water for site maintenance and other utility.

A site-engineered water retention system addresses other issues such as runoff and erosion, along with saturation of the top layers of soil in such quantities as to prevent routine maintenance, lowers insurance rates for fire and flood, and provides areas for growth of native wetland vegetation.

The current plan, as provided by sPower, would lead to the collapse of the area aquifer, sink holes, mass erosion and increased costs to residents, agricultural areas and Spotsylvania County as additional more expensive wells (or installation of county water utility lines) will be required, and other environmental impacts managed.

## Who is Responsible?

### Comments to Spotsylvania Planning Commission, April 4, 2018

I am confused by the maze of Limited Liability Companies, Special Purpose Entities, subsidiaries, and subsidiaries of subsidiaries that sPower operates under. This confusion is intentional, and they are being successful.

For example, their original application form to the County states that the Applicant is "sPower Development Company, LLC (d/b/a sPower)". In their recent Decommissioning and Site Restoration Plan they state that "Sustainable Power Group (sPower) or its successor in interest will be responsible for ..." the decommissioning. Note that different companies are both referred to as sPower.

We understand that the Applicant is actually Sustainable Power Group. However the application and narrative documents have not been revised to reflect that change.

To further add to the confusion, the Applicants to the State Corporation Commission are five new Special Purpose Entities that are being established specifically to become owners and operators of the solar facility:

- + Pleinmont Solar 1, LLC – 75 MW
- + Plenmont Solar 2, LLC – 240 MW
- + Highlander Solar Station 1, LLC – 165 MW
- + Richmond Spider Solar, LLC – 20 MW
- + Highlander IA, LLC is the entity that will be owned by the four above entities and will enter into the interconnection agreement for the project

In the SCC documents, sPower indicates that the corporate entity is FTP Power LLC, and that they do business as (d/b/a) sPower. They also refer to Sustainable Power Group as sPower.

We also understand Sustainable Property Holdings, LLC will buy the land. Therefore, the land owner is different than the solar facility owner/operators and is not listed as an applicant for either the County or State.

The company is a maze of subsidiaries, and subsidiaries of subsidiaries. The County should ensure that the sPower corporate entity retains liability if one of their subsidiaries engaged in this project financially fails and is unable to fulfill their obligations.

## Remarks to BOS and Planning Commission August 14/15, 2018

My name is Sean Fogarty. I live in the Livingston District at 11609 Fawn Lake Pkwy, Spotsylvania, VA 22551.

Our focus tonight is the stormwater erosion threat from this huge construction project. I know that the County staff is working diligently on these issues for a project that, as the County Technical letter said, has an “unprecedented construction land mass and steep topography...”

I highlight these problems at other solar facilities not to be alarmist. Clearly well intentioned people can make mistakes but these muddy messes have occurred in much smaller projects (23 acres!) even when the appropriate environmental regulatory agency had approved the plan. Mitigation measures are critical but not a guarantee when not built properly or when the site receives 6 inches of rain in several days like we experienced here in June. This further supports the County staff’s proposal for no more than 400 acre parcels to be cleared, graded and permanently stabilized before moving on to the next parcel. That may mean that work is delayed during winter months if grasses have not had a chance to establish. By way of perspective, a 400 acre site would support about a 60MW power plant which is still 3 times the median size solar plant in Virginia. Our recommendation is to permanently stabilize each 400 acre site before moving on and disturbing the next site.

(SLIDE SHOW)

Rhode Island example: From two articles in the Westerly Sun newspaper. The link is included in my written submittal:

<http://www.thewesterlysun.com/News/Richmond-Hopkinton/Richmond-solar-developer-cited-for-continuing-runoff.html#ath>

QUOTE:

Green Development CEO Mark DePasquale (Developer) said that the severe winter had made it impossible to seed the ground under the solar panels. Vegetation stabilizes the soil and keeps it from running off the site.

The chief of groundwater and wetlands protection at the state Department of Environmental Management said “It is not normal to see such a large site (23

acres!!) with the type of grades that this has to be unstabilized in the winter...the reason that this is a problem is because they had construction delays and their project was delayed to the point that they could not properly implement the plan that was approved by DEM, which was to get in and get out and have the site stabilized before winter came," he said.

"My well has gone cloudy three times during heavy rain," he said. "It's the only time it's happened in the 17 years we've been there. We put in a brand new well."

End Quote from Westerly Sun  
(END SLIDE SHOW)

## SCC Approves Solar Facility in Spotsylvania

Good evening, my name is David Hammond and I live in the Livingston District of Spotsylvania County.

The recent decision by the State Corporation Commission makes it clear that all of the really important decisions about the sPower solar project are your responsibility. The SCC approval is conditional on the applicants obtaining local special use permits, state environmental approvals, and paying the cost of unspecified network upgrades.

The SCC Final Order makes it perfectly clear that they refused to take a position on any of the numerous concerns raised regarding public health and safety, wildlife and environmental protection. The DEQ will address a couple of concerns, but not the ones that pertain to the unprecedented massive scale of the proposed project, not water extraction, not toxic compounds in the panels, not decommissioning and reclamation, not preserving the character of Spotsylvania County, etc.

The SCC documented these concerns, but then they abdicated all of the responsibility, stating in their news release that:

““Spotsylvania County has wide latitude in attaching conditions to the Special Use Permit necessary for the project” for concerns not explicitly addressed by DEQ recommendations or in the county’s permit ordinances.”

As an illustration of this transfer of responsibility, I will read the following paragraph directly from page 18 of the SCC Final Order:

“We find that Spotsylvania County, through this ordinance governing the Special Use Permit process, can address Mr. Mueller’s concerns related to the health of the aquifer and the use of cadmium or cadmium telluride products in the solar panels themselves to the extent they are not otherwise addressed by local, state or federal law.”

In my opinion, the SCC Final Order is a document that prepares their future argument that anything that goes wrong due to the unprecedented scale of this project, damage to the aquifer, injury to public health, safety, and welfare, or harm to wildlife and the environment will be all your fault because you failed to properly assess the risks and set appropriate conditions in the Spotsylvania County Special Use Permit.

The decisions that you make about whether this project is allowed to proceed, and if so, how it will be developed will be part of your personal and collective legacies. Please proceed carefully and decide wisely.

BOS Solar Aug 15

Yesterday citizens from varying areas of Spotsylvania gave convincing evidence of substantial problems related to a special use permit for a solar power plant in Spotsylvania. If the biblical prayer "He who has ears to hear, let him hear" has relevance in our lives we can only hope that truth will prevail in an era where the media, lobbyists, and wealth control the information decision makers receive and use when making decisions. Citizens continue to present evidence of problems related to erosion, water runoff and land devastation. They continue to ask about management plans and quality control. The supervisors were shown how the project is chiefly a method for supposedly politically correct business executives to become wealthy through tax credit methodology. Meanwhile the earth becomes a wasteland at decommission.

How can an honest public servant listen and hear in this environment? Why was the unbiased consultant who is an expert on solar projects not offered an interview when he applied to assist? Will you confer with Culpeper County which just rejected several solar applications? What happened to the 2002 Comprehensive Plan report on water resources in Spotsylvania which have relevance to the requirements and potential dangers of this project? Several citizens have mentioned advisory groups. Are you responding to their courtesy? Many significant questions remain unanswered, which lead to the irreverent thought of hearing aids. The truth for this permit request requires rigorous listening and action.

We need a full response to the questions which have been asked. A tentative plan might determine the feasibility of submitting 6,500 acres of land to multiple environmental impact before irreversible damage is done.

Presented on 15 August 2018

**Significant Concerns with Utility Scale Solar Power Plants in Culpeper County**

My name is Mike Mikolosko and I am a resident of Livingston District in Spotsylvania County.

As you may know, the Culpeper Planning Commission has recently recommended the denial of both of the utility scale solar power plants that are currently under application for a Special Use Permit in Culpeper County.

The Culpeper North Solar Project is on 174 acres near Brandy Station.

The Open Roads Renewables Project is on 1000 acres south of Stevensburg.

One article indicated that the Culpeper North Solar Project did not comply with the comprehensive plan, and that it was the wrong place for this type of facility. They are concerned that these facilities will change the character of the county and have other negative impacts.

In addition, the Culpeper Board of Supervisors recently voted to commission an independent study of the potential impacts on property values for neighbors of large solar power facilities. A Request for Proposals has been written and a reference to the RFP has been provided in my written submission.

Clearly, Culpeper County has many of the same concerns as we do regarding these large solar power plants. We recommend that the Planning Commission suggest to the Spotsylvania Board of Supervisors either commission their own real estate appraisal impact study or co-sponsor the Culpeper study. Obtaining an unbiased evaluation of likely impacts on neighboring property values will be an extremely important component of an overall Cost / Benefit Analysis that should be done by Spotsylvania County.

To discuss the real estate appraisal study RFP, please contact Culpeper Board of Supervisors' member Jack Frazier:

Jack Frazier: 540.219.8871  
use email : [cjfrazier069@gmail.com](mailto:cjfrazier069@gmail.com)  
gov. email : [cjfrazier@culpepercounty.gov](mailto:cjfrazier@culpepercounty.gov)

**References:**

1. COUNTY OF CULPEPER, RFP NO. OA-19-0502, REQUEST FOR PROPOSALS FOR APPRAISAL IMPACT STUDY OF SOLAR UTILITIES, August 10, 2018 [https://web.culpepercounty.gov/Portals/0/Departments/Purchasing/Documents/March2015/RFP\\_OA-19\\_0502\\_Aprsl\\_Impact\\_Solar\\_Utilities.pdf?ver=2018-08-10-143405-827](https://web.culpepercounty.gov/Portals/0/Departments/Purchasing/Documents/March2015/RFP_OA-19_0502_Aprsl_Impact_Solar_Utilities.pdf?ver=2018-08-10-143405-827)
2. Culpeper County planners deny solar project, By Allison Brophy Champion, Jul 12, 2018 [https://www.starexponent.com/news/culpeper-county-planners-deny-solar-project/article\\_e11429b1-479b-5361-8b72-1aa043a23cef.html](https://www.starexponent.com/news/culpeper-county-planners-deny-solar-project/article_e11429b1-479b-5361-8b72-1aa043a23cef.html)

My Name is Daniel Kulig and I reside in the Livingston District.

Commissioners, in light of the situations you have just reviewed, the following conditions are recommended for inclusion in the SUP by County Staff.

1. The "rolling" 400-acre site development plan proposed by the sPower in their response to the Staffs Technical Letter is much too aggressive for a development of this scale. The maximum of a 400-acre development at one time, complete with permanent stabilization, as recommended by County Staff, is the preferred approach and is critical to reduce risk and maintain control by the County Engineers.  
This approach will require that construction in the initial area be completed and final grading and seeding put in place with sufficient growth established. Any temporary stabilization must be replaced by permanent techniques.  
In addition, the Virginia Erosion and Sediment Control Plan Minimum Standards Checklist (4VAC50-30-40) shall be completed for each 400-acre plot. The next 400-acre development shall be contingent upon successful completion of the previous parcel.
2. To evaluate the potential existence of Acidic soil, it is recommended that the developer be required to conduct a soil sample survey down to the maximum depth of the proposed excavations based on the final regrading plan for the site. A sufficient number of samples should be taken, as specified by the County inspection authority, to insure adequate coverage.
3. The Performance Bond required under Section 8-38 of the County Erosion Control Ordinance shall be equal to the total cost of providing erosion and sediment control improvements to the entire project site (3500 acres), as determined by the County Administrator. This performance bond is separate from the decommissioning surety equivalent required by the County's Solar Energy Facility Ordinance (23.4.5.7).
4. During the storm prone months of April – September, the developer shall be required to have a plan in place, and be able to execute such plan, to

contain the runoff from an emergent event such as a Severe Thunderstorm or Flash Flood scenario. Storm water calculations should include evaluation of the 4"- 6" rains which were encountered in June and July of this year.

5. As part of the final Erosion and Stormwater Management Plans, the Final Site plan must address the unique configuration of impervious solar panels constructed over newly established grade. To ensure that this condition is properly addressed for runoff calculations, it is recommended that the final Erosion Control and Stormwater Management Plans for the completed Site (3500 acres) be certified by an independent Civil Engineering Agent, designated by the County and qualified to address these unique conditions.

Commissioners, if you only take away one thing from my presentation, please remember that the maximum 400-acre plot development at one time is the key to reducing the risks involved in this massive project. Lessons learned from the first plot will help reduce risks as the project evolves.

To August 15, 2018 Spotsylvania County Planning Commission (File Version)

My name is Irvin Boyles, I live at 11501 General Wadsworth Drive, Spotsylvania. My credentials include three Masters of Science degrees: Electrical and Electronic Engineering, and Systems Management from University of Southern California, and the third in Management from M.I.T. I have a Bachelor of Science in Physics, and am a graduate of the Air War College. My present employment supports the Department of Defense and Department of Homeland Security.

My purpose today is to stress the criticality of having an Emergency Action Plan in place acceptable to the Concerned Citizens of Fawn Lake and Spotsylvania County, as a condition for the County's approval of the special use permit for this Solar Farm project and the electrical power grid connection to proceed adjacent to our residences and living environment. This is based on my skepticism that the necessary due diligence has been expended on the inevitability or high likelihood that emergency conditions will arise that can affect the safety and health of persons, or damage property, the aquifer, waterways, lakes, ponds, and the environment if prompt actions are not taken to contain or mitigate emergency situations.

I look at the proposed installation and operation of the proposed project, and have to ask "what could go wrong that could affect lives, health, safety, and security of citizens and properties of Spotsylvania County, and visitors to historical landmarks within the inundated area of the project?" And when should an "emergency" be declared, and what actions should be taken in response? I see this "solar power plant, consisting of 1.8 million solar panels, constructed with possibly carcinogenic or other toxic materials or heavy metals; all linked together through a common grounding grid; and tied into a large number of inverters, substations and transformers leading to the Dominion power connection point, and eventually into the State and national electric grid itself, and part of the National Critical Infrastructure – something will break!. I can envision several emergency conditions that could occur with a solar power plant of this scale and complexity, many of which have been identified by other presenters. In the paper, I discuss two examples of causes of over-voltage build-up between the solar plant and the electric grid connection point that can bring on the need for emergency response action that would be identified in an Emergency Action Plan: Failure of grid connection point to accept 500-megawatts of electrical energy generated, and direct and indirect lightning strikes.

- What happens when 500-megawatts by the Solar plant cannot be accepted or dispensed at the grid connection point by Dominion Power or the electric grid due to equipment failures, under usage, or terrorist attacks on the electric grid itself? As concluded at the National Defense Industry Association (NDIA) *2018 System-of-Systems Engineering Collaborators Information Exchange*: "The electric grid of the 21st century needs to cope with the smart grid, cyber-attacks, space weather (solar storms), Electro-Magnetic Pulse (EMP) and High Power Microwave (HPM) weapons, proliferation of clean energy sources, phase-out of fossil fuels, etc." In other words, the solar plant will continue generating electricity whenever there is daylight, and will build up over-voltages that can cause fires or wreck solar panels and other equipment that can release toxic or carcinogenic materials when it cannot be efficiently expended into the electric grid.

- Destructive natural weather and climate effects such as direct and indirect lightning strikes, tornados, earthquakes, and flooding impact the operation and structure of the solar plant; and its interface with surrounding and downstream communities. Solar photovoltaic farms installed in an open area without high buildings or trees are subjected to high solar radiation and air humidity (i.e., the heat dome effect), and have an increased risk of being hit by lightning. So far, sPower has downplayed the dangers associated with release or leakage of Cadmium and Cadmium compounds like Cadmium Telluride (CdTe), or other materials known to be carcinogens, due to breakage of solar panels from lightning. They haven't accounted for effects of lightning-induced overvoltages in the circuits that cause insulation breakdown at the edges of the photovoltaic modules, which can release these toxic materials into the ground and runoffs, or the subsequent damage done by the dc current generated by the array to the inverters and the connection into power station itself. According to open literature (e.g., Sandia National Labs), when direct lightning hits a solar photovoltaic module, an extremely strong current flows through the module, resulting in overcurrent and surge overvoltage. Meanwhile, an indirect lightning strike produces induced overvoltage, which is influenced by lightning current characteristics, distance of the solar photovoltaic modules from the lightning, soil resistivity, photovoltaic grounding resistance and distance of any lightning protection system.

sPower and their LLCs have tried to assure us this project won't bring harm to any of us, our environment, the Lake, or any waterways in or leaving our area. Given the vulnerability of such a large project to foreseen and inadequately accommodated engineered protections, all high risk scenarios should be addressed in an Emergency Action Plan.

Such an Emergency Action Plan, as a minimum, should include:

1. Purpose to safeguard lives, health, safety, and security of citizens and properties of Spotsylvania County, and visitors to historical landmarks within the inundated area.
2. A basis for pre-planning the necessary emergency response by the solar plant owner/operator and the responsible local, state, and federal emergency organizations.
3. A full description of the geography, structures, environment and historical sites within the inundation or hazard zone of the solar plant to be included within this plan.
4. A listing of typical conditions and vulnerabilities which could lead to failure that the solar plant and/or power grid connection could incur, and internal and external (e.g., roadways, water supply pipelines) structures and environments that could be impacted, and typical responses.
5. Responsible individuals or organizations, and criteria for detecting, assessing, and declaring an emergency.
6. Responsibilities for contacting all first responders and support personnel.
7. Responsibilities for contacting all citizens who or their property may be in harm's way immediately and/or following an emergency situation according to the nature of the emergency.
8. Responsibilities to contact all citizens who could have incurred after-effects after resolution the emergency.
9. Responsibilities for cleanup, remediation, and financial retribution where warranted.
10. Responsibilities for identifying and assessing follow-up remedial activities.

11. A schedule of periodic inspections to check degraded or damaged components of the solar plant.

A copy of the Emergency Action Plan should be coordinated with the local Emergency Services Coordinator servicing all areas potentially impacted by this solar plant project and its connection point with the electric power grid; coordinated with the Concerned Citizens of Fawn Lake and Spotsylvania County, and other affected citizens; and filed with the Virginia Department of Emergency Management.

Thank you.

Irvin Boyles  
11501 General Wadsworth Drive  
Spotsylvania VA 22551  
540-972-4404  
[irv.boyles@verizon.net](mailto:irv.boyles@verizon.net)

**Comments to Spotsylvania County Board of Supervisors, April 24, 2018, by Richard and Judith Genaille, 12000 Fawn Lake Parkway, Spotsylvania, VA 22551, regarding Public Health Concerns Related to Pending Solar Power Application**

**Health Risks from Biosolids**

The land application of biosolids to fertilize/amend the soil at the proposed solar power facility sites must be prohibited. Although not specifically mentioned in the pending applications, intent to use biosolids should be assumed. Biosolids are effective amendments for poor/acidic soils, are readily available, and generally free for the taking. However, biosolids are sewage sludge. The waste treatment process does not kill all the pathogens in the sludge, nor does it break down all the chemicals, toxic heavy metals, and legal and illegal drugs prevalent in human waste.

The EPA January 2009 Targeted National Sewage Sludge Survey found biosolids made from sewage sludge contain more than 100 toxins. Research by the EPA, CDC, and the Virginia Tech Department of Crop and Soil Environmental Sciences found that Class B biosolids contain various bacteria, viruses, and highly toxic chemicals. Some of these pathogens are designated superbugs that are resistant to antibiotics and are frequently resistant or immune to disinfection.

Biosolids are also known to contain chemicals from cleaning agents, including household, hospital and industrial agents as well as the residue washed off of buildings, roads and cars by rain. Chemicals used by various industries, pesticides, fertilizers, grease, vegetable and meat products from homes and restaurants, and bacteria and viruses excreted by people as well as germs washed from skin and hands and surfaces in labs and medical treatment facilities are part of the mix as well.

Exposure to viruses in biosolids can cause gastroenteritis, respiratory illness such as pneumonia, cardiovascular disease and central nervous system disorders. The bacteria and viruses in biosolids are a health concern for everyone, but are a very serious risk for young children, pregnant women, people over 60, and immunocompromised individuals.

Aerosolized pathogens can become airborne during application of biosolids, and carried long distance by winds and storms. Research conducted by Edo McGowan, M.D., PhD, a consultant for the UN and the EPA, shows that a virus can be carried by the wind up to 15 miles. Virus particles are so minute, less than 3 microns, and bacteria are less than 10 microns that they do not settle out of the air and are easily carried on the wind. Because of their minute size, bacteria and viruses are easily inhaled into deep respiratory pathways.

Applying Class B biosolids will inevitably result in contamination of air, water and land in Spotsylvania County. Insects, fowl, rodents, deer and domestic animals are attracted to sewage sludge, particularly when it is moist. Other animals such as squirrels, rabbits, and foxes will also carry harmful bacteria, viruses and chemicals onto properties adjacent

to the biosolids application site. Birds and waterfowl that forage biosolids areas will transfer harmful material to lakes, ponds, streams and rivers in Spotsylvania and surrounding counties.

Flies, mosquitoes and ticks are other sources of infection. A single fly can carry thousands of bacteria for weeks. A female fly lays 100 to 150 eggs every twelve hours and lives for about 30 days. The eggs and hatched flies contain the same bacteria carried by the female. Flies laying eggs over 4,000 acres of biosolids will increase the number of bacteria laden flies in the area exponentially. The exact number cannot be known, but will likely total in the millions. When flies increase in number, they travel further afield, spreading bacteria further and further from the site where they hatched.

Biosolids are hazardous material and a very serious health risk. Land application of biosolids should be banned county wide.

### **Open Burning to Clear Debris Waste from Five Thousand Acre Property Must be Prohibited**

According to the EPA, “smoke is a complex mixture of gases and fine particles produced when wood and other organic materials burn. The biggest health threat is from the microscopic particles that penetrate deep into the lungs. They can cause a range of health problems from watery eyes to aggravated chronic heart and lung disease. Exposure is even linked to premature death.” Those who are at greatest risk are:

- Children, including teenagers because their respiratory systems are still developing and they breathe more air and pollution per pound of body weight than adults. Children are more likely to be outdoors and are more likely to have asthma
- Pregnant women due to potential health risks to both the mother and developing fetus
- Persons with lung or heart diseases such as angina, chronic obstructive pulmonary disease, emphysema or asthma

Site A of the proposed solar facility is a vast 5000 acre flammable debris field that extends up to the 1.5 mile border with the Fawn Lake community, and several other residential areas around the periphery. The debris is composed of thousands of tons of dead/felled trees, stumps, branches, brush, leaves and pine needles. Open burning of the magnitude required to reduce such a huge amount of debris will go on for several weeks if not a month or two. The intense heat from the fires will propel huge clouds of smoke, ash, soot and embers up into the atmosphere where they will disperse and fall back to the surface on residences, schools, playgrounds, parks, day care centers and athletic fields.

We note that atmospheric temperature inversions (not an uncommon phenomena) are known to trap concentrated smoke and ash clouds near ground level. And since there are residential areas all around the site, there will likely be health impacts regardless of wind direction.

Can you picture the headline “one dead, 50 hospitalized from smoke inhalation.” Can you be sure it won’t happen? Do we really want to take the risk?

The county should have an ordinance restricting massive scale open burning. This type of open burning should not be treated the same as open burning of a farm field that is completed in a few hours or a day.

### **Risks from Mosquito-Borne Diseases Must be Mitigated**

According to the CDC, drainage ditches and stormwater retention ponds are prime breeding grounds for mosquitoes. Maps included with the three pending special use solar power permit applications depict a total of 117 stormwater retention ponds, 85 on Site A alone. The extent of drainage ditches to be constructed on the three sites is unknown, but will likely total several miles.

Again according to the CDC, mosquitoes are known to transfer several serious life threatening diseases to humans including West Nile virus, Zika virus, Encephalitis and Malaria.

No mention of these potential very serious health issues or planned mitigating actions appear in the applications. The applications should be rejected and a hold placed on processing new solar applications until the county can assess the implications of such large scale risks to public health, and develop appropriate policies, guidelines and regulations. Furthermore, the county should require applications specifically address avoiding/mitigating risks to public health.

We support the call for rejecting the current applications, putting a hold on new solar applications, and forming a Citizens Committee to advise and assist the county on these matters.

Patrick

**Concerned Citizens of Spotsylvania County (CCSC)  
Analysis of sPower SUPs' compliance with County Comprehensive Plan  
In accordance with Virginia Code Section 15.2-2232  
Recommend include this analysis as Appendix A to the staff report  
Submitted to Spotsylvania County Board of Supervisors and Planning Commission  
November 7, 2018**

**Comprehensive Plan review for SUPs 18-0001, 0002, and 0003 (sPower Solar)**

The Spotsylvania County Comprehensive Plan presents a long range land use vision for the County. The Comprehensive Plan sets forth principles, goals and implementation techniques that will guide development activity within the County and promote, preserve, and protect the health, safety and general welfare of its citizens. Specifically, the Plan provides data and analysis on land use, transportation, housing, natural and historic resources, and public facilities and utilities. The purpose of this document is not to regulate, but rather guide land use, transportation, and infrastructure decisions. This guidance seeks to ensure continued economic and community vitality while ensuring necessary policies and infrastructure are in place to provide for the continuation of quality services to Spotsylvania's residents and businesses.

This proposal is located outside the Primary Development Boundary with over half of the area designated as Agricultural and Forestal within the future land use element. The remainder of the property is designated as rural residential. The Agricultural and Forestal land use area represents active agricultural land within the County. The agricultural land is used for both crops and livestock purposes, as well as forestry operations and agribusiness. Prime agricultural and forestry lands should be preserved and protected from development pressures through enrollment in Agricultural/Forestal Districts or other programs with similar goals.

The Rural Residential category encompasses most of the area outside the Primary Development Boundary. In general, rural residential development has a density of one unit per two acres and greater, including large lot residential, cluster development, farms, and forestland. These properties are served by private wells and septic systems. The preservation of land through conservation easements or preservation methods defined by the County Code may also be appropriate within this land use.

A special use permit is required to establish the solar energy facility proposed upon existing Agricultural 3 (A-3 zoned) acreage. The purpose of the A-3 district is to promote and protect large lot size parcels to maintain the rural character of the county and to protect, support, and enhance the agricultural economy of the county. Section 15.2-2232 of the Virginia Code requires that the location, character, and extent of the sPower facility be submitted to and approved by the planning commission as being substantially in accord with the adopted comprehensive plan. As per County Code Section 23-4.5.1, special use permit required uses are generally compatible with other land uses permitted in a zoning district but which because of their unique characteristics or potential impacts on the surrounding neighborhood and the

This proposal poses a threat to the historic resources and identification of the county because of conversion of the habitat to a commercial/industrial use.

The County has yet to receive sPower's Invasive Species Management Plan as directed by the County. This Plan needs to be evaluated to determine whether it satisfies DCR recommendations.

**1.D.5: "Do not extend public infrastructure (such as water and sewer) into productive agricultural and silvicultural lands except in those instances where those areas are designated for future commercial/industrial/office development."**

The land designated for this project is productive agricultural land as evidenced by current forestal/timber use. If the land were to be considered as designated for future commercial/industrial/office development, then the proposal would directly conflict with provision 1.D.7 which encourages complementary land uses in agricultural and rural areas, not industrial uses. Therefore the county is planning to extend county water to the sPower lands which are zoned agricultural and are not designated for future commercial/industrial/office development. This is in conflict with the Comprehensive Plan and could open up the land to a backdoor rezoning to industrial/commercial since county water would already be available. See further discussion under Land Use section, Primary Development Boundary.

The proposal would be in violation of this provision unless the applicant agrees to use county water only during the construction period and that any water used by the project during the operation phase is obtained other than from county water lines. That this is a very reasonable requirement is substantiated by the applicant's own statement that only minimal amounts of water will be needed during operations.

In addition, in order to comply with this provision the applicant and the county utility department should ensure that any county water line connections extending onto the project site be disconnected and disassembled after construction is complete. This is so that the solar project site not be used as a springboard to future residential or commercial development, which has been a concern of the Planning Commission and Board of Supervisors and other Spotsylvania County landowners. This requirement would also be consistent with County Code Section 22-160(b) which allows for access to county water during construction if water isn't to be provided beyond the construction period for highway and utility construction projects.

**1.D.7: "Encourage complementary land uses such as agritourism, agribusiness, and renewable energy generation in agricultural and rural areas."**

Utility scale solar is not a "complementary land use" with agricultural/rural in this instance. It may be complementary in some configurations but not with this huge 500MW facility covering 6,350 acres. Specifically this property was previously used for forestal purposes and that use is now no longer available. This utility scale solar plant is not mutually supportive of agricultural use and in fact will likely degrade the property for future agricultural land use because of

Spotsylvania County Future Land Use Map:

[http://www.spotsylvania.va.us/filestorage/21027/21029/24071/24073/4\\_County\\_Wide\\_FLUM\\_20131114.pdf](http://www.spotsylvania.va.us/filestorage/21027/21029/24071/24073/4_County_Wide_FLUM_20131114.pdf)

This proposal would remove the largest agricultural and forestal land use tract in the county (see county future land use chart) and is inconsistent with the Future Land Use map. The site would cover an area more than twice as large as the county's entire Agricultural/Forestal District program which contains 2,883 acres. It also directly conflicts with the desire to preserve the rural character of the county by placing a 3,500 acre industrial utility site in agricultural zoned land.

Related comments from the Virginia Department of Forestry (July 25, 2018): "Forest Area: The majority of the proposed locations are historically forested. This forested landscape, has contributed to soil protection, improved water quality, provided income from timber, habitat for wildlife, and carbon storage values. The installation of the facilities will result in the conversion of these forestlands to another use, resulting in the reduction or change of these values."

Additionally, "The Board of Supervisors has found that agricultural and forestal lands are valued natural and ecological resources which provide essential open spaces for clean air sheds, watershed protection, wildlife habitat, as well as aesthetic value in our community." (page 53 of Appendix D to the Comprehensive Plan (Natural Resources))

This proposal is entirely inconsistent with the Agricultural and Forestal land use area.

See attached County Future Land Use Map with site superimposed.

#### "Primary Development Boundary

A major aim of any Comprehensive Planning process is ensuring that the provision of community facilities and public services is phased with demand. One of the most effective tools for directing the timing and location of new development is the establishment of a Primary Development Boundary to define the area within which public water and sewer utilities will be provided. The Primary Development Boundary is shown on the Future Land Use Map. Land within the boundary is intended to develop with higher residential densities and more intensive nonresidential uses than outside of the boundary. By maintaining a Primary Development Boundary, the County encourages the most efficient use of the land while preserving the rural character and agricultural viability of those portions of the County outside the boundary. This boundary is not permanent and may be adjusted when conditions warrant through the amendment process, in accordance with the policies outlined below.

**Primary Development Boundary Policies: 1. Rezoning outside of the Primary Development Boundary desiring to connect to public sewer and water should submit a Comprehensive Plan amendment."**

detrimental impact to residents due to leaching of cadmium should broken panels come in contact with the acidic soils and water.

Heat Island Effect: sPowers' heat island effect research indicates a slight heat island effect from solar energy facilities is possible up to 1000 ft away from the solar panels. Therefore, the heat island effect can extend well beyond the boundaries of the site. The applicant has been unable to provide any research as to how this would scale up in this 500MW facility. Another aspect is the elevated temperatures under the panels which can affect the ecosystem in and around the entire facility.

#### **"Agricultural and Forestal Land Use Category**

The agricultural and forestal land use area represents active agricultural land within the County. The agricultural land is used for both crops and livestock purposes, as well as forestry operations and agribusiness. Prime agricultural and forestry lands should be preserved and protected from development pressures through enrollment in Agricultural/Forestal Districts or other programs with similar goals.

**Agricultural and Forestal Land Use Policies:**

- 1. Foster the preservation of agricultural and forestal land for its intrinsic economic benefits.**
- 2. Discourage rezonings or special use permits for land uses incompatible with adjacent agricultural, silvicultural, or forestal operations or that would have an adverse effect on the continued viability of these uses."**

This proposal would remove the largest agricultural and forestal land use tract in the county (see county future land use chart) and is inconsistent with the Future Land Use map. The site would cover an area more than twice as large as the county's entire Agricultural/Forestal District program which contains 2,883 acres. It also directly conflicts with the desire to preserve the rural character of the county by placing a 3,500 acre industrial utility site in agricultural zoned land. Related comments from the Virginia Department of Forestry (July 25, 2018): "Forest Area: The majority of the proposed locations are historically forested. This forested landscape, has contributed to soil protection, improved water quality, provided income from timber, habitat for wildlife, and carbon storage values. The installation of the facilities will result in the conversion of these forestlands to another use, resulting in the reduction or change of these values."

Additionally, "The Board of Supervisors has found that agricultural and forestal lands are valued natural and ecological resources which provide essential open spaces for clean air sheds, watershed protection, wildlife habitat, as well as aesthetic value in our community." (page 53 of Appendix D to the Comprehensive Plan (Natural Resources)

Finally sPowers' heat island effect research indicates a slight heat island effect from solar energy facilities is possible based on research in a much smaller solar energy facility in Arizona. The scientific studies measured increased ambient temperatures up to 1000 ft away from the solar panels. Therefore, the heat island effect can extend well beyond the boundaries of the site. The applicant has been unable to provide any research as to how this would scale up in this 500MW facility. The proposed solar power plant site covers 6,350 acres which is 10 square

**Large scale and mixed use developments should consider incorporating Transportation Demand Management (TDM) measures that reduce single occupancy vehicle trips.”**

**Applicant has not provided sufficient detail on sourcing of their materials to determine whether traffic mitigation measures are sufficient.** The TIA does not address questions asked by the county about rail spur location and overland route from location to site, road repair plans, and delivery hour restriction proposals. **The refusal to provide this detail prevents the county from ensuring that the proposal will meet this Comprehensive Plan provision.** Their proposal to fund a roundabout at Orange Plank and Brock Roads, even if approved by NPS, will not be started until after completion of project construction thus will have no impact on traffic mitigation.

## **Chapter 5, Historic Resources**

### **“History:**

**The purpose of this Preservation Plan is to grapple with the difficult issue of how to accommodate growth and still preserve the character-defining nature of the County that makes it such a desirable place to live and which draws visitors from across the country, if not from around the world. Key to the plan is to identify those resources and characteristics that make the County unique; but, more than that, the plan suggests actions that should be taken by government, the business community, and individuals to preserve a special heritage and sense of place before they are lost forever.”**

### **HISTORIC RESOURCES POLICIES AND STRATEGIES**

**GOAL: Spotsylvania County is known for the beauty of its agricultural and rural environment and for its wealth of historic and cultural resources. Spotsylvania recognizes that these assets are essential components of its identity, with an economic value worthy of protection. Spotsylvania County seeks to preserve and promote these resources through the following policies and strategies.**

**Policy 1: Encourage and promote the voluntary protection and preservation of scenic, historic, cultural, architectural, and archaeological resources.**

#### **Strategies:**

- 3. Promote the continuance and expansion of the Agricultural/Forestal District program to promote agricultural land preservation and protection of the rural farm/ forest character of the county.**
- 4. Promote and protect agriculture as the primary use of land in rural areas to promote the scenic character and economy of this area of the county.**

According to the Virginia Tourism Corporation, Spotsylvania County received more than \$285 million in 2017 in domestic travel expenditures which resulted in a \$63 million payroll impact and 3,140 jobs. Many of these tourist trips are a result of our historic resources which have an

facilities will result in the conversion of these forestlands to another use, resulting in the reduction or change of these values.”

From page 37 of Appendix D to the Comprehensive Plan (Natural Resources):

**“Potential Threats to Natural Heritage Resources:**

**The single greatest threat to natural heritage resources is the ongoing conversion of habitat to residential and commercial development. Forest removal, and increased impervious surfaces can influence water quality, and aquatic natural communities. Alteration of the local hydrology by land disturbance can change or eliminate terrestrial habitat. Fragmentation of forests and the introduction of invasives, both flora and fauna, can have a direct effect on the survival of many native plants and the resources that rely upon them for survival. Threats to the Natural Communities include incompatible development, and recreational activities, invasive species; and incompatible agricultural and forestry practices.”**

# Spotsylvania County Future Land Use

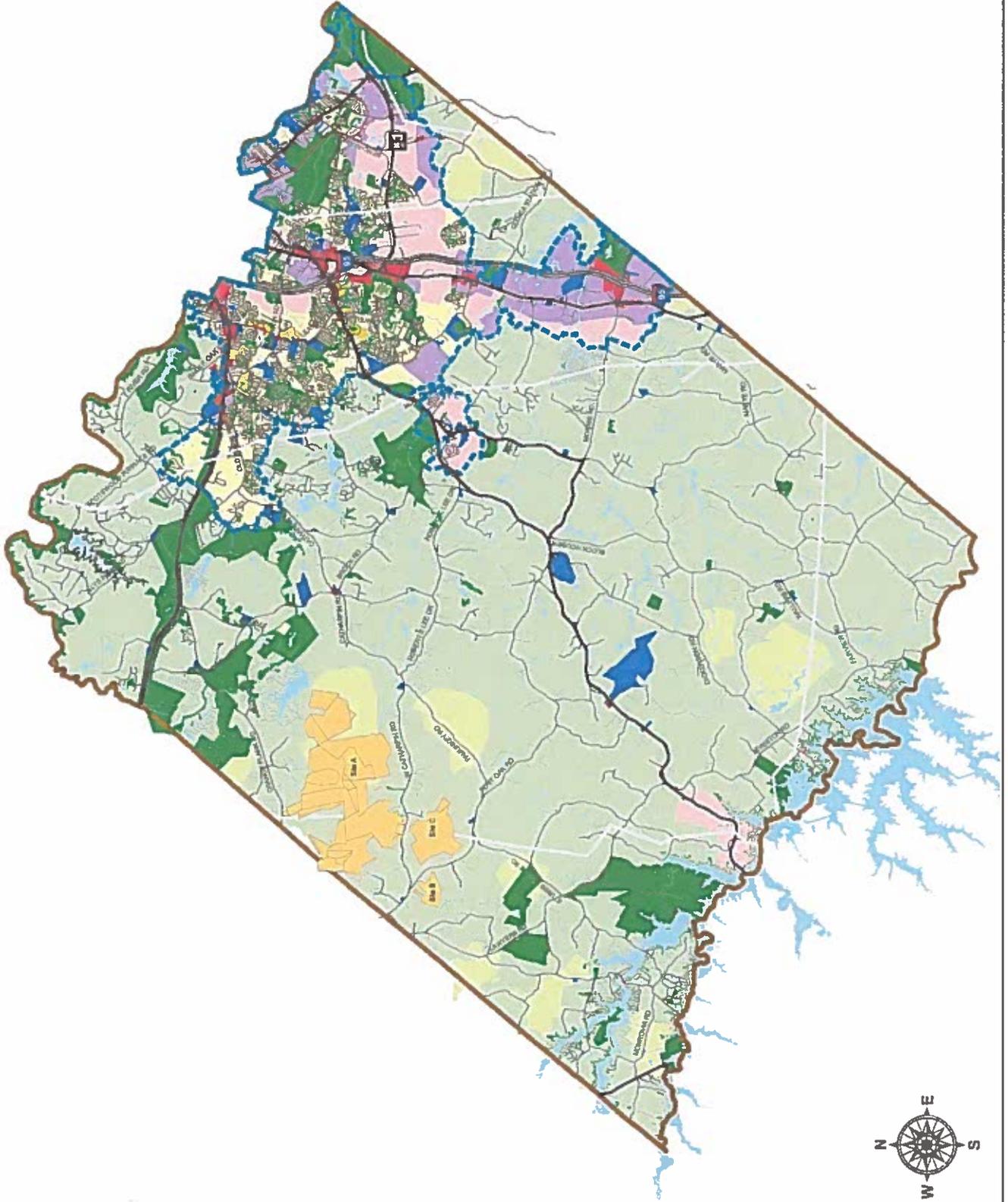


## Legend

- Primary Development Boundary
  - Water
- ### Land Use Designations
- Open Space
  - Institutional
  - Commercial Land Use
  - Employment Centers
  - Mixed Land Use
  - High Density Residential Land Use
  - Low Density Residential Land Use
  - Rural Residential Land Use
  - Agricultural and Forestal Land Use



Map Approved November 14, 2013



February 26, 2018

RE: Statement For the Record to Spotsylvania County Board of Supervisors and Planning Commission to Request Actions to Avoid Harmful Impact of sPower Application (SUP18-0001 sPower Development Co., LLC dba sPower)

From: Concerned Citizens of Fawn Lake and Spotsylvania County (CCFLSC)

Please find attached our statement from Concerned Citizens of Fawn Lake and Spotsylvania County which expresses the concerns of many about the risks and potential adverse impact on our community of the 500 MW solar power plant that sPower proposes to build next to our homes and properties. The site's footprint is the size of Fredericksburg and one-half the size of Manhattan.

In general, we cannot support the building of the World's near 10th largest solar power plant in the middle of our residential neighborhoods unless all of the threats to our lake, streams, water, roads, health and property values are adequately assessed and subsequently prevented or mitigated in the "Special Use Permit" being considered by the County.

Among other requests described in the attached, we are asking the County to conduct a due diligence cost-benefit analysis which not only recognizes the potential benefit for increased tax revenue, but the minimal amount of economic benefit stemming from the temporary construction subcontractors and the 10-15 permanent employees and the significantly large costs to the County and taxpayers if the project's risks are not properly assessed and mitigated (e.g. damage to the local aquifer and Fawn Lake springs replenishing the lake; pollution of the lake and project site areas; damage to roads and property values; and the cost of decontamination and decommissioning if the applicant goes into bankruptcy and abandons 3,500 acres of solar panels containing toxic wastes, etc.).

In summary, it should be noted that Virginia and affected county agencies gave extensive close scrutiny to the significant risks presented by the Lake Anna nuclear power plants well in advance of their construction and operation. The sPower solar power plant will generate over half the power of either reactor at Lake Anna and will cover an area six (6) times the nuclear plant.

We believe it is not too much to ask that Spotsylvania County give this immense power facility the intensive scrutiny it deserves and delay any permit until all risks are assessed and the applicant agrees to all of the detailed plans for prevention or mitigation that the County finds are prudent and necessary.

Thank you in advance for considering our concerns. Points of Contact are listed below, if you would like to further discuss the issues concerned.

Russell J. Mueller, FSA  
10819 Perrin Circle  
703-627-9767

David Hammond  
11416 Seymour Lane  
540-972-1240

Richard Genaille  
12000 Fawnlake Pkwy  
571-215-3669

Rmueller540@comcast.net DaveHammond@gmail.com RichardGenaille@gmail.com

**Statement For the Record to Spotsylvania County Planning Commission and Board of Supervisors to Request Actions to Avoid Harmful Impact of sPower Application**

(SUP18-0001 sPower Development Co., LLC dba sPower)

Submitted by Concerned Citizens of Fawn Lake and Spotsylvania County (CCFLSC)

**Section 1: In General**

Described in more detail below are the significant environmental and other concerns that the CCFLSC has identified in connection with the 6,350 acre land acquisition and utility-size solar power plant complex that sPower intends to build potentially as close as 50 feet to our neighboring homes and properties in Fawn Lake and surrounding areas (SUP18-0001 sPower Development Co., LLC dba sPower). [Footnote 1: see footnotes below each section]

**In general, the CCFLSC cannot support the building of the World's near 10th largest solar power plant in the middle of our residential neighborhoods unless all of the threats to our lake, streams, water, roads, health and property values are adequately assessed and mitigated in the "Special Use Permit" being considered by the Planning Commission and the Board of Supervisors. [Footnote 2]**

**We implore the Planning Commission to view our comments in the context of:**

**(1) the Land Use Section of the Planning Commission's Comprehensive Plan** which directs that "Renewable energy generation facilities, such as solar, geothermal, or wind, should be sited and designed to minimize detrimental impacts to neighboring properties, uses, and roadways..."; and

**(2) the Special Use Standards applicable to solar facilities** specifying that "The planning commission shall not recommend, nor shall the board of supervisors approve..." a Special Use Permit unless each of the standards are satisfied in their entirety (Zoning Code Sec. 23-4.5.7. - Standards of Review, including subsection (d) which sets forth specific standards for solar facilities). Such standards are hereinafter referred to as "General Standards".

**(3) a due diligence cost-benefit analysis** which not only recognizes the potential for increased tax revenue for the County, but the minimal amount of economic benefit stemming from the temporary construction subcontractors and the 10-15 permanent employees and the large costs to the County and taxpayers if the significant risks and attendant costs described below are not adequately assessed and prevented or mitigated (e.g. damage to the aquifer and lake springs; pollution of lake, streams and site areas; damage to roads; decrease in property values; and bankruptcy and abandonment of toxic waste site, etc.); and

**(4) the concurrent consideration of the sPower Site A, Site B and Site C proposals as a whole** and not in a piecemeal fashion for each part of the phase-in (Pleinmont Solar, LLC is only the first partnership of seven mentioned in the application to the State Corporation Commission), because the potential adverse impact to the local environment will be the sum of the effects of the entire project.

In summary, it should be noted that Virginia and county agencies gave extensive close scrutiny to the significant risks presented by the Lake Anna nuclear power plants well in advance of their construction and operation. The sPower solar power plant will generate

over half the power of either reactor at Lake Anna and will cover an area six times the nuclear plant. **We believe it is not too much to ask that Spotsylvania County and Virginia state agencies having regulatory jurisdiction over one of the World's largest solar power plants not give short shrift to a full and complete assessment of the power plant's risks to the end that they be avoided or mitigated before approval.**

[Footnote 1] It should be noted that the proposed sPower site A (5,200 acres) shares about a 1.5 mile contiguous border with the Fawn Lake community. Fawn Lake has around 1400 building lots with 900 existing homes, a 288 acre recreational lake with a 100 slip marina, an 18-hole regulation golf course, tennis courts, community outdoor swimming pool, sand beach, sports fields, picnic areas, and children's playgrounds. Sections of the community are protected areas within the National Military Battlefield Park.]

[Footnote 2] List of photovoltaic power stations, 150 MW or larger, Wikipedia [https://en.wikipedia.org/wiki/List\\_of\\_photovoltaic\\_power\\_stations](https://en.wikipedia.org/wiki/List_of_photovoltaic_power_stations)]

## **Section II. Impact of World Scale Solar Power Plant Unknown**

The CCFLSC has researched but been unable to identify any comparable solar power plant of the immense size proposed by sPower--500 MW situated on 6,350 acres in Sites A, B and C—that has been built and operated safely and without significant adverse effects in a United States East Coast environment immediately surrounded by residential neighborhoods.

However, we have found that solar power plants of this size and larger are built in secluded areas, principally semi-arid or desert-like locations. In the United States all four of the 500+ MW solar facilities are situated in isolated semi-arid areas of the South West. The brochures supplied by sPower contain photos clearly demonstrate that their other projects are located in isolated areas distant from homes and human interaction.

We have found that the largest existing solar energy facilities on the East Coast are about 100 MW or less. The largest facility operating in Virginia is 100 MW in Southampton, which started up late last year. We think that further research is needed before larger scale solar energy plants are considered for approval by the County and state agencies, in particular the proposed sPower facility in Spotsylvania County.

The sPower project represents an unprecedented step-out in scale in Virginia. Research should start with the existing 50-100 MW plants, so that the impacts of that scale are understood in the context of the ecosystems in Virginia. Increases in scale should not be allowed until the risks and impacts are fully understood.

Spotsylvania County citizens do not want to be the "guinea pigs" that will find out about the potentially serious impact of building the first such large scale solar energy power plant on the East Coast. If the negative consequences are discovered only after the fact, they will be irreversible unless the project is scaled back after the project is in operation which would not benefit sPower and their partnership investors.

In comparison with any other similarly large solar power plant, the site proposed by sPower is uniquely situated in the middle of residential neighborhoods and non-agricultural A-3 zoned land. This enormous footprint among Spotsylvania County homes calls into question whether this size project could reasonably meet Spotsylvania County's general zoning standards such as 24.4.7 (a)(2) "That the proposed use or development of

the land will be in harmony with the scale, bulk, coverage, density, and character of the area or neighborhood in which it is located”.

If the proposed power plant is not found to fail this clear cut “scale, bulk, coverage, density, and character” standard on its face (notwithstanding that solar facilities are restricted to land zoned A-3), at a bare minimum we believe the Planning Commission needs to conduct a due diligence analysis that includes independent expert study of all aspects of the potential risk and impact of this project.

Just one aspect of the impact is illustrative of the need for this independent analysis. The local aquifer that sPower says they will drill wells to extract over 308 million gallons of water, just during the short 18 month construction phase and significantly more over the years, is the lifeblood for residences relying on wells for all their water needs and also for the springs under Fawn Lake that are the prime source maintaining normal lake water levels. Local residents can testify to the already unstable nature of the local aquifer which currently produces well water sediment and that during dry periods experiences an even more severe degree of collapse rendering well water granular and unsuitable for drinking.

**Additional drainage and stress on the aquifer from a large industrial user such as sPower could further reduce the water table and threaten both existing wells and the water level of Fawn Lake rendering the lake and its docks and boat ramps unusable for recreation.**

It should be clear that induced well destabilization and any depletion of the water levels at Fawn Lake would cause a serious decline in property values in Fawn Lake and surrounding communities, resulting in the consequent reduction of Spotsylvania County property taxes rivaling or exceeding any potential increase in such revenues from the sPower facility.

Sound scientific risk analysis, including but not limited to a GIS and hydro-geological/drilling study, obtained for the County from a source independent of sPower is crucial if the Planning Commission and the Board of Supervisors are to render a fully informed and non-conflicted decision on a Special Use Permit with respect to not only the above-described water issue but all other environmental matters.

### **Section III. Erosion and Chemical Runoff Could Cause Undue Adverse Impact on Environmental and Natural Resources**

Paragraph (8) of the General Standards states “That the proposed use will have no undue adverse impact on environmental or natural resources.”

There are several potential risks stemming from the construction of the solar facility that could result in the above mentioned adverse impact. A reasonable reading of the sPower application makes clear that during the construction period significant amounts of chemicals will be spread over up to 6,350 acres once the land has been cleared of major tree and woody and plant material. These chemicals might include herbicides (e.g. pre-emergents) to clear the ground of vegetation; although the application to date does not mention such herbicide applications, this should be clarified and made subject to further analysis. Once the acreage is sufficiently leveled to embed the mounting and steel pier solar panel supports, many tons of fertilizer will be spread over more than 3,500 acres in order to grow the fields of grass intended to keep the panels free of undergrowth that could damage the panels.

Unless sufficiently mitigated, the aerial spreading or runoff of such chemicals could be particularly injurious to the surrounding lake, streams and other environs. The relatively small size of the Fawn Lake body of water, about 288 acres, increases the risk that the lake could be severely polluted from only a small fraction of any contaminant reaching the lake.

In particular, even small amounts of fertilizer containing phosphorous or other chemicals conducive to the growth of harmful algae blooms introduced by runoff into the lake could render it unsuitable for swimming and other types of recreation. Experience has shown that even very large bodies of water are not exempt from virulent algae blooms stemming from agricultural nutrients, turning them into masses of green smelly ooze.

Other chemicals used in construction, herbicides, pesticides and solar panel cleaning agents, if introduced into the lake and local streams and ponds, could swiftly lead to polluted local waters that could ultimately impact the Whitehall and Greenfield Creeks, the Po River, the Mattaponi River, the York River and ultimately the Chesapeake Bay. Of particular concern would be runoff containing any toxic materials from the solar panels in the event the casings and interior panels are damaged (see further information in the section addressing catastrophic risks). [Footnote 3]

This kind of runoff pollution is hopefully preventable, but only if the chemicals are not spread by means of aerial application and fully contained behind elevated berms and runoff gutters sufficiently removed from the boundaries of Fawn Lake and other neighboring properties similarly susceptible to potential harm. A reasonable conclusion is that a 100 yard barrier will be necessary to help guarantee that airborne particles and runoff do not find their way into local waterways and the aquifer. Such a barrier is absolutely necessary along the entire length of the Fawn Lake boundary and the areas that currently feed rainwater into the mouth of Greenfield Creek (i.e. Fawn Lake).

Unless properly mitigated, the above described airborne or ground pollution from chemicals would clearly be found to be in violation of the General Standards, including “(4) That the proposed use will not adversely affect the health or safety of persons residing or working in the neighborhood of the proposed use; (5) That the proposed use will not be detrimental to the public welfare or injurious to property or improvements within the neighborhood; and (8) That the proposed use will have no unduly adverse impact on environmental or natural resources.”

[Footnote 3] The Ordinance on Solar Energy Facilities specifies “5. Any cleaning products used to maintain photovoltaic materials must be biodegradable.” We anticipate that thousands of gallons of cleaning agents will be used to clean the 1.8 million panels. These cleaning agents should not harm people, birds, fish, etc. In this connection, we recommend that the ordinance, Special Use Permit and other applicable permits require that the cleaning agents be not only biodegradable but non-toxic as well.

#### **Section IV. Extreme Water Extraction from Fragile Aquifer Poses Undue Adverse Impact**

As explained in the introduction, the applicant proposes to drill centrally located wells to extract, from an already overburdened aquifer, about 945.35 acre-ft of water, equivalent to 308.043 million gallons, over just the 18 months of construction. This level of usage should be viewed as if 3,500-4,000 homes had dug new wells on the same site and experienced average water usage over the same period of time. During construction, the average monthly rate of over 17 million gallons exceeds by a factor of 57 the 300,000 gallon per month that would trigger the Virginia water extraction permitting process if

the site was within a state “groundwater management area”, in this case only a few miles away. [Footnote 4]

Also, the applicant states that an additional 24.21 acre-ft or 7.9 million gallons of water will be used yearly thereafter. This estimate is questionable and in need of further explanation and verification; particularly concerning is the peak rate of daily water consumption, not just the annual rate. The applicant states that “During operation of the Project, minimal water would be used for solar panel washing on an annual basis and periodically for landscaping...” We are concerned that the water usage during routine operations of the solar facility may be much higher than stated. The wording in their application indicates that panel washing would be done on an annual basis. For example, if they wash the panels once per year and it takes 10 days, then the daily water consumption is about 790,000 gallons per day. The impact of these peak loads should be evaluated. We are concerned that the amount of water to be used is greatly understated. More frequent cleaning in this East Coast climate will be needed versus other semi-arid solar locations because of contamination from the presence of high pollen counts, pine sap, periodic infestations of cicadas and birds and excrement from migrating waterfowl which are more difficult to remove from the glass panels.

We agree with the Virginia Department of Inland Game and Fisheries statement submitted by DEQ in connection with sPower’s application to the State Corporation Commission: “DGIF is concerned that the application has not fully evaluated the potential impact of ground water withdrawal to the surrounding watershed supporting [certain endangered species]”. **It is only prudent and reasonable that the potential for damage to existing wells and to Fawn Lake be expertly assessed by means of an independent hydro-geologic/drilling study** conducted by a professional hydrogeologist certified by the American Institute of Hydrology (AIH) or the American Institute for Professional Geologists.

Adverse consequences to homeowners of **a mistake in assessing the risk to the local aquifer would be catastrophic and irreversible**, e.g. dry wells, lack of water for agricultural irrigation and a decline in Fawn Lake’s normal water level which would prevent a mandated flow from the lake to farms to below the dam. Also, a drop in Fawn Lake water level would prevent golf irrigation and boating and recreational access. Dry wells would require the County to run county water lines to the affected properties costing millions of dollars. Dry wells and docks would inevitably lead to plunging property values and County property tax revenues which would offset or exceed any increased tax revenue from the solar facility.

**The County can more accurately assess these risks if a study independent of the applicant is conducted, including step tests for performance analysis and aquifer drilling, testing and analysis** for depth, water quality and sustainability in various drought and other conditions, etc. The need for such a detailed analysis is illustrated by the varying degrees of low pressure and sediment residents report in connection with their existing wells.

**The extreme water usage proposed raises a serious question whether the following requirements of the General Standards could reasonably be satisfied without an independent hydro-geologic/drilling study.** If the usage results in the further impairment of the aquifer and the springs feeding Fawn Lake, thus restricting the water usage of surrounding wells or lowering the level of Fawn Lake, a reasonable conclusion would be that the application did not meet the following General Standards: “(5) That the proposed use will not be detrimental to the public welfare or injurious to property or improvements within the neighborhood; (6) That the proposed use is appropriately

located with respect to ....water supply....; and (8) That the proposed use will have no unduly adverse impact on environmental or natural resources.” [See Footnote 5 for further explanation]

The mineral content of the water extracted from the local aquifer may not meet the non-streaking standards needed by the applicant to adequately clean the 1.8 million First Solar Series 6 Solar panels. This should be determined in advance of any consideration of the Special Use Permit. If this is found to be the case, any water treatment facility or water tower proposed to be built on the site to extract unwanted mineral content should be included in the application and closely scrutinized under all of the General Standards, including the decommissioning requirements, and subsequently monitored for regulatory compliance.

As noted earlier, a mistake in the risk assessment of water usage by the applicant would be catastrophic and irreversible. However, if the project is allowed to move forward, even on a lesser scale, a halt to further impairment of the aquifer and consequences to surrounding landowners can be better executed if the water consumption of the project is capped at specified amounts (construction and operation). To adequately monitor this requirement, the applicant should be required to measure and report water usage monthly. In addition, we think it only prudent that the County require provisions for the periodic reassessment of the impact of the project’s water consumption on the aquifer and nearby wells, lakes, streams and ponds. If an adverse effect is found, the applicant should be compelled under the terms of the Special Use Permit to reduce their well water consumption sufficiently to avoid further harm.

Sound scientific risk analysis, including but not limited to a GIS and hydro-geological/drilling study, obtained for the County from a source independent of sPower is crucial if the Planning Commission and the Board of Supervisors are to render a fully informed and non-conflicted decision on a Special Use Permit with respect to not only the above-described water issue but all other environmental matters. [Footnote 6]

[Footnote 4] During the 18 month construction phase, the average daily water consumption will be over 550,000 gallons per day. Of course, the peak load will be higher than the average.

[Footnote 5] An explanation of the potential instability of water levels in Fawn Lake may be helpful in understanding how a marginal change in water levels could prove catastrophic. Fawn Lake is replenished with water from Greenfield Creek and a number of springs leading from the aquifer. The entire watershed area for the 288 acre lake is very small, covering only about 4.1 square miles, so local impacts are very consequential. If the solar facility water consumption reduces water flow into the lake, then the lake level will decline over time, especially during droughts. Lake levels typically decline starting in late summer as seasonal rainfall diminishes. The reduced lake levels can persist until early spring when rainfalls increase. This indicates that the lake level is already sensitive to rainfall amounts. A further reduction in water flow into the lake could be catastrophic to the lake and its beneficial use by the children and adult residents of Fawn Lake. Of note is the requirement that Fawn Lake release water to downstream farms to help meet their agricultural needs. If water levels in Fawn Lake decline because of the applicant’s increased stress on the local aquifer, not only Fawn Lake residents but local farmers will be negatively impacted.

[Footnote 6] We suggest that the county GIS office conduct an independent study of the sPower applicant construction plan. The study should include loss of carbon sink, routes

for the equipment to travel and general spatial analytics. Costs incurred such as the purchase of WV3 imagery and additional required plug-ins should be covered by sPower.

**Carbon Sink:**

1. Purchase WV3 data May 2016 and May 2018 of the proposed construction site
2. Load data into GIS platform
3. Merge the data
4. Orthorectify the data
5. Determine vegetation by type and calculate current carbon sequestration amounts
6. Create feature files of the area for both years.
7. Calculate area of growth in 2016
8. Calculate area of growth 2018
9. Determine area of replanting sPower will need to achieve after purchase of the site properties in order to comply with State Forestry guidelines

**General Spatial Analytics:**

1. Download the .dem file for Spotsylvania county and convert the correct projection.
2. Convert the .dem file to DETED L2
3. Determine current slope of the planed areas
  1. From slope predict amount of land re-formation required for 2% grade of panel areas.
  2. From slope predict runoff to riparian zones
  3. Preform view shed of the area to homes 360.
4. Load TAZ.shp file
5. Load Address.shp file
6. Join TAZ and Address tables
7. Calculate tax lose to areas adjacent to power plant site at 3%, 5%, and 8%
8. Load Stream.shp
9. Produce buffer around stream 50 feet
10. Produce intersect of buffer and construction area

**Transport routes**

1. Map surrounding lines of communication and determine best route for heavy transport
2. Determine road wear due to heavy transport on class 3 road systems

**Section V. Full Cost of Decommissioning Should be Guaranteed by All Related Parties to Prevent Abandonment of a Potentially Toxic Waste Site**

The risk to the County of the millions of dollars it will cost to decommission the World's near 10th largest solar complex must be fully guaranteed by all partnerships and related corporate parties. **Abandonment of some or all of the solar facilities without immediate deconstruction and expert and safe removal of the solar panels and land restoration would present the County and surrounding landowners with the presence of potentially one of the largest toxic waste sites in the State** (abandonment and potential damage to First Solar Series 6 solar panels inside the glass frames would release toxic materials that requires special "hazardous" handling by OSHA during the manufacturing process).

Specific plans for the expert and safe removal and recycling of the panels should be required in the Special Use Permit. It is estimated that each First Solar Series 6 panel contains about 30 grams of Cadmium (Cd) and a similar quantity of Tellurium (Te).

With about 1.8 million panels, the total amount of Cadmium positioned over this site is over 100,000 lbs. Some sources indicate that leaching rates from broken panels will likely be small, but even relatively small leaching rates can result in the release of a significant amount of toxic material into the soil and water. Cadmium is highly toxic and genotoxic and exposure can cause cancer, and other diseases in the body's cardiovascular, renal, gastrointestinal, neurological, reproductive and respiratory systems. This level of risk, even if somewhat diminished when cadmium is combined with tellurium, makes for a compelling argument that the Special Use Permit include very specific precautions and protocols that the applicant should take to minimize the risks involved and to implement a best-practice emergency response when required. Some studies indicate that panel leaching rates can be very high in landfills under the right conditions, so the panels should be recycled rather than dumped in a landfill (for example, Leaching of Cadmium and Tellurium from Cadmium Telluride (CdTe) Thin-Film Solar Panels Under Simulated Landfill Conditions, Ramos-Ruiz et.al., April 2017). [Footnote 7]

Therefore, the provisions in the County Zoning Code Sec. 23-4.5.7. - Standards of review, in particular (d) which sets forth specific standards for solar facilities, needs to be invoked in the Special Use Permit with much more clarity and specificity to avoid a future financial calamity for the County and its taxpayers. Specifically, **the surety or other security issued to secure the payment for all aspects of decommissioning must be obtained and guaranteed by not just each of the seven limited partnerships (e.g. Pleinmont Solar, LLC is the only such entity currently named in the application to the State Corporation Commission) but also sPower, its parent corporations, AES Corporation and Alberta Investment Management Corporation, and their successors.**

The County should not agree to a Special Use Permit that would prevent recoupment of all of the decommissioning and remediation costs because of the dissolution or bankruptcy of a partnership or other entity that would negate the continued issuance of and payment for a surety (a less than creditworthy or bankrupt entity cannot obtain or renew a surety) or preclude liability for upstream corporate entities. That this clarification is an absolute necessity is illustrated by the less than stellar financial condition of the solar industry as a whole which has led to the bankruptcy of other large renewable energy companies (e.g. SunEdison and panel suppliers like SolarWorld and Solyndra) and the fragility of future governmental subsidies.

In addition, the Special Use Permit should specify that the surety or other security also include any decommissioning costs related to the remediation of any site contamination so as to allow for the complete restoration of the entire site.

[Footnote 7] End-of-Life Management: Solar Photovoltaic Panels, as published by IRENA, June 2016.

## **Section VI. Earthquakes and Extreme Weather Could Lead to Catastrophic Release of Toxins**

As explained above, even minor leaching of cadmium and tellurium from damaged solar panels will release significant amounts of highly toxic material into the soil and local water sources. While ongoing operations, if safely conducted to avoid damage to the panels, can be addressed in specified risk avoidance protocols, **there are severe weather and other conditions that can deliver an unintended catastrophic blow to the site's 1.8 million solar panels. We believe it imprudent to issue a Special Use Permit without conducting studies which assess catastrophic risks, the level of emergency**

**and other resources needed to respond to same and the means for making a timely and complete response by not only the applicant but all governmental emergency response teams.**

Snowball sized hail, hurricane and microburst level winds, tornados, lightning, forest fires, and earthquakes at various levels can all cause catastrophic events resulting in solar panel damage and the subsequent leaching of toxic and genotoxic materials. That energy plants can suffer damage from local earthquakes is illustrated by the 5.8 magnitude Central Virginia quake that emanated from Mineral in August, 2011 which impacted the Lake Anna nuclear power plants just 20-25 miles south of the proposed solar facility site. In that case, spent fuel canisters shifted and backup generators suffered a coolant leak triggering an “alert of unusual event” and the temporary shutdown of the facility.

This quake and aftershocks ran right through the proposed site, into Fawn Lake and beyond resulting in damage to various building structures, including the National Cathedral and Washington Monument as far away as Washington, D.C. A solar site of the immense size proposed would not be exempt from shifting earth and damage if another quake occurs over the stated 30 year expected lifetime of the project.

Tornados, hurricanes and microburst winds exceeding 80 mph are not uncommon in the Spotsylvania area and over the years they have resulted in severe damage and the actual destruction of homes and other entities. In the spring of 2017 a tornado running right through the proposed solar site laid down a swath of trees and proceeded to destroy parts of homes and roofs in Fawn Lake. **There is no denying that winds of this level that can damage trees and homes can also twist and damage solar panels and their structure, inverters, substations and other elements of the solar facility.** This was most recently demonstrated when Hurricane Maria struck several large solar power plants in Puerto Rico and ripped the solar panels from their foundation and destroyed them, most likely releasing the toxins embedded inside the glass and steel casings. Hurricane Irma similarly devastated a large solar facility in St. Thomas (see “It is in Shambles’: St. Thomas solar farm destroyed by Irma” video on WRAL.com).

Lightning poses another more unique risk to solar facilities. If granted, the Special Use Permit should require specific steps to be taken by the applicant to minimize any damage to elements of the facility that could result in harm to people or the environment. In this connection, the National Fire Protection Association (NFPA 780) and International Electro-Technical Commission (IEC-62305) standards suggest that solar facility developers take stock of lightning risk to establish a baseline for lightning protection systems.

**The actual prior occurrence in the local area of the above described severe weather and other natural events should be reason enough for the County to take care during the Special Use Permit process to require specific steps designed to avoid or deal with potential catastrophic events.** The County should require adequate capabilities and procedures to remotely detect and respond to emergency situations. To do otherwise would be to ignore the General Standards, in particular: “(4) That the proposed use will not adversely affect the health or safety of persons residing or working in the neighborhood of the proposed use; (5) That the proposed use will not be detrimental to the public welfare or injurious to property or improvements within the neighborhood; and (8) That the proposed use will have no unduly adverse impact on environmental or natural resources.”

## **Section VII. Require Strict Burning, Erosion and Seeding Requirements**

The Special Use Permit should include specific requirements for the applicant and subcontractors to not only meet the minimum state fire and burning laws, but strict rules prohibiting burning activities when winds would cause smoke and airborne particles to spread to the lake, ponds and homes adjacent to the power plant. Unless this activity is mitigated, the health of residents with pulmonary and other diseases could be severely compromised. The Special Use Permit should direct that the prescribed plan of the certified burn manager reflect this stricter requirement. This directive would be wholly consistent with the General Standards stating that “(4) That the proposed use will not adversely affect the health or safety of persons residing or working in the neighborhood of the proposed use;”

In like manner, the Special Use Permit should direct the applicant and subcontractors to not only meet the minimum provisions of the Virginia State Seed Tree Law but should also require erosion, sediment and tree/grass seed provisions that a due diligence analysis finds are necessary taking into account the facility’s unique placement in the middle of residential neighborhoods and surrounding streams, ponds and lakes. This would be consistent with the practices of other Virginia County ordinances addressing specific local conditions.

Severe and persistent downpours present another significant risk for erosion from storm water drainage. The 200 acre solar facility in Essex County has already experienced this kind of catastrophic event jeopardizing the environment. Tons of muddy runoff escaping into the watershed has resulted in an “an active enforcement case resulting in penalties” according to the Department of Environmental Quality (DEQ). An incident like this could devastate the area, including the DGIF Oakley Forest, Fawn Lake, and the streams and rivers that flow all the way to the York River (see <https://www.riverfriends.org/update-on-essex-county-solar-farm-stormwater-run-off/>).

**The size of the sPower site presents Spotsylvania with a risk of out of control storm water runoff 30 times that of the Essex County site.** Financial penalties levied after severe damage of this sort is no substitute for a requirement by Spotsylvania County and DEQ that sPower offer a detailed high-quality, erosion prevention plan (perhaps including berms, gutters and holding ponds) as a condition for approval of a Special Use Permit and similar state requirements. **As a precondition of any approval, we endorse the recommendation by the Virginia Department of Environmental Quality** (submitted by DEQ in connection with sPower’s application to the State Corporation Commission) that an effective Environmental Management System (EMS) be adopted and that the applicant adhere to on-site Best Management Practices (BMP).

## **Section VIII. Solar Heat Island Effect Could Negatively Impact Local Environment**

We agree with the Virginia Department of Inland Game and Fisheries statement submitted by DEQ in connection with sPower’s application to the State Corporation Commission: “...‘thermal island’ impacts of large solar facilities also are potentially of concern.” Consistent with the DGIF recommendations, we also suggest that there be additional study of the potential negative heat island impact a 500 MW utility-sized solar power plant could impose on surrounding water sources, environmental and other natural resources, animals and people.

It has been demonstrated that the installation of photovoltaic solar energy facility changes the local climate due to changes in the way the sun's rays are absorbed by the soil and vegetation resulting in only a 4% reflection versus the 20% or so reflection rate from solar panels. A research paper titled "The Photovoltaic Heat Island Effect: Larger solar power plants increase local temperatures" presents the results of a year-long field test by the University of Arizona, Tucson. The study measured temperatures 2.5 meters above the ground at three locations to compare the differences. The locations were nearby each other, and included a natural semiarid desert (natural environment), a 1 MW PV solar farm, and an asphalt parking lot. The study found that temperatures were 5.4-7.2 degrees Centigrade warmer over the solar farm than the natural terrain. [Footnote 8]

Compare the results of this study involving only a 1 MW solar facility to the 500 MW facility proposed by sPower and it is difficult to dismiss the potential for severe and sustained negative consequences on the local climate and environment.

Studies indicate that the solar heat island effect from very large installations could reduce local rainfall by as much as 20%. The potential impact of both higher evaporation rates and lower rainfall could have a very significant impact on the local climate, and it would negatively impact flow rates in nearby streams and water levels in lakes and ponds. Any additional negative consequences from the solar heat island effect on water resources would only exacerbate the previously described threat to the water level of Fawn Lake.

Much more research is needed to understand the impacts of the solar heat island effect on the local climate as DGIF suggests. The proposed 500 MW solar farm in Spotsylvania County represents an unprecedented step-out in size on the East Coast. The solar heat island effect is one example where scale matters.

Further study may find that the heat island effect is proportional to the size of the solar facility, so the **best solution would be for the County to require a reduction in the size of the sPower footprint** in order to abate an undue adverse impact on neighboring properties.

[Footnote 8] The Photovoltaic Heat Island Effect: Larger solar power plants increase local temperatures, Barron-Gifford, et.al., Nature.com, March 2016  
<https://www.nature.com/articles/srep35070.pdf>

## **Section IX. Preserve Property Values by Requiring Significant Visual/Sound Barriers**

In addition to the other potential adverse consequences of the proposed solar facility explained above, the mere sight, sound and presence of the proposed facility could have a negative impact on surrounding property values, including on the sale and resale of properties and homes. **It is only reasonable that the Special Use Permit require barriers, berms, evergreen trees and shrubbery sufficiently removed from the site's border (e.g. 100 yards) to adequately mute the sounds coming from the facility and to fully block the sight of the solar fields. A setback of at least 100 yards along the Fawn Lake border and other neighboring properties zoned residential would also help curb contamination from chemicals and drainage into property-owner lots.** As stated at several public meetings, as a good neighbor this extensive solar power plant should not be seen or heard from residential areas.

## Conclusions and Recommendations

**The lack of specifics regarding this project is problematic.** Just a few examples should suffice: the application lacks specifics with respect to the amount and manner chemicals and other products will be used and the areas over which they will be spread. The location and number of wells to tap the local aquifer are left unspecified, as are monthly and peak amounts of consumption. Left unstated are details regarding the location of elevated berms and concrete drainage systems which are critical to avoiding severe erosion from downpours, drainage and flooding, especially beyond the sites' boundaries. Also, unstated are any plans for the positioning of security fences which will protect the public from the risk of electrocution, exposure to electromagnetic interference of medical devices, and flying panels or debris. Emergency plans to address toxic contamination and other safety issues in the event of a catastrophic event are lacking. Also left unspecified is the location of setbacks and barriers to minimize noise and visual pollution that could negatively affect property values. In addition, it is stated that "There is the potential for one or more phases of the Project to include an intelligent battery system onsite for energy storage." Given the size and risks associated with such units spanning 20-40 feet and rising nearly 10 feet into the air, the application should be clear as to whether or not such units will be used so an assessment of risk can be performed.

The proposed sPower solar power plant (sited over an area as large as Fredericksburg and producing power over half that of a Lake Anna nuclear reactor) is lacking in detail as to critical elements of its construction and operation. **Our plea to the Spotsylvania County Planning Commission and Board of Supervisors is that action be taken on the sPower application to ensure: (1) that the many potential risks of undue harm to the aquifer, the environment and other natural resources, animals and humans be adequately and independently assessed, and (2) that sPower be required to submit plans specific and sufficiently validated to avoid or mitigate such risks.**

We think that a World-scale solar power plant to be owned and operated by a non-utility should undergo the same extensive and rigorous process that would be required of a utility company planning to build a 500 megawatt facility. What is to prevent an actual utility company from purchasing this facility once built, thus obviating the more rigorous scrutiny it would have been given if the utility was the original developer? We are also concerned that sPower or another solar operator could be viewing the agricultural properties remaining in the general area as a target for future expansion, thus avoiding an assessment of the more extensive environmental and other risks of an even larger original complex.

**Issuing a Special Use Permit before these concerns are fully addressed, including the guaranteed assumption of liability by sPower and all related and successor entities for the full cost of decommissioning and remediation, would be unacceptable to Concerned Citizens of Fawn Lake and Spotsylvania County.**

Genaille  
12000 Fawn Lake Parkway  
Spotsylvania, VA 22551

## **Fire Detection and Prevention**

SUP conditions must require the applicants to provide 24/7 specialized fire detection and firefighting capability on sites A, B and C.

Here's why.

The three sites combined are the size of the city of Fredericksburg. There are approximately 2700 homes on the periphery of the sites.

The closest firefighting units are Station 7 at the intersection of Brock and Orange Plank Roads, Station 9 in Belmont, and Station 2 in Brokenburg.

Station 7 is 5 miles from the closest entrance to Site A, Station 9 is 5.5 miles from Site B, and Station 2 is 6.5 miles from Site C.

According to an article in Forbes Magazine September 6, 2017 edition entitled "The Terrifying Physics of How Wildfires Spread So Fast" wildfires travel at approximately 14 mph, faster if driven by wind or terrain upslope. That equates to approximately 1 mile every 4 minutes.

Given the distances firefighting units must travel on narrow, curvy country roads to reach the sites, if a wildfire were to start anywhere within Site A, B or C it would reach residences on the periphery of the sites before firefighting units could arrive on the scene.

Lack of 24/7 fire detection/reporting equipment on site, the necessity for fire vehicle access to the sites through locked gates, and narrow gravel/dirt roads within the solar panel complex will further delay firefighter response.

This situation is dangerous now and will become more so as the sites are developed and 1.8 million solar panels are installed.

Here's why.

The sites are covered with thousands of tons of flammable clear cut debris and new growth underbrush. Once the land is cleared, native field grasses will be planted to

prevent soil erosion. This material provides abundant fuel for wildfires, particularly in hot, dry summer months.

Sources of ignition such as sparks and hot exhaust pipes from vehicles/equipment, welding and open flame work, discarded cigarettes, electrical arcing from high power lines, storage of flammable fuels on site, and lightning strikes will dramatically increase the probability of wildfires on the sites.

Tons of I-beam steel supports for solar panel arrays will be huge lightning attractors.

The roads within the sites will not be wide enough and have the weight bearing capability to support large/heavy firefighting vehicles.

The applicants' Emergency Response Plan, Section 4.4.2 states: "Access aisles consist of unimproved native material and are not suitable for all emergency services vehicles."

To avoid electrical shock, commonly used firefighting agents such as water or chemical retardants cannot be used to extinguish wildfires under or near solar modules or inverters.

Thus specialized firefighting equipment must be immediately available 24/7 to prevent fires from extending beyond the sites to residential areas. If such equipment does not exist, the SUP application should not be approved.

It is not a matter of IF but WHEN a wildfire event will happen on the solar field sites!

Failure to require the applicants to provide 24/7 specialized fire detection and firefighting capability designed to be used under and near solar panels and inverters will put nearby residents at elevated risk of loss of life or serious injury and property damage from wildfires.

# The Terrifying Physics Of How Wildfires Spread So Fast



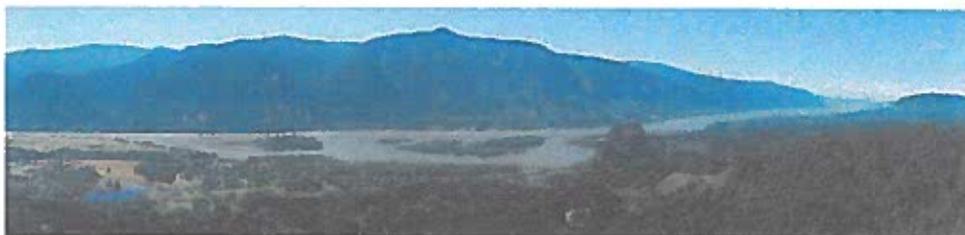
Ethan Siegel Senior Contributor  
Starts With A Bang Senior Contributor  
Science

*The Universe is out there, waiting for you to discover it.*



The Eagle Creek fire has now spread to engulf over 10,000 acres, has caused the evacuations of thousands of families, and millions of dollars in property damage. The terrain itself will take decades to recover. TRISTAN FORTSCH/KATU-TV VIA AP

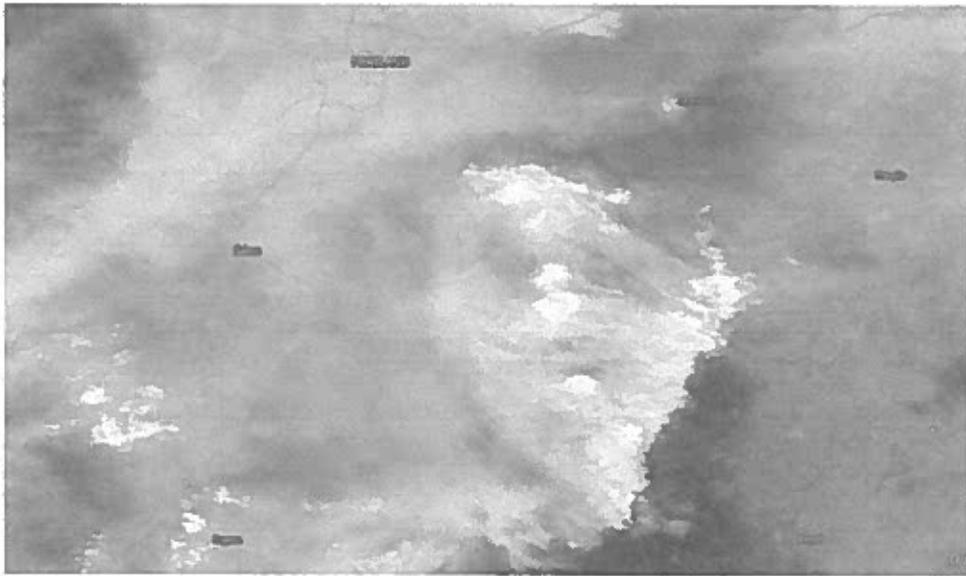
At about 3:30 PM on a Saturday afternoon, Kevin Marnell was hiking along Eagle Creek in the scenic Columbia Gorge, along the border between Oregon and Washington. The National Scenic Area has been protected for over 30 years and contains the only navigable river to run through the Cascade Mountain range to the Pacific Ocean. Rainforests and grasslands have created a thriving ecosystem along both the Oregon and Washington sides, with humans living there for some 13,000 years. On the afternoon of September 2nd, Marnell heard loud banging sounds, like gunfire. He soon realized it was worse than gunfire, as thick smoke began rising nearby.



A view of the Columbia River Gorge from the near the top of Hamilton Mountain, looking south from the Washington state side of the gorge. On the left side of the image, the Bonneville Dam is visible. The entire Oregon side of this view, taken in better

times, is now aflame, along with much of the Washington side as well. SNOTTYWANG/WIKIMEDIA COMMONS

Two (at least) teenage boys were tossing fireworks off a cliff and into the gorge, and one didn't make it, going off in the forest. Just hours later, 153 hikers in the Eagle Creek area were stranded, needing to be rescued and evacuated. Within 24 hours, more than 3,000 acres were engulfed in flames. The nearby town of Cascade Locks was evacuated over Labor Day weekend, followed by five other towns. By Tuesday morning, a thick haze blanketed most of western Oregon and Washington states, reducing the air quality to the most dangerous levels. Throughout Tuesday, ash fell from the skies in Portland, accumulating more than an inch in places, as the fire swelled to over 10,000 acres in area. Embers crossed the Columbia River, spreading the fire into Washington State as well.



Smoke and haze have filled the entire valley to the west of the Cascades, causing a severe air quality warning across much of Oregon and Washington states. NASA

The fire continues to race westward at an alarming pace, at one point having traveled 13 miles in a span of just 16 hours. Monday and Tuesday evening, 600,000 young hatchery fish were released up to six months early, as it was the only way to give the fish a chance at life in the face of the approaching wildfires. Over 4,500 people have been evacuated from their homes as of Wednesday morning, and the fire continues to spread, having reached 30,000 acres as of midday on Wednesday. With officials now considering whether to order a mandatory evacuation for parts or, potentially, the entirety of Portland, OR, it's never been more important to understand why and how wildfires are so dangerous, and how they can spread so quickly. Four out of every five wildfires are caused by human activity, and this one may prove to be among the most catastrophic in recent history.

## YOU MAY ALSO LIKE

Overnight time lapse of the Eagle Creek fire in Oregon



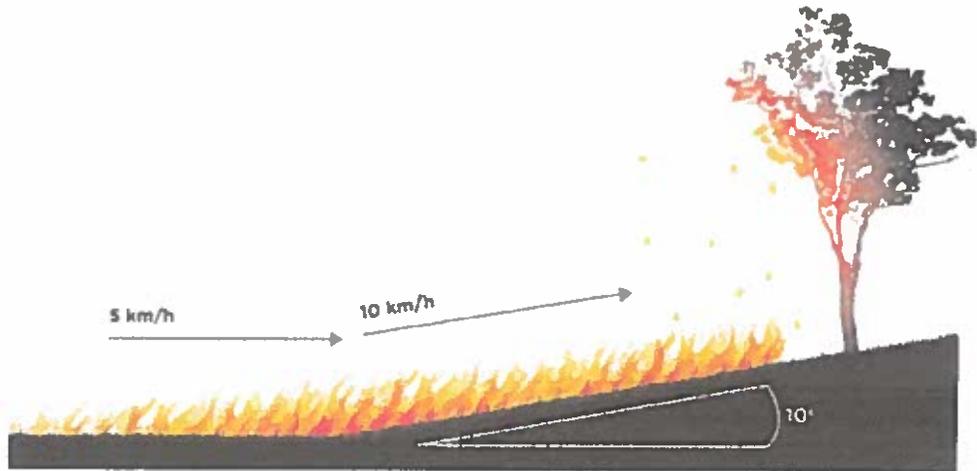
Every summer, when it's been dry enough for long enough, all the counties west of the Cascade mountain range throughout Washington and Oregon place a burn ban in effect. Summer is wildfire season out here, as the long, wet winters and springs we experience lead to a tremendous amount of tree growth and undergrowth; this past year was particularly spectacular for that. While much of the west coast saw long-standing drought conditions alleviated, we also received record-setting rainfalls in places, both in terms of total accumulation and in the number of consecutive days with precipitation.



As photographed on September 5th, the 'fuel' from a rainy winter and spring and a very hot, dry summer has created one of the worst fires in decades. It now threatens the evacuation of Portland, OR. ASSOCIATED PRESS

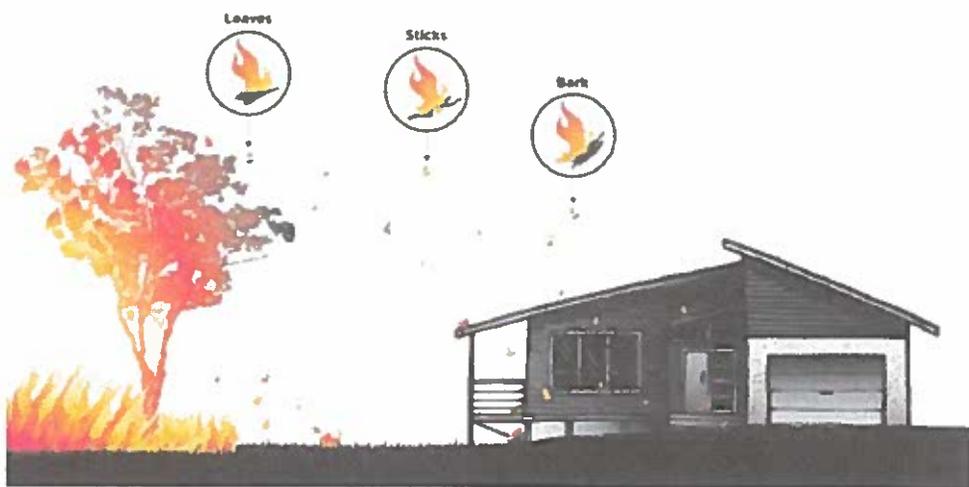
All of this served to create a huge amount of potential "fuel" for wildfire season. Coupled with the warm, dry summers that the Pacific Northwest experiences — and it's been uncommonly warm this year — that fuel becomes easily

combustible. Oxygen is never a problem in this region of the country, and the Columbia Gorge, in particular, is notorious for breezes and continuously-moving air. That means, during the dry season, where you have lots of highly flammable plant matter to serve as fuel, oxygen to keep it burning, and high temperatures and winds to help spread the fire, all you need is something to ignite it. In 80% of situations, that's a negligent or malicious human.



Fires can spread very quickly, but an additional 10 degrees of slope is enough to double the speed at which a fire spreads. At some points in the Columbia Gorge, the slope is three times that value. COUNTRY FIRE AUTHORITY (CFA) / VICTORIA STATE GOVERNMENT, AUSTRALIA

Fires can travel quickly: up to 6 miles-per-hour in forests and up to 14 miles-per-hour in grasslands. If you have an upward-slope to your terrain, the flames can travel even faster; an extra 10 degrees of slope will double the speed of your fire. It's the reason why, if the fire started near the bottom of the Columbia Gorge, it's only a brief amount of time before it spreads up and engulfs the entire valley.



When embers from a lit tree burn leaves, bark, or twigs, they can travel, via wind, to homes, other flammable areas, or even across rivers. An ember attack can even cross deliberate firebreaks if the flaming debris is high enough and the winds are strong enough. COUNTRY FIRE AUTHORITY (CFA) / VICTORIA STATE GOVERNMENT, AUSTRALIA

The fires can also spread to homes, jump cleared areas, or even cross natural firebreaks like rivers, owing to what's known as an "ember attack." When high-

standing plant matter (like trees) catch fire, burning twigs, leaves, and pieces of debris can be carried large distances by the wind, still aflame after traveling tens or even hundreds of feet through the air. Any small, dry, easily flammable thing that it contacts can easily catch fire, from a leaf on another tree across a body of water to the dried pine needles in a house's rain gutters. If the fire gets too close to a major city, it becomes much more an issue of rescuing and evacuating people than it does about saving homes and preventing property damage. Just a few months ago, **62 people were killed** owing to a wildfire in Portugal.



Lightning strikes and human activity are the two main causes of wildfires on Earth, which routinely spread to burn thousands of acres every fire season. NATIONAL WILDFIRE COORDINATING GROUP

While it's true that 20% of fires have natural causes — mostly lightning strikes — the remainder, and hence the vast majority, are caused by human activity. There are burn bans all throughout Washington and Oregon that have been in place for two months, but all it takes is one spark to begin that fiery combustion reaction, and the dry, flammable flora can turn it into a catastrophe. While the press may be calling the firestarters "idiot teenagers," which they may well be, they're also arsonists, having knowingly started one of the worst fires in a protected (and populated) area that Oregon has seen in decades. As [Alex Berezow wrote](#) for the American Council on Science and Health:

“ All of this was entirely preventable. And all of this was entirely foreseeable; even teenagers understand the consequences of their actions. But they just didn't care. They didn't care that a forest fire could not only destroy a true natural treasure, but that it could threaten the lives of thousands of people and cause millions of dollars in damage.



A wildfire as seen from near Stevenson Wash., across the Columbia River, burning in the Columbia River Gorge above the Bonneville Dam near Cascade Locks, Oregon. TRISTAN FORTSCH/KATU-TV VIA AP

The good news, though, is twofold:

1. The fire is likely to slow down its spreading, as temperatures are dropping and winds are blowing only slowly. Rain is even forecast for parts of the valley later this week.
2. The Columbia Gorge, being a temperate rainforest ecosystem, will recover quickly. Shrubs and bushes will return within 12 months; young Douglas Firs will tower over humans in a decade. Within about 30 years, there will be scant evidence to hikers, passersby, wildlife, and even forest rangers that there was ever a fire here.

Fires like this can be prevented, but it's up to all of us to be responsible. One evil or negligent action, even a small one, can grow to an uncontrolled catastrophe: destroying thousands of acres of land, displacing thousands of people, causing millions of dollars worth of damage, and may even threaten to burn a major city before it's all over. The iconic Smoky the Bear may say "only you can prevent forest fires," but the truth is that everyone has to be on board. It's up to all of us. It's not merely something we "can" do, but rather something we "must" do.

*I am a Ph.D. astrophysicist, author, and science communicator, who professes physics and astronomy at various colleges. I have won numerous awards for science writing since 2008 for my blog, [Starts With A Bang](#), inclu... MORE*

*Astrophysicist and author Ethan Siegel is the founder and primary writer of [Starts With A Bang!](#) His books, [Trekology](#) and [Beyond The Galaxy](#), are available wherever books are sold.*

**Scott King**  
Image Scientist

9641 Nottoway Lane  
Spotsylvania VA, 22551  
(540)276-1680  
Scott.king@geo-seer.com

13 April 2018

**Mr. Mueller,**

As a Certified Geospatial Analyst and an Image Scientist (CGP) of twenty-six years advising government agencies, businesses and investment groups on the feasibility and footprint of powerplants globally, I have assessed the current sPower proposed site in Spotsylvania County.

Using local GIS files, Digital Elevation Maps (DEM), Imagery and distributed water sample data from the United States Geological Survey (USGS), I have determined that the local aquifer is not robust enough to sustain industrial taps in quantity to supply water to a solar power site of the proposed magnitude. These findings have been detailed in a hydrology an erosion study titled *sPower Solar Power Site: Issues in Hydrology and Erosion.*

These issues are not insurmountable and may be overcome with the proper use of site-engineered bioswales, solar powered dehumidifiers, underground cisterns and retention ponds. Many sites globally utilize these capture aids in retain water for site maintenance and other utility.

A site-engineered water retention system addresses other issues such as runoff and erosion, along with saturation of the soil in such quantities as to prevent routine maintenance, lowers insurance rates for fire and flood, and provides areas for growth of native wetland vegetation.

The current plan, as provided by sPower, would lead to the collapse of the area aquifer, sink holes and increased costs to residents, agricultural areas and the county as additional more expensive wells will be required, and other environmental impacts managed.

Sincerely,



Scott King CGP

# GEO SEER LLC

---

## sPower Proposed Solar Power Site

Issues in Hydrology and Erosion

3/21/2018



### Summary

There are two main environmental issues of the sPower proposed site. The issue are the impacts on local area aquifers and due to poor site engineering erosion. Both issues can be controlled with the appropriate site development.

## Local Hydrology

The USGS has a distributed water database that is locally managed. Surface water, groundwater, and water quality data are compiled from these local, distributed databases into a national information system. The groundwater database contains records from about 850,000 wells that have been compiled during groundwater hydrology studies over the past 100 years. Information from these wells is served via the Internet through the National Water Information System (NWIS) Web Interface. <https://groundwaterwatch.usgs.gov/>

The four closest ground water monitoring sites to the proposed sPower solar power plant are in Prince William County, Louisa County, Orange County and Fauquier County. The Fauquier County site is the only monitored well sitting on a separate aquifer.

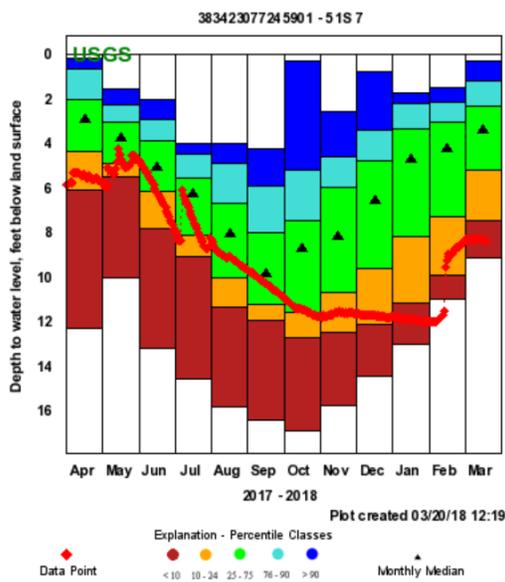
Except for Fauquier County, all the data collected over the last 47 years indicate a continuing decrease in water levels in this area of Virginia. The two counties bounding Spotsylvania County, Orange and Louisa Counties, both indicate trends in the tenth percentile or below. In the case of Orange County, water levels are trending severely below historic norms.

The sPower proposed site is in the Po River-Robertson Run (*HUC 12 020801050102 VAHU6 YO39*) hydrology area of the York River watershed. The Po River-Robertson Run area is supported by local weather (Spotsylvania County is included in an area Rain Shadow along with Orange, Culpeper and Louisa Counties) <sup>1</sup>and is not supported by a large underground reservoir. Most local area residence receive water from the Surficial Aquifer that contains water in unconfined conditions, but clay beds create locally confined conditions. This means that the impact of industrial scale water usage by local tap, such as proposed by sPower, would be a significant impact and probable cause of depletion of the local area water reserves.

---

<sup>1</sup> USGS Ground Water Atlas of the United States, Segment 11 (Delaware, Maryland, New Jersey, North Carolina, Pennsylvania, Virginia and West Virginia)

Site Statistics



Most recent data value: **8.31** on 3/20/2018  
 Period of Record Monthly Statistics for 383423077245901  
 Depth to water level, feet below land surface  
 All Approved Continuous & Periodic Data Used In Analysis  
 Note: **Highlighted** values in the table indicate closest statistic to the most recent data value.

Month	Lowest Median	10th %ile	25th %ile	50th %ile	75th %ile	90th %ile	Highest Median	Number of Years
Jan	12.96	11.13	8.13	4.69	3.31	2.20	1.71	36
Feb	10.95	9.86	7.23	4.24	3.00	2.15	1.49	30
Mar	<b>9.08</b>	<b>7.46</b>	5.17	3.36	2.32	1.19	0.29	34
Apr	12.27	6.07	4.32	2.88	1.98	0.62	0.14	35
May	10.03	5.47	4.88	3.75	3.00	2.24	1.52	28
Jun	13.19	7.82	6.11	5.02	3.87	2.91	1.99	37
Jul	14.56	9.06	8.11	6.27	5.53	4.44	3.99	32
Aug	15.77	11.30	10.03	8.02	6.68	4.88	3.97	31
Sep	16.41	11.94	11.20	9.82	7.95	5.86	4.24	32
Oct	16.88	12.71	11.57	8.68	7.41	5.14	0.27	37
Nov	15.75	12.42	10.63	8.16	5.93	4.57	2.52	32
Dec	14.43	12.10	9.56	6.56	4.73	3.37	0.77	36

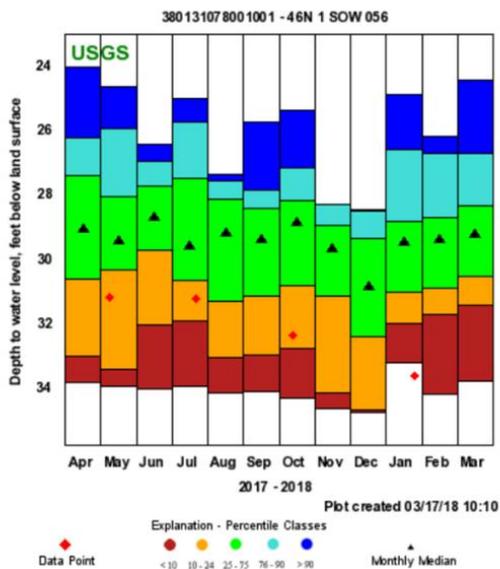
.As of 3/17/2018 00:11-2

Statistics Options

View month/year statistics

Figure 1 USGS Water level Prince William County Site 383423077243077245901-51S7

Site Statistics



Most recent data value: **33.61** on 1/22/2018  
 Period of Record Monthly Statistics for 380131078001001  
 Depth to water level, feet below land surface  
 All Approved Continuous & Periodic Data Used In Analysis  
 Note: **Highlighted** values in the table indicate closest statistic to the most recent data value.

Month	Lowest Median	10th %ile	25th %ile	50th %ile	75th %ile	90th %ile	Highest Median	Number of Years
Jan	<b>33.22</b>	32.01	31.03	29.49	28.85	26.62	24.90	22
Feb	34.20	31.72	30.93	29.40	28.73	26.75	26.20	21
Mar	33.80	31.43	30.55	29.25	28.35	26.73	24.44	21
Apr	33.82	33.04	30.62	29.09	27.44	26.25	24.04	21
May	33.95	33.44	30.34	29.45	28.06	25.97	24.65	21
Jun	34.02	32.04	29.72	28.70	27.76	26.98	26.43	22
Jul	33.94	31.94	30.67	29.62	27.49	25.74	25.03	21
Aug	34.17	33.05	31.30	29.21	28.16	27.57	27.40	22
Sep	34.12	32.99	31.15	29.39	28.42	27.86	25.75	21
Oct	34.30	32.76	30.84	28.88	28.21	27.16	25.40	36
Nov	34.63	34.14	31.15	29.69	28.97	28.33	28.33	16
Dec	34.78	34.68	32.42	30.86	29.38	28.52	28.48	10

.As of 3/17/2018 00:09-2

Statistics Options

View month/year statistics

Figure 2 USGS Water level Louisa County Site 380131078001001-46N 1 SOW 056

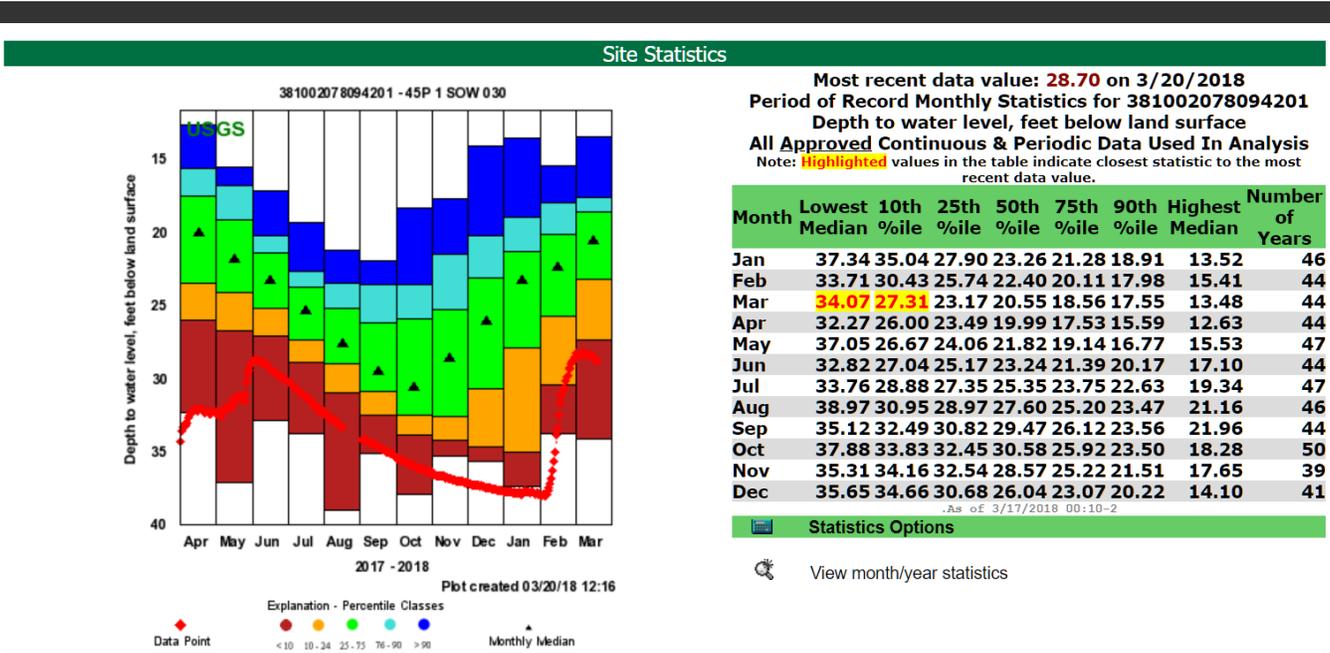


Figure 3 USGS Water Level Orange County Site 381002078094201-45P 1 SOW 030

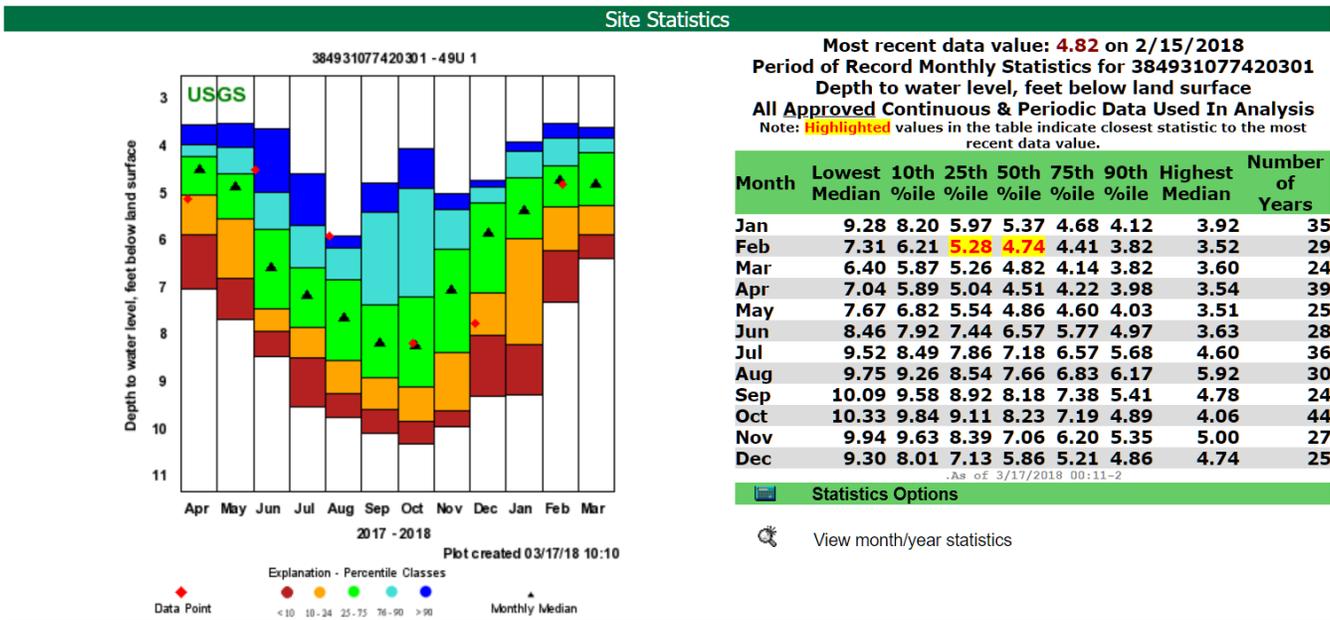


Figure 4 USGS Water Level Fauquier County Site 384931077420301-49U1

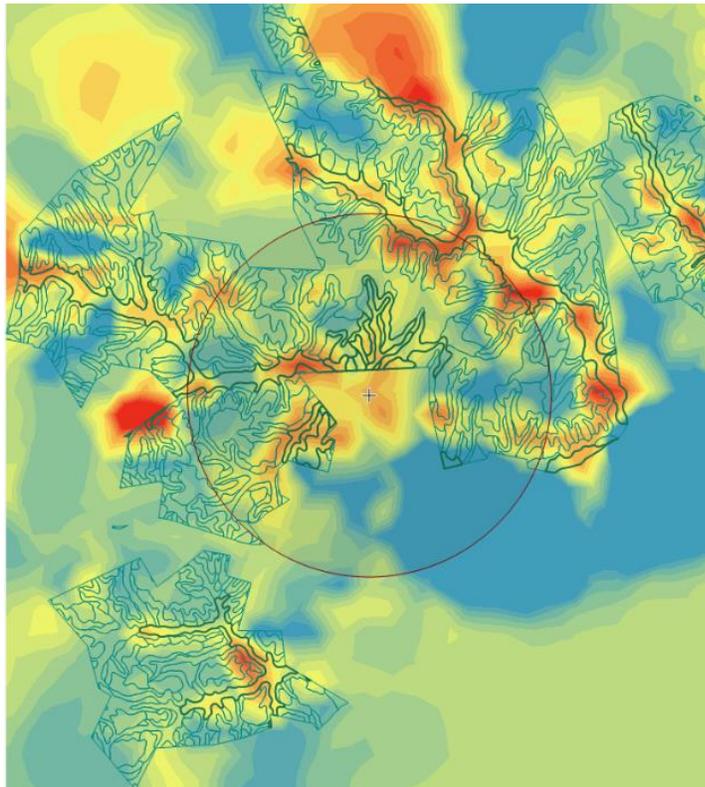
Likely impacts include increased water levels drops below current area well depths (40'-65'), collapse of current sub terrain localized aquifers and increases in sedimentation. This degradation will have a direct impact on the 2,674 (*Figure 4*) residences around the proposed site and the county as it would be required to supply water and sewage to the residents and agriculture affected.



*Figure 4 2,674 Households around the proposed site*

## Erosion of the Local Area

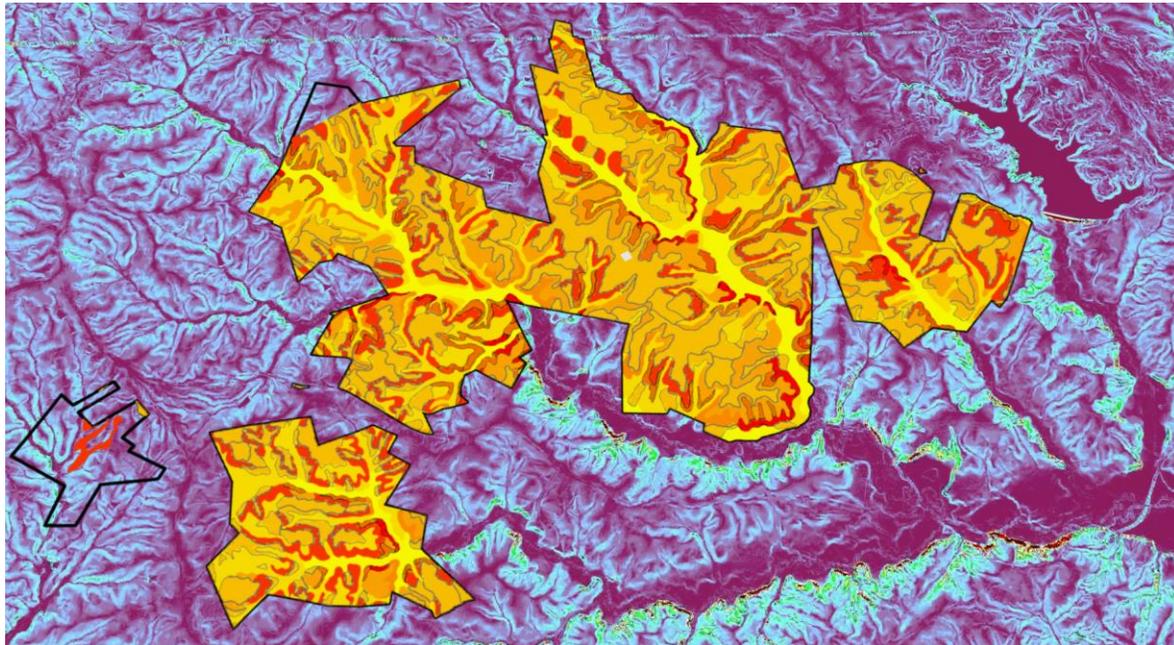
The map in *Figure 5* consists of a National Elevation Dataset base layer downloaded from the United States Geological Survey (USGS). The NED layer n39w078 provides a 3m elevation profile of Spotsylvania County. Also included are the areas sPower is proposing as the three-site configuration for the solar power plant. From the Spotsylvania County GIS office came the county soil map. The Po River-Robertson Run (*HUC 12 020801050102 VAHU6 YO39*) hydrology area of the York River watershed from USGS is included. The map in *Figure 5* shows areas of erosion throughout the proposed site. In red and yellow are the areas currently under threat and eroding while blue indicates soil stability. The current proposed sPower site plan is to disturb areas currently stable by creating a contiguous area with a gentle slope for the panel arrays. This will greatly increase the erosion throughout the area.



*Figure 5 Site erosion due to slope and soil type*

The map *Figure 6* is of the proposed sPower solar power plant site depicting slope, soil by type and area hydrology. None of the primary soils on the proposed site area are hydric, meaning the soils do not absorb water. This map is the true indicator of a massive potential for erosion with the current sPower site plan across approximately 10 square miles of Spotsylvania County. Since

none of the area soil is hydric, water from seasonal rain showers and snow storms will not percolate through the soil, instead they will pool on the top shelf and runoff down slope. Terrain slope analysis of the area proves a range of 5-45 degrees of angle across the local area with little exception.



- Fluvaquents-Udifluvents complex
- Aquults, loamy-Margo complex, 2 to 7 percent slopes
- Catharpin silt loam, 2 to 7 percent slopes
- Tatum loam, 7 to 15 percent slopes, eroded
- Fluvanna fine sandy loam, 7 to 15 percent slopes, eroded
- Nason silt loam, 15 to 25 percent slopes, eroded
- Nason silt loam, 15 to 25 percent slopes, eroded
- Nason silt loam, 7 to 15 percent slopes, eroded
- Nason silt loam, 7 to 15 percent slopes, eroded
- LaRoque loam, 25 to 55 percent slopes

Figure 6 Soil by type in relation to slope and hydrology

These issues are not insurmountable and may be overcome with the proper use of site-engineered bioswales, solar powered dehumidifiers, underground cisterns and retention ponds. Many solar power sites globally utilize these capture aids to retain water for site maintenance and other utility.

A site-engineered water retention system addresses other issues such as runoff and erosion, along with saturation of the top layers of soil in such quantities as to prevent routine maintenance,

lowers insurance rates for fire and flood, and provides areas for growth of native wetland vegetation.

The current plan, as provided by sPower, would lead to the collapse of the area aquifer, sink holes, mass erosion and increased costs to residents, agricultural areas and Spotsylvania County as additional more expensive wells (or installation of county water utility lines) will be required, and other environmental impacts managed.

Appendix A: Ground Water Atlas of the United States

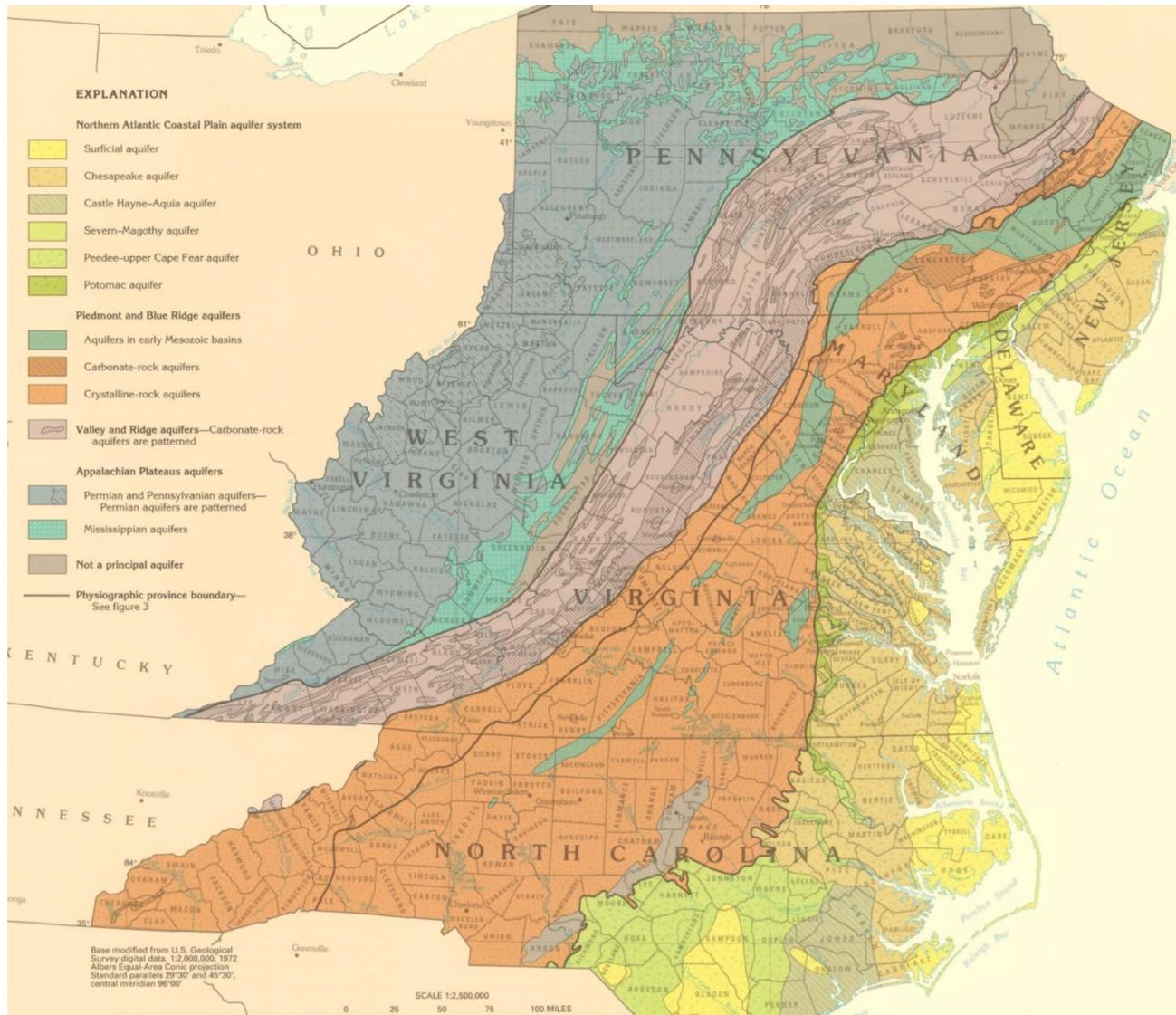


Figure 7 Page L 4 Principal Aquifers Ground Water Atlas of the United States

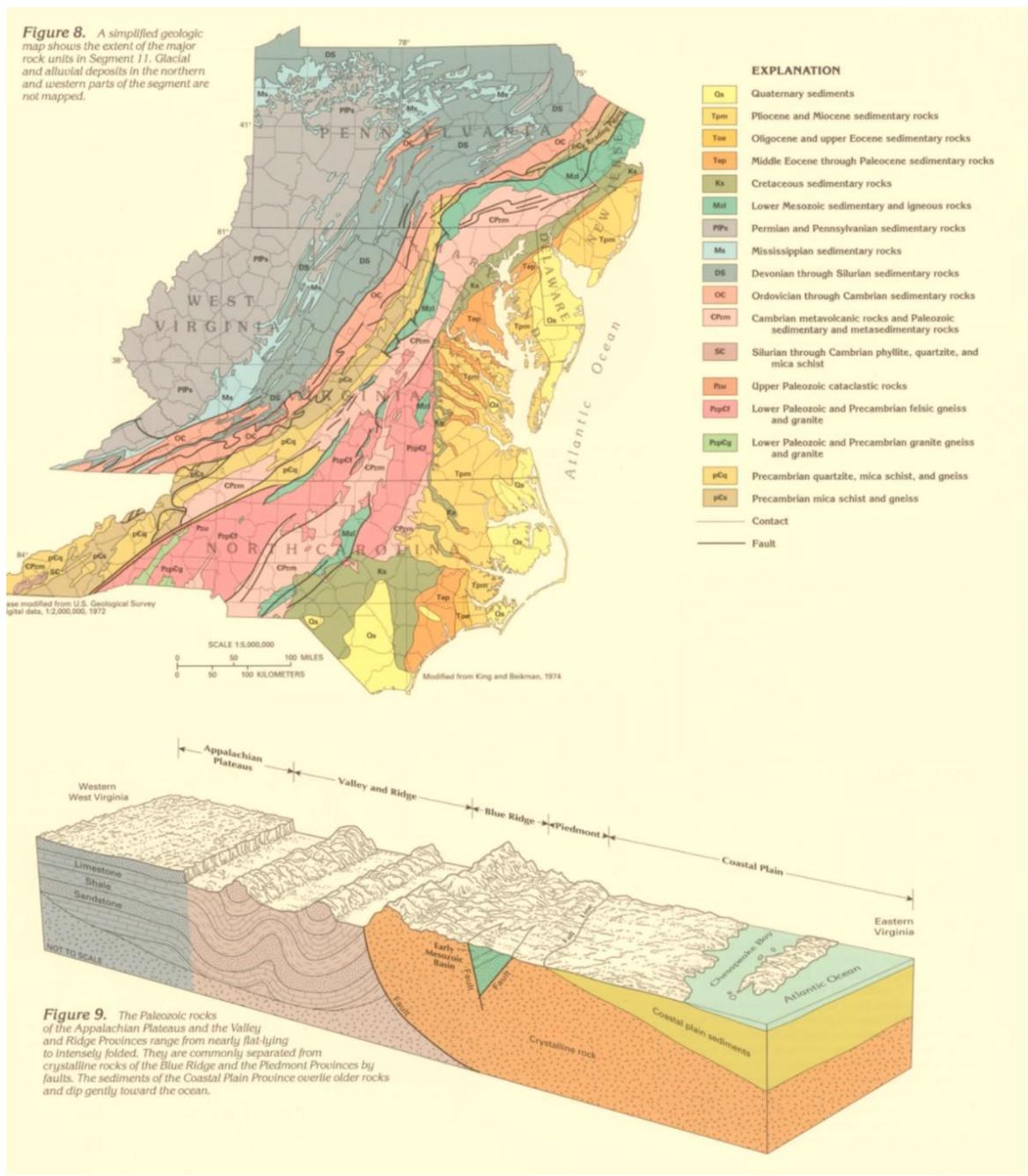


Figure 8 Page L5 Geology Aquifers Ground Water Atlas of the United States

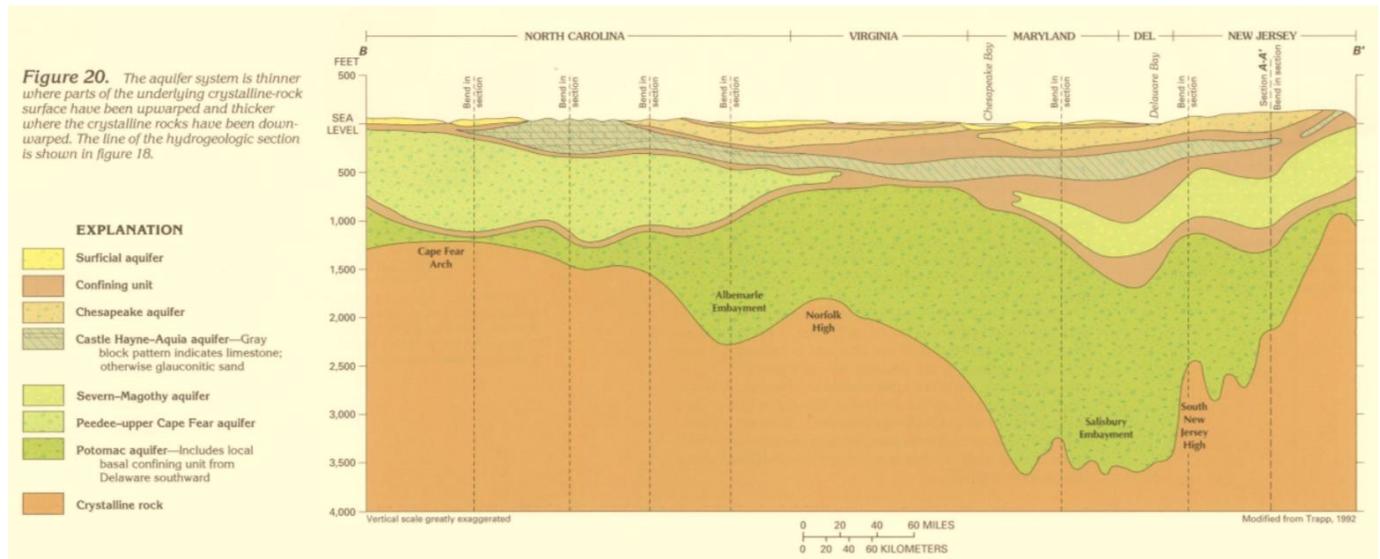


Figure 9Page L8 Piedmont Aquifer Ground Water Atlas of the United States

# GEO SEER LLC

---

Scott King  
Image Scientist

9641 Nottoway Lane  
Spotsylvania VA, 22551  
(540)276-1680  
Scott.king@geo-seer.com

13 April 2018

Mr. Mueller,

As a Certified Geospatial Analyst and an Image Scientist (CGI) of twenty-six years advising government agencies, businesses and investment groups on the feasibility and footprint of powerplants globally, I have assessed the current sPower proposed site in Spotsylvania County.

Using local GIS files, Digital Elevation Maps (DEM), Imagery and distributed water sample data from the United States Geological Survey (USGS), I have determined that the local aquifer is not robust enough to sustain industrial taps in quantity to supply water to a solar power site of the proposed magnitude. These findings have been detailed in a hydrology an erosion study titled *sPower Solar Power Site: Issues in Hydrology and Erosion*.

These issues are not insurmountable and may be overcome with the proper use of site-engineered bioswales, solar powered dehumidifiers, underground cisterns and retention ponds. Many sites globally utilize these capture aids in retain water for site maintenance and other utility.

A site-engineered water retention system addresses other issues such as runoff and erosion, along with saturation of the soil in such quantities as to prevent routine maintenance, lowers insurance rates for fire and flood, and provides areas for growth of native wetland vegetation.

The current plan, as provided by sPower, would lead to the collapse of the area aquifer, sink holes and increased costs to residents, agricultural areas and the county as additional more expensive wells will be required, and other environmental impacts managed.

Sincerely,



Scott King CGP

---

9641 Nottoway Lane  
Spotsylvania VA, 22551  
T (540)273-1680 U SCOTT.KING@GEO-SEER.COM



# GEO SEER LLC

---

## sPower Proposed Solar Power Site

Issues in Hydrology and Erosion

3/21/2018



### Summary

There are two main environmental issues of the sPower proposed site. The issues are the impacts on local area aquifers and due to poor site engineering erosion. Both issues can be controlled with the appropriate site development.

## Local Hydrology

The USGS has a distributed water database that is locally managed. Surface water, groundwater, and water quality data are compiled from these local, distributed databases into a national information system. The groundwater database contains records from about 850,000 wells that have been compiled during groundwater hydrology studies over the past 100 years. Information from these wells is served via the Internet through the National Water Information System (NWIS) Web Interface. <https://groundwaterwatch.usgs.gov/>

The four closest ground water monitoring sites to the proposed sPower solar power plant are in Prince William County, Louisa County, Orange County and Fauquier County. The Fauquier County site is the only monitored well sitting on a separate aquifer.

Except for Fauquier County, all the data collected over the last 47 years indicate a continuing decrease in water levels in this area of Virginia. The two counties bounding Spotsylvania County, Orange and Louisa Counties, both indicate trends in the tenth percentile or below. In the case of Orange County, water levels are trending severely below historic norms.

The sPower proposed site is in the Po River-Robertson Run (*HUC 12 020801050102 VAHU6 Y039*) hydrology area of the York River watershed. The Po River-Robertson Run area is supported by local weather (Spotsylvania County is included in an area Rain Shadow along with Orange, Culpeper and Louisa Counties) <sup>1</sup>and is not supported by a large underground reservoir. Most local area residence receive water from the Surficial Aquifer that contains water in unconfined conditions, but clay beds create locally confined conditions. This means that the impact of industrial scale water usage by local tap, such as proposed by sPower, would be a significant impact and probable cause of depletion of the local area water reserves.

---

<sup>1</sup> USGS Ground Water Atlas of the United States, Segment 11 (Delaware, Maryland, New Jersey, North Carolina, Pennsylvania, Virginia and West Virginia)

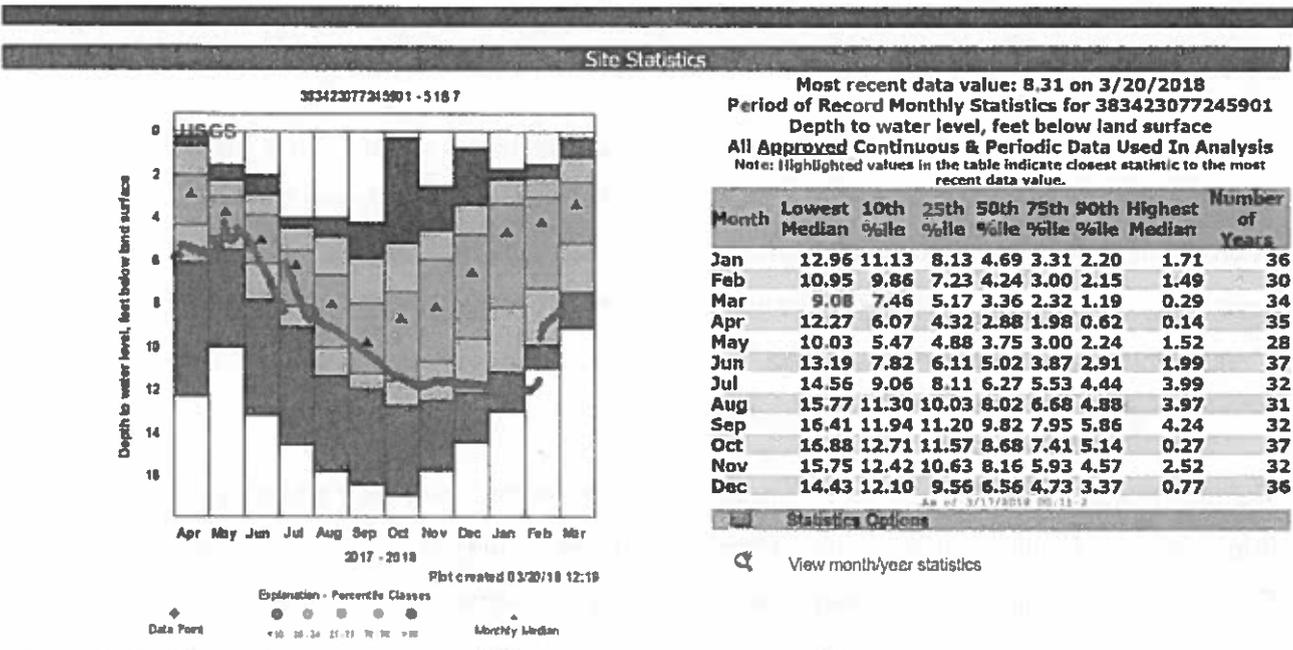


Figure 1 USGS Water level Prince William County Site 383423077243077245901-5187

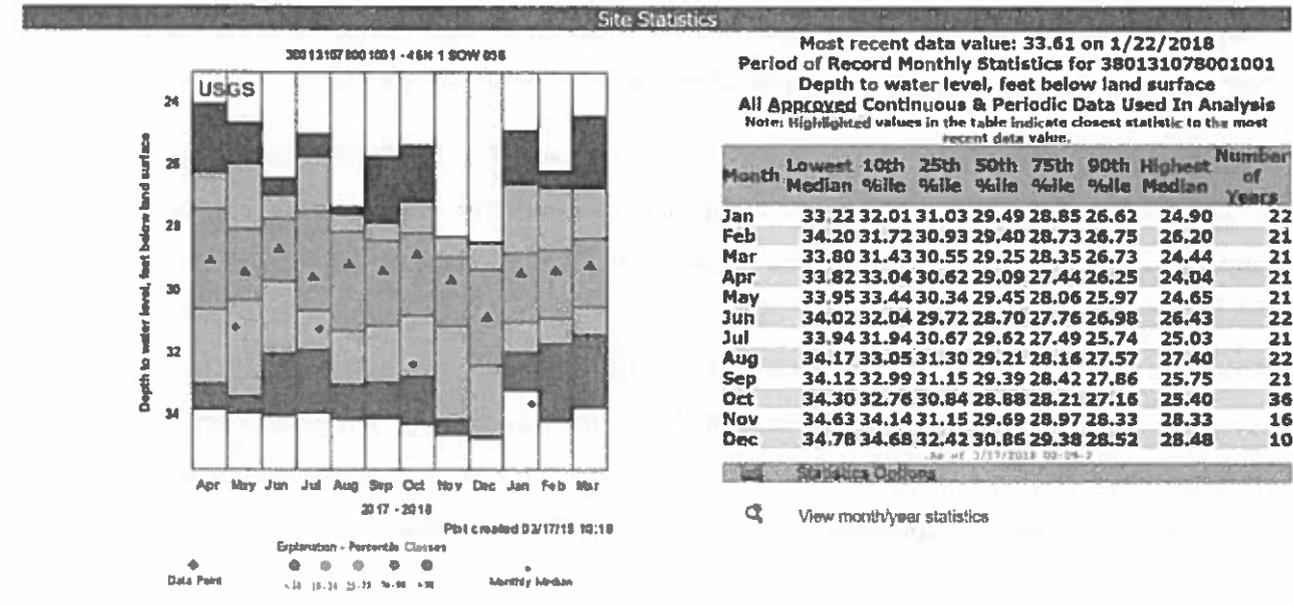


Figure 2 USGS Water level Louisa County Site 380131078001001-46N 1 SOW 036

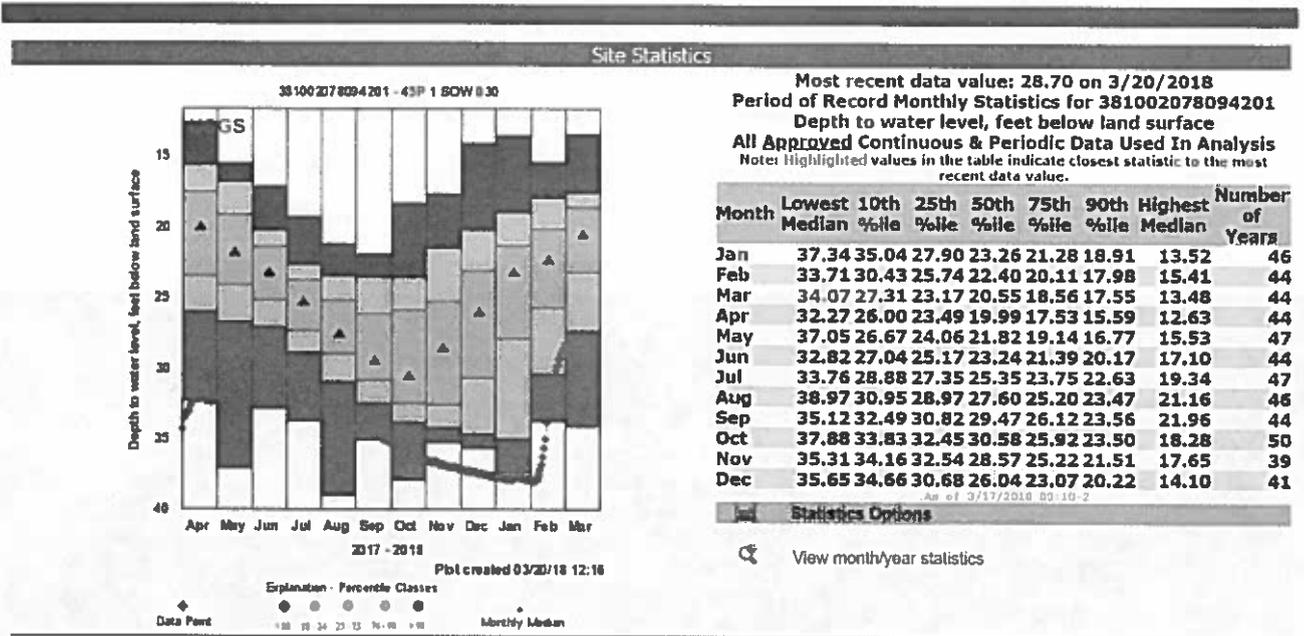


Figure 3 USGS Water Level Orange County Site 381002078094201-45P 1 SOW 030

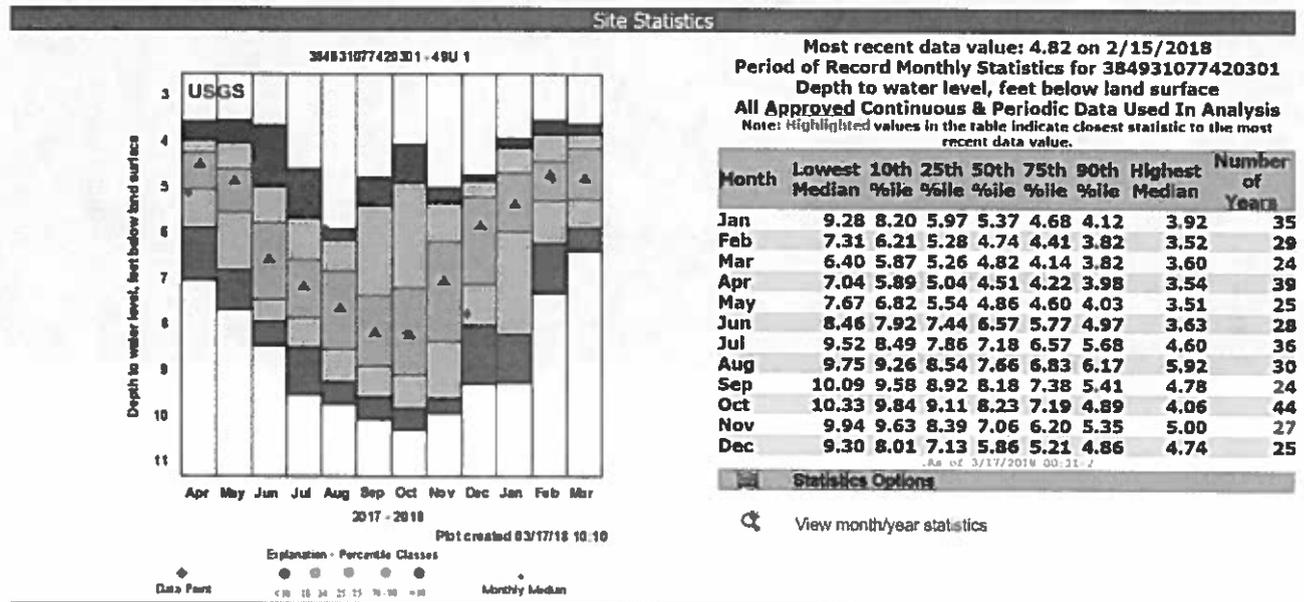


Figure 4 USGS Water Level Fauquier County Site 384931077420301-49U 1

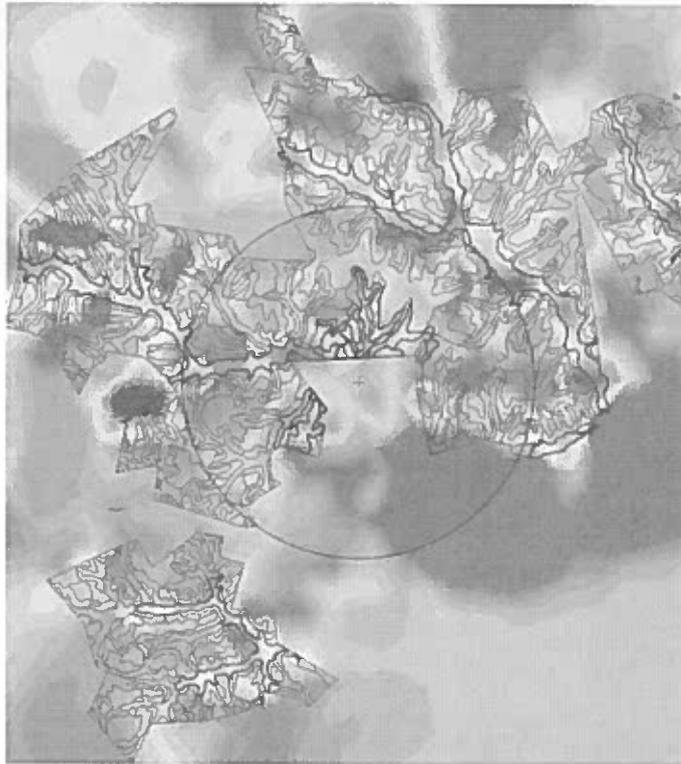
Likely impacts include increased water levels drops below current area well depths (40'-65'), collapse of current sub terrain localized aquifers and increases in sedimentation. This degradation will have a direct impact on the 2,674 (Figure 4) residences around the proposed site and the county as it would be required to supply water and sewage to the residents and agriculture affected.



Figure 4 2,674 Households around the proposed site

## Erosion of the Local Area

The map in *Figure 5* consists of a National Elevation Dataset base layer downloaded from the United States Geological Survey (USGS). The NED layer n39w078 provides a 3m elevation profile of Spotsylvania County. Also included are the areas sPower is proposing as the three-site configuration for the solar power plant. From the Spotsylvania County GIS office came the county soil map. The Po River-Robertson Run (*HUC 12 020801050102 VAHU6 YO39*) hydrology area of the York River watershed from USGS is included. The map in *Figure 5* shows areas of erosion throughout the proposed site. In red and yellow are the areas currently under threat and eroding while blue indicates soil stability. The current proposed sPower site plan is to disturb areas currently stable by creating a contiguous area with a gentle slope for the panel arrays. This will greatly increase the erosion throughout the area.



*Figure 5 Site erosion due to slope and soil type*

The map *Figure 6* is of the proposed sPower solar power plant site depicting slope, soil by type and area hydrology. None of the primary soils on the proposed site area are hydric, meaning the soils do not absorb water. This map is the true indicator of a massive potential for erosion with the current sPower site plan across approximately 10 square miles of Spotsylvania County. Since

none of the area soil is hydric, water from seasonal rain showers and snow storms will not percolate through the soil, instead they will pool on the top shelf and runoff down slope. Terrain slope analysis of the area proves a range of 5-45 degrees of angle across the local area with little exception.



- Fluvaquents-Udifuvents complex
- Aquults, loamy-Margo complex, 2 to 7 percent slopes
- Catharpin silt loam, 2 to 7 percent slopes
- Tatum loam, 7 to 15 percent slopes, eroded
- Fluvanna fine sandy loam, 7 to 15 percent slopes, eroded
- Nason silt loam, 15 to 25 percent slopes, eroded
- Nason silt loam, 15 to 25 percent slopes, eroded
- Nason silt loam, 7 to 15 percent slopes, eroded
- Nason silt loam, 7 to 15 percent slopes, eroded
- LaRoque loam, 25 to 55 percent slopes

*Figure 6 Soil by type in relation to slope and hydrology*

These issues are not insurmountable and may be overcome with the proper use of site-engineered bioswales, solar powered dehumidifiers, underground cisterns and retention ponds. Many solar power sites globally utilize these capture aids to retain water for site maintenance and other utility.

A site-engineered water retention system addresses other issues such as runoff and erosion, along with saturation of the top layers of soil in such quantities as to prevent routine maintenance,

lowers insurance rates for fire and flood, and provides areas for growth of native wetland vegetation.

The current plan, as provided by sPower, would lead to the collapse of the area aquifer, sink holes, mass erosion and increased costs to residents, agricultural areas and Spotsylvania County as additional more expensive wells (or installation of county water utility lines) will be required, and other environmental impacts managed.

Appendix A: Ground Water Atlas of the United States

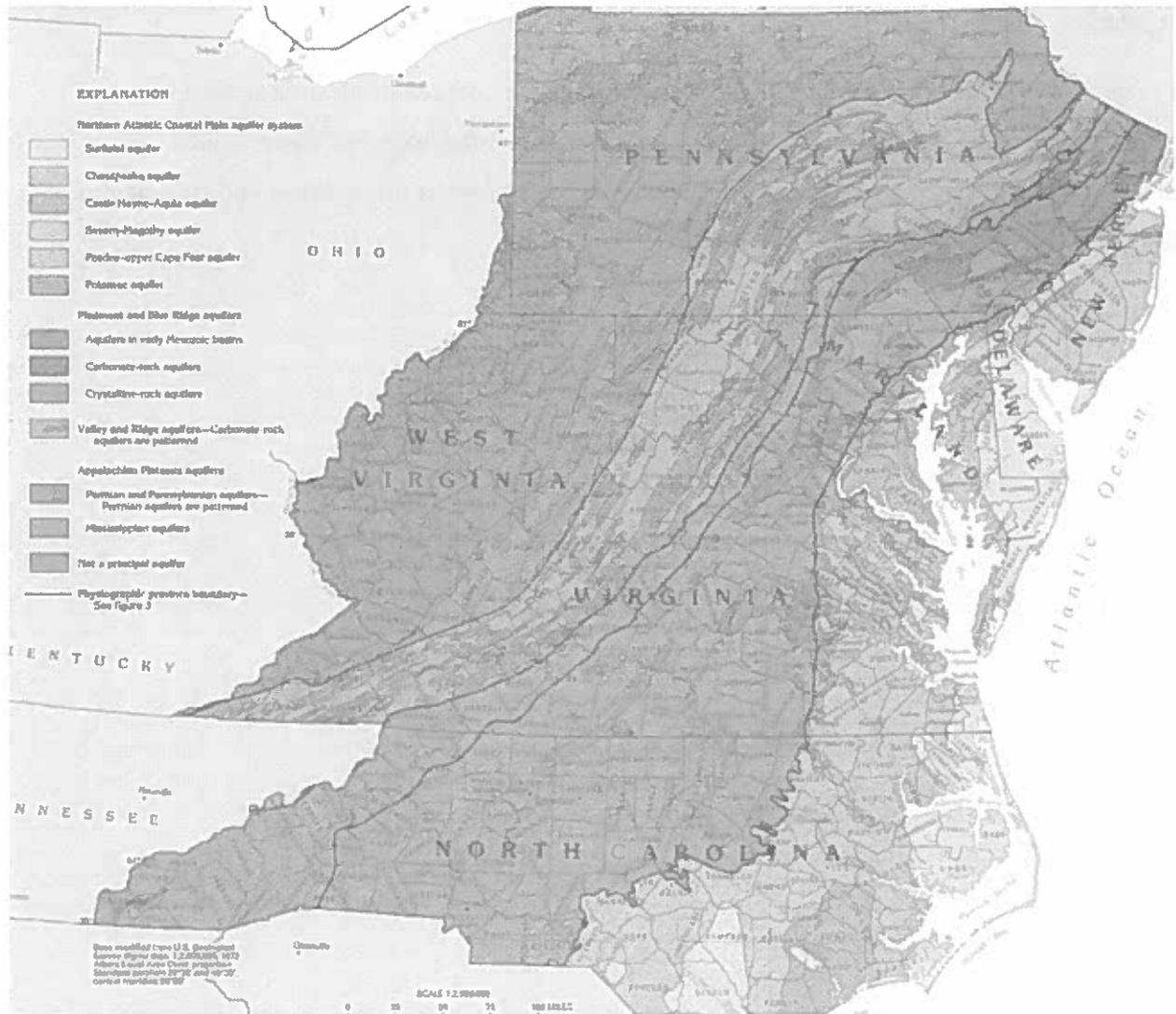


Figure 7 Page L 4 Principal Aquifers Ground Water Atlas of the United States

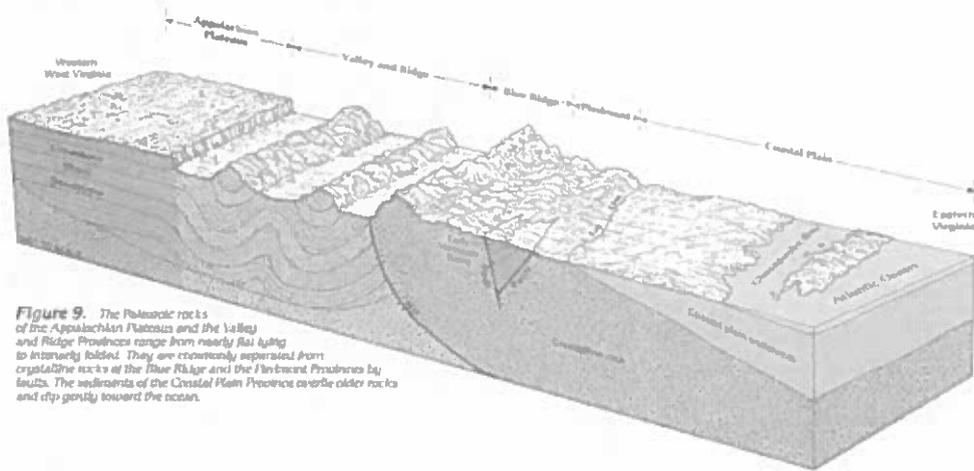
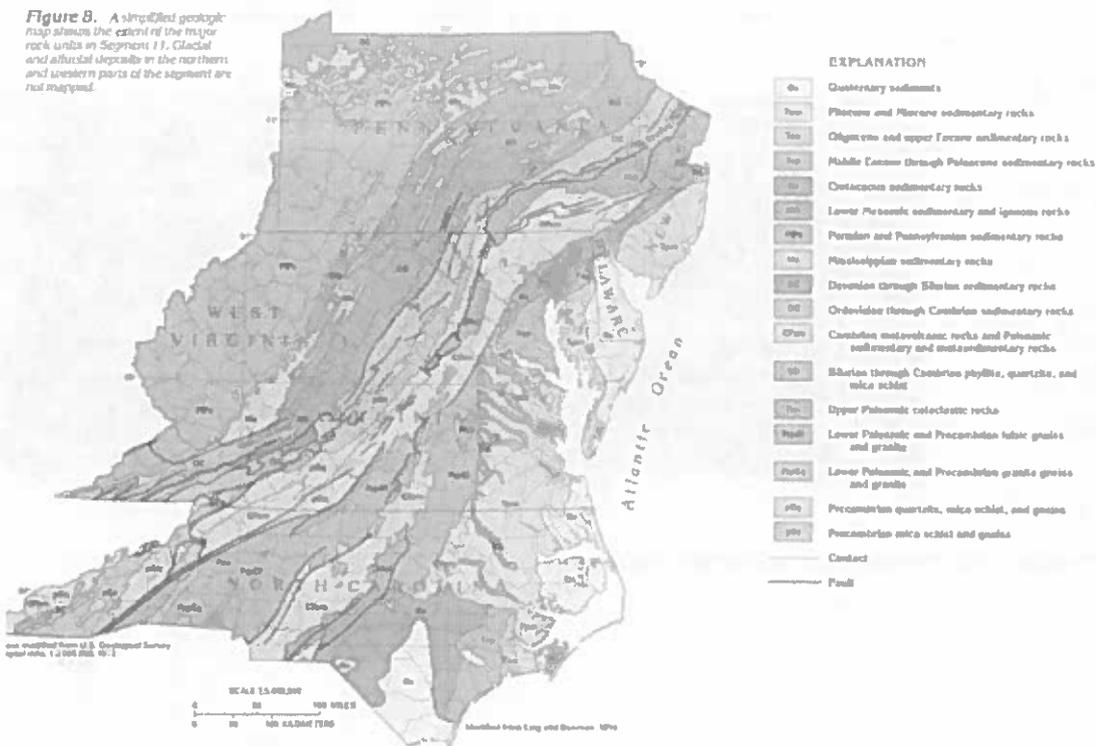


Figure 8 Page L5 Geology Aquifers Ground Water Atlas of the United States

Figure 20. The aquifer system is thinner where parts of the underlying crystalline-rock surface have been upwarped and thicker where the crystalline rocks have been downwarped. The line of the hydrogeologic section is shown in Figure 18.

EXPLANATION

-  Surficial aquifer
-  Confining unit
-  Chesapeake aquifer
-  Castle Hayne-Agula aquifer—Grey block pattern indicates brecciated, otherwise glauconitic sand
-  Beavers-Magee aquifer
-  Pender-upper Cape Fear aquifer
-  Patuxent aquifer—includes local basal confining unit from Delaware southward
-  Crystalline rock

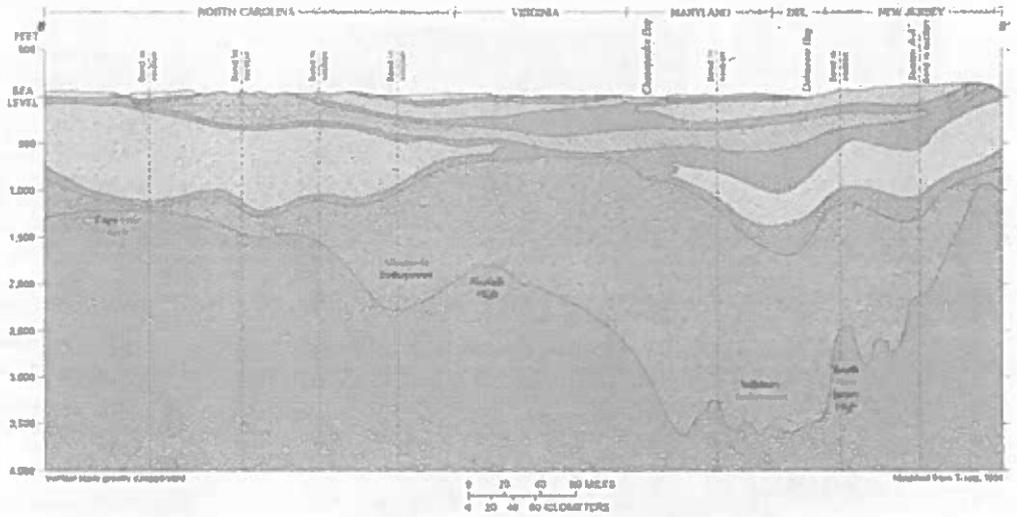


Figure 9Page L8 Piedmont Aquifer Ground Water Atlas of the United States

## Concerns with Cadmium Leaching from Solar Panels

sPower's Cadmium Telluride Panel Integrity and Safety document states:

*"The panel's thin layer of CdTe is encapsulated between two sheets of glass and sealed with an industrial laminate"*



Photo: [http://img.alibaba.com/photo/115259576/broken\\_solar\\_panel.jpg](http://img.alibaba.com/photo/115259576/broken_solar_panel.jpg)

However, these panels only contain a single sheet of plastic attached to the bottom sheet of glass.

**How is anything “encapsulated” above a single sheet of plastic?**

First Solar (panel manufacturer) has not responded to two requests for scientific data demonstrating that the Cadmium remains inside mangled panels following a devastating storm.

## Concerns with Cadmium Leaching from Solar Panels

Scientific confirmation that “encapsulation” is fully effective is crucial to confirm that all Cadmium remains inside damaged panels.

sPower has stated that cleanup of broken panels is simply a matter of picking up broken glass.

However, if the broken pieces contain Cadmium, then an urgent and thorough cleanup effort is required to ensure all of the toxic material is found and recovered.

Cadmium will leach out at different rates based on conditions. Leaching rates as high as 73% in one month have been measured under certain acidic conditions. Given enough time, all of the Cadmium will be released, regardless of leaching rate.

We do not want thousands of pounds of Cadmium released into the soil and groundwater!

## Concerns with Cadmium Leaching from Solar Panels

**SIMPLE SOLUTION → PROHIBIT USE OF THESE TYPES OF PANELS**

For example:

Culpeper County prohibited the use of ALL Thin-Film technology solar panels:

*Section 33. Panel Specifications and Composition.*

*“The Applicant, consistent with the Applicant’s commitment to the County, shall not utilize any panels that are of the type known as thin-film panels, including but not limited to not utilizing amorphous silicon (a-Si), cadmium telluride (CdTe), copper indium gallium selenide (CIS/CIGS), or organic photovoltaic cells (OPC) panels.”*

Reference: Culpeper County resolution to approve Use Permit #U-2207-18-1 Greenwood Solar I LLC (Oct. 2, 2018)



## Comments to Spotsylvania Planning Commission, March 7, 2018

1) **Massive Scale** – Proposed project produces 500 MW electrical power from 1.8 million solar panels. The project would be:

- One of the largest solar facilities in the world (tied for 12<sup>th</sup>).
- 5<sup>th</sup> largest in the U.S. All four of the larger U.S. power plants are located in remote desert areas of California, Nevada, Arizona.
- Proposed project is surrounded by residential neighborhoods.
- Solar panels are placed on 6,350 acres, or 10 square miles. This is equal to the size of the City of Fredericksburg, VA, or almost half the size of Manhattan.
- Largest solar energy facility on the East Coast is just over 100 MW.
- Largest solar energy facility in Virginia is 100 MW (Southampton), started up in December 2017.
- Unprecedented step-out in scale on East Coast ... 5X larger size!

2) **Water Usage Rates** – the large scale increases the water usage

- sPower states that they need 308 million gallons of water during 18 months of construction. This is a 10% increase in well water consumption in Spotsylvania. Peak loads could easily be 15-20% higher when accounting for weekends and other non-working days.
- sPower may propose trucking in water due to the large requirements during construction. A semi-sized tanker truck holds about 9000 gallons, and weighs 80,000 lbs. Supplying 787,000 gallons every workday would require 87 maximum size tanker truckloads every workday for 18 months (over 34,000 loads). This would be in addition to the approximately 3850 tractor-trailer loads of solar panels, and the indeterminate number of concrete, heavy equipment, and other supply deliveries to the construction site during this same period. This will have a huge impact on traffic and our roads and bridges.
- In addition, sPower states that 8 million gallons per year is needed during operation. The water will be used for landscaping and panel washing on an annual basis. Peak loads during panel washing could be millions of gallons in a few days.
- We think that the panels will have to be washed much more often than once per year, given the pollen, pine sap, bugs and birds that are so prevalent in Virginia. Can you imagine washing your car's windshield just once per year? Monthly cleaning is more realistic, so water requirements will be 10 times higher than sPower's estimate.

### **3) Extreme Water Extraction Threatens Aquifers, Wells and Fawn Lake**

- Excessive extraction of water from new large capacity wells could lower groundwater levels and irreversibly damage the aquifer.
- There are 1000+ households that depend on well water in the immediate vicinity of the project. Many of these residents report problems with their wells during periods of drought. Further stress on the aquifer could exacerbate the problems, requiring Spotsylvania County to spend millions of dollars to supply drinking water to these residents.
- Fawn Lake depends on ground water from several springs plus water from Greenfield Creek. A reduction in groundwater levels could dry up these springs, which would reduce the lake level and make it unusable for recreation. This would be devastating to the Fawn Lake Community.
- We recommend that an independent hydro-geologic/drilling study be performed to determine if the required water extraction rates are feasible and sustainable.
- We understand that the state will not limit the quantity of water that can be extracted since Spotsylvania is not in a water management area. Any limitations on well water extraction rates must be included in the Special Use Permit.

### **4) Due Diligence is Needed to Assess the Impact of Building a World Scale Solar Power Plant in This Region**

- There has not been time to study the environmental impacts due to the large solar projects in Virginia (50-100 MW) because have only recently been completed. Negative environmental impacts from increasingly larger solar power plants in Virginia environs, adjacent to residential neighborhoods, should be carefully evaluated before allowing even larger facilities to be constructed. Some impacts can be irreversible and devastating.
- The "solar heat island effect" could significantly impact the local climate. Local temperatures could increase by 5 to 7 degF and rainfall could be reduced by 20%. This is another risk that is scale dependent, and much more research is need to understand and mitigate the risks in Virginia environs, near residential neighborhoods.
- Wherever possible, the County ordinances should be revised to ensure that adverse consequences are avoided or mitigated. In addition, the Special Use Permit should provide specific constraints and requirements for this project to avoid harming the residents, wildlife, or the environment.
- sPower is trying to make Spotsylvania County the "guinea pigs" that will find out about the potentially serious impacts of building such a large scale solar energy power plant on the East Coast. We need to do our due diligence to ensure that we can live with the consequences.

**Remarks by Lew Sherman, a Livingston District homeowner, Spotsylvania County, on  
10/3/2018**

I wish to refer you to the document, submitted to you on September 25, 2018, by the Concerned Citizens of Fawn Lake and Spotsylvania County (Concerned Citizens), which outlined all of our concerns regarding sPower's application for a special use permit to construct a 500 Megawatt solar panel facility in Spotsylvania County (Document). Essentially, this Document stated the application should not be supported unless all issues raised by the Concerned Citizens were "adequately assessed and mitigated in the Special Use Permit being considered by the Planning Commission and the Board of Supervisors.

I stand here tonight to express my concerns with the amount of water needed by applicant for construction and operation of this solar facility. Previously, applicant has expressed a need for 400,000 gallons of water per day during construction, a project likely to take at least 9 months or more to complete. Even their own hydrology report, which was completed in August and submitted to you, reflects a continuing requirement for 400,000 gallons per day. This water was to be obtained from an aquifer that provides water to several counties, including Spotsylvania. I remind you of the GEO SEER report of April 13, 2018, that stated there was "a continuing decrease in water levels in this area of Virginia" over the last 47 years. Furthermore, the report states that "the impact of industrial scale water usage by local tap, such as proposed by sPower, would be a significant impact and probable cause of depletion of the local area water reserves."

However, last night in a presentation to local residents, sPower advised that they only needed 100,000 gallons of water per day during construction and that they expected to obtain this water, not by sinking wells and draining the aquifer, but by extending Spotsylvania County's water system from Fawn Lake through to the project site. This begs several questions:

- If sPower doesn't need 400,000 GPD, why did they commission a study that looked at that requirement?
- What do they intend to do that reduces their need for water?
- Is the County planning to extend its own water system to the site?
- If so, when will this occur and how will it impact an already well known lack of water pressure in the immediate area? This is important to me as I currently can't water my lawn and flush my toilet at the same time. And now there'll be an additional drain of 100,000 gallons a day or more?
- Finally, if the extension is made, what plans does the County have to provide the infrastructure needed to improve water pressure in the area and how soon will it occur?

My experience in following this application by sPower has shown several changes that have been made over the intervening months. However, many of them have never been set to paper to the extent that we can rely on the representations and study with a degree of certainty what changes to our environment and quality of life will result. We need to see detailed site plans, which address our concerns previously provided in our September 25<sup>th</sup> document (referenced above) and which respond to requirements set forth in any Special Use Permit you issue. Time is passing us by. We need to have specific information that addresses our concerns and it needs to happen soon. We need a detailed site plan from the applicant, not just to address water usage issues, but all other issues that have arisen too!

## **Establishing SUP Conditions for Solar Power Project**

Good evening, my name is David Hammond and I live in the Livingston District of Spotsylvania County.

In August, I discussed the recent decision by the State Corporation Commission that makes it clear that all of the really important decisions about the sPower solar project are the responsibility of Spotsylvania County. The SCC Final Order makes it perfectly clear that they refused to take a position on any of the numerous concerns raised regarding public health, safety and welfare, plus protection of wildlife and the environment. The DEQ will address a couple of concerns, but not the ones that pertain to the unprecedented massive scale of the proposed project, not water extraction, not toxic compounds in the panels, not decommissioning and reclamation, not preserving the character of Spotsylvania County, etc.

This project is unprecedented in many ways. This is the first utility scale solar power plant being considered for construction in Spotsylvania County. As you know, it is five times larger than the largest solar power plant operating in Virginia, and it would be the largest solar facility east of the Rocky Mountains. The stakes are high, and we need to make sure that each of the concerns is fully evaluated, and the risks are either mitigated or avoided in the SUP.

Therefore, I recommend that you approach this Special Use Permit in an unconventional way, perhaps even an unprecedented way. The usual procedure is to have the county staff write the Special Use Permit, and then the Planning Commission reviews it and votes on it. I contend that this is too important, too new, too different, too precedent setting, to withhold your input until after the SUP has been drafted. Instead, I strongly recommend that the Planning Commission, individually and collectively, take an active role in establishing each of the Conditions that will be included in the Special Use Permit. Please note that this recommendation does not reflect negatively on the County staff in any way. Instead, I believe that the Special Use Permit will be a stronger document with all of our input and guidance.

In conclusion, the SCC has made it clear that the responsibility falls on Spotsylvania County's Special Use Permit process. We need to get this 100% correct on this first attempt to protect the people of Spotsylvania County and the environment. Please take an active role in the development of the Special Use Permit.

Spotsylvania Planning Commission October 3, 2018

Richard Genaille

12000 Fawn Lake Parkway, Spotsylvania, VA 22551

FIRE HAZARD ISSUES:

ACCORDING TO ETHAN SIEGEL PHD ASTROPHYSICS STATED IN HIS FORBES September 6, 2017 article, "THE TERRIFYING PHYSICS OF HOW WILDFIRES SPREAD SO FAST",

20% OF WILDFIRES ARE CAUSED BY LIGHTNING STRIKES

DR. ETHAN SIEGEL PHD. FURTHER STATED," THERE IS A CORRELATION BETWEEN SOLAR RADIATION, AIR HUMIDITY, AND THE FREQUENCY OF LIGHTNING STRIKES

SPOTSYLVANIA, VA HAS HOT HUMID WEATHER DURING THE SUMMER.

AS PREVIOUSLY EXPLAINED IN PREVIOUS SPOTSYLVANIA GOVERNMENT MEETINGS BY ELECTRICAL ENGINEER IRV BOYLES, THE PROPOSED SOLAR FARM IN SPOTSYLVANIA IS 3,500 ACRES OF CONDUCTIVE MATERIAL.

ACCORDING TO THE FEBRUARY 18, 2018 JOURNAL OF ELECTRICAL ENGINEERING, THE RISK OF FIRE IS MUCH HIGHER IN A SOLAR FIELD DUE TO THE USE OF DC CURRENT WHICH DOES NOT DISCONNECT UNDER FAULT CONDITIONS

THERE IS CAUSE FOR CONCERN RELATED TO LIGHTNING STRIKES AND FIRE ISSUES FOR THE SOLAR FARM AND SURROUNDING RESIDENTS:

ACCORDING TO PHYSICIST DR. ETHAN SIEGEL, "FIRES CAN TRAVEL 6 MILES AN HOUR IN FORESTS AND UP TO 14 MILES AN HOUR ON GRASSLAND"

"A TEN DEGREE SLOPE DOUBLES THE SPEED OF THE FIRE"

THIS SOLAR FARM;

IS NOT SUPERVISED TWENTY-FOR HOURS A DAY

DOES NOT HAVE FIRE TOWERS

DOES NOT HAVE ANY OF ITS OWN FIRE FIGHTING EQUIPMENT

THE NEAREST FIRE STATION IS 5 MILES AWAY FROM THE CLOSEST ENTRANCE TO THE SITE. THE NEXT CLOSEST FIRE STATION IS ABOUT 8 MILES AWAY

IF A FIRE STARTED IN THE MIDDLE OF SITE "A" AND IT TRAVELED 10 MILES AN HOUR, IT WOULD TAKE ABOUT 6 MINUTES TO REACH A RESIDENTIAL PROPERTY, IF THE RESIDENTIAL PROPERTY IS A MILE AWAY FROM THE ORIGIN OF THE FIRE

IT WOULD REACH A RESIDENTIAL PROPERTY BEFORE ANY FIRE FIGHTING EQUIPMENT COULD ARRIVE

SOME RESIDENTIAL PROPERTIES ABUT THE SOLAR FARM AND ARE MUCH CLOSER TO A POTENTIAL FIRE

## The Terrifying Physics Of How Wildfires Spread So Fast

Judith Page Genaille <traveler9722@gmail.com>

Wed, Oct 3, 2018 at 2:53 PM

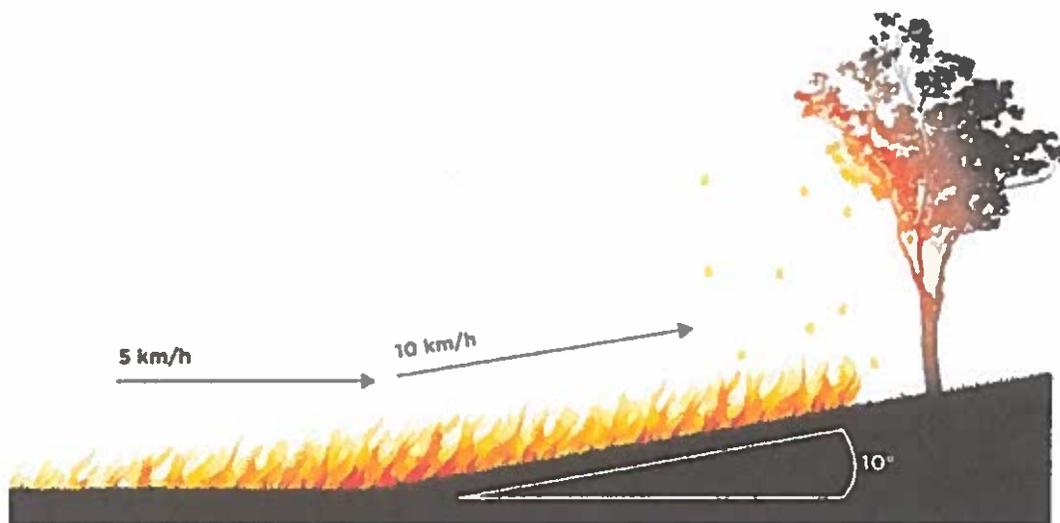
To: traveler9722@gmail.com, "Mr. Dick Genaille" <richard.genaille@gmail.com>

[https://www-forbes-com.cdn.ampproject.org/v/s/www.forbes.com/sites/startswithabang/2017/09/06/the-terrifying-physics-of-how-wildfires-spread-so-fast/amp/?amp\\_js\\_v=0.1&usqp=mq331AQGCAEoATgA#origin=https%3A%2F%2Fwww.google.com&prerenderSize=1&visibilityState=prerender&paddingTop=54&p2r=0&horizontalScrolling=0&csi=1&aoh=15385924365456&viewerUrl=https%3A%2F%2Fwww.google.com%2Famp%2Fs%2Fwww.forbes.com%2Fsites%2Fstartswithabang%2F2017%2F09%2F06%2Fthe-terrifying-physics-of-how-wildfires-spread-so-fast%2F&history=1&storage=1&cid=1&cap=swipe%2CnavigateTo%2Ccid%2Cfragment%2CreplaceUrl](https://www-forbes-com.cdn.ampproject.org/v/s/www.forbes.com/sites/startswithabang/2017/09/06/the-terrifying-physics-of-how-wildfires-spread-so-fast/amp/?amp_js_v=0.1&usqp=mq331AQGCAEoATgA#origin=https%3A%2F%2Fwww.google.com&prerenderSize=1&visibilityState=prerender&paddingTop=54&p2r=0&horizontalScrolling=0&csi=1&aoh=15385924365456&viewerUrl=https%3A%2F%2Fwww.google.com%2Famp%2Fs%2Fwww.forbes.com%2Fsites%2Fstartswithabang%2F2017%2F09%2F06%2Fthe-terrifying-physics-of-how-wildfires-spread-so-fast%2F&history=1&storage=1&cid=1&cap=swipe%2CnavigateTo%2Ccid%2Cfragment%2CreplaceUrl)

# The Terrifying Physics Of How Wildfires Spread So Fast

Sep 6, 2017,

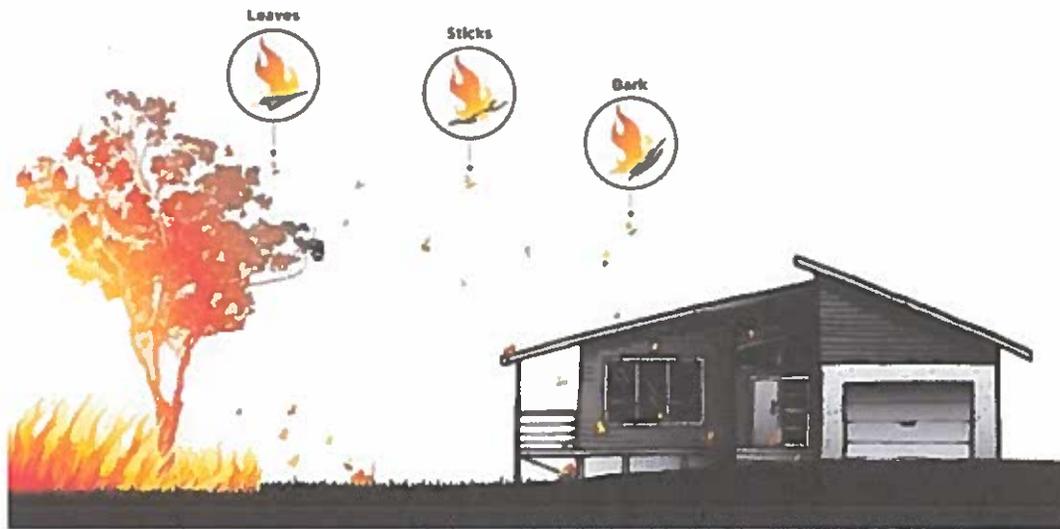
All of this served to create a huge amount of potential “fuel” for wildfire season. Coupled with the warm, dry summers that the Pacific Northwest experiences — and it’s been uncommonly warm this year — that fuel becomes easily combustible. Oxygen is never a problem in this region of the country, and the Columbia Gorge, in particular, is notorious for breezes and continuously-moving air. That means, during the dry season, where you have lots of highly flammable plant matter to serve as fuel, oxygen to keep it burning, and high temperatures and winds to help spread the fire, all you need is something to ignite it. In 80% of situations, that’s a negligent or malicious human.



*Fires can spread very quickly, but an additional 10 degrees of slope is enough to double the speed at which a fire spreads. At some points in the Columbia Gorge, the slope is three times that value. Country Fire Authority (CFA) / Victoria State Government, Australia*

Fires can travel quickly: up to 6 miles-per-hour in forests and up to 14 miles-per-hour in grasslands. If you have an upward-slope to your terrain, the flames can travel even faster; an extra 10 degrees

of slope will double the speed of your fire. It's the reason why, if the fire started near the bottom of the Columbia Gorge, it's only a brief amount of time before it spreads up and engulfs the entire valley.



*When embers from a lit tree burn leaves, bark, or twigs, they can travel, via wind, to homes, other flammable areas, or even across rivers. An ember attack can even cross deliberate firebreaks if the flaming debris is high enough and the winds are strong enough. Country Fire Authority (CFA) / Victoria State Government, Australia*

The fires can also spread to homes, jump cleared areas, or even cross natural firebreaks like rivers, owing to what's known as an "ember attack." When high-standing plant matter (like trees) catch fire, burning twigs, leaves, and pieces of debris can be carried large distances by the wind, still aflame after traveling tens or even hundreds of feet through the air. Any small, dry, easily flammable thing that it contacts can easily catch fire, from a leaf on another tree across a body of water to the dried pine needles in a house's rain gutters. If the fire gets too close to a major city, it becomes much more an issue of rescuing and evacuating people than it does about saving homes and preventing property damage. Just a few months ago, [62 people were killed](#) owing to a wildfire in Portugal.



*Lightning strikes and human activity are the two main causes of wildfires on Earth, which routinely spread to burn thousands of acres every fire season. National Wildfire Coordinating Group*

While it's true that 20% of fires have natural causes — mostly lightning strikes — the remainder, and hence the vast majority, are caused by human activity. There are burn bans all throughout Washington and Oregon that have been in place for two months, but all it takes is one spark to begin that fiery combustion reaction, and the dry, flammable flora can turn it into a catastrophe. While the press may be calling the firestarters "idiot teenagers," which they may well be, they're also arsonists, having knowingly started one of the worst fires in a protected (and populated) area that Oregon has seen in decades. As [Alex Berezow wrote](#) for the American Council on Science and Health:

All of this was entirely preventable. And all of this was entirely foreseeable; even teenagers understand the consequences of their actions. But they just didn't care. They didn't care that a forest fire could not only destroy a true natural treasure, but that it could threaten the lives of thousands of people and cause millions of dollars in damage.

*A wildfire as seen from near Stevenson Wash., across the Columbia River, burning in the Columbia River Gorge above the Bonneville Dam near Cascade Locks, Oregon. Tristan Fortsch/KATU-TV via AP*

The good news, though, is twofold:

Fires like this can be prevented, but it's up to all of us to be responsible. One evil or negligent action, even a small one, can grow to an uncontrolled catastrophe: destroying thousands of acres of land, displacing thousands of people, causing millions of dollars worth of damage, and may even threaten to burn a major city before it's all over. The iconic Smoky the Bear may say "only you can prevent forest fires," but the truth is that everyone has to be on board. It's up to all of us. It's not merely something we "can" do, but rather something we "must" do.

*I am a Ph.D. astrophysicist, author, and science communicator, who professes physics and astronomy at various colleges. I have won numerous awards for science writing...[MORE](#)*

*Astrophysicist and author Ethan Siegel is the founder and primary writer of Starts With A Bang! His books, [Treknology](#) and [Beyond The Galaxy](#), are available wherever books are sold.*

Sent from my iPhone

Presented on November 7, 2018

**Traffic Congestion Concerns with Current sPower Solar Farm Construction**

My name is Mike Mikolosko; I am a resident of Livingston District in Spotsylvania County and I am speaking for myself. Although I have a number of concerns about the sPower solar farm project, I wish to focus on the issue of traffic congestion.

The major artery for trucks during construction to the two sPower entrances #1 and #2 is the two lane historic Orange Plank Road, which is already burdened during rush hours. sPower, which has not yet provided a traffic mitigation plan, has mentioned restricting construction traffic to “business hours” and improving traffic flow by assisting in the building of a roundabout at the intersection of Orange Plank and Brock Road, a historic intersection of significance during the Battle of the Wilderness. Even if the roundabout were approved, sPower is offering to fund this roundabout “no later than 12 months after the final construction and completion of the solar energy facility,” which would do nothing to relieve congestion during construction.

As an alternative, I propose an alternate route shown on the second page of my written submission. All construction traffic for entrances #1 and #2 would go along Route 3 to the intersection of Route 20, which has a traffic light, then down Route 20 to the intersection with Route 611, Gold Dale Road, which also has a traffic light, and from there to the sPower site entry points. This route is, in fact, the one used by Dominion Energy vehicles to access their substation site.

This alternate route has several advantages:

- It alleviates congestion along the already burdened Orange Plank Road.
- It avoid the four way stop at the historic intersection of Orange Plank and Brock Road and removes the issue of a roundabout being built at that historic intersection.
- It reduces the distance that construction traffic travels along a narrow two lane road from nearly 8 miles (along Orange Plank Road) to about 4 miles (along Gold Dale Road).

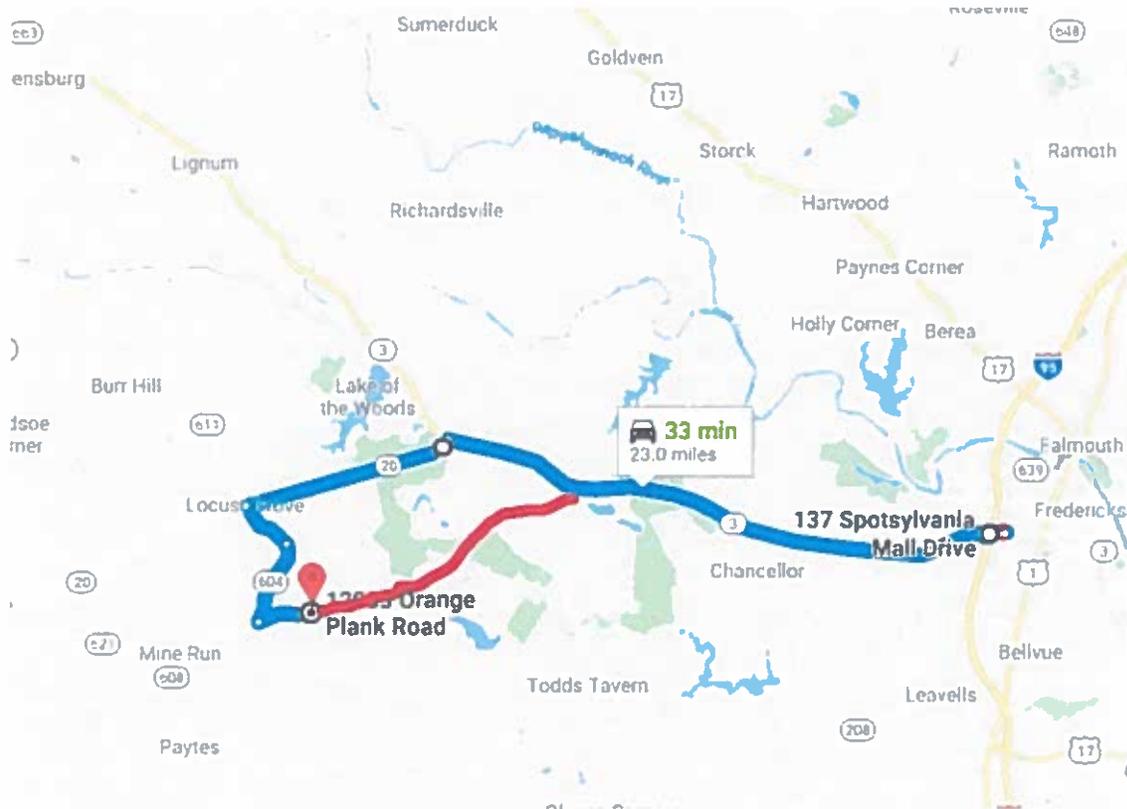
I strongly encourage the Planning Commission to require the use of this alternate route in the special use permit as the only route to the sPower entry points. I also encourage these additional conditions:

- Any County or VDOT changes or upgrade requirements to the roads used should be paid by the applicant, sPower.
- All project construction temporary or permanent employees or vehicles would be prohibited from entering or exiting any community or residential property.

All these conditions must be added as part of the special use permit approval.

Thank you for allowing me this time.

## Proposed Alternate Route for sPower Construction Traffic to Entry Sites #1 and #2:



- I95 west along Route 3 to the intersection of Route 3 and Route 20;
- Take left at Route 20 to the intersection of Route 20 and Gold Dale Road;
- Take left at Gold Dale Road to Orange Plank Road to Entry Sites #1 or #2.

### Alternate route avoids Orange Plank Road from Route 3 to Entry Sites (shown in red):

- Alleviates congestion along the already burdened Orange Plank Road.
- Avoids the four way stop at the historic intersection of Orange Plank and Brock Road and removes the issue of a roundabout being built at that historic intersection.
- Reduces the distance that construction traffic travels along a narrow two lane road from nearly 8 miles (along Orange Plank Road) to about 4 miles (along Gold Dale Road).

Statement by Russell J. Mueller to Planning Commission on behalf of the  
CCFLSC  
November 7, 2018

My name is Russ Mueller and I reside in the Livingston district.

On behalf of our Concerned Citizens group, in the strongest terms I want to reiterate that the CONDITIONS we are demanding be included in the sPower SUP have been determined on good authority to meet the Virginia state legal test for “reasonableness”. Also the risks we have scientifically documented must be adequately mitigated or we will have no choice but to oppose its’ approval because the resulting harm will be in clear violation of the County Zoning Code that protects citizens and the environment against adverse consequences.

Beyond the buildout risks of this precedent-setting environmentally sensitive monstrosity, I would hope before voting on the project that you would also consider the totality of the material adverse changes that will be made to the historic and substantially rural character of this part of Spotsylvania County. Also, the bottom line of our financial analysis, although preliminary, makes it pretty clear that county taxpayers will wind up subsidizing this sPower project. This is particularly evident given that the legally binding basis is totally suspect as to how sPower is going to be allowed to make the \$600,000 payments designed to offset the declining tax revenues resulting from this project.

To date sPower has made only minimal changes to their original GDP and the continued lack of detail is glaring.

It should be clear to this Commission that sPower will use well water for construction notwithstanding their intent to gain access to county water. A hookup to county water through Fawn Lake would likely take until early summer and the full completion of the proposed pump and pipe upgrade to the system (from the Brock Elementary School water tower through Fawn Lake to the sPower site) would likely take until the end of the year.

Even if the County delays project construction until county water is available, we have additional concerns and proposals for mitigation to ensure that the pressure put on the water system by sPower will not be injurious to the communities depending on county water. These CONDITIONS are contained in our September 25<sup>th</sup> documents you were provided which also make clear that sPower should be held responsible financially for the costs of any water improvements they have requested.

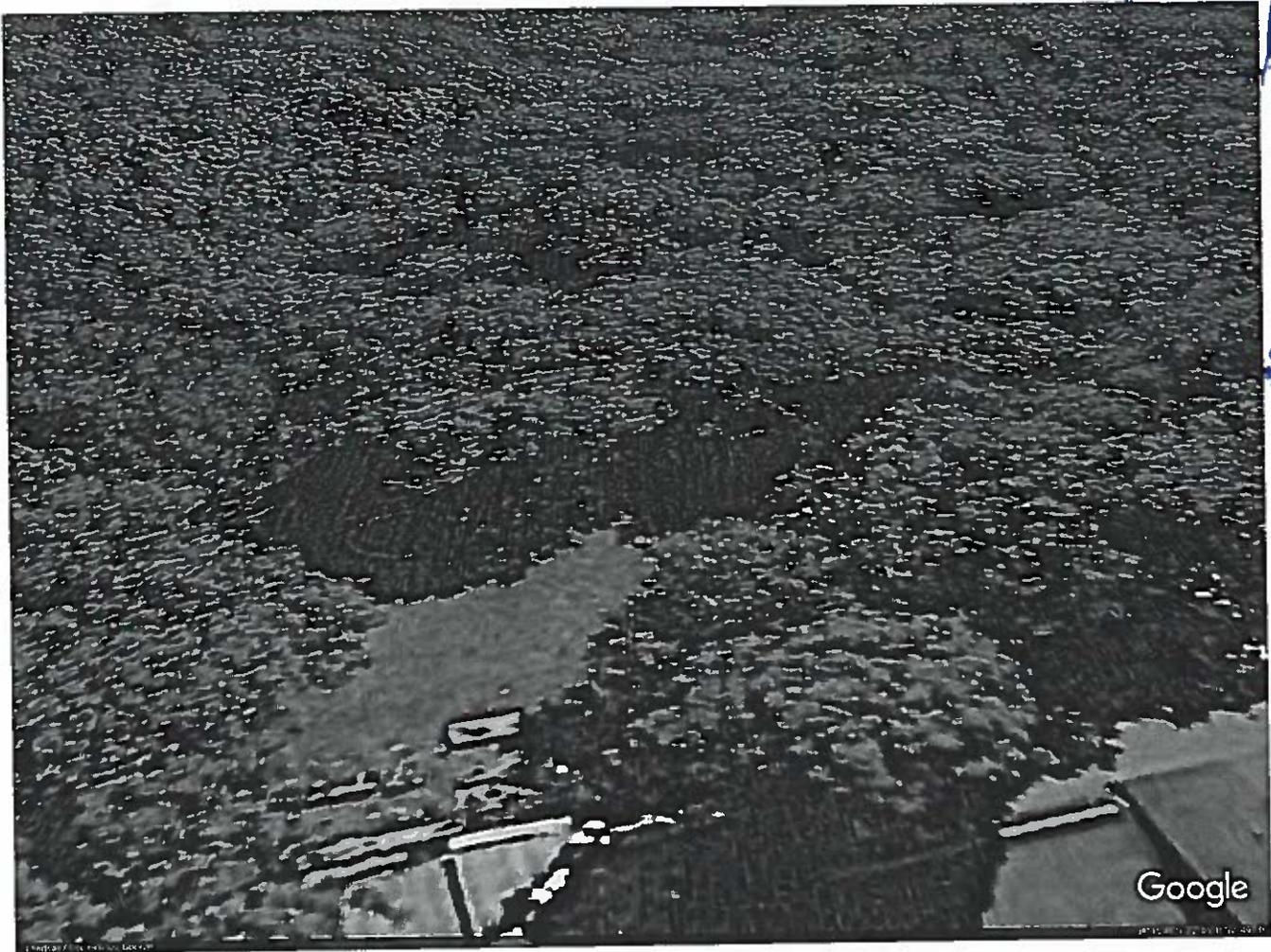
In conclusion, before a hearing is held on the staff report, we plead with the Commission to direct staff to include our CONDITIONS to prevent harm to the county and its citizens.

Thank you very much for your kind consideration.

Comprehensive Plan Must be Amended to Limit Multiple  
Solar Power Plants

At a previous meeting I asked when action is going to be taken to prevent the entire County from being glassed over

with solar panels. We warned of this problem six months ago when this Commission and the Board took up Amendments to the Comprehensive Plan. We asked then for provisions to prevent new energy projects from being positioned within 30-40 miles from the last one and that there be a limit on the total land in the County converted to solar. This project would already gobble up nearly two and a half percent (2.5%) of the County. We would appreciate being apprised of any review that would lead to Comprehensive Plan amendments along these lines, particularly given recent forays by other solar operators to engage Spotsylvania landowners in selling or renting their land for solar fields.



↑ Old Aerial.

MR. White

Planning Spotsy

1.24.18

From Mr. Bierman 540 972 4220  
804 8715

Also states NO Access Easement at Site 1. Well maintained gravel, private road, Chancellor Meadows Ln. 7-8 other impacted residences. Home is downhill of site.

Google

pictures of largest solar farm in usa



Sign in

All News Images Videos Maps More



Switch to Chrome, a smarter browser  
Tools  
Google recommends using Chrome. Try it?

Size Color Type Time Related images Usage rights More tools Clear

I DON'T WANT IT YES, I WANT IT

details listing installation idaho 83327 land property road additional view solar installation states fair



July | 2015 | OUR ARAGON

our aragon - WordPress.com - 2379 x 1410 - Search by image  
solar farm unity road trees

Visit View Image Share

Related images

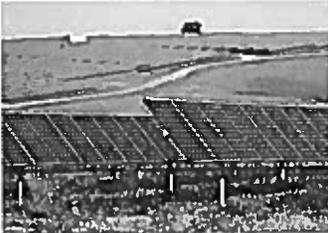


Images may be subject to copyright. - Get help - Send feedback

↑  
In copyright



Other sites ↑



Other sites



ArchDaily News Japan's Abandoned Golf Courses Get Second Life As Solar Farms

## Japan's Abandoned Golf Courses Get Second Life As Solar Farms

16:00 - 10 August, 2015 | by Karissa Rosenfield

Share in Whatsapp

*what they should have done  
w/ existing lands.*



With a goal to double the amount of its renewable energy power sources by 2030, Japan has begun to transform abandoned golf courses into massive solar energy plants. As Quartz reports, Kyocera, a company known for its floating solar plants, has started construction on a 23-megawatt solar plant on an old golf course in

the Kyoto prefecture (scheduled to open in 2017). The company also plans to break ground on a similar, 92-megawatt plant in the Kagoshima prefecture next year. Pacifico Energy is also jumping on the trend; with the help of GE Energy Financial Services, the company is overseeing two solar plant golf course projects in the Okayama prefecture. The idea is spreading too; plans to transform gold courses into solar fields are underway in New York, Minnesota and other US states as well.

The full story can be read on Quartz [here](#).

---

Share in Whatsapp

See more:

News

Architecture News

Japan

Solar Energy

Sustainability

Cities

Kyoto

Kagoshima

Okayama

---

Cite: Karissa Rosenfield. "Japan's Abandoned Golf Courses Get Second Life As Solar Farms" 10 Aug 2015. ArchDaily. Accessed 20 Jan 2018. <<https://www.archdaily.com/771647/japans-abandoned-gold-courses-get-second-life-as-solar-farms/>> ISSN 0719-8884

## BROWSE THE CATALOG

4 Comments

ArchDaily

 Login

[Skip to Content](#)[HOME](#) ▾ [DMME](#) ▾ [PUBLIC](#) ▾ [ABOUT US](#)[Agencies | Governor](#)[Search Virginia.Gov](#)[☎ \(804\) 692-3200](#)   [✉ deinfo@dmme.virginia.gov](#)

## DIVISION OF ENERGY

[HOME](#) ▸ [DIVISION OF ENERGY](#) ▸ [ENERGY INCENTIVES](#)

## ENERGY INCENTIVES

---

### Financial Incentives for Energy Efficiency and Conservation

There are several state, federal, and utility/private financial and tax incentives available for Virginia homeowners businesses in the commercial, industrial, and manufacturing sectors. Click on the appropriate quick link on this web page to learn more about tax credits, deductions, exemptions and utility programs that can help your home or business conserve energy and save money by becoming more energy efficient.

## FEDERAL TAX INCENTIVES

**Personal Income Tax Credit for Renewable Energy, Geothermal and fuel cells *Has Been Extended!* Potential Applicants: Homeowners who placed in service qualified energy saving home improvements between January 1, 2011, and December 31, 2016.** Income tax credits are available for solar (hot water and photovoltaic), geothermal heat pumps, fuel cells, and small wind energy systems through December 31, 2016. Fuel cells may be eligible of a tax credit of 30% of the cost, up to \$500 per 0.5 kW of power capacity. These five incentives remain in place and unchanged from the prior law:

- Plug-in electric drive vehicles scheduled to extend until 12/31/16
- Combined heat and power systems scheduled to extend until 12/31/16
- On-site renewable energy systems including ground-source heat pumps, scheduled to extend until 12/31/16
- Fuel cells and microturbines scheduled to extend until 12/31/16

## IRS TAX INCENTIVE FORMS

- Residential Energy Efficient Property: **Form 5695**
- Commercial Solar Incentives: **Form 3468** (Investment Credit)

*Note: The links above go to the IRS web site. IRS often does not publish new versions of forms until the beginning of the following tax year.*

## VIRGINIA PROPERTY TAX EXEMPTION FOR SOLAR EQUIPMENT

Virginia allows any county, city or town to exempt or partially exempt solar energy equipment or recycling equipment from local property taxes. Residential, commercial or industrial property is eligible. The statute broadly defines solar energy equipment as any that is "designed and used primarily for the purpose of providing for the collection and use of incident solar energy for water heating, space heating or cooling or other application which would otherwise require a conventional source of energy."

Cities and counties currently offering a solar energy equipment and facilities exemption include:

Albemarle, Alexandria, Charlottesville, Chesterfield, Hampton, Hanover, Harrisonburg, Henrico, Isle of Wight, King and Queen, Lexington, Loudoun, Lynchburg, Prince William, Pulaski, Roanoke, Spotsylvania, Warren, Winchester and Wise.

Please contact your local building inspection officials for information on how this credit, if offered, is applied in your locality.

*Need taxes to be paid to County.*

## ENERGY EFFICIENT BUILDINGS TAX EXEMPTION

*NA*

(Code of VA §58.1-3221.2)

**Potential Applicants: Business, Industry, and Residents** This statute allows any county, city, or town to exempt or partially exempt energy efficient buildings from local property taxes. Eligible buildings are those that:

- exceed the energy efficiency standards prescribed in the Virginia Uniform Statewide Building Code by 30 percent, or
- meets or exceeds performance standards of the Green Globes Green Building Rating System of the Green Building Initiative, or
- meets or exceeds performance standards of the Leadership in Energy and Environmental Design (LEED) Green Building Rating System of the U.S. Green Building Council, or
- meets or exceeds performance standards or guidelines under the EarthCraft House Program, or
- is an Energy Star qualified home.

Localities offering exemptions: Charlottesville, Roanoke, Virginia Beach

## WEATHERIZATION AND ENERGY ASSISTANCE PROGRAMS <sup>NA</sup>

### **Potential Applicants: Low-income homeowners and renters**

The Weatherization Assistance Program provides funds to reduce the heating and cooling costs for low-income families and to ensure their health and safety. The Program provides repairs and improvements to home heating and cooling systems as well as providing for the installation of energy-saving measures in the house.

To see if you qualify for this program and for a list of weatherization providers, click [here](#).

For more information about this Program, email Lee Hutchinson at the Virginia Department of Housing and Community Development.

For eligibility information on the Energy Assistance Program or for assistance on crisis home heating and cooling, please contact your local Department of Social Services.

For more information about the Energy Assistance Program, please visit the Virginia Department of Social Services.

## ENERGY STAR AND WATER SENSE SALES TAX HOLIDAY <sup>NA</sup>

The annual back-to-school sales tax holiday returns in early August. Along with school supplies, clothing and footwear, shoppers can now buy emergency preparedness items and certain energy-efficient products that were previously tax-exempt only during their own respective tax holidays.

Virginia's existing three tax holidays – **back to school** in August, **hurricane and emergency preparedness** in May, and **Energy Star and WaterSense** in October – were combined into a **single tax holiday** by the 2015 General Assembly. The new combined sales tax holiday applies only to sales occurring during the three-day period that begins each year on the first Friday before the second Monday in August and ends at midnight 11:59 p.m. on the following Sunday.

During the holiday, shoppers won't be charged state and local sales tax on a variety of items. The tax-exempt products have various price limits, but there is no restriction on how many exempt items consumers can purchase.

### **Here's an explanation of the tax exemptions during the sales tax holiday:**

- Most school/office supplies, such as pens, loose-leaf paper, scissors, binders, backpacks and construction paper, will be tax-exempt as long as each item costs \$20 or less.
- Clothing and footwear priced at \$100 or less per article or pair will be tax-exempt.
- Items that may be needed to prepare for an emergency, priced at \$60 or less each, will be exempt from sales tax; examples include batteries, flashlights, bottled water, tarps, duct tape, fire extinguishers, cell-phone chargers, smoke detectors, buckets, rope and first aid kits.

- Gas-powered chainsaws that cost \$350 or less each, and chainsaw accessories that cost \$60 or less each, will be exempt.
- Portable generators will be exempt if they cost \$1,000 or less each.
- Energy Star-labeled dishwashers, washing machines, air conditioners, ceiling fans, light bulbs, dehumidifiers and refrigerators will be exempt if they sell for \$2,500 or less each.
- WaterSense-labeled sink faucets, faucet accessories, aerators, shower heads, toilets and landscape irrigation controllers priced at \$2,500 or less each will be sales tax-exempt.

All retailers who sell the exempt products are required to participate in the tax holiday. In addition, retailers may choose to pay the sales tax themselves on any taxable items and pass the savings on to customers.

Online purchases of qualifying products will also be exempt from the sales tax as long as the orders are placed during the Aug. 7-9 exemption period and the sellers have the items available for immediate shipment.

For complete details, visit the Virginia Department of Taxation's website at tax free weekend.

## GREEN MORTGAGES *NA*

### **Potential Recipients: Small businesses, homeowners refinancing, and soon-to-be homeowners**

If your small business is looking for loans to retrofit facilities, purchase energy efficient equipment, utilize energy efficient construction, buy alternative fuel for vehicles, or to implement other efficient ideas, there may be help from the U.S. Small Business Administration (SBA). Although the SBA does not make loans, it does guarantee them. SBA loan programs 7(a) and CDC/504 could offer some assistance. For more information on green mortgages visit <http://www.mortgageloan.com/environment/> and for information on SBA loan programs visit the SBA's web page on loan programs.

For homeowner green mortgage information please see Energy Efficient Mortgages.

## INDUSTRIAL INCENTIVES *NA*

### **Energy Efficient Buildings Tax Exemption (Code of VA §58.1-3221.2)**

#### **Potential Applicants: Business, Industry, and Residents**

This statute allows any county, city, or town to exempt or partially exempt energy efficient buildings from local property taxes. Eligible buildings are those that:

- exceed the energy efficiency standards prescribed in the Virginia Uniform Statewide Building Code by 30 percent, or
- meets or exceeds performance standards of the Green Globes Green Building Rating System of the Green Building Initiative, or

- meets or exceeds performance standards of the Leadership in Energy and Environmental Design (LEED) Green Building Rating System of the U.S. Green Building Council, or
- meets or exceeds performance standards or guidelines under the EarthCraft House Program, or
- is an Energy Star qualified home.

Localities offering exemptions: Charlottesville, Roanoke

**DMME HEADQUARTERS**

 3405 Mountain Empire Rd

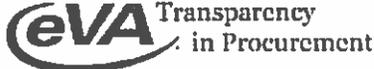
 (276) 523-8100

 dmmeinfo@dmme.virginia.gov

**OTHER LINKS**

- Web Policy
- VITA Large File Transfer
- DMME Expenses
- IMCC

**OTHER LINKS**

- IOGCC
- STRONGER
- 

•  
•  
•

Support Our Work



# CLIMATE CENTRAL

Researching and reporting the science and impacts of climate change

## Study Sees Ecological Risks as Solar Expands

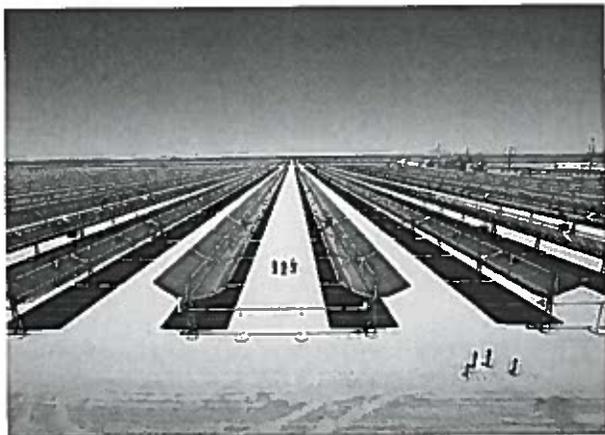
By [Bobby Magill](#)

Potential eco-risks.

Published: October 19th, 2015

Solar power development is big business in sunny California, fueled by low solar panel prices and the drive to reduce greenhouse gas emissions to tackle climate change. Some biologists, however, are growing concerned that the placement of new large-scale solar power plants in the Mojave Desert may harm the biological diversity found there.

A study published Monday shows that solar power developers in California have been using mostly undeveloped desert lands with sensitive wildlife habitat as sites for new solar power installations rather than building on less sensitive, previously developed open lands.



A solar power plant in California's Mojave Desert.

Credit: [Worklife Siemens/flickr](#)

The study, by the Carnegie Institution for Science and Stanford University, shows the ecological footprint of solar power development could grow to more than 27,500 square miles — roughly the land area of South Carolina — if the U.S. were to adopt a more ambitious climate goal. When thousands of solar panels are built in undeveloped natural areas, the panels crowd out wildlife and destroy their habitat.

“Solar takes out a lot of territory, right? It obliterates everything,” University of California-Santa Cruz ecologist [Barry Sinervo](#), who is unaffiliated with the study, said. “There is as much plant biodiversity in the Mojave as there is in a redwood forest. The key part of this is, do we want to tile out the last largest wilderness area that we have, which is the Western desert?”

The Carnegie study found that of the 161 planned or operating utility-scale solar power developments in California, more than half have been or will be built on natural shrub and scrublands totaling about 145 square miles of land, roughly the land area of the city of Bakersfield, Calif. About 28 percent have been built on agricultural land and 15 percent have been built in developed areas.

Areas that have already been developed and have little wildlife habitat would be better suited for solar development from an ecological standpoint, said study lead author [Rebecca Hernandez](#), a postdoctoral fellow at University of California, Berkeley, and a former ecologist at the Carnegie Institution.

RELATED

**Government to Spend Millions on Solar Power Research  
Can Birds Be Protected From Huge Solar Plants?  
MIT: 'Massive' Solar Expansion Critical for Climate**

Hernandez said she was surprised to find that nearly a third of solar development is occurring on former cropland, perhaps because farmers are shifting from growing crops to using their land to generate electricity. California's devastating drought may be responsible for farmers' shift to solar, something one of the study's co-authors is researching in more depth.

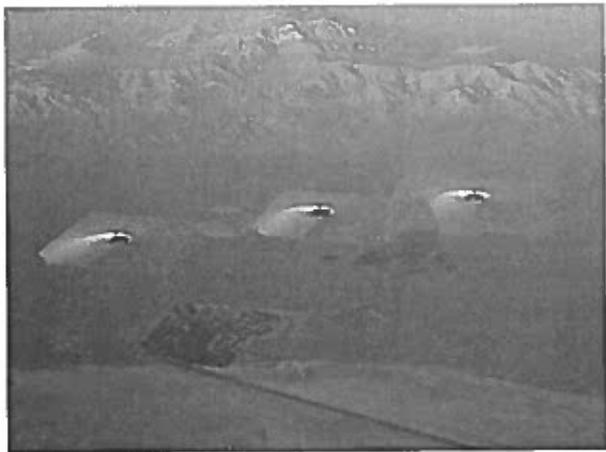
"We see that 'big solar' is competing for space with natural areas," she said. "We were surprised to find that solar energy development is a potential driver of the loss of California's natural ecosystems and reductions in the integrity of our state and national park system."

Finding ways to resolve conflicts between renewable energy development and ecosystem protection may be critical if the U.S. is to rely on more solar power to displace fossil energy to reduce greenhouse gas emissions.

Assuming that 500 gigawatts of solar power may be needed to meet a future climate goal of reducing greenhouse gas emissions 80 percent below 1990 levels by 2050, Hernandez's team found that a region of California roughly equal to the land area of South Carolina may be needed to accommodate all the new solar power plant development.

There are caveats to that, however: Though a 2050 greenhouse gas reduction goal has been adopted in California, the Obama administration's current goal for the U.S. is to cut emissions by up to 28 percent below 2005 levels within 10 years. The study also does not account for increasing solar panel efficiency over time, something that is likely to reduce the amount of land needed to generate a megawatt of solar electricity.

"In light of advancing solar energy technologies, we will need less land in 2050 to generate 1 MW (megawatt) than we do now in 2015," Hernandez said.



*The Ivanpah Solar Electric Generating System in California.  
Credit: [Ken Lund/flickr](#)*

Hernandez's team found that there are more than 8,500 square miles of land throughout California that is less environmentally sensitive than desert scrubland and agricultural land that would be best suited for future solar power development.

Just as important in reducing the ecological footprint of solar power is the expected growth of rooftop solar, which allows homeowners to generate electricity on site, reducing the demand on utilities' solar power installations, she said.

Hernandez's research emphasizes that there are sometimes significant tradeoffs between climate and energy policy and the needs of the natural environment, Cameron Barrows, a research ecologist at the University of California-Riverside, who is unaffiliated with the study, said.

"We can't just throw them (solar installations) across a landscape and say biological diversity be damned," he said.

"We have to find the right places to put these things," he said. "If you're in Washington or Spain or France and you just see this landscape that from a satellite looks like there's nothing there, it's hard for them to imagine why anyone would be upset about throwing 10 or 20 square miles of glass across this (desert) to produce solar energy. There are biological riches that are part of our natural heritage that we don't want to lose."

**You May Also Like:**

[150 Countries Pledge to Curb Carbon Emissions](#)  
[More Super El Niños Could Decimate Pacific Corals](#)

Obama Says Paris Climate Talks Bound to 'Fall Short'  
Rising Emissions Threaten Goal of Poverty-Free World



•  
•  
•

Support Our Work


**CLIMATE  CENTRAL**
*Researching and reporting the science and impacts of climate change*

## Can Birds Be Protected From Huge Solar Plants?

 By [John Upton](#)
*Published: August 26th, 2014*

You might never have seen an [Yuma clapper rail](#). Fewer than 1,000 are thought to still be sloshing about in cattail-thick marshes from Mexico up to Utah and across to California. But if you were lucky enough to spot one, you might chuckle at its oversized toes.

When officials with the [National Fish and Wildlife Forensics Laboratory](#) saw one of these endangered birds last year, it was no laughing matter. It was dead. It was one of 233 birds recovered from the sites of three Californian desert solar power plants as part of a federal investigation. The laboratory's wildlife equivalents of CSI stars concluded that many of the birds had been fatally singed, broken, or otherwise fatally crippled by the facilities.



Yuma clapper rail. Credit: [Fish & Wildlife Services](#)

Last week, that long-dead clapper rail stoked a legal action that challenges at least a half dozen additional solar plants planned in California and Arizona.

Conservationists say they're also worried about [yellow-billed cuckoos](#), which might be added to the federal government's list of threatened species, and endangered [southwestern willow flycatchers](#), though none of those birds have been found dead at any of the solar sites.

The effects of wind turbines on birds, which [research](#) suggests kill far fewer birds per megawatt hour than do fossil fuel plants, have long been a source of consternation for many environmentalists. Their bird-killing effects have been serious enough to [kill and hamper some planned projects](#). Now, as concentrated solar farms start to sweep the globe, solar energy developers are facing similar outcries and opposition for the harm that their clean energy facilities can cause to wildlife.

The construction of solar panel farms and concentrated solar power are both booming businesses. In California, industrial-scale facilities like these are helping utilities meet a state mandate that 20 percent of electricity sold by 2017 is renewable. But if the problem of wildlife impacts festers, the growth of concentrated solar, which by [one recent estimate](#) could grow to a \$9 billion worldwide industry in 2020, up from \$1 billion in 2013, could be crimped by lawsuits and opposition from conservationists.

**RELATED** [Cheap Solar Power Pushes Renewables Growth Worldwide](#)  
[New Design Delivers Round-the-Clock Solar Power](#)  
[Offshore Wind Farms Could Protect Cities from Hurricanes](#)  
[Wind Turbine Syndrome? Courts Aren't Buying It](#)

Much of the problem appears to lie in the “lake effect,” in which birds and their insect prey can mistake a reflective solar facility for a water body, or spot water ponds at the site, then hone in on it. Because of the power of the lake effect, the federal investigators described such solar farms as “mega-traps” in their report.

“I strongly believe there’s a way to show the birds that the PV panels are solid surfaces, not water,” said Ileene Anderson, a scientist at the Center for Biological Diversity, which is preparing to sue over Yuma clapper rail mortality at solar power plants.

The Associated Press reported last week on “streamers” at BrightSource Energy’s concentrated solar plant -- a futuristic-looking facility that gamers pass as they drive through the desert between Las Vegas and Los Angeles. That’s the name given to birds as their feathers ignite, mid-air, after flying through a concentrated beam of sunlight. Such hapless birds can be burned to death, killed by brute force when they crash to the ground, or eaten a predator swoops in to claim their maimed body. These are just some of the ways that large solar plants can kill birds. It’s not known how many birds are being felled by the groundswell of such facilities, but the numbers are high enough to concern bird and conservation groups -- regardless of the environmental benefits of solar power.

“We can safeguard our irreplaceable wildlife, like the Yuma clapper rail, through thoughtful implementation of renewable energy projects,” Anderson said.



Aerial view of solar panels in Arizona.  
Credit: [Daniel Lobo/flickr](#)

Within days of the AP report, Anderson’s group, which had obtained the federal report through a public records request, dispatched a notice of intent to sue. In the letter, an attorney for the group threatened to take the U.S. Department of the Interior, U.S. Fish & Wildlife Service, and U.S. Bureau of Land Management to court in 60 days unless the agencies agreed to more thoroughly review the potential bird impacts of other large solar power plants proposed within the Yuma clapper rail’s range. The notice alleges violations of the Endangered Species Act.

The attorney cites findings from the federal investigation report, which showed that the Yuma clapper rail had been killed at First Solar’s 4,400-acre Desert Sun Solar Farm in California’s Riverside County. The facility uses a 550-megawatt photovoltaic array that produces clean electricity for Californian utility customers. (The group also cited a media report of another Yuma clapper rail death at a similar facility.) Birds can be killed when they smash into the facility’s solar panels, the investigation concluded.

The other solar farms analyzed by the investigators were of the newfangled trough and solar power tower varieties. They included the Genesis Solar Energy Project, also in Riverside County, which uses a trough system in which parabolic mirrors focus sunrays into a tube where water boils into steam that spins a turbine to produce electricity. The mirrors pose similar threats to birds as solar panels. The third facility studied was the Ivanpah Solar Electric Generating System in Bernardino County, Calif., where birds can be burned as they pass through concentrated sunrays that are reflected off thousands of mirrors toward a solar power tower, where water is boiled to produce electricity-generating steam.

The problem of bird deaths at solar power farms is a complex one. Some solar developers have been powering down bright lights that had attracted insects at night, or switching to LEDs, and using nets to keep birds at bay. But that apparently is not enough. “The diversity of birds dying at these solar facilities, and the differences among sites, suggest that there is no simple ‘fix’ to reduce avian mortality,” the federal report states.

The report recommends improving bird- and bat-death monitoring through the use of sniffer dogs, video cameras, and daily surveys. It also lists recommendations for directly reducing avian mortality. Those recommendations include clearing vegetation around solar towers to make the area less attractive to birds, retrofitting panels and mirrors with designs that help birds realize the solar arrays are not water, suspending operations at key migration times, and preventing birds and bats from roosting and perching at the facilities. The recommendations are being considered by regulators.

The Center for Biological Diversity supports those proposed measures. It also suggests restoring bird habitat elsewhere to draw birds away from the solar facilities, which could help the rails and other species recover. And it wants the government to undertake new scientific research -- research that could offer clues for better protecting birds from solar power farms.

"We'd like the FWS to start looking at the potential problem that the Yuma clapper rail may be being attracted onto the sites," Anderson said. "These large-scale solar projects in the desert are giant experiments, and we should be learning something from them in order to avoid and minimize impacts. We're so low on the learning curve that there's a lot of unanswered questions."

**You May Also Like:**

[Visualize It: Old Weather Data Feeds New Climate Models](#)

[Antarctic Riddle: How Much Will the South Pole Melt?](#)

[A Tale of Two Cities: Miami, New York and Life on the Edge](#)

[Epic Drought in West is Literally Moving Mountains](#)

[Here's How Arctic Sea Ice Could Shrink Even More](#)



[http://www.starexponent.com/news/opposition-mounting-to-large-culpeper-solar-farm/article\\_4400ad8a-637e-5a03-82c0-01970fb69d1e.html](http://www.starexponent.com/news/opposition-mounting-to-large-culpeper-solar-farm/article_4400ad8a-637e-5a03-82c0-01970fb69d1e.html)

FEATURED

## Opposition mounting to large Culpeper solar farm

By Allison Brophy Champion Jan 10, 2018



Cheryl Orye stands at the property line Tuesday afternoon of her family farm in Brandy Station overlooking the area proposed for Culpeper County's first large scale utility farm.

ALLISON BROPHY CHAMPION/STAR-EXPONENT

BRANDY STATION – Culpeper County's Rules Committee finished its multi-month review Tuesday of a first-ever policy regulating large solar farms even as the planning commission prepares to consider its initial application at Wednesday night's meeting for a \$28 million solar farm.

Meanwhile, neighbor Doug Orye, owner of Brandy View Farm, is saying – not in my

backyard.

"I realize they might have some benefit – to Dominion Power," he said following Tuesday's committee meeting of the Culpeper North Solar proposal to build the project that it could then sell to the power company like the developer has done in the past.

Orye, whose property would face the 172-acre solar panel project from two sides, said his main concerns with the proposal are potential impacts to the soil, inadequate buffering, environmental issues, view sheds and what he thinks would be plummeting housing values.

"There's better locations that out there," he said later Tuesday from his farm with expansive views and wide open spaces on 73 acres where cows graze and hay is grown. "The county has taken a lot of steps to preserve our history. This flies in the face of all that. The county needs to make a position, either want to preserve this, promote tourism, promote the history and what it stands for or bulldoze at it all because nobody's going to want to come out here and look at the Brandy battlefields and all they see is a solar farm."

The largest cavalry battle ever fought on North America waged in the area on June 9, 1863. The area proposed for the solar farm is considered to be located just south of "core battlefield," though some of it is located in what is considered a "study area" by the Dept. of Historic Resources.

County staff is recommending that no panels be built on the study area either and the core battlefield area is off limits.

Supervisor Sue Hansohn said the view shed issue is subjective.

"Some people see solar farms as not a bad thing. They like the look of it – it's a good thing for the future," she said Tuesday morning.

In a staff report, the county contended solar farms would increase agricultural land values while having a positive impact on the environment while also recognizing a desire to protect its historic properties and resources and agricultural and rural heritage.

Culpeper North Solar has agreed to provide minimum 150-foot setbacks from the solar equipment to any adjacent houses, according to the staff report. The Civil War Trust has requested 250-foot setbacks for any adjacent properties located in an agricultural and forestal district, as is the adjacent subject property where Orye lives.

According to county staff, addressing other concerns, sun glare from the panels would not be an issue due to an anti-reflective coating material that will be applied. In addition, according to the staff report, concerns about toxicity or radiation from solar panels once they are operational are unfounded as various studies have proven it to be false.

Noise during construction could be an issue, county staff acknowledged, with the most recent solar farm policy restricting construction to 7 a.m. to 7 p.m. Monday-Saturday and none on Sunday.

"I think people will need a break from all the noise," said Supervisor Alexa Fritz at Tuesday's committee meeting.

Cheryl Hovey, who lives across the gravel road from Doug Orye and his wife, said on site that she will need a break from it. She's a retired disabled veteran who served in combat zones overseas.

"People with anxiety disorders don't want to hear that noise nonstop. I'm a disabled vet and every muscle in my body tenses with noises that sound like mortar or gunfire all day long in what is supposed to be my home," Hovey said.

The construction project will involve the use of pile driving machines to place some 89,000 solar panels, 14-foot-tall, on the site and about half that many poles. Culpeper North Solar has agreed to limit any pile driving activities to 8 a.m. to 6 p.m. Monday-Friday, according to the staff report.

Per the proposed solar policy that goes to the full board of supervisors next month for final approval, any solar farm built in the county inoperable for two years would have to be decommissioned within six months. Part of the revised policy recommended at Tuesday's committee meeting would place some of the responsibility to return the land to its original condition on the landowner, and not just the project owner.

Culpeper County Planning staff recommended conditional approval of the application going before the planning commission Wednesday. Action on it could be deferred, however, since the elected board has not yet approved the associated policy that commissioners would look to for guidance.

Culpeper County Planning Director Sam McLearn told the committee Tuesday that it was important to move the policy forward at this point.

"We do have a current application," he said in addition to a notice of intent for another.

Construction of the project in Brandy Station could take four to eight months, McLearn said.

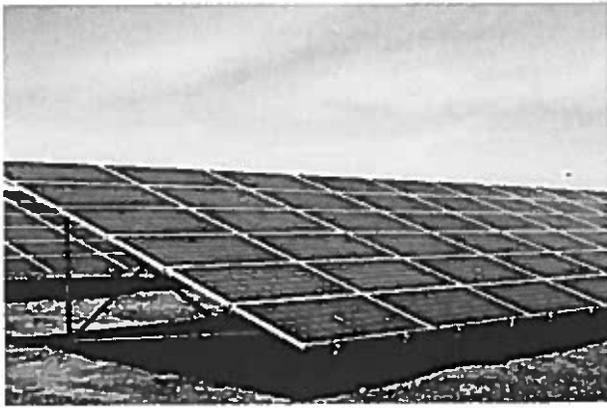
Supervisor Steve Walker noted that Spotsylvania County is currently considering an even larger solar farm facility near the Orange County line.

"These big projects are coming," he said.

---

Allison Brophy Champion can be reached at [abrophy@starexponent.com](mailto:abrophy@starexponent.com) or (540) 825-4315.

---



Solar farms pay property taxes on a fraction of value.  
(Ecoplexus Inc.)

Chowan and Currituck counties are collaborating on an appeal against property tax breaks for solar energy producers and have asked North Carolina's other 98 counties to join them.

The two counties have each sent a resolution to the North Carolina General Assembly, asking that the law that grants big tax breaks to solar energy producers be repealed.

That law allows the exclusion of 80 percent of the appraised value of solar energy electric systems from local ad valorem tax valuation, meaning that solar farms only pay property taxes on 20 percent of the property's value.

Advertisement



It's an issue that's been discussed among county managers of all of the counties in northeastern North Carolina, said Chowan County Manager Kevin Howard.

"We're the only ones that don't have solar farms," Howard said. Two solar energy facilities have been approved, he added, but construction hasn't started on either.

"It's a revenue source we're looking at," Howard added. "For us, when we need money for schools and other projects, it make sense."

In Currituck County, the law translates into a loss of \$355,000 in tax revenue each year, Currituck County Manager Dan Scanlon said.

"The state repealed the state incentive, but left the county one in place," Scanlon added. A state law that allowed a 35 percent tax credit on renewable energy systems ended Jan. 1, 2016.

Advertisement



Currituck's chairman of the Board of Commissioners, Bobby Hanig, said commissioners want the law allowing the tax break at the county level to be repealed as well.

"We want that to be changed to where we don't have to give them that tax break," Hanig said. "If it's good enough at the state level, it should be good enough at the county level."

As a business owner, Hanig doesn't see the law as fair.

Advertisement



"I don't get a tax break, so why should a solar farm get a tax break?" he said. "We don't get any benefits, so why are we giving them a tax break?"

Hanig added that Currituck commissioners aren't against solar energy but would like to see solar electric systems be more of a benefit to the county.

The resolutions approved by Chowan and Currituck counties are similar, but there are some differences. For example, Currituck's resolution spells out the loss of revenue to the county.

"We don't have any construction, so we couldn't include how much value they had," Howard explained.

In 2015, renewable energy development in Currituck County comprised of solar energy electric systems encumbered 2,200 acres of land, with real property investment in the amount of \$210 million, Currituck’s resolution states.

Because of the tax break, the solar energy systems in Currituck were assessed a combined business and property tax of \$210,600, rather than the \$1,008,000 any other commercial development would owe taxes on.

As part of the argument against the tax break, Chowan’s resolution includes information from a September report from the Solar Energy Industries Association.

That report states that the cost of installing solar energy production facilities has decreased 70 percent since 2010, and in North Carolina, costs have fallen by 64 percent over the past five years, according to Chowan County’s resolution.

There’s another difference in Chowan County’s resolution. It directs the clerk to the board, Susanne Stallings, to forward the resolution to the rest of the counties in the state, encouraging them to submit their own resolutions.

Both counties’ resolutions state that a community hosting a solar energy system should receive the full benefit of the developments, “particularly since solar energy electric systems reduce open space and useable farmland and generate visual and other impacts unwelcome to property owners adjacent to solar energy electric systems.”

In Currituck, a solar farm in Shawboro has been completed, and the first phase of another, much larger solar farm in Moyock has also begun producing solar energy, with plans for its expansion already approved.

Currituck commissioners denied a permit request for a third solar farm in Grandy, and has a moratorium in place prohibiting new solar farms until the county has revised its ordinances.

“Before we allow another one, we’re going to be sure we dot our ‘i’s’ and cross our ‘t’s’ and get it right,” Hanig said.

Currituck commissioners approved its resolution Sept. 18, while Chowan County adopted its resolution Monday night.

Share this:



Recent posts in this category



**Dozens of watermen heading out to hunt for old fishing gear**

Last year, when the project was expanded to include to all three Marine Patrol districts, 72 watermen collected 4,304 pots, according to the North Carolina Coastal Federation.

Share this:



**Access through Roanoke Inlet was the prize colonists sought**

In the decades after the colonists disappeared, there never was a significant permanent population on Roanoke Island because the island was not the prize. It was the inlet.

Share this:



**One dead after Avon accident involving Dare trash truck**

Traffic on N.C. Highway 12 was stopped on both sides of Ace Hardware and the Food Lion shopping plaza in Avon from about 11 a.m. until 12:30 p.m., when traffic slowly resumed in both directions.

Share this:



Comments

**Browny Douglas**

Tuesday, Oct 10 9:46 pm

Can anyone explain to me why NC has , in place, solar to equal that of 46 other states combined? I believe "something smells good in Stinkville", i bet it's green.

Browny Douglas

**Dee Langston**

Sunday, Oct 8 7:13 am

Chris, I'm fairly certain that the energy generated from Currituck's solar farms isn't sold locally. I do know that the solar farms won't reduce the cost of utilities for the county's residents.

**elizabeth akjam**

Friday, Oct 6 6:35 pm

good grief...they are using tired low taxation farmland back in the boonies...yes, the business needs to pay its fair share of taxes, but the land simply is not very valuable where they propose the farms. Clean energy...no pollution...water around you everywhere...don't you want clean energy? Don't you want to protect your tourism fueled environment?

**larry sellers**

Thursday, Oct 5 11:24 pm

Even if your energy subsidy numbers are correct they don't include the cost our military has paid in blood and money.

Can that cost, war and lives lost be counted?

How many military actions and how much funding has been spent on the Middle East, Iraq and worldwide protecting oil.

But the "subsidy" is way higher when you add in that cost.

**Lance Manly**

Thursday, Oct 5 2:10 pm

>"2,200 acres of land, with real property investment in the amount of \$210 million"

Currituck county land at 100k per acre?

**surf123**

Thursday, Oct 5 1:12 pm

A little more follow up for @Big Picture who is completely uninformed. Cruise over to Wikipedia and look up Energy Subsidies ([https://en.wikipedia.org/wiki/Energy\\_subsidies](https://en.wikipedia.org/wiki/Energy_subsidies)):

Renewable energy: \$7.3 billion (45 percent)

Energy efficiency: \$4.8 billion (29 percent)

Fossil fuels: \$3.2 billion (20 percent)

Nuclear energy: \$1.1 billion (7 percent)

Fossil fuels are in a distant 3rd.

**surf123**

Thursday, Oct 5 1:09 pm

@Big Picture... You are talking about two different things. The supposed subsidies you speak of allow gas to be reasonably priced at around \$3/gallon. Without them we could be looking at \$10/ gallon like they pay in Europe. When guess went over \$4 a few years ago there was an uproar. Fossil fuels (Oil and Natural Gas) are here to stay as there is no cheaper way to do it unless you believe the siren's call of the solar industry which is heavily subsidized, much like the farmers who grow corn to make ethanol. Take away the subsidies and solar and ethanol go away. Government meddling is what allows events like this to happen.

As for this issue the solar farms are being subsidized (lower property taxes) at the county level (forced on them by the state), which means they are paying less than ever other business in the county as they are not getting a free gift. The idea of redistributing someone else's money is socialism which we already have enough of. Leaving the government to pick winners and losers always leaves the taxpayers holding the bag.

**surf123**

Wednesday, Oct 4 10:00 am

Tax abatements (or reductions) along with other incentives to encourage specific industries or specifically companies to relocate to an area are completely unfair to existing businesses who do not get the same breaks. Incentives to individual companies for the purpose of relocation to a specific area are bribery.

Chris

Wednesday, Oct 4 9:46 am

I've heard that the power from the wind farm in Elizabeth City is actually sold up north to places like New York. I'm just curious if the energy being generated at these farms goes back to the local grid, or is also sold elsewhere?

**Big Picture**

Wednesday, Oct 4 8:41 am

Thinking about 20+ billion in taxpayer subsidies to fossil fuel industry and related health risks, the solar subsidy is a drop in the bucket.

Forward thinking should support and expand clean and renewable energy.

It is not clear in article if commissioners know how the electric grid works when they say more benefit to the county.

They could redistribute those tax dollars to homeowners who wish to install individual units.

Comments are closed.



Also In The Voice



**Dozens of watermen heading out to hunt for old fishing gear**



**Access through Roanoke Inlet was the prize colonists sought**



**One dead after Avon accident involving Dare trash truck**



**New rules for eel farming create barriers to enforcement**





**Callers help Kill Devil Hills police catch**



Scroll for more



**Total Tile**  
& Carpet Care

**THE**

**(252) 548-9030**

Popular

- [Most Read](#)
- [Most Discussed](#)
- [Snow starts to pile up, winds crank up from latest storm](#)
- [While we slept, the snow piled up on the Outer Banks](#)
- [Search underway for missing tow service captain in...](#)
- [Weather closings, cancellations and delays for Thursday](#)
- [Main roads generally clear; temperatures near 60...](#)
- [Weather closings, cancellations and delays for Friday](#)



**Chilli Peppers Coastal Grill**  
Amazing Lunch, Dinner, & Sunday Brunch (9am)

**HAPPY HOUR** from 3pm - 6pm DAILY  
with SHIRAZ & WING SPECIALS

**MONDAYS**  
Build Your Own Pizza

**TUESDAYS**  
Oyster Night

**WEDNESDAYS**  
Build Your Own Pizza

**THURSDAYS**  
Kebab • Flavors from Around the World

**FRIDAYS**  
Summer Burger Night

**SUNDAY**  
"Best Brunch On The Beach" voted by US, Fodor's

MP 5.5, Bypass, KDH • (252) 441-8081





**City of Kingston  
Report to Rural Advisory Committee  
Report Number RAC-15-009**

---

**To:** Chair and Members of Rural Advisory Committee  
**From:** Lanie Hurdle, Commissioner, Community Services  
**Resource Staff:** Paige Agnew, Director, Planning, Building & Licensing Services  
**Date of Meeting:** June 22, 2015  
**Subject:** Municipal Process for Large Renewable Procurement (LRP)  
File Number D05-001-2015

---

**Executive Summary:**

The Large Renewable Procurement (LRP) program was created to give municipalities a stronger voice and additional opportunities to participate in the development of large scale renewable energy projects. The LRP program is currently administered by the Independent Electricity Systems Operator and only applies to large renewable energy projects that produce over 500 kW (0.5 MW) of power. When the LRP program was introduced it included an initial Request for Qualifications (RFQ). The qualification process is now complete and is being followed by a Request for Proposals (RFP).

The RFP requires the proponent to complete mandatory community engagement plans, provide site consideration information and undertake meaningful consultation with the municipality for their project. The deadline for the submission of proposals is September 1, 2015.

The LRP program offers a point system based on rated criteria, which can take the form of a municipal council resolution and/or a municipal agreement. The point based system is intended to increase greater communication between the developer and the municipality and provide opportunities for communities to raise local needs and considerations.

The purpose of this report is to provide information on the Large Renewable Procurement program and to recommend an updated process for requests for municipal council resolutions and municipal agreements for large ground mounted solar energy facilities.

June 22, 2015

Page 2 of 7

**Recommendation:**

**That** Council approve and that staff be directed to implement the process for municipal council support resolutions and municipal agreements, for large ground mounted solar energy projects as set out in Report Number RAC-15-009.

**Authorizing Signatures:**

ORIGINAL SIGNED BY COMMISSIONER  
**Lanie Hurdle, Commissioner, Community Services**

ORIGINAL SIGNED BY CHIEF ADMINISTRATIVE OFFICER  
**Gerard Hunt, Chief Administrative Officer**

**Consultation with the following Members of the Corporate Management Team:**

Cynthia Beach, Corporate & Strategic Initiatives	Not required
Denis Leger, Transportation, Facilities & Emergency Services	Not required
Jim Keech, President and CEO, Utilities Kingston	Not required
Desiree Kennedy, Chief Financial Officer & City Treasurer	Not required

June 22, 2015

Page 3 of 7

**Options/Discussion:****Purpose of Report**

The purpose of this report is to provide information on the Large Renewable Procurement Request for Proposals (RFP) program and to recommend an updated process for proponent requests for municipal council resolutions and municipal agreements for large ground mounted solar energy facilities.

**Background**

Since the passage of the *Green Energy Act*, renewable energy projects are subject to a provincial-led approval process and are exempt from the *Planning Act*. The municipality is now a stakeholder in this process and provides comments to the developer and the Province.

The exemption from the *Planning Act* means that the following local planning instruments do not apply to or affect renewable energy projects:

- Official Plans;
- Demolition Control By-Laws;
- By-Laws or Orders passed under Part V of the *Planning Act*, including zoning, site plan, holding and interim control by-laws; and
- Development Permit System By-Laws.

As a result of the new approvals framework, most renewable energy projects are subject to the Renewable Energy Approval (REA) process created through Ontario Regulation 359/09 of the *Environmental Protection Act*. The purpose of the REA is to establish clear, consistent rules and standardized technical requirements across the province. Part of the Renewable Energy Approval (REA) process set up by the Province of Ontario includes consultation with affected municipalities. A municipal review framework is currently in place for the review of large solar energy projects. Further details with respect to this review process are outlined in Council Report Number 12-078.

The City of Kingston currently has Council approved landscaping and site design guidelines for large ground mounted solar energy facilities (Exhibit A). These guidelines outline the minimum standards that the City asks for with regards to landscaping and site design for large solar projects. The intent of these guidelines is to assist in mitigating the visual impact of large solar facilities on the residences and the landscape of the rural area. These guidelines must be addressed by the proponent through an agreement which forms part of the City's comments to the Province as part of the Renewable Energy Approval (REA) process.

The City of Kingston has developed a municipal consultation process in which the proponent is required to submit preliminary information (e.g. geo-technical studies, environmental impact assessment) and a completed pre-application form at the initial stage of the review process. This will enable staff to review the proposal to identify any potential concerns from a City perspective. As well, the proponent is advised of the City's Landscaping and Site Design Guidelines for Large-Scale Ground Oriented Solar Energy Facilities. The Council approved pre-application form and process are outlined in Rural Advisory Committee Report Number RAC-14-001.

June 22, 2015

Page 4 of 7

**Large Renewable Procurement (LRP)**

On June 12, 2013, the Minister of Energy directed the Ontario Power Authority to remove 'large' projects (projects that produce over 500 kW or 0.5 MW of power) from the Feed-in Tariff (FIT) program and to begin developing a new competitive process for the procurement of large renewable energy capacity. On January 1, 2015, the Ontario Power Authority (OPA) merged with the Independent Electricity System Operator (IESO) to create a new organization that will combine the OPA and IESO mandates. The new organization, now known as the IESO, currently administers the new Large Renewable Procurement (LRP) program.

The Province has set the following procurement targets for the LRP:

- Solar - 140 MW
- Wind – 300 MW
- Water - 75 MW
- Bio Energy – 50 MW

As part of the development of the LRP program, the IESO consulted extensively with municipalities, Aboriginal communities, industry associations, the general public and other stakeholders with respect to the design and implementation of this program. As a result of the stakeholder consultation, the LRP program was created to give municipalities a stronger voice and additional opportunities to participate in the development of renewable energy projects.

When the LRP program was introduced, it included an initial Request for Qualifications (RFQ). The Qualification is now complete and forty-two (42) applicants were qualified based on their ability to meet a set of mandatory requirements which focused on past development experience and financial capability. The next step is the RFP that recently came into effect and sets out how the projects will be evaluated and awarded.

**Timelines for the LRP Process**

The IESO has established deadlines with respect to the LRP process. The RFP is open only to the forty-two qualified applicants. The proposal submission period began on March 10, 2015 and will close on September 1, 2015.

**Community Engagement**

As part of the mandatory requirements for the RFP, proponents must have a community engagement plan, which should be completed prior to the submission deadline. A copy of the plan should be posted on the proponent's website and provided to the community. At least one meeting should be held with municipal staff to gather feedback on local considerations and requirements. Consultation also needs to occur with the community with a requirement that notice of the meeting is to be published fifteen (15) days in advance of the meeting. Further, property owners within a 120 metre radius of the host property and the proposed connection line must be circulated with a notice.

**Project Site Information**

Information regarding the site under consideration for the project must be provided by the proponent to local communities and at public meetings. Preliminary studies on features of the site should be undertaken and maps should be prepared to indicate site location; endangered or

June 22, 2015

Page 5 of 7

threatened species; provincially significant areas of natural and scientific interest, provincially significant wetlands; cultural heritage resources; and transportation features such as highways, railways and airports. Developers are also responsible for contacting the Ministry of Tourism, Culture and Sport to confirm the presence of known archaeological resources in the project area.

The LRP also has agricultural land use restrictions for ground mounted solar projects. Ground mounted solar projects are not permitted in Prime Agricultural Areas that are designated in a municipality's current Official Plan. The City's Official Plan has a Prime Agricultural Area designation which is indicated on the Plan's land use schedules.

### **Rated Criteria for Points**

As part of the LRP process, points will be awarded to proposals that demonstrate community engagement that exceed the mandatory requirements. These rated criteria are optional measures focused on engagement and participation. The point based system is intended to create greater communication between the developer and the municipality and provide opportunities for communities to raise local issues and considerations.

Projects that receive rated criteria points may increase their likelihood of success in the RFP process, but a lack of points does not guarantee that a project will not move forward. Rated criteria points can be received by a municipal council resolution or a municipal agreement.

### **Municipal Council Support Resolution and Municipal Agreements**

A municipal Council support resolution indicates that council supports the construction and operation of the Large Renewable Project on the proposed lands. In Council Report Number 13-093 (Update on FIT 2.1 Requirements) a process was set out for the review of municipal council support resolutions for large ground mounted solar facilities. This report will update the process and retain elements of the process outlined in Council Report Number 13-093. It should be noted that Council still has the opportunity to review further details about the project through the REA process.

As part of the LRP process, the applicant will enter into a landscaping and site design agreement with the City. This agreement states that if the proponent receives approval from the province to construct a ground-mounted solar energy facility, then the facility will be built in accordance with the City's Landscaping and Site Design Guidelines for Large-Scale, Ground-Oriented Solar Energy Facilities. After applicants have entered into this agreement with the City, Council may adopt a municipal council support resolution for the project.

Under the LRP process, municipalities have the opportunity to enter into other agreements with qualified applicants. Evidence of a municipal agreement with qualified applicants must be provided on a prescribed form. The prescribed form is to confirm that a binding agreement was reached between the municipality and the proponent pertaining to the Large Renewable Project and is intended to provide flexibility so that municipalities can have input regarding the agreement that would best suit their needs.

Therefore, municipal agreements can be project specific. Unlike the City's existing landscaping and site design agreement, a municipal agreement could address terms such as road use and

June 22, 2015

Page 6 of 7

infrastructure costs and impacts, community vibrancy/benefit or other information that Council would consider appropriate for the project.

The updated City of Kingston Landscaping and Site Design Guideline agreement template for the LRP program is attached as Exhibit B. The IESO prescribed forms for a municipal council support resolution and municipal agreement are found in Exhibits C and D. It should be noted that the language contained in the forms shall not be altered.

It is recommended that the proposed process be as follows:

1. The proponent contacts the Planning Division to initiate the pre-application process including completing the pre-application form.
2. The proponent submits to the Planning Division a brief project overview, including such information as location, size and scale of the project and site plan. This information, as well other preliminary studies, would have been received through the pre-application process. A signed copy by the applicant of the proposed landscaping and site design agreement is also required.
3. Planning staff will present a report to Council (with the proposed landscaping and site design agreement signed and attached) describing the proposed project with two recommendations to Council: 1) to enter into a landscaping and site design agreement between the applicant and the City and 2) to adopt a Municipal Council Support Resolution for the project.
4. Should the proponent wish to enter into a further municipal agreement with the City, a signed copy by the applicant of the proposed agreement is required. Planning staff will include the signed agreement in the above noted Council report. The report will further recommend that the City enter into the municipal agreement with the proponent. The information for the municipal agreement will be presented to Council along with the request for a municipal council support resolution.

### **Conclusion and Recommendation**

The LRP process was designed to provide municipalities with greater opportunities to participate in the development of large scale renewable energy projects at its early stages. At the RFP stage, proponents are required to complete mandatory community engagement plans and conduct meaningful consultation with the municipality.

Staff have recommended an updated process for reviewing requests for municipal council resolutions and municipal agreements. The timing window for the submission of proposals under the RFP is fairly short with a deadline for submissions of September 1, 2015. Therefore, it is intended that the updated process will provide a streamlined approach which will allow staff to conduct a comprehensive initial review of proposals for large ground mounted facilities so that potential impacts as well as local considerations and requirements can be identified. Council still retains the ability to review and make comments on project details when they become available through the later REA process.

June 22, 2015

Page 7 of 7

**Existing Policy/By-Law:**

City of Kingston Landscaping and Site Design Guidelines for Large Ground Mounted Solar Facilities

**Notice Provisions:**

Not applicable

**Accessibility Considerations:**

Not applicable

**Financial Considerations:**

Not applicable

**Contacts:**

Paige Agnew, Director, Planning, Building & Licensing Services 613-546-4291 extension 3252

Cherie Mills, Manager, Policy Planning 613-546-4291 extension 3289

Annemarie Eusebio, Intermediate Planner 613-546-4291 extension 3183

**Other City of Kingston Staff Consulted:**

Not applicable

**Exhibits Attached:**

- Exhibit A      City of Kingston Landscaping and Site Design Guidelines for Large-Scale Ground-Oriented Solar Energy Facilities
- Exhibit B      City of Kingston Landscape and Site Design Guideline Agreement Template for Large Ground-Oriented Solar Facilities
- Exhibit C      IESO Prescribed Form – Municipal Council Support Resolution
- Exhibit D      IESO Prescribed Form – Municipal Agreement



# Landscaping and Site Design Guidelines for Large-Scale, Ground-Oriented Solar Energy Facilities

Good standards per Mr. Obier

Since the *Green Energy Act* was passed in 2009, most renewable energy projects are exempt from most *Planning Act* approvals, and have instead been subject to a provincial-led approval process. Part of the Renewable Energy Approval (REA) process set up by the Province of Ontario includes consultation with affected municipalities. Developers of renewable energy projects must submit specific materials to the municipality within a certain timeframe, and consult with the municipality. This includes having the municipality complete the Municipal Consultation Form provided by the Province, which the developer must then submit with their REA application.

The purpose of these guidelines is to outline the minimum standards that the municipality would ask for with respect to the landscaping and site design for solar energy facilities in their comments to the Province as part of the REA process.

The guidelines apply to large-scale, ground-oriented solar energy facilities, where the generation of electricity is the primary use of the property, excluding MicroFIT projects. These types of facilities cover large amounts of land, and can have significant impacts on the surrounding environment, particularly in rural areas that do not generally contain such large-scale facilities. The guidelines are intended as a starting point in helping to mitigate the visual impact that these solar energy facilities have on the landscape.

## 1. Access

- a) All solar energy project sites will be required to have a civic address. If a civic address does not exist for the property, one will be created by the municipality.
- b) The creation of access points (driveways) to any property, or the alteration of an existing access point, will require an Access Permit from the appropriate approval authority.
- c) The access road bed will be constructed to the appropriate standard to accommodate the weight of a standard-size fire (pumper) truck.

## 2. Setbacks

- a) Structures, panels and fencing associated with a solar energy facility will be set back from all property lines and public road rights-of-way a minimum of 20 metres (66 feet).
- b) A 100 metre (328 ft.) setback for fencing and solar arrays will be required from any residence, unless otherwise negotiated by the property owner.

---

**Landscaping and Site Design Guidelines for Large-Scale, Ground-Oriented Solar Energy Facilities**

---

- c) Additional setbacks may be required, if identified through the review process, to address certain issues, including, but not limited to, mitigating noise or glare impacts, providing for road or utility corridors, or protecting significant natural or cultural heritage features.

### **3. Visual Appearance and Impact**

- a) No solar energy facility will produce glare that would constitute a nuisance to occupants of neighbouring properties, to persons traveling on public roads, or within known local flight routes to the Kingston Municipal Airport. Glare resistant solar panels should be used wherever possible.
- b) The visual impact of electrical lines and all other utility connections will be minimized wherever possible (refer to Section 5. Utility Connections).
- c) Appropriate landscaping, screening materials, and architectural treatments will be required to help screen or buffer the impact of the solar energy facility and accessory structures from public roads and adjacent properties (refer to Section 4. Accessory Structures, Section 7. Landscaping, Section 8. Berms, and Section 9. Fencing).

### **4. Accessory Structures**

- a) All solar energy facility buildings and accessory structures, including, but not limited to, equipment shelters, storage facilities, transformers and substations, will be screened from view, particularly when adjacent to a public road or residential property, using a combination of landscaping elements (refer to Section 7. Landscaping, Section 8. Berms, and Section 9. Fencing).
- b) Where buildings or accessory structures are visible from a public road or adjacent property, and cannot be appropriately screened, additional architectural treatments will be required to help the structure blend into the surrounding landscape.

### **5. Utility Connections**

- a) In designing the plans for the connection of the solar energy facility to the electricity grid, the proponent will consider all options, including placing all utility connections (e.g. electrical lines and wires) from the solar energy facility underground, as well as the feasibility of running the lines overhead in the rear of properties, away from public roads.
- b) The placement of utility connections underground will have to take into consideration soil conditions, shape and topography of the site, and any adjacent natural or cultural heritage features.
- c) The proponent will consult with the City regarding its plans for utility connections. The City will confirm whether the utility connections should be underground or overhead, as there may be the possibility of using existing pole systems, and it may not always be suitable to have private infrastructure buried within the municipal right-of-way.

- d) Electrical transformers or substations for utility interconnections may be above ground, if required, but any of these facilities that are visible from a public road or an adjacent property will be appropriately screened or architecturally treated (refer to Section 3. Visual Appearance and Impact and Section 4. Accessory Structures).

## **6. Site Alteration and Stormwater Management**

- a) Any removal of topsoil, placement of fill, or alteration of the grade of the land required for the construction or operation of a solar energy facility will require a Site Alteration Permit, in accordance with the City's Site Alteration By-Law.
- b) There will be no negative impact on public rights-of-way or adjacent properties with respect to stormwater runoff from solar energy facilities.
- c) Fixed panel solar arrays will be considered pervious surfaces for the purposes of calculating stormwater runoff and detention. The impervious surfaces will include the support posts and bases of the panels, any roads or impervious driveway surfaces, parking areas, and buildings on the site.

## **7. Landscaping**

- a) A full landscape plan, prepared by a Landscape Architect, will be submitted to the municipality for review and comment.
- b) Where solar energy facilities are visible from a public road or adjacent property, appropriate screening and buffering will be employed to mitigate the presence of the facility through a combination of landforming, vegetation and fencing. This may include wrapping the landscaping treatments from the road frontage around to a portion of the side yards of the property.
- c) Wherever possible, mature trees and vegetation will be preserved, particularly where it can be used to screen and buffer adjacent properties and public roads from the solar energy facility.
- d) The structures comprising the solar energy facility will be constructed and located in a manner so as to minimize the necessity to remove existing trees upon the lot.
- e) Any tree removal on the property will require a Tree Permit, in accordance with the City's Tree By-Law.
- f) Any trees to be retained on-site will be protected from development activity in accordance with the *City's Guidelines for Tree Preservation and Protection*.
- g) Accessory structures on the property that will be visible from a public road or adjacent property will be screened or architecturally treated so that they blend in with the surrounding landscape (refer to Section 4. Accessory Structures).

**Landscaping and Site Design Guidelines for Large-Scale, Ground-Oriented Solar Energy Facilities**

---

- h) The chain link fence surrounding the solar energy facility will be screened from view using a variety of landscaping options, such as berms, vegetation, wood fencing, or living fences/walls (refer also to Section 8. Berms and Section 9. Fencing).
- i) Within the fenced enclosure, and on the grounds of the facility around the solar panel arrays, there should be vegetated groundcover, preferably drought-tolerant species. Interior to the site, the vegetated groundcover, as well as any granular or hard surfaces, should not require any herbicide treatment for maintenance or growth control. A management plan for sustainable maintenance of the site should be produced.
- j) Plantings on the property used to screen and buffer public roads and adjacent properties should include a mix of native coniferous and deciduous trees and shrubs, and allow for the landscaping material to be visually effective in a short period of time.
- k) The planted size of trees and shrubs may vary from site to site, based on proximity, land elevations, and soil types in order to have a greater mitigating effect for the solar energy facility.
- l) Emphasis on year-round screening should be prioritized in plant material selection.
- m) Multi-storey plant material for screening and habitat should be integrated into the design.
- n) There is a preference for native vegetation and heritage species to be planted. Non-native species may be considered for more landscaped areas. However, whatever species are chosen, they should not be invasive, and they should be appropriate to the existing landscape and natural environment. The Cataraqui Region Conservation Authority (CRCA) and City of Kingston Forestry Division and Parks Development staff should be consulted when determining appropriate plant species.
- o) Wherever possible, landscaping elements used to screen and buffer public roads and adjacent properties should be installed prior to construction.

**8. Berms**

- a) Berms should be used in appropriate situations, where they will not impact drainage on the site and adjacent sites.
- b) Berms that are constructed should not be so large as to look out of place. Instead, they should be appropriate to the location and surrounding environment.
- c) Contoured landforms with a naturally undulating design, ranging in height from 0.5 metres to 2.4 metres, with cross-sectional slopes not exceeding 1:5, are encouraged to blend (feather out) into the landscape and not present an obvious and jarring intrusion into the landscape.

---

**Landscaping and Site Design Guidelines for Large-Scale, Ground-Oriented Solar Energy Facilities**

---

- d) Any berms that are installed will be fully landscaped with appropriate vegetation (refer to Section 7. Landscaping).
- e) All berms will be constructed on private property and will not be permitted in the municipal right-of-way.

## 9. Fencing

- a) While chain link fencing is required by the proponent around the perimeter of all solar energy facilities, it should be screened from view from public roads and adjacent properties.
- b) Additional types of fencing may be used to act as a buffer and screen the chain link fencing. Examples include wood fencing or a living fence/wall.
- c) Any solid fencing used should be installed with other landscaping elements, including vegetation, to soften the appearance of the fence.
- d) All fencing is to be properly installed and maintained in good repair.

## 10. Lighting

- a) Lighting of a solar energy facility, including entrances and accessory structures, will be limited to that required for safety and operational purposes, and will be reasonably shielded from abutting properties.
- b) Where feasible, lighting of the solar energy facility will be directed downward and will incorporate full cut-off fixtures to reduce light pollution.
- c) Lighting of large-scale, ground-oriented solar energy facilities will be consistent with applicable local, provincial and federal law.

## 11. Signage

- a) Signage posted on the property will comply with the City's Sign By-Law and may require a permit.
- b) Signage will be posted at the entrance to the site, so that it is clearly visible from a public road or right-of-way.
- c) Signs will only identify the manufacturer, installer, owner and/or operator of the system, and any operational or public health and safety information applicable to the facility.

## 12. Site Plan Drawings

Site plan drawings will be submitted to the municipality for review and comment, and should contain the following information:

- An aerial plan of the solar energy facility location, including all properties within 120 metres of the site;
- Property lines, public roads and other physical features of the site;
- Location of access roads;
- Location and spacing of solar panels;
- Location of all accessory structures, including inverters, transformers and substations;
- Location of underground or overhead electrical lines connecting the solar energy facility to any buildings, substations, or other electric load;
- Proposed changes to the landscape of the site, such as grade changes and the removal of vegetation, including the grade six metres onto any adjacent properties;
- Drawing of the solar energy installation showing the proposed layout of the system and the proximity to adjacent properties, and potential shading from nearby structures or trees; and,
- A landscape plan, prepared by a Landscape Architect, showing all landscape elements that will be installed on the site, including, but not limited to, trees and other plantings, fences, berms, exterior lighting, and signage.

Approved by Council: May 1, 2012

Prepared by: City of Kingston  
Planning and Development Department  
613-546-4291, ext. 3180

K:\DOS\_Natural Resources\Renewable Energy\Solar Farms - Landscaping & Site Design\Design Guidelines for Large-Scale Solar Energy Projects (FINAL - May 1, 2012).docx

To August 15, 2018 Spotsylvania County Planning Commission (File Version)

My name is Irvin Boyles, I live at 11501 General Wadsworth Drive, Spotsylvania. My credentials include three Masters of Science degrees: Electrical and Electronic Engineering, and Systems Management from University of Southern California, and the third in Management from M.I.T. I have a Bachelor of Science in Physics, and am a graduate of the Air War College. My present employment supports the Department of Defense and Department of Homeland Security.

My purpose today is to stress the criticality of having an Emergency Action Plan in place acceptable to the Concerned Citizens of Fawn Lake and Spotsylvania County, as a condition for the County's approval of the special use permit for this Solar Farm project and the electrical power grid connection to proceed adjacent to our residences and living environment. This is based on my skepticism that the necessary due diligence has been expended on the inevitability or high likelihood that emergency conditions will arise that can affect the safety and health of persons, or damage property, the aquifer, waterways, lakes, ponds, and the environment if prompt actions are not taken to contain or mitigate emergency situations.

I look at the proposed installation and operation of the proposed project, and have to ask "what could go wrong that could affect lives, health, safety, and security of citizens and properties of Spotsylvania County, and visitors to historical landmarks within the inundated area of the project?" And when should an "emergency" be declared, and what actions should be taken in response? I see this "solar power plant, consisting of 1.8 million solar panels, constructed with possibly carcinogenic or other toxic materials or heavy metals; all linked together through a common grounding grid; and tied into a large number of inverters, substations and transformers leading to the Dominion power connection point, and eventually into the State and national electric grid itself, and part of the National Critical Infrastructure – something will break!. I can envision several emergency conditions that could occur with a solar power plant of this scale and complexity, many of which have been identified by other presenters. In the paper, I discuss two examples of causes of over-voltage build-up between the solar plant and the electric grid connection point that can bring on the need for emergency response action that would be identified in an Emergency Action Plan: Failure of grid connection point to accept 500-megawatts of electrical energy generated, and direct and indirect lightning strikes.

- What happens when 500-megawatts by the Solar plant cannot be accepted or dispensed at the grid connection point by Dominion Power or the electric grid due to equipment failures, under usage, or terrorist attacks on the electric grid itself? As concluded at the National Defense Industry Association (NDIA) *2018 System-of-Systems Engineering Collaborators Information Exchange*: "The electric grid of the 21st century needs to cope with the smart grid, cyber-attacks, space weather (solar storms), Electro-Magnetic Pulse (EMP) and High Power Microwave (HPM) weapons, proliferation of clean energy sources, phase-out of fossil fuels, etc." In other words, the solar plant will continue generating electricity whenever there is daylight, and will build up over-voltages that can cause fires or wreck solar panels and other equipment that can release toxic or carcinogenic materials when it cannot be efficiently expended into the electric grid.

- Destructive natural weather and climate effects such as direct and indirect lightning strikes, tornados, earthquakes, and flooding impact the operation and structure of the solar plant; and its interface with surrounding and downstream communities. Solar photovoltaic farms installed in an open area without high buildings or trees are subjected to high solar radiation and air humidity (i.e., the heat dome effect), and have an increased risk of being hit by lightning. So far, sPower has downplayed the dangers associated with release or leakage of Cadmium and Cadmium compounds like Cadmium Telluride (CdTe), or other materials known to be carcinogens, due to breakage of solar panels from lightning. They haven't accounted for effects of lightning-induced overvoltages in the circuits that cause insulation breakdown at the edges of the photovoltaic modules, which can release these toxic materials into the ground and runoffs, or the subsequent damage done by the dc current generated by the array to the inverters and the connection into power station itself. According to open literature (e.g., Sandia National Labs), when direct lightning hits a solar photovoltaic module, an extremely strong current flows through the module, resulting in overcurrent and surge overvoltage. Meanwhile, an indirect lightning strike produces induced overvoltage, which is influenced by lightning current characteristics, distance of the solar photovoltaic modules from the lightning, soil resistivity, photovoltaic grounding resistance and distance of any lightning protection system.

sPower and their LLCs have tried to assure us this project won't bring harm to any of us, our environment, the Lake, or any waterways in or leaving our area. Given the vulnerability of such a large project to foreseen and inadequately accommodated engineered protections, all high risk scenarios should be addressed in an Emergency Action Plan.

Such an Emergency Action Plan, as a minimum, should include:

1. Purpose to safeguard lives, health, safety, and security of citizens and properties of Spotsylvania County, and visitors to historical landmarks within the inundated area.
2. A basis for pre-planning the necessary emergency response by the solar plant owner/operator and the responsible local, state, and federal emergency organizations.
3. A full description of the geography, structures, environment and historical sites within the inundation or hazard zone of the solar plant to be included within this plan.
4. A listing of typical conditions and vulnerabilities which could lead to failure that the solar plant and/or power grid connection could incur, and internal and external (e.g., roadways, water supply pipelines) structures and environments that could be impacted, and typical responses.
5. Responsible individuals or organizations, and criteria for detecting, assessing, and declaring an emergency.
6. Responsibilities for contacting all first responders and support personnel.
7. Responsibilities for contacting all citizens who or their property may be in harm's way immediately and/or following an emergency situation according to the nature of the emergency.
8. Responsibilities to contact all citizens who could have incurred after-effects after resolution the emergency.
9. Responsibilities for cleanup, remediation, and financial retribution where warranted.
10. Responsibilities for identifying and assessing follow-up remedial activities.

11. A schedule of periodic inspections to check degraded or damaged components of the solar plant.

A copy of the Emergency Action Plan should be coordinated with the local Emergency Services Coordinator servicing all areas potentially impacted by this solar plant project and its connection point with the electric power grid; coordinated with the Concerned Citizens of Fawn Lake and Spotsylvania County, and other affected citizens; and filed with the Virginia Department of Emergency Management.

Thank you.

Irvin Boyles  
11501 General Wadsworth Drive  
Spotsylvania VA 22551  
540-972-4404  
[irv.boyles@verizon.net](mailto:irv.boyles@verizon.net)

## Remarks to BOS and Planning Commission August 14/15, 2018

My name is Sean Fogarty. I live in the Livingston District at 11609 Fawn Lake Pkwy, Spotsylvania, VA 22551.

Our focus tonight is the stormwater erosion threat from this huge construction project. I know that the County staff is working diligently on these issues for a project that, as the County Technical letter said, has an “unprecedented construction land mass and steep topography...”

I highlight these problems at other solar facilities not to be alarmist. Clearly well intentioned people can make mistakes but these muddy messes have occurred in much smaller projects (23 acres!) even when the appropriate environmental regulatory agency had approved the plan. Mitigation measures are critical but not a guarantee when not built properly or when the site receives 6 inches of rain in several days like we experienced here in June. This further supports the County staff’s proposal for no more than 400 acre parcels to be cleared, graded and permanently stabilized before moving on to the next parcel. That may mean that work is delayed during winter months if grasses have not had a chance to establish. By way of perspective, a 400 acre site would support about a 60MW power plant which is still 3 times the median size solar plant in Virginia. Our recommendation is to permanently stabilize each 400 acre site before moving on and disturbing the next site.

(SLIDE SHOW)

Rhode Island example: From two articles in the Westerly Sun newspaper. The link is included in my written submittal:

<http://www.thewesterlysun.com/News/Richmond-Hopkinton/Richmond-solar-developer-cited-for-continuing-runoff.html#ath>

QUOTE:

Green Development CEO Mark DePasquale (Developer) said that the severe winter had made it impossible to seed the ground under the solar panels. Vegetation stabilizes the soil and keeps it from running off the site.

The chief of groundwater and wetlands protection at the state Department of Environmental Management said “It is not normal to see such a large site (23

acres!!) with the type of grades that this has to be unstabilized in the winter...the reason that this is a problem is because they had construction delays and their project was delayed to the point that they could not properly implement the plan that was approved by DEM, which was to get in and get out and have the site stabilized before winter came," he said.

"My well has gone cloudy three times during heavy rain," he said. "It's the only time it's happened in the 17 years we've been there. We put in a brand new well."

End Quote from Westerly Sun  
(END SLIDE SHOW)

## SCC Approves Solar Facility in Spotsylvania

Good evening, my name is David Hammond and I live in the Livingston District of Spotsylvania County.

The recent decision by the State Corporation Commission makes it clear that all of the really important decisions about the sPower solar project are your responsibility. The SCC approval is conditional on the applicants obtaining local special use permits, state environmental approvals, and paying the cost of unspecified network upgrades.

The SCC Final Order makes it perfectly clear that they refused to take a position on any of the numerous concerns raised regarding public health and safety, wildlife and environmental protection. The DEQ will address a couple of concerns, but not the ones that pertain to the unprecedented massive scale of the proposed project, not water extraction, not toxic compounds in the panels, not decommissioning and reclamation, not preserving the character of Spotsylvania County, etc.

The SCC documented these concerns, but then they abdicated all of the responsibility, stating in their news release that:

““Spotsylvania County has wide latitude in attaching conditions to the Special Use Permit necessary for the project” for concerns not explicitly addressed by DEQ recommendations or in the county’s permit ordinances.”

As an illustration of this transfer of responsibility, I will read the following paragraph directly from page 18 of the SCC Final Order:

“We find that Spotsylvania County, through this ordinance governing the Special Use Permit process, can address Mr. Mueller’s concerns related to the health of the aquifer and the use of cadmium or cadmium telluride products in the solar panels themselves to the extent they are not otherwise addressed by local, state or federal law.”

In my opinion, the SCC Final Order is a document that prepares their future argument that anything that goes wrong due to the unprecedented scale of this project, damage to the aquifer, injury to public health, safety, and welfare, or harm to wildlife and the environment will be all your fault because you failed to properly assess the risks and set appropriate conditions in the Spotsylvania County Special Use Permit.

The decisions that you make about whether this project is allowed to proceed, and if so, how it will be developed will be part of your personal and collective legacies. Please proceed carefully and decide wisely.

BOS Solar Aug 15

Yesterday citizens from varying areas of Spotsylvania gave convincing evidence of substantial problems related to a special use permit for a solar power plant in Spotsylvania. If the biblical prayer "He who has ears to hear, let him hear" has relevance in our lives we can only hope that truth will prevail in an era where the media, lobbyists, and wealth control the information decision makers receive and use when making decisions. Citizens continue to present evidence of problems related to erosion, water runoff and land devastation. They continue to ask about management plans and quality control. The supervisors were shown how the project is chiefly a method for supposedly politically correct business executives to become wealthy through tax credit methodology. Meanwhile the earth becomes a wasteland at decommission.

How can an honest public servant listen and hear in this environment? Why was the unbiased consultant who is an expert on solar projects not offered an interview when he applied to assist? Will you confer with Culpeper County which just rejected several solar applications? What happened to the 2002 Comprehensive Plan report on water resources in Spotsylvania which have relevance to the requirements and potential dangers of this project? Several citizens have mentioned advisory groups. Are you responding to their courtesy? Many significant questions remain unanswered, which lead to the irreverent thought of hearing aids. The truth for this permit request requires rigorous listening and action.

We need a full response to the questions which have been asked. A tentative plan might determine the feasibility of submitting 6,500 acres of land to multiple environmental impact before irreversible damage is done.

Presented on 15 August 2018

**Significant Concerns with Utility Scale Solar Power Plants in Culpeper County**

My name is Mike Mikolosko and I am a resident of Livingston District in Spotsylvania County.

As you may know, the Culpeper Planning Commission has recently recommended the denial of both of the utility scale solar power plants that are currently under application for a Special Use Permit in Culpeper County.

The Culpeper North Solar Project is on 174 acres near Brandy Station.

The Open Roads Renewables Project is on 1000 acres south of Stevensburg.

One article indicated that the Culpeper North Solar Project did not comply with the comprehensive plan, and that it was the wrong place for this type of facility. They are concerned that these facilities will change the character of the county and have other negative impacts.

In addition, the Culpeper Board of Supervisors recently voted to commission an independent study of the potential impacts on property values for neighbors of large solar power facilities. A Request for Proposals has been written and a reference to the RFP has been provided in my written submission.

Clearly, Culpeper County has many of the same concerns as we do regarding these large solar power plants. We recommend that the Planning Commission suggest to the Spotsylvania Board of Supervisors either commission their own real estate appraisal impact study or co-sponsor the Culpeper study. Obtaining an unbiased evaluation of likely impacts on neighboring property values will be an extremely important component of an overall Cost / Benefit Analysis that should be done by Spotsylvania County.

To discuss the real estate appraisal study RFP, please contact Culpeper Board of Supervisors' member Jack Frazier:

Jack Frazier: 540.219.8871  
use email : [cjfrazier069@gmail.com](mailto:cjfrazier069@gmail.com)  
gov. email : [cjfrazier@culpepercounty.gov](mailto:cjfrazier@culpepercounty.gov)

**References:**

1. COUNTY OF CULPEPER, RFP NO. OA-19-0502, REQUEST FOR PROPOSALS FOR APPRAISAL IMPACT STUDY OF SOLAR UTILITIES, August 10, 2018 [https://web.culpepercounty.gov/Portals/0/Departments/Purchasing/Documents/March2015/RFP\\_OA-19\\_0502\\_Aprsl\\_Impact\\_Solar\\_Utilities.pdf?ver=2018-08-10-143405-827](https://web.culpepercounty.gov/Portals/0/Departments/Purchasing/Documents/March2015/RFP_OA-19_0502_Aprsl_Impact_Solar_Utilities.pdf?ver=2018-08-10-143405-827)
2. Culpeper County planners deny solar project, By Allison Brophy Champion, Jul 12, 2018 [https://www.starexponent.com/news/culpeper-county-planners-deny-solar-project/article\\_e11429b1-479b-5361-8b72-1aa043a23cef.html](https://www.starexponent.com/news/culpeper-county-planners-deny-solar-project/article_e11429b1-479b-5361-8b72-1aa043a23cef.html)

My Name is Daniel Kulig and I reside in the Livingston District.

Commissioners, in light of the situations you have just reviewed, the following conditions are recommended for inclusion in the SUP by County Staff.

1. The "rolling" 400-acre site development plan proposed by the sPower in their response to the Staffs Technical Letter is much too aggressive for a development of this scale. The maximum of a 400-acre development at one time, complete with permanent stabilization, as recommended by County Staff, is the preferred approach and is critical to reduce risk and maintain control by the County Engineers.  
This approach will require that construction in the initial area be completed and final grading and seeding put in place with sufficient growth established. Any temporary stabilization must be replaced by permanent techniques.  
In addition, the Virginia Erosion and Sediment Control Plan Minimum Standards Checklist (4VAC50-30-40) shall be completed for each 400-acre plot. The next 400-acre development shall be contingent upon successful completion of the previous parcel.
2. To evaluate the potential existence of Acidic soil, it is recommended that the developer be required to conduct a soil sample survey down to the maximum depth of the proposed excavations based on the final regrading plan for the site. A sufficient number of samples should be taken, as specified by the County inspection authority, to insure adequate coverage.
3. The Performance Bond required under Section 8-38 of the County Erosion Control Ordinance shall be equal to the total cost of providing erosion and sediment control improvements to the entire project site (3500 acres), as determined by the County Administrator. This performance bond is separate from the decommissioning surety equivalent required by the County's Solar Energy Facility Ordinance (23.4.5.7).
4. During the storm prone months of April – September, the developer shall be required to have a plan in place, and be able to execute such plan, to

contain the runoff from an emergent event such as a Severe Thunderstorm or Flash Flood scenario. Storm water calculations should include evaluation of the 4"- 6" rains which were encountered in June and July of this year.

5. As part of the final Erosion and Stormwater Management Plans, the Final Site plan must address the unique configuration of impervious solar panels constructed over newly established grade. To ensure that this condition is properly addressed for runoff calculations, it is recommended that the final Erosion Control and Stormwater Management Plans for the completed Site (3500 acres) be certified by an independent Civil Engineering Agent, designated by the County and qualified to address these unique conditions.

Commissioners, if you only take away one thing from my presentation, please remember that the maximum 400-acre plot development at one time is the key to reducing the risks involved in this massive project. Lessons learned from the first plot will help reduce risks as the project evolves.

**Statement For the Record to Spotsylvania County Planning Commission and Board of Supervisors  
to Request Actions to Avoid Harmful Impact of sPower Application**  
(SUP18-0001, 0002, 0003 Sustainable Property Holdings, LLC and/or sPower Development Co., LLC  
dba sPower)

**Submitted on April 24, 2018 by Concerned Citizens of Fawn Lake and Spotsylvania  
County (CCFLSC)**

**Size of sPower Mega-Solar Power Plant Presents Extraordinary Risks**

In general, the CCFLSC cannot support the building of the World's 12th largest MEGA-Solar-Power-Plant in the middle of our residential neighborhoods unless all of the threats to our lake, streams, water, roads, health and property values are adequately assessed and mitigated in the "Special Use Permit" being considered by the Planning Commission and the Board of Supervisors.

We implore the Board of Supervisors and the Planning Commission to view our comments in the context of:

(1) **the Land Use Section of the Planning Commission's Comprehensive Plan** (proposed language) which directs that "Renewable energy generation facilities, such as solar, geothermal, or wind, should be sited and designed to minimize detrimental impacts to neighboring properties, uses, and roadways..."; and

(2) **the Special Use Standards applicable to solar facilities** specifying that "The planning commission shall not recommend, nor shall the board of supervisors approve..." a Special Use Permit unless each of the standards are satisfied in their entirety (Zoning Code Sec. 23-4.5.7. - Standards of Review, including subsection (d) which sets forth specific standards for solar facility decommissioning). For example, we believe that a Special Use Permit that does not contain the Conditions described below would be in violation of the standards in at least the following paragraphs: "(4) That the proposed use will not adversely affect the health or safety of persons residing or working in the neighborhood of the proposed use; (5) That the proposed use will not be detrimental to the public welfare or injurious to property or improvements within the neighborhood; and (8) That the proposed use will have no unduly adverse impact on environmental or natural resources.

**County Must Mandate More Detailed Engineering Plans Upfront**

Given the EXTRAORDINARY size and challenges this project presents, we believe Spotsylvania County citizens can only be protected from harm if sPower is required to begin anew and submit UPFRONT more detailed engineering plans, including an overall **Environmental Management System (EMS)** as suggested by DEQ, designed to avoid severe risk, including but not limited to:

- (1) a **Water Source Plan** that will not collapse the local aquifer and lead to the loss of drinking water for thousands of citizens and the depletion of water levels in Fawn Lake;
- (2) a **Stormwater/Ground-Stabilization Management Plan** to prevent tons of sludge from polluting the local streams, Po River and Chesapeake Bay watershed, repeating what happened on the 200 acre solar site in Essex County (only 3-5% of the sPower site);
- (3) a **Site Clearing and Regrading Plan** that does not involve burning of nearly 4,000 acres of cutover that will cause serious health problems and bankrupt the Fawn Lake restaurant and golf club (who will hold weddings and charity golf events in the midst of stench and billowing smoke?), and includes specific plans for regrading and soil testing to the full depth of disturbance at each location;
- (4) an **Erosion/Sedimentation Plan** that will not send phosphorous-laden fertilizers into Fawn Lake and surrounding neighborhoods which would cause environmentally destructive algae blooms and loss of recreational activities on the lake. The use of biosolids laden with pathogens and toxic chemicals to amend/fertilize soil must be prohibited.

- (5) an **Emergency Response Plan** that will prevent the toxic and Geno-toxic cadmium in broken solar panels from poisoning our lake, streams and groundwater and downstream Po, Mattaponi and York Rivers and the Chesapeake Bay (and prevent wildfires from breaking out in the cutover);
- (6) a **Site Plan** that sets back solar operations at least 300 feet from all residentially zoned properties and that includes berms and a green screen along the entire property line of Fawn Lake and other area homes to prevent hazardous runoff and to reduce visual eyesores and noise; and
- (7) a **Remediation and Decommissioning Plan** that will prevent abandonment of a toxic waste site by requiring a guarantee of payment for the full cost of these activities and by making financially responsible not only Sustainable Property Holdings, LLC, but also the parent corporations—sPower, AES Corporation and AIMCo.

### **Special Use Permit Conditions Requested to Prevent and Mitigate Harm.**

Even in the absence of the above requested detailed engineering and site plans, we believe Spotsylvania County citizens can only be protected from harm if the Special Use Permit contains specific conditions to prevent and mitigate such harm, as described below. Attached is additional information that has been extensively researched to substantiate the need for the requested Conditions in the Special Use Permit. We also endorse the recommendation by DEQ that the applicants use **Best Management Practices (BMP)**.

#### **I. Alternatives to Well Drilling and Extraction of Industrial Levels of Water on Site**

The attached GEO SEER, LLC report from a well-recognized GIS expert clearly states that “The current plan, as provided by sPower, would lead to the collapse of the area aquifer, sink holes, mass erosion and increased costs to residents, agricultural areas and Spotsylvania County as additional more expensive wells (or installation of county water utility lines) will be required....”. The current application specifying that 4 wells will be drilled to extract 308 Million gallons of water just during the short construction period will collapse the aquifer and deny potentially thousands of Spotsylvania County residents their drinking water; and will negatively impact the springs that serve as the only source of water keeping Fawn Lake levels up during periods of draught (a permanent drop in water levels would leave docks dry and prevent boats from entering the lake for recreational activities).

The GEO SEER, LLC report’s conclusions are dispositive of the need for a **SUP Condition: Require that water during construction and during operations be obtained from onsite sources described in the GEO SEER, LLC report.**

#### **II. Alternatives to Burning Cutover to Clear Site for Positioning of Solar Panels**

A new engineering study is not needed for the applicant and the County to understand the severe harm that 6-12 months of burning tons and tons of cutover and woody debris over up to 6,350 acres will inflict on local residents. The prevailing southerly and westerly winds blowing over the site will pour smoke and ash directly into Fawn Lake and other neighboring homes. The first to feel the impact will be a senior living section in which many seniors already have chronic breathing and other severe medical conditions which will worsen or cause them to move. Also, the continual contamination of the Fawn Lake restaurant and golf facilities will lead their bankruptcy when potential patrons turn away after they learn of the constant stream of smoke and stench pouring over wedding, dining and charity and other golfing events.

These conclusions are dispositive of the need for a **SUP Condition: Require that NO BURNING be permitted on the site and that alternative means be employed to remove the cutover and other debris.**

#### **III. Alternatives to Use of Biosolids to Fertilize Areas Intended for Grass Growing**

A new engineering study is not needed for the applicant and the County to understand that using biosolids as a means to fertilize grass seed or to otherwise stabilize the soils on the site, regardless of how they are spread, can cause severe harm to not only individuals on the immediate borders of the facility, but also the entire Spotsylvania community if prescription drugs, heavy metals and other toxic and harmful substances are not fully degraded in the biosolids used. Runoff containing harmful biosolids would present a clear threat to the quality of water extracted from the aquifer across the entire county.

These conclusions are dispositive of the need for a **SUP Condition: Require that NO BIOSOLIDS be permitted on the site and that alternative means be employed to fertilize or stabilize soil.**

#### **IV. Control Spread of Fertilizers/Chemicals from Leaving-Site/Entering-Waters**

A new engineering study is not needed for the applicant and the County to understand that phosphorous laden fertilizers and other harmful chemicals (such as cleaning agents, etc.) used on the site, if allowed to become airborne and blown into neighboring Fawn Lake, ponds, and streams, will result in severe harm to the use of such water resources because of the destructive algae blooms and pollution such materials will cause. Likewise, any runoff from the site containing such chemicals will result in the same harm.

These conclusions are dispositive of the need for a **SUP Condition: Require that any fertilizers or chemicals employed at the site not be spread by airborne means and that other means of mitigation discussed below be required to prevent runoff containing such materials from leaving the site and into on-site wetlands and waterways; require that only the most efficient, least toxic pesticides and herbicides are used; and require that only non-toxic/biodegradable cleaning agents are used.**

#### **V. Control Erosion and On-site Stormwater from Leaving-Site/Entering-Waters**

Specific engineering studies are needed for the applicant and the County to understand the full implications of siting 1.8 million solar panels in the unique Virginia red clay soil covering the 3,500-6,350 acres to be cleared, graded and seeded. There is evidence that agricultural areas previously covered in pine present especial challenges in reconditioning the soil to first stabilize it and then to grow grasses or crops. It would appear only prudent that a small acreage demonstration project be conducted on-site to determine the exact methods and materials needed to clear, grade, and seed this challenged acreage in order to successfully stabilize the acidic clay soil and prevent serious erosion and runoff from occurring over 6,350 acres after the entire site is graded to bare clay. To do otherwise would be imprudent, given the problems that other construction sites have faced with preventing serious erosion (in particular, the mere 200-acre solar facility in Essex County that sent tons of sludge into the Rappahannock watershed). The fact that the site contains or borders numerous wetlands, creeks and streams (e.g. Robertson Run, Norton Prong, Whitehall Creek, McCracken Creek, Greenfield Creek, Po River, etc.) presents particularly significant engineering challenges to prevent soil movement and stormwater from entering these waters.

These conclusions are dispositive of the need for a **SUP Condition: Require, before construction begins on the site, that a small scale acreage demonstration project be conducted to determine the exact methods and materials needed to prevent severe erosion, landslides, and uncontrolled stormwater runoff from leaving the site or entering wetlands and waters leading to the Chesapeake Bay.**

#### **VI. Prevent Sight, Sound and Runoff Pollution with Setbacks and Berms, etc.**

A new engineering study is not needed for the applicant and the County to understand the harm presented to residents and property values from the loud noise produced by trucks, construction grading and pounding of steel solar panel structures, etc.; from the above-described runoff of phosphorous-laden fertilizers and other harmful chemicals; and from the visual eyesores stemming from solar fields as far as the eye can see. In addition, studies show a significant temperature increase in the areas around even small solar power plants and that the increase may extend out horizontally by at least 300 meters. This

so-called thermal or heat island effect is a significant reason the solar panels and operations should be set back at a significant distance from bordering properties. These factors that can adversely affect health and the environment can be mitigated by, among other things, putting distance between resident properties and the solar panels and other facility operational structures.

These conclusions are dispositive of the need for a **SUP Condition: Require a Site Plan that sets back solar operations at least 300 feet from neighboring properties and that includes berms and a green screen along the entire property line of Fawn Lake and all other residential properties.**

#### **VII. Prevent Cadmium in Solar Panels from Leaving-Site/Entering-Waters**

Specific emergency management plans are needed to prevent leaching of the cadmium contained in the cadmium-tellurium solar panels from leaching into the soil, surface waters and groundwater when the panels are broken and such toxic and geno-toxic chemicals are exposed. As one of the most toxic substances strictly regulated by OSHA during the manufacture of the 1.8 Million First Solar Series 6 panels to be used onsite, any exposure of such substances outside of their glass/steel casings could cause a toxic calamity for the local area and waterways all the way to the Chesapeake Bay. The local area regularly experiences tornadoes and other high wind events, and a recent earthquake that caused severe damage. One recent high wind storm cleared a path of trees in the solar site, extending into Fawn Lake. Recent events such as this in Puerto Rico and elsewhere caused the destruction of entire solar farms, strewn their solar panels over the landscape.

These conclusions are dispositive of the need for a **SUP Condition: Require, before construction begins on the site, that the applicant produce and agree to abide by an emergency management plan that would immediately remove broken panels, and affected soil from the site in an environmentally safe manner and specify the methods to be used and the ultimate resting place for such materials so as not to cause a toxic waste site to be created in another area of Virginia.**

#### **VIII. Impact of Scale Must Be Defined and Mitigated**

The impacts of building a large scale solar power plant must be thoroughly understood and evaluated. The proposed sPower project is 500% larger than the largest solar power plant currently operating in Virginia, and four times larger than anything operating on the East Coast. Larger impacts occur with larger scale, and these impacts must be scientifically extrapolated to a larger scale. The solar heat island effect (also called thermal island or heat dome) has been shown to change the local climate based on data obtained in two separate studies on 1 MW solar plants. Methodical, scientific research is required to be able to extrapolate the extent and impacts due to a solar heat island that will exist over a 500 MW facility located in Spotsylvania County. If a definitive scientific understanding of the impacts cannot be demonstrated by the Applicant, then any increase in scale should not be permitted.

#### **IX. Prevent Solar Facility from Becoming a Toxic Waste Site**

Abandonment of some or all of the solar facilities without immediate deconstruction and expert and safe removal of the solar panels and land restoration would present the County and surrounding landowners with the presence of potentially one of the largest toxic waste sites in the State. Approximately 100,000 pounds of cadmium in the 1.8 Million solar panels would present a clear and present danger to residents, the local environment and large areas of Virginia leading to the Chesapeake Bay. Full financial responsibility for any remediation and decommissioning must be clearly spelled out in the Special Use Permit to prevent such a calamity. The current application by Sustainable Property Holdings, LLC is wholly deficient in this regard and does not even meet current Spotsylvania County code requirements.

These conclusions are dispositive of the need for a **SUP Condition: Require a Remediation and Decommissioning Plan that will prevent abandonment of a toxic waste dump by requiring a guarantee of payment for the full cost of these activities and by making financially responsible not**

**only Sustainable Property Holdings, LLC, but also the parent corporations—sPower, AES Corporation and AIMCo.**

**Request Immediate Suspension of Special Use Process to Allow for Due Diligence**

**In summary, it should be noted that Virginia and county agencies gave extensive close scrutiny to the significant risks presented by the Lake Anna nuclear power plants well in advance of their construction and operation. The sPower solar power plant will generate over one-quarter of the power of the nuclear reactors at Lake Anna and will cover an area six (6) times the nuclear plant. We believe it is not too much to ask that Spotsylvania County and Virginia state agencies having regulatory jurisdiction over one of the World's largest solar power plants not give short shrift to a full and complete assessment of the power plant's risks to the end that they be avoided or mitigated before further review or approval is given.**