

Robert L. and MaryAnn M. Butterfield
7912 Madison Plantation Way
Fredericksburg, Virginia 22407

March 1, 2019

Mr. Kevin W. Marshall
Berkeley District Supervisor
Spotsylvania County Board of Supervisors
9104 Courthouse Road
Spotsylvania Courthouse, VA 22553

Dear Mr. Marshall:

We are looking to you to protect Spotsylvania from encroaching big business and development that will not benefit the citizens of this county.

As a young man born in this area, and who has benefited from the good works of at least two generations of Spotsylvania family members who were dedicated to preserving this county, I guess we're holding you to a higher standard than those who are more recent residents. Therefore, we are asking you to vote to reject the massive solar power plant project being proposed for Spotsylvania.

This county is growing in leaps and bounds. Businesses are drawn to the beauty, as well as the financial opportunity the area provides. We moved here and built a home nine years ago to be near our sons and their families. And, we have been excited and pleased to see the progress and development of the area. Lidl built the largest warehouse distribution center we've ever seen, Publix built on Route 1, there are massive developments of homes, townhomes, senior centers, fast food restaurants, gas stations, etc. Southpoint Parkway has become a major street, built out on both sides. We have some of the best doctors, in new medical buildings, and a new regional medical center. There are new churches being built, schools are full, there are myriad new/used car dealers lining Route 1, and Fredericksburg finalized a \$35 million stadium deal with the Potomac Nationals, bringing more work, and income to the area.

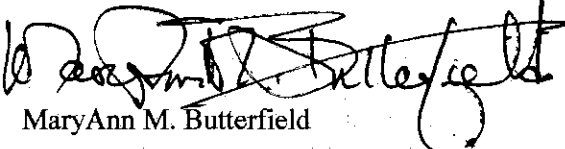
The one thing all this development has had in common was... each added to the betterment of the community. The proposed solar power plant will not benefit residents. It will benefit big business, decrease adjacent property values, threaten wildlife habitat (already threatened from current development), ruin the historic beauty of this area, and who knows what toxicity of the soil and rain runoff will do to earth and streams.

There's a reason solar plants have been built in the desert! And, there is no reason why a solar power plant, especially of this magnitude, should be plunked down on thousands of acres of forested land, which will ruin it for generations to come. We don't need the "temporary" jobs this would provide.

Please join us in rejecting this project for Spotsylvania County. We think your grandfather and great-grandfather would be on our side!

Sincerely,


Robert L. Butterfield, Colonel, USAF Ret.


MaryAnn M. Butterfield

cc: via E-Mail to: BOS@spotsylvania.va.us
concernedcitizensspotsylvania@gmail.com

Donna Mayfield

From: Dave Hammond <davehammond@gmail.com>
Sent: Wednesday, March 13, 2019 2:00 PM
To: Wanda Parrish
Cc: Paul D. Trampe; Gary Skinner; David Ross; Thomas G. Benton; Timothy J. McLaughlin; Chris Yakabouski; Kevin Marshall; Aimee Mann; Concerned Citizens
Subject: Article on Water Leaching Cadmium from Solar Panels

Wanda - Please forward this article to Dewberry (Evan Hill), since I don't have his email address.

[Study warns of environmental risks from solar modules](#), Daniel Wetzel, De Welt, 13May2018 - contrary to earlier studies, water can wash contaminants out of solar panels in months.

This article is a summary of a study conducted by the European Union. It states:

"The researchers had investigated whether the pollutants used in the four main photovoltaic technologies are water-soluble. Contrary to previous assumptions, the result shows that pollutants such as lead or carcinogenic cadmium can be almost completely washed out of the fragments of solar modules over a period of several months, for example by rainwater. "

As I stated last night, I am not concerned about whole Cadmium-Telluride solar panels sitting in a field - "in normal use". However, I am very concerned when the panels are damaged and exposed to water for weeks or months.

Please let me know if you have any questions.

Dave Hammond
11416 Seymour Lane
Spotsylvania, VA

--

This email was Malware checked by UTM 9. <http://www.sophos.com>

Donna Mayfield

From: rickschwartzman@comcast.net
Sent: Saturday, March 9, 2019 3:45 PM
To: Thomas G. Benton; Chris Yakabouski; Kevin Marshall; Timothy J. McLaughlin; David Ross; Paul D. Trampe; Gary Skinner
Cc: Wanda Parrish
Subject: Citizen Letters Opposed to sPower SUP Applications

Dear Chairperson Trampe and Board Members,

It would truly be understandable if an email got lost in the shuffle amidst the mountain of reading and hours of study required to prepare for the coming vote on the sPower Special Use Permit applications. That said, constituents, long-time friends and neighbors, have written many emails – personal and compelling – about the wonderful way of life that exists today in Spotsylvania, and not surprisingly, they ask the County Board of Supervisors to preserve its splendor for the future.

I hope this is helpful and I apologize if this adds to your workload, but I'm compelled to try and simplify the Board's access to the latest batch of constituent letters by extracting a direct link from the County website. Hopefully – for a brief moment – these letters, notes and stories will rise to the top of your reading list.

<https://spotsylvania.novusagenda.com/agendapublic/AttachmentViewer.ashx?AttachmentID=13626&ItemID=5966>

Gentlemen, in short and as usual, your constituents are overwhelmingly opposed to the project. I won't list the many compelling reasons why they feel this way, please see for yourselves.

Thank you for your service, time and attention to these letters. May God allow you to truly hear the voice of the people and grant you the good judgement to vote to deny the sPower applications.

Richard A. Schwartzman

Livingston District

--

This email was Malware checked by UTM 9. <http://www.sophos.com>

Donna Mayfield

From: Dave Hammond <davehammond@gmail.com>
Sent: Sunday, March 10, 2019 6:38 PM
To: Paul D. Trampe; Gary Skinner; Thomas G. Benton; David Ross; Kevin Marshall; Timothy J. McLaughlin; Chris Yakabouski
Cc: Aimee Mann; Wanda Parrish; Concerned Citizens
Subject: Concerned Citizens of Spotsylvania County Comments on sPower SUP Issues Tables
Attachments: Staff Report Concerns and Comments with CCSC Comments Added 10March2019 Final.pdf; sPower Concern Response Expert Table with CCSC Comments Added 10March2019 Final.pdf

Spotsylvania County Supervisors --

Attached are two documents that provide the Concerned Citizens of Spotsylvania County comments on two SUP issues and conditions tables - one was prepared by the Spotsylvania Planning Staff, and one by sPower. This listing of issues and positions was requested at the last Board of Supervisors meeting on Feb. 26.

- 1) [Staff Report Concerns and Comments with CCSC Comments Added 10March2019 Final](#)
- 2) [sPower Concern Response Expert Table with CCSC Comments Added 10March2019 Final](#)

Please let us know if you have any questions, or would like to discuss this further.

Best regards,
David Hammond
Livingston District

--

This email was Malware checked by UTM 9. <http://www.sophos.com>

sPower - Concern Response Expert Table 3/4/2019 with CCSC response

Issue	Expert or Authority	sPower Response	CCSC Response
Decommissioning - Salvage Value	Spotsylvania SEF Ordinance (County Code Section 23.4.5.7) .Virginia Senate Bill 1091 .DNV-GL* .Department of Energy	.Virginia Senate Bill 1091 - May include the net salvage value of such equipment, facilities, or devices, plus a reasonable allowance for estimated administrative costs related to a default of the owner, lessee, or developer, and an annual inflation factor. .In general, DNV GL finds that the Decommissioning Plan approach used in determining the estimated decommissioning cost appears to have been performed in accordance with typical industry practice, including the estimated salvage values .A Department of Energy study found there is a healthy resale market for PV modules that should be recognized in project level economic calculations. The salvage price is a market reflection of the reliability. Functioning modules will have a revenue value based on life/performance expectations with the additional shipping and handling costs in comparison to other alternative to electric generation costs. From 2005-2012, the winning bids ranged \$0.04 to \$1.26 / watt .Should the salvage value of the PV panels not be allowed for consideration, the panels are EPA approved for local and state landfill disposal and could be disposed of at standard landfill tipping fee rates	Agree with Planning Commission conditions. We estimate the bond value should be \$67M. Recycling credits should not be included per county consultant recommendation and market conditions. “Dewberry recommends that the County require bonding the actual cost of the decommissioning before the recycling amounts are figured in.” There is no recycle value for PV panels - in fact there is a cost of \$42M just to recycle the 1.8M solar panels using data from the recycling companies provided in sPower’s own decommissioning plan. EPRI (industry non-profit) study results calculate at least \$41.5M to decommission a facility of this size but assumed the panels would be dumped in a landfill. Actual cost would be much higher when recycling costs are included. There is no salvage value for the PV panels. SB1091: VACO lobbied on behalf of all VA counties to ensure that counties have the flexibility to decide whether or not to allow salvage value. This language was included in spite of heavy lobbying from the utility solar industry to remove that flexibility from counties like Spotsylvania. PC and staff’s actions are supported by SB1091. Maintain surety of either a cash bond or an irrevocable letter of credit to protect county. SB1091 doesn’t mandate a particular type of surety - county has complete flexibility to protect its interests. SUP condition A.19.b requires solar panels to be recycled. Add criteria addressing the shutdown of a portion of the facility. If a portion of the facility is not operated for 3 months, then decommissioning of that portion should be triggered (see A.19.t). This will ensure the facility is maintained in good working order, and portions are not abandoned.

	Issue	Expert or Authority	sPower Response	CCSC Response
				Add a requirement for a 15% contingency in the decommissioning cost estimate (A.19.j). sPower's proposed 2% contingency is inadequate. Currituck County requires 15% in their solar ordinance. Dr Fthenakis quote: Sustainability Metrics for Extending Thin Film Photovoltaics to Terawatt levels, April 2012: "Nevertheless, there could be other pathways for uncontrolled releases in extreme situations, and therefore, every effort should be made to collect the modules and recycle the contained metals at the end of their useful lifetimes."
	Decommissioning - Surety Bond	Spotsylvania SEF Ordinance (County Code Section 23.4.5.7) .Virginia Senate Bill 1091 .DNV-GL .Department of Energy	.Virginia Senate Bill 1091 - "...owner, lessee, or developer provides financial assurance of such performance to the locality in the form of certified funds, cash escrow, bond, letter of credit, or parent guarantee, based upon an estimate of a professional engineer licensed in the Commonwealth..." .In general, DNV GL finds that the Decommissioning Plan approach used in determining the estimated decommissioning cost appears to have been performed in accordance with typical industry practice. .	See response for Decommissioning – salvage value – above.
	CdTe Panel - Safety	.County Consultant - Dewberry .Dr. Fthenakis**	.Cadmium telluride (CdTe) is not the same compound as cadmium. CdTe is non-hazardous, non-water soluble, and is encapsulated in the panels. CdTe panels pose no human or environmental health and safety risk. The findings were confirmed by the County's independent engineer, and further confirmed by independent industry experts such as Dr. Fthenakis. .	Agree with Planning Commission prohibiting use of CdTe panels (A.14.) Solar panels that are both less toxic and higher efficiency are readily available. There is no reason to use this type of solar panel.
	Impact on Real Estate Values	.Chris Kaila - Professional Appraiser from Spotsylvania .NTS Fawn Lake Property	.Chris Kaila conclusion is there are no negative impacts to surrounding property values. Extensive research and interviews with experts in this area is that there is no support for any negative influence	Disagree -- There will be property value loss as indicated by multiple studies and evidence gathered from homeowners and potential home buyers. It will be highest for those homes closest to the border and could exceed \$21 million.

	Issue	Expert or Authority	sPower Response	CCSC Response
		Sales Report from 2018	from solar farms and neighboring property values .NTS Fawn Lake Property Sales Report from 2018 showed that houses in Fawn Lake stayed on the market 17% less days than 2017, average net sales price rose \$8000 compared to 2017 and the number of houses sold equaled the same as 2017 at 48.	There will be lost tax revenue from homes not build on the Fawn Lake lots being sold to sPower (54-191 lots) and other existing lots neighboring the 3 sites. That loss will be at least \$3.7 million and could easily exceed \$14 million. There will be lost local construction business revenue when these homes are not built. It will be \$17 to \$62 million. NTS property sales report from 2018 is not applicable since the impact of the solar facility is not reflective of prior years' sales. The report ignores testimony from purchasers and potential buyers who have stated that they would not have bought or will not buy if the solar project advances.
	Economic Impact	.Virginia State Corporation Commission .Mangum Economics .Fredericksburg Regional Alliance .Virginia Chamber of Commerce .Virginia Department of Mining, Minerals, and Energy	.Project will likely provide direct and indirect economic benefits to the County .Project could aid in attracting high-tech industries to Spotsylvania County - 78% of Dominion's renewable generation is partnerships with data centers .Project could give the County a marketable edge in its pursuit of attracting data centers and complementary industries to locate in the County .An important element to the Commonwealth's economic competitiveness is energy diversity. Put more simply: as corporate and consumer demand for solar energy increases, so must our ability to meet this demand in order to be an attractive state for future economic development and job creation	Disagree with this unsubstantiated wishful thinking. Accomack, Southampton, Mecklenburg, and Currituck (NC) counties - home to very large solar plants (80-120 MW) - have experienced no new business development and no long-term job creation as a result of utility solar plants. No connection between an SEF and additional business activity/relocations. Most of the construction jobs went to out of state solar installation companies. During the operations phase, a medium sized restaurant or small business on one acre would provide more economic impact than this facility. This project is a feeder to, not an attracter of, data centers. Microsoft representative admitted the need for power to sustain data center growth, not of any plan to add a data center to County, or any jobs. Energy diversity is better obtained with less disruption by using distributed rather than centralized renewable solar. The FRA report provided unsubstantiated opinions about this project. The report admitted (page 5): "It is our opinion, based on cursory (emphasis added) research of other solar farms..." sPower's attorney is on FRA's board and sPower is a major contributor to FRA. The report should be disregarded. VA DMME has withdrawn support of project, relegating

	Issue	Expert or Authority	sPower Response	CCSC Response
				decision to County authority.
	Heat Island Effect	.Dr. Fthenakis .County Consultant - Dewberry	.A heat island effect would not occur at this location due to Virginia's climate, rate of heat attenuation, extensive amount of vegetation surrounding the site, and cooling temperatures at night. Heat Islands are typical in this area for open, large department store or mall parking lots, not agricultural land areas. .Dewberry notes: "The panels have a low thermal mass compared to conventional building materials and soil. They lose heat very quickly and do not create a prolonged increase in temperature which suggests a micro-climate as an urban heat island would" .	Agree with Planning Commission recommendation for consistent 350 ft. setback for Sites B and C, but a dense vegetative buffer should also be provided around the entire perimeters. A larger setback is likely needed for Site A, but absolutely no analysis of the scale-up to 400 MW has been performed. Only two studies have obtained actual data on temperatures in and around a solar plant. They indicate that the increased temperatures dissipate at 100-130 ft. away from a 1 MW facility, but the distance increases to 1000-1500 ft. away at 80 MW. Neither sPower nor Dewberry addressed the likely impacts at 400 MW. Also, absolutely no research has been done on the impact that 50°F+ higher temperatures under the panels has on the soil or wetlands on the site.
	Impact on Electric Ratepayers	.Virginia State Corporation Commission .PJM	."...the proposed Project would be borne solely by the Joint Applicants [sPower], with no direct impact on rates paid by ratepayers in Virginia..."	Disagree -- The SCC is requiring sPower to pay for some unspecified grid upgrades, but they have no provisions for them to pay for ongoing costs associated with the conventional grid having to ramp up and down to accommodate their unreliable intermittent power generation. Costs for new natural gas topper plants, their operation and maintenance will be borne by the electric ratepayers. Regions that have a substantial amount of intermittent solar and wind, always have higher electricity rates. For example, California has about 15% solar power, and 40-60% higher electricity rates than average for the U.S. Implementation of renewables eventually brings higher electric rates with CA being the best example. Dominion Energy's latest Integrated Resource Plan (IRP) filed with the SCC describes the increased costs that they are anticipating with the increase in solar PV in VA (p.81 of IRP).

	Issue	Expert or Authority	sPower Response	CCSC Response
	Comprehensive Plan Compliance	.Spotsylvania Planning Commission .Planning Staff	.Planning Commission and staff found the projects are in substantial accordance with Comprehensive Plan	Recommend BOS overturn PC's finding of substantially in accord with the Comprehensive Plan. The proposal violates at least 15 provisions of the Comp Plan dealing with preservation of timber land and our agricultural, natural, historic or cultural resources which are all being threatened with this proposal. Also violates provisions requiring preservation of tree buffers, to protect environmental quality, to preserve AG/Forestal lands and to protect AG as the primary use of land in rural areas. Not complementary - it's dominating! Must overturn PC "in accord" finding or BOS would be confirming that a solar facility of any size could be built on any Ag zoned land. The BOS needs to establish limits to maintain control of future zoning decisions. Important step for the credibility of the Comp Plan and for future requests.
	Burning	.Spotsylvania FREM .Planning Staff	.Burning allowed using trench burners with a permit and oversight from FREM. .Burning allowed with additional setbacks from houses.	Agree with the Planning Commission recommendation of NO burning.
	Water Line	.Spotsylvania Utilities	. Will pay for 50% of the costs to construct an improved waterline within Fawn Lake community (improve fire flow, capacity and pressure; and eliminate need for groundwater)	Agree with Planning Commission recommendations, use only County water with restrictions. No use of well water. sPower wells to be capped. Cost Share Agreement concept is outside the purview of the SUP and unenforceable.

* DNV-GL is the largest technical consultancy and supervisory to the global renewable energy (particularly wind, wave, tidal and solar) and oil & gas industry.

** Dr. Fthenakis has written over 400 publications on PV technology, is founding Director of the Center for Life Cycle Analysis at the Department of Earth and Environmental Engineering of Columbia University, and Senior Scientist Emeritus at the Brookhaven National Laboratory.

Staff Report Concerns and Comments with CCSC Comments and/or Recommended Conditions added

Overview of Concerns Raised Related to the sPower Project - SUP18-0001 (Site A)				
Concern	sPower Proposal/Comment	Staff/Consultant Comment	Recommended Conditions	CCSC Comments and/or Recommended Conditions
Size / Scale	Agreed to a phased approach with limitations and measures in place to minimize potential negative impacts associated with the scale.	Site A encompasses approximately 5,200 acres, of which approximately 2,800 acres would be disturbed. Site A encompasses approximately 1.96% of the County and 2.37% of the land outside the Primary Development Boundary. The Planning Commission found that Site A is substantially in accord with the Comprehensive Plan under the Code of Virginia's requirement that they conduct a review of the project's location, character, and extent (15.2-2232).	There are a number of conditions that directly or indirectly mitigate potential negative impacts of the project's size.	Reasons to Deny: sPower has proposed an unprecedented scale in this region, without any understanding of the impacts on the sensitive environmental areas on the site, or impacts on the surrounding areas. Only two studies have obtained actual data on temperatures in and around a solar plant. They indicate that the increased temperatures dissipate at 100-130 ft. away from a 1 MW facility, but the distance increases to 1000-1500 ft. away at 80 MW. Neither sPower nor Dewberry addressed the likely impacts at 400 MW. Also, absolutely no research has been done on the impact that 50°F+ higher temperatures under the panels has on the soil or wetlands on the site. This proposed project is 5X larger than the largest solar power plant in Virginia. After 15 months of operation, that site has still not been stabilized and several environmental permits remain open. This is a recurring theme, which is very troubling. Counties that have permitted very large solar facilities (80-120 MW) have decided they are too big, and they are taking steps to reduce the

Overview of Concerns Raised Related to the sPower Project - SUP18-0001 (Site A)				
Concern	sPower Proposal/Comment	Staff/Consultant Comment	Recommended Conditions	CCSC Comments and/or Recommended Conditions
				size of future solar facilities. It is irresponsible to continue to increase the size of these facilities without first conducting detailed research on the existing facilities in and around Virginia.
Habitat and Forest Loss / Environmental Impacts	Preservation areas are identified within each site. These are primarily environmentally sensitive areas and Resource Protection Areas. Agreed to create wildlife corridors. Agreed to plant pollinators and to conditions related to identified threatened and endangered species that are or may be located on site. Provided an invasive species management plan.	The project (including Sites A, B, & C) will result in the loss of approximately 2.3% of the forestland in the County and the associated benefits of managed forestry acreage. Concerns were raised about solar flux causing bird deaths. County consultant informs that solar flux occurs in a different type of facility known as concentrated solar power generation, which involves ground mounted mirrors that reflect concentrated light towards an elevated heating tower. The solar panels proposed are not light refractor or reflectors.	Conditions section B, C, and F contain a number of conditions that address environmentally sensitive areas, RPAs, wildlife corridors, the use of pollinators, threatened and endangered species, invasive species, and native plants. Note: the Certificate of Public Convenience and Necessity (CPCN) issued by the State Corporation Commission (SCC) 8/8/18 conditioned compliance with DEQs recommendations and shall obtain all environmental permits and approvals that are necessary to construct and operate the Project (Attachment A)	Reasons to Deny: Project consumes 23% of all agricultural/forestall land and is not in compliance with Comprehensive Plan. The clearcutting of about 4,000 acres (right up to property lines in some cases) is a direct result of sPower's contracts with these landowners to build the SEF. Seven large landowners would never have clearcut their property so extensively and changed the land use without sPower's development plans.
Use of Panels Containing Cadmium Telluride	Propose the use of panels containing Cadmium Telluride (CdTe). Provided studies supporting the use as safe, including a Limited Soil Sampling of Sierra Solar Greenworks owned by sPower that found: "Cadmium concentrations were not detected above the laboratory reporting limits of 0.23 to 0.25 mg/kg in any of the samples	County consultant finds that "Cadmium Telluride (CdTe) is a compound that contains cadmium and tellurium. It is a black crystalline powder that is odorless, not water soluble and non- flammable. It has a melting point of above 1000 °C and the boiling point is above 1100 °C. Cadmium by itself is a highly toxic material, however, based on research	Planning Commission conditions prohibit use of panels containing CdTe. Staff conditions do not, but do include soil testing and remediation conditions.	Agree with Planning Commission prohibiting use of CdTe panels (A.14.) Solar panels that are both less toxic and higher efficiency are readily available. There is no reason to use this type of solar panel. Research shows that rain water will leach the Cadmium out of broken pieces over time, and acidic

Overview of Concerns Raised Related to the sPower Project - SUP18-0001 (Site A)				
Concern	sPower Proposal/Comment	Staff/Consultant Comment	Recommended Conditions	CCSC Comments and/or Recommended Conditions
	collected from the solar farm or from the vacant lot. Therefore, the solar farm operations do not appear to have impacted soils with cadmium on the portion of the property developed as solar farm. The reporting limit for the non-detected concentrations are at least an order of magnitude lower than any applicable screening levels for residential and commercial land use in the states/regions of California or Virginia". Additional information provided in Attachment B.	cadmium telluride is much less toxic than pure cadmium. CdTe can be toxic if it is ingested, inhaled or comes in direct contact with skin." Regarding the panels: "If they are handled properly during all phases of construction and disposal, they will not emit any toxicity into the environment." Recommend conditions related to soil testing for CdTe and other heavy metals and reclamation if positive results.		conditions increase the leaching rates. We agree that there is very little risk "during normal operation" due to panels that remain intact. The key question is what happens when the panels are shattered by a catastrophic event like a tornado, hurricane, etc. First Solar has not provided any evidence that the Cadmium Telluride remains "encapsulated" as claimed.
Burning of Wood Debris	The applicant indicated to the Planning Commission that they would not object to the prohibition on burning. Otherwise, propose burning of timber waste consistent with County ordinances and with a 2,000' setback to any residence. Emergency Management Plan - Construction includes other safety measures: • All combustible materials removed within 35' of trench. • A water truck shall be on standby. • Trench burners shall be equipped with fire extinguishers. • No burning on high wind days (sustained winds more than 25 mph) or when prohibited by Spotsylvania County Fire	Staff's conditions do not prohibit the burning of timber waste, but do condition the use of newer model trench burners operated per specs and set back a minimum of 3,000' from the property boundary. Allowing only mulching and hauling will result in increased truck traffic on the roads and may prolong the construction period. Additionally, mulch has its own fire hazards. The conditions limit the size of mulch piles and require monitoring, turning, and wetting.	Conditions section D. Burning and Fire, Rescue, and Emergency Management. Planning Commission conditions prohibit the burning of wood or other debris. Include conditions related to the size of mulch piles and required monitoring, turning, and wetting.	Agree with Planning Commission recommendation to prohibit burning.

Overview of Concerns Raised Related to the sPower Project - SUP18-0001 (Site A)				
Concern	sPower Proposal/Comment	Staff/Consultant Comment	Recommended Conditions	CCSC Comments and/or Recommended Conditions
	Department. • Burning shall take into consideration sensitive receptors and prevailing wind direction at lower speeds (<25 mph). Burning shall cease 2 hours prior to end of work day. • A Fire Watch Person will be designated to monitor all trench burning activities. • The Fire Watch Person shall remain within the immediate area of the trench burning at all times and shall not be assigned any other duties. • If the burn area is still producing smoke, it must be attended.			
Use of Biosolids	Do not propose to use biosolids.	N/A	Prohibit the use of biosolids.	Agree with Planning Commission recommendation to prohibit use of biosolids.
Use of Panels Manufactured Using GenX	sPower documented that none of the panels are manufactured using GenX.	N/A	Prohibit the use of panels manufactured using GenX.	Agree with PC prohibiting use of GenX materials (A.13.) Recommend adding “GenX (PFAS)” to improve clarity - the EPA is using the term PFAS to describe this family of chemical compounds.
Use of - Fertilizers Containing Phosphorus / Chemical Cleaning Agents / Pesticides / Herbicides	Propose to use phosphorus fertilizer as needed. Water only cleaning of panels. Have not objected to the conditions related to these topics.	Phosphorus aids in groundcover growth. Rapid site stabilization is critical.	Phosphorus permitted, but by Certified Applicator and based on state standards. Other conditions limit pollution or impact on groundwater, streams, etc. Require soil testing and set remediation requirements.	Agree with Planning Commission recommendation.

Overview of Concerns Raised Related to the sPower Project - SUP18-0001 (Site A)				
Concern	sPower Proposal/Comment	Staff/Consultant Comment	Recommended Conditions	CCSC Comments and/or Recommended Conditions
Sufficiency of Aquifer	Provided a hydrology study. Applicant does not object to the prohibition on the use of groundwater.	N/A	Conditions section H - Prohibits the use of groundwater.	Agree with Planning Commission recommendation. All sPower wells to be capped.
Public Water	Separate from the Special Use, the applicant has coordinated with the Utilities Dept. on a Cost-Share Agreement concept that would aid in implementing the County's public waterline upgrade that serves Fawn Lake (531-foot pressure zone). Applicant would pay for 50% of the cost of this planned upgrade. Applicant's desired water volume is 100,000 gallons/day during construction and 350 gallons/day during operation.	The applicant can withdraw water from an existing bulk water withdrawal site and truck it to the site. This does not require any upgrade to the existing public water system.	Conditions section H - Addresses Water, giving the Utilities Dept. control over water withdrawal to prevent any negative impact on the existing distribution system. Limits bulk water withdrawal to 10 p.m. and 4 a.m. with a maximum aggregate volume usage of 69,000 gallons per day from October to April and 56,000 gallons per day from May to September. With an upgrade system, limits withdrawal to 10 p.m. and 4 a.m. with a maximum aggregate volume usage of 166,000 gallons per day from October to April and 153,000 gallons per day from May to September.	Agree with Planning Commission recommendation. Cost Share Agreement concept is outside the purview of the SUP and unenforceable.
Heat Island Effect	A heat island effect would not occur at this location due to Virginia's climate, rate of heat attenuation, extensive amount of vegetation surrounding the site, and cooling temperatures at night. Heat Islands are typical in this area for open, large department store or mall parking lots, not agricultural land areas. The applicant disputes the conclusions of the County's consultant related to a temporary	County consultant concludes there is no heat island, but that a temporary temperature increase may occur that dissipates to 0.5 degrees at 328' from the solar panels. The County consultant and the applicant's consultant agree that berms and plantings will lessen any effect from heat, but that no model exists that would scientifically support a specific reduction.	Conditions section E - Planning Commission conditions include a consistent 350' setback for panels from property line. Staff conditions are 350' from property line with residentially platted properties.	Reasons to Deny: Agree with Planning Commission recommendation for consistent 350 ft. setback for Sites B and C, but a dense vegetative buffer should also be provided around the entire perimeters. A larger setback is likely needed for Site A , but absolutely no analysis of the scale-up to 400 MW has been performed.

Overview of Concerns Raised Related to the sPower Project - SUP18-0001 (Site A)				
Concern	sPower Proposal/Comment	Staff/Consultant Comment	Recommended Conditions	CCSC Comments and/or Recommended Conditions
	temperature increase and is seeking a setback of 100'. Additional information provided in Attachment B and C.			Only two studies have obtained actual data on temperatures in and around a solar plant. They indicate that the increased temperatures dissipate at 100-130 ft. away from a 1 MW facility, but the distance increases to 1000-1500 ft. away at 80 MW. Neither sPower nor Dewberry addressed the likely impacts at 400 MW. Also, absolutely no research has been done on the impact that 50°F+ higher temperatures under the panels has on the soil or wetlands on the site.
Setbacks	Propose minimum 100' setback from property line with minimum 350' setback of panels and inverters to existing homes.	Setbacks vary at approved SEFs in Virginia with setbacks measured from both existing residences and from the property line (i.e. Belcher Solar, LLC in Loudoun Co.- 300' setback from solar equipment to property line, setback reduced to 150' where house is more than 350' from the property boundary; Virginia Solar, LLC in Powhatan Co.- 50' setback from solar equipment to property line, if house exists at time of approval setback increases to 150' between the equipment and the house; Greenwood Solar I, LLC - Culpeper Co.- 150' setback between above-ground equipment and adjacent house that exists at time of approval and 150' setback from the property line of any residentially-zoned parcels, allows for reduction upon agreement by adjacent	Conditions section E - Planning Commission conditions include a consistent 350' setback for panels from property line. Staff conditions are 350' from property line with residentially platted properties; 100' setback elsewhere, except along public roads, which is 50'.	Agree with Planning Commission recommendation. Should be at least 350 feet around the entire perimeter of all 3 sites so it will equally protect all landowners who may want to build homes in the next 40 years. Setbacks <u>must</u> be from property lines, not current home location. Delete 50 ft. setback from public roads (E.4.). This industrial site must have at least a 350 ft setback and dense vegetative screening to protect the character of the county. Delete setback exception in Site A condition E.3. "This setback shall not apply along any boundary shared between the Property and another property owned by the Operators." It is inappropriate to include an exception based on neighboring

Overview of Concerns Raised Related to the sPower Project - SUP18-0001 (Site A)				
Concern	sPower Proposal/Comment	Staff/Consultant Comment	Recommended Conditions	CCSC Comments and/or Recommended Conditions
		property owner; Buckingham II, LLC in Buckingham Co.- minimum 50' setback of equipment to property line, increases to 150' setback of equipment to adjacent existing houses and may be reduced upon agreement of adjacent property owner)		properties that are not part of this SUP. It is especially inappropriate to encumber neighboring residentially zoned properties that cannot be used for a solar facility in the future. This will prevent the planned future development of the residentially zoned land, simply to provide a reduced setback for the proposed solar facility.
Buffers / Viewshed / Visual Impacts	Provided new buffer plan after Planning Commission vote. Varied landscape buffers depending on use of adjacent property/proximity of existing homes. The minimum is natural regrowth within the 100' setback and the maximum is an 8-ft berm with landscaping installed within the 100' setback along with natural regrowth.	Staff notes that the applicant's proposed plantings may provide a better visual screen than proposed in the conditions because they are all evergreens.	Conditions section E - Varied landscape buffers depending on proximity of existing homes and existing tree buffers. Maximum is 8' berm with landscaping and minimum is landscaping only.	Disagree -- It does not make any sense to provide mitigation for some neighboring properties but not others. Therefore, dense vegetative buffers (100% opacity within 3 years) and berms should be provided around the entire perimeter, including all public roads, not just in a few selected areas. A minimum of 100 ft. vegetative buffer must be provided around the entire perimeter. However, up to 300 ft. of vegetative buffer should be provided wherever possible. This is in compliance with Dept. of Conservation and Recreation's recommendation that 300 ft. is needed to provide an effective visual buffer. They also indicate that 600 ft. is needed for wildlife migration.

Erosion and Run-off	Modified original grading plan to reduce the amount of grading needed. Do not object to conditions that require elevated E&S measures including monitoring and maintenance standards, but would like to disturb more than 400 acres at a time.	E&S inspections will be handled by County staff and the County's 3rd party inspectors and will be paid for by the applicant through fees adopted by the Board on 11/15/18.	Conditions section C - Limit the disturbed land area to 400 acres total within up to two watersheds at a time, require E&S measures above Code requirements, additional monitoring and inspections, and stabilization standards.	Agree with Planning Commission recommendations. Add criteria to condition C.2. to specify when the land disturbance is deemed complete. Richard Street described that final grading and seeding must be completed, and 80% germination has occurred. 400 acre maximum disturbance for the whole Project should be maintained. Soil testing every 5 years is inadequate (A.17.d). Recommend soil testing every 2 years, and upon request from the Zoning Administrator. The county should be able to request testing after a major storm, etc. Add requirement for periodic groundwater testing, and upon request testing. Ground water monitoring was removed from earlier conditions. Contaminant testing should include Arsenic, Barium, Cadmium. Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nitrate/Nitrites, Selenium, Silver, Zinc. See Currituck County, NC SEF ordinance for an example.
Security / Fire Hazards / Natural Disasters	Supplied Emergency Response Plans for construction and operations phases that address employee roles, training, and communication procedures; unique concerns from PV systems; fire prevention and response, storms and natural disasters; and spills. Will train FREM on PV systems. Will provide a	Installation and grounding will be required to meet Virginia Uniform Statewide Building Code. County consultant notes that PV systems are designed and constructed in accordance with applicable National Electric Code standards. This includes systems incorporating appropriate grounding, bonding,	Conditions section A & D - Condition 20' wide fire breaks between arrays and property boundary, no storage of power in batteries, 24 hour video surveillance.	Agree with Planning Commission recommendation. However, there is a lack of credible emergency action plan for cyber-attack on SCADA (Supervisory Control and Data Acquisition) system. In addition, a 350 ft. wide firebreak should be required around the perimeter of Site A that includes a

	wayfinding system within the facility to aid in FIRE response. Providing two 50K gallon water tanks for FIRE use. Will install a SCADA system to monitor for potential ground faults. The facility will be fenced.	wire sizing, and individual components being UL rated/certified.		fire road suitable for heavy firefighting vehicles and a hydrant system.
Traffic / Rural Roads	Submitted Traffic Mitigation Plan. The applicant would like to be able to use all private access easements for all types of traffic.	During construction there will be increases in employee and truck traffic that will degrade levels of service on local roads. Once construction is complete, traffic volumes will return to normal and levels of service will not be negatively impacted.	Conditions section B - Conditions limit oversize loads during prime school bus traffic hours, limit use of some private access easements to light vehicles only, shuttling requirement for employees, video haul routes and implement repairs related to construction traffic, and creation of a Joint Traffic Mitigation Team to address issues that may arise.	Disagree -- Traffic mitigation plan will not prevent congestion and overburdened traffic along Orange Plank Road and West Catharpin Road.
Impact on Brock Rd & Orange Plank Rd Intersection	N/A	The intersection of Brock Road (613) & Orange Plank Road (621) is a four-way stop controlled intersection. The intersection is located within the Wilderness National Military Park. It currently operates at an overall level-of service F during both the AM and PM peak hours. Average delay in the AM peak hour is fifty-five (55) seconds, while average delay in the PM peak hour is one-hundred and fifty- eight (158) seconds. During construction delay is likely to increase at this intersection given the location of Site A. As a result of low speeds due to the four-way stop condition the intersection has a low crash rate. The intersection has averaged one crash per year for the past six (6) years for the period 2013-2018. All involved property	Conditions section B as noted above.	The intersection of Orange Plank Road and Brock Road will be overburdened during construction. No final traffic mitigation plan will alleviate this congestion. Staff/Consultant comments do not address likelihood of increased traffic accidents and property damage along Orange Plank Road.

		damage; no serious injuries were reported at this location.		
Plank Rd & Orange Plank Rd Intersection	N/A	The intersection of Plank Road (3) & Orange Plank Road is an actuated traffic signal but is not coordinated with other nearby intersections on Plank Road. The signal cycle length varies. Both peak hours operate at a cycle length of approximately 120 seconds. The intersection currently operates at an overall level-of-service C in the AM peak hour, and A in the PM peak hour. Average delay is twenty-five (25) seconds in the AM peak hour and eight (8) seconds in the PM peak hour. The impact of additional traffic from Site A construction would be negligible. Level-of-Service would not change. The intersection has averaged three crashes per year for the past six (6) years for the period 2013-2018. The majority of crashes have been angle accidents. Two were fatalities.	Conditions section B as noted above.	Number of crashes before start of construction is not indicative of the likely number of crashes due to increased traffic during construction.
Lack of Fully Engineered Site Plan	Complied with requirements of SUP by providing a Generalized Development Plan (GDP) and provided a conceptual plan of the 1st phase (Zone E in Site A) for E&S review.	A fully engineered plan will be required at the site plan stage if the SUP is approved. A site plan is a fully engineered construction plan that must meet all Code requirements and SUP conditions.	N/A	Final engineered site plan must be fully compliant with all Code requirements to proceed
Lighting / Glare	Applicant does not object to conditions.	N/A	Conditions section A - Limits all lighting to 0.5 footcandles at the property line.	Agree with Planning Commission recommendation.
Height Limitations	Applicant does not object to conditions.	N/A	Conditions section A - Inverters and panels limited to 15' above grade.	Agree with Planning Commission recommendation.

Hours / Days during Construction	Applicant does not object to conditions, but would like option to work on Sundays.	Staff's conditions allow for Sunday work in order to lessen the construction time period. Working Sundays could be the difference between an 18-24 month construction period and a 21-27 month construction period, and the resulting noise, traffic, and other impacts specific to the construction period.	Conditions section B - All clearing, grading, and construction of the Property shall be limited to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday and between 8:00 a.m. and 6:00 p.m. Saturday (and Sunday - Planning Commission prohibits Sunday work, except to comply with conditions). Pile driving within 500 feet of any residential property boundary shall cease no later than 5:00 p.m. daily and shall be prohibited all day on every Sunday.	Agree with Planning Commission recommendation.
Noise	Applicant submitted a noise study that concluded under a worst case scenario of multiple pile drivers operating at a time would result in noise levels of 68 to 80 dBA at the closest residential properties modeled. The modeling did not include ground attenuation or existing or proposed ground cover or berms, which could lower the results by as much as 5 dBA (70dBA = gas lawn mower at approx. 100'; 80 dBA = noisy urban environment). The pile driving impacts are expected to last no more than 4 working days in the immediate vicinity of residences. Applicant does not object to noise conditions.	County code allows for a maximum dBA in residential areas of 65 dBA during the daytime hours (6 am to 10 pm), but the Code does exempt construction noise from these limits.	Conditions section E - Inverters and generators 400' setback from property line. Limits on construction hours and pile driving hours. Planning Commission conditions no construction work on Sundays.	Agree with Planning Commission recommendation. Per the federal highway administration, an impact pile driver is 101 decibels at 50 feet. Multiple pieces of machinery operating at the same decibel level combine the sound waves and will increase the decibel levels

Number/Trades of Workers During Construction	For Sites A, B, & C, the applicant will employ approximately 800 (local employment focus), including tradesman like electricians, site contractors, landscapers, mechanics, heavy equipment operators, engineers, haulers, construction & waste management to security guards, technicians, and others (\$45 million in immediate employment dollars).	N/A	N/A	Disagree -- Most of the construction jobs in similar installations in Accomack, Southampton, Mecklenburg, and Currituck (NC) counties went to out of state solar installation companies, with <u>minimal local hiring</u>. Mangum Fiscal Analysis states that the SEF will employ 523 FTEs in contrast to the sPower comment of approximately 800.
Types of Permanent Workers	For Sites A, B, & C the applicant indicates the permanent long term jobs include 1 Office Administrator, 16-18 Operations & Maintenance Technicians (Comprised of Solar Techs I, II, and III), 5-8 Landscape Personnel (Comprised of 2 Supervisors and the remainder Land Maintenance Specialists), and 1 Safety Manager.	N/A	N/A	Disagree -- 20 (from Mangum Report) permanent long term jobs (most in maintenance) is not substantial enough to justify job growth. Most SEFs are either unmanned, or minimally staffed with 2-5 people for security and maintenance. sPower's projections for long term local employment are not credible.
Fiscal Benefit	Provided fiscal and economic analysis prepared by Magnum Economics for Sites A, B, & C that concludes there will be a one-time rollback payment of approximately \$579,000 and at build out, year 1 M&T tax revenues of \$714,925 and Real Estate taxes of \$101,121. Depreciation will reduce the tax revenues over time. The study shows the depreciation leveling out at 10% value in year 24 with an annual tax revenue of \$79,436 (based on the current real property tax rate).	Confirmed validity of methodology used in the Magnum study with SCC. Confirmed rollback taxes for Site A of approximately \$471,000 (1 time payment) and current Real Estate taxes of \$82,321.	N/A	Reasons to Deny: Disagree -- sPower's proposal locks the county into a 40 year declining tax revenue for a 6,350 acre property. County goal per Comp Plan is an annual growth of the commercial and industrial tax base at a rate greater than 2%. SPower claims a \$552M investment but the county will have very little to show for it especially when balanced against the lost tax revenue from unbuilt homes in Fawn Lake, loss of associated construction activity and anticipated drop in assessed values

				of adjacent property. (See topic on Fiscal Impact if Fawn Lake lots are not built on). This could result in a tax increase on all county residents to replace that lost revenue. The SCC is responsible for determining the Fair Market Value for the facility. The staff report states that the SCC's only other assessment (Southampton) was 79% of the anticipated value resulting in lower tax revenue for the county. The 80% M&T tax exemption results in a foregone tax revenue to the county of approximately \$52M.
Economic Benefit / Attracting Business to the County	Provided fiscal and economic analysis prepared by Magnum Economics for Sites A, B, & C which concludes the proposed 650 MWdc (500 MWac) project would provide an estimated one-time pulse of economic activity during its construction phase of approximately 843 full-time-equivalent jobs, \$45.8 million in associated labor income, and \$110.0 million in economic output. The proposed project would provide an estimated annual economic impact during its ongoing operational phase of approximately 34 full-time-equivalent jobs, \$2.5 million in associated labor income, and \$4.7 million in economic output. Additional comments are found in sPower's Concern Response Expert Table.	No separate analysis of the economic impacts has been performed. Staff notes that economic impacts are wider ranging than just to the County. In the CPCN issued by the SCC, they "find that the proposed Project will likely generate direct and indirect economic benefits to Spotsylvania County and the Commonwealth as a result of employment and spending from construction and operation of the proposed Project".	N/A	Disagree with this unsubstantiated wishful thinking. Accomack, Southampton, Mecklenburg, and Currituck (NC) counties - home to very large solar plants (80-120 MW) - have experienced no new business development and no long-term job creation as a result of utility solar plants. No connection between an SEF and additional business activity/relocations. Most of the construction jobs went to out of state solar installation companies. During the operations phase, a medium sized restaurant or small business on a half an acre would provide more economic impact than this facility.

Liability Insurance	N/A	Insurance provisions conditioned as recommended by County's insurance provider.	Conditions section A - Require liability insurance with County co-insured and requirements for bi-annual review and increases as needed.	Agree with Planning Commission recommendation.
Potential for Increase in Consumer Electric Rates	SCC CPCN allows for only wholesale sale of electricity, not retail. sPower has long term contracts to supply electricity for specific companies. Additional comments are found in sPower's Concern Response Expert Table.	The project (including Sites A, B, & C) requires an Interconnection Service Agreement approved by PJM. PJM requires that each new service customer pay 100% of the costs of local updates and network upgrades necessary to accommodate the new service request.	N/A	Disagree -- The sPower response addresses only the immediate cost of the project, NOT the subsequent impact on rates in the years to come. Implementation of renewables eventually brings higher electric rates with CA being the best example. Dominion Energy's latest Integrated Resource Plan (IRP) filed with the SCC describes the increased costs that they are anticipating with the increase in solar PV in VA (p.81 of IRP). The SCC is requiring sPower to pay for some unspecified grid upgrades, but they have no provisions for them to pay for ongoing costs associated with the conventional grid having to ramp up and down to accommodate their unreliable intermittent power generation. Costs for new natural gas topper plants, their operation and maintenance will be borne by the electric ratepayers. Regions that have a substantial amount of intermittent solar and wind, always have higher electricity rates. For example, California has about 15% solar power, and 40-60% higher electricity rates than average for the U.S.

Potential for Negative Impact on Electric Grid	PJM and CPCN approval processes require that there be no negative impact on the electric grid.	In the CPCN issued by the SCC found "that construction of the Project will have no adverse effect on reliability of electric service provide by regulated public utilities in Virginia. We recognize, however, that the Joint Applicants will be responsible for all projects that PJM concludes are necessary to ensure reliable operation of the transmission system". The CPCN conditions that the Joint Applicants pay for all network upgrade costs PJM assigned to them in order to ensure no adverse impacts on the network. (overview of PJM - Attachment D)	N/A	Disagree – The sPower response addresses only the immediate cost of the project, NOT the subsequent potential for negative impact after completion. Renewable solar utilities provide intermittent power which requires dispatchable power (i.e. natural gas peaking plants) to cover the gaps. The more renewables on the grid, the more potential for a problem.
Property Value Impacts	Submitted study of the impact of solar farms on neighboring properties by Christian Kaila, MAI, SRA dated 12/28/2018 that concludes "there is no consistent negative impact to adjacent property that is attributed to proximity to an adjacent solar farm". Additional comments are found in sPower's Concern Response Expert Table	The County's Commissioner of Revenue (COR) conducted research among Virginia CORs and found in Louisa County - no decrease in real property values around the Whitehouse solar site, Essex County - no appreciable change in assessed-to-sales ratios (noted it is well screened and it will likely take 3-4 years to see any real impact). For Spotsylvania, review of Fawn Lake's sales data did not show a downward trend in any categories of land sales, improved resales, or new construction sales through 1/15/19.	No specific condition, but setbacks and buffers (including landscaping and berms) will minimize visual impacts.	Reasons to Deny: Disagree -- There will be property value loss as indicated by multiple studies and evidence gathered from homeowners and potential home buyers. It will be highest for those homes closest to the border and could exceed \$21 million. There will be lost tax revenue from homes not build on the Fawn Lake lots being sold to sPower (54-191 lots) and other existing lots neighboring the 3 sites. That loss will be at least \$3.7 million and could easily exceed \$14 million. There will be lost local construction business revenue when these homes are not built. It will be \$17 to \$62 million. NTS property sales report from 2018 is not applicable since the impact of the solar facility is not reflective of prior years' sales. The report ignores

				testimony from purchasers and potential buyers who have stated that they would not have bought or will not buy if the solar project advances.
Fiscal Impact if Enabled Lots in Fawn Lake are Not Platted and Built On	N/A	The Commissioner of Revenue's office has estimated that the median improved value of each lot would be \$401,200. This value is based on the assumption that the land and improved values would be comparable to other non-lake-front lots in adjacent sections of Fawn Lake. At the current tax rate, the annual real estate tax per lot would be \$3,342. Housing has a cost to County services and that is reflected in the break-even assessed value, which was last calculated in 2017 and at that time it was \$374,000. An updated value has not been calculated because the County's Fiscal and Economic Model is undergoing a recalibration and update. We will be able to re-calculate the break-even value in the next few months. The annual tax revenue associated with the break-even value is \$3,115. Separately, the County collects a \$1,000 proffer for each new home built in this section of Fawn Lake which is used to help pay down debt on the Brock Road water tower.	N/A	Reasons to Deny: -See response to Property Value Impacts above- \$401,200 is not representative. We are performing a more complete review and will provide that information. This evaluation does not include the foregone economic impact of construction spending or of household spending.
sPower Accountability in the Future	Provided information on corporate structure.	Post Planning Commission, changed 'Applicant' in conditions to 'Operator' on legal advice to encompass any and all involved parties.	Conditions section A and throughout - Conditions are linked to the Applicant and Owner of the property. Decommissioning surety required to be either a cash bond or an	CCSC STRONGLY recommends the use of the Planning Commission's SUP conditions, not the Staff's Conditions. The Staff alternative SUP documents which redefine the parties jointly and

			irrevocable letter of credit, which are the strongest types of surety most protective of the County.	severally liable for the project as the "OPERATOR" with respect to all aspects of the SUP, including decommissioning, is DEFICIENT to protect Spotsylvania County and its taxpayers from the OPERATOR defaulting on the insurance and surety requirements, which could exceed \$50-60 million. Specifically FTP Power, LLC (dba sPower) and parent companies must be included among liable parties.
Impact of PG&E Bankruptcy	There will be no impact. PG&E is reorganizing in bankruptcy not terminating business operations or relinquishing assets or requesting a chapter 7 discharge. Only a small portion of sPower's power supply contracts are with PG&E and PG&E's bankruptcy is not material to sPower's ongoing operations, including the proposed project in Spotsylvania County. Please note that sPower's lenders and investors are well aware of the PG&E matter and have no concerns with sPower's ongoing viability, including the Spotsylvania County 500 MW project. The fact sPower has secured long term power supply contracts for all its energy generation, including from Microsoft and Apple, the two largest publicly traded companies in the world, provides lenders and investors great security this project will be viable for the long term.	N/A	N/A	Disagree -- Without immediate and complete disclosure of all sPower contracts with PG&E, Spotsylvania County cannot estimate the extent to which the PG&E bankruptcy affects sPower. The utility's estimated \$30 billion exposure to liability for damages, coupled with sPower's numerous, complex long-term contracts with PG&E, definitively point to an sPower future as uncertain and troubling as PG&E's future. The full extent of sPower's Power Purchase Agreements (PPAs) in California must be disclosed and evaluated before a decision is rendered.

Sufficiency of Decommissioning Plan and Cost Estimate	Decommissioning plan and estimate includes deficiencies identified by County Consultant. Includes credit for recycling value. Applicant feels condition requiring either a cash bond or an irrevocable letter of credit is onerous. Would like to provide a surety bond through an AAA rated company and personal guarantees from their parent company. Additional comments are found in sPower's Concern Response Expert Table.	The County consultant reviewed the decommissioning cost estimates and found that the costs appears to be within the broad range of estimates that they have observed; however 2-3 times below the mean and median values of the observed ranges. Identified missing items from estimate that have been incorporated into the conditions, such as related to de-compaction of soils. In staff's conditions, the minimum surety amount is presented as per disturbed acre since, if approved, conditions such as the setback, may impact the size and the facility. County consultant notes that with a required biannual review of the engineer's estimate and updating of the surety, the County may feel comfortable allowing for a credit for recycling.	Conditions section A - Extensive conditions related to decommissioning plan, execution, cost estimate, and bonding. Decommissioning estimate requirements consistent with County consultant recommendations. The surety is required to be either a cash bond or an irrevocable letter of credit, which are the surety type that are the most protective for the County. No credit is given for recycling.	Agree with Planning Commission conditions. We estimate the bond value should be \$67M. Recycling credits should not be included per county consultant recommendation and market conditions. "Dewberry recommends that the County require bonding the actual cost of the decommissioning before the recycling amounts are figured in." There is no recycle value for PV panels - in fact there is a cost of \$42M just to recycle the 1.8M solar panels using data from the recycling companies provided in sPower's own decommissioning plan. EPRI (industry non-profit) study results calculate at least \$41.5M to decommission a facility of this size but assumed the panels would be dumped in a landfill. Actual cost would be much higher when recycling costs are included. There is no salvage value for the PV panels. SB1091: VACO lobbied on behalf of all VA counties to ensure that counties have the flexibility to decide whether or not to allow salvage value. This language was included in spite of heavy lobbying from the utility solar industry to remove that flexibility from counties like Spotsylvania. PC and staff's actions are supported by SB1091. Maintain surety of either a cash bond or an irrevocable letter of credit to protect county.
---	---	---	--	--

				SUP condition A.19.b requires solar panels to be recycled.
Comprehensive Plan Compliance			Planning Commission and staff found the projects are in substantial accordance with Comprehensive Plan	Reasons to Deny: Recommend BOS overturn PC's finding of substantially in accord with the Comprehensive Plan. The proposal violates at least 15 provisions of the Comp Plan dealing with preservation of timber land and our agricultural, natural, historic or cultural resources which are all being threatened with this proposal. Also violates provisions requiring preservation of tree buffers, to protect environmental quality, to preserve AG/Forestal lands and to protect AG as the primary use of land in rural areas. Not complementary - it's dominating! Must overturn PC "in accord" finding or BOS would be confirming that a solar facility of any size could be built on any Ag zoned land. The BOS needs to establish limits to maintain control of future zoning decisions. Important step for the credibility of the Comp Plan and for future requests.

Donna Mayfield

From: Doug Morgan
Sent: Tuesday, March 12, 2019 4:02 PM
To: David Ross; Daniel Cole
Subject: RE: solar farm

Mr. Ross,

Parks and Recreation is leading the maintenance effort at the Harrison Road park with capital projects PR1803 and PR1901. A majority of the park shows site settling issues, and these P&R capital projects intend to address. Josh Knight will be assisting P&R, and the plan is to re-fine grade the ball fields first and then address the parking and drive lanes (work the property from the inside outward).

Doug

From: David Ross
Sent: Monday, March 11, 2019 8:15 PM
To: Daniel Cole; Doug Morgan
Subject: FW: solar farm

Dan, Doug,

What are your thoughts on the road to the playground? Can we fix that ourselves for relatively low cost. I have not been back there for a while but I remember the last time I was – the description below is spot on.

Best,

Dave

David Ross
Courtland Representative
Spotsylvania County Board of Supervisors
Cell – 571.594.0814
Updates on County Business – www.facebook.com/Dave4Spotsy

From: William Moser [mailto:bilmo1@aol.com]
Sent: Monday, March 11, 2019 4:00 PM
To: David Ross
Subject: solar farm

David I'm for the solar farm in Spotsylvania because I believe in getting away from coal and natural gas as a energy source. I really don't see why the people in Fawn Lake are so upset about it. I wouldn't mind it for a neighbor after all the construction is complete. Better that then more apartments and town houses. It's not going to stay a tree farm much longer.

On another subject not related to this. The convenience center on Harrison Rd also has a athlete complex next to it , baseball field and an open area used for soccer. The

road to it is in terrible shape and has been for a long time. To park where the play ground is also the soccer field and hiking trail you have to cross a dirt, mud, and pot hole riddled area. Needs to be repaired by hard surfacing it. That it for today.

Moser.

Fredericksburg Va. 540 226 8911

Take Care Bill and Sharon

6121 River rd,

--

This email was Malware checked by UTM 9. <http://www.sophos.com>

Donna Mayfield

From: Sean Fogarty <sfogarty77@verizon.net>
Sent: Tuesday, March 12, 2019 10:38 AM
To: Thomas G. Benton; Paul D. Trampe; David Ross; Timothy J. McLaughlin; Kevin Marshall; Gary Skinner; Chris Yakabowski
Cc: Wanda Parrish; Dave Hammond; sfogarty77@verizon.net
Subject: Dr Dean Bellas report and testimony tonight
Attachments: UAI_Letter_190311_signed.pdf

Supervisors,

I've attached a letter with supporting analysis prepared by Dr. Dean Bellas, a noted economist who has extensive experience in analyzing the fiscal and economic impacts of real estate developments. Dr. Bellas evaluated the Mangum Fiscal Analysis that is the foundation for sPower's estimates of the fiscal and economic benefits of their proposals.

His finding:

"In summary, while the proposed utility scale solar facility currently referred to as the Spotsylvania Solar Energy Center generates revenues to the County, there are alternative land-use scenarios that take up less acreage that could generate substantially more revenues to the County than the proposed sPower project....The true net fiscal and economic benefits to the County are not shown in the Mangum Report. This is because the *foregone* tax revenues and economic benefits from the three alternative revenue stream scenarios were not subtracted from the findings shown in the Mangum Report."

Dr. Bellas has provided consulting services in 20 states and the District of Columbia. He has analyzed the fiscal impacts to the federal government, states, counties, cities, and towns on over 98,000 residential units and over 38.7 million square feet of non-residential space. The total value of all land-uses analyzed is estimated to be over \$27 billion. Dr. Bellas has authored or co-authored over 125 research reports on the fiscal and economic impacts of real estate development. Additional information on Dr Bellas' background, credentials and extensive experience in economic and fiscal analysis for development projects is listed at the end of his attached letter.

Dr Bellas will be at today's hearing and we request that you ask him more about his report during the discussions about the sPower SUPs.

Thank you and best regards,

Sean Fogarty
540-972-4957

--

This email was Malware checked by UTM 9. <http://www.sophos.com>



URBAN ANALYTICS, INC.

REAL ESTATE AND URBAN PLANNING CONSULTANTS

POST OFFICE BOX 877 • ALEXANDRIA, VIRGINIA 22313-0877

(TELEPHONE) 703.780.8200 • (FAX) 703.780.8201 • (EMAIL) DBELLAS101@AOL.COM

March 11, 2019

Honorable Paul D. Trampe
Chairperson
Spotsylvania County Board of Supervisors
9104 Courthouse Road
Post Office Box 99
Spotsylvania, Virginia 22553

Re: “Spotsylvania Solar Energy Center Economic and Fiscal Contribution to Spotsylvania County” dated February 13, 2019 and prepared by Mangum Economics, LLC.

and

Special Use Permit Applications SUP18-0001, SUP18-0002 and SUP18-0003

Dear Dr. Trampe:

The Concerned Citizens of Spotsylvania County have engaged my firm to review and critique the above-referenced report which was submitted to Spotsylvania County as part of the application materials for the Special Use Permit applications listed above.

Urban Analytics specializes in preparing economic and fiscal impact analyses for proposed and existing land-uses and we are in our 23rd year of operations. A brief summary of our firm can be found at the end of this letter.

I have read the above-referenced report prepared by Dr. Mangum and there are several economic and fiscal issues that need to be brought to the attention of the Board of County Supervisors. Understanding these economic and fiscal issues will help the Board of County Supervisors by providing them with additional information to make an informed decision.

In summary, while the proposed utility scale solar facility currently referred to as the Spotsylvania Solar Energy Center generates revenues to the County, *there are alternative land-use scenarios that take up less acreage that could generate substantially more revenues to the County* than the proposed sPower project. Our review of Dr. Mangum's report (using the data provided by both Dr. Mangum and by Spotsylvania County) indicate the following:

1. Under the sPower proposal, Spotsylvania County will receive *declining* tax revenues annually *on a per-acre basis* on an appreciating asset (real estate).
2. The *foregone* tax revenues to Spotsylvania County from alternative development scenarios are substantial. That is, the County would enjoy larger fiscal benefits from alternative development scenarios with less acreage needed.
3. The *foregone* economic benefits to Spotsylvania County from alternative development scenarios are substantial. The County would also enjoy larger economic benefits (new jobs, new labor income, and the multiplier effect on the local economy) with less acreage needed.
4. The true net fiscal and economic benefits to the County are not shown in the Mangum Report. This is because the *foregone* tax revenues and economic benefits from the three alternative revenue stream scenarios were not subtracted from the findings shown in the Mangum Report.

These economic and fiscal issues are addressed in detail on the following pages.¹

Thank you, in advance, for taking the time to read this letter. If you should have any questions regarding the content of this letter, please do not hesitate to call or write. Until then, I remain,

Most respectfully,

Dean D. Bellas

Dean D. Bellas, Ph.D.
President

CC: Members, Board of Supervisors
Sent: via email

¹In the next few weeks I will be analyzing the economic and fiscal impacts of alternative non-residential development scenarios. These non-residential land-uses generate larger tax revenues per acre and require fewer acres to operate.

Table of Contents

The County will receive <i>declining</i> tax revenues annually on an appreciating asset	3
<i>Foregone</i> Tax Revenues to the County are substantial	5
<i>Foregone</i> Economic Benefits to the County are substantial	8
About the Author of this Letter	10
APPENDIX A: Supporting Tables	12
APPENDIX B: Qualifications of the Consultant Firm	18
APPENDIX C: Qualifications of the Author	19

The County will receive *declining* tax revenues annually on an appreciating asset

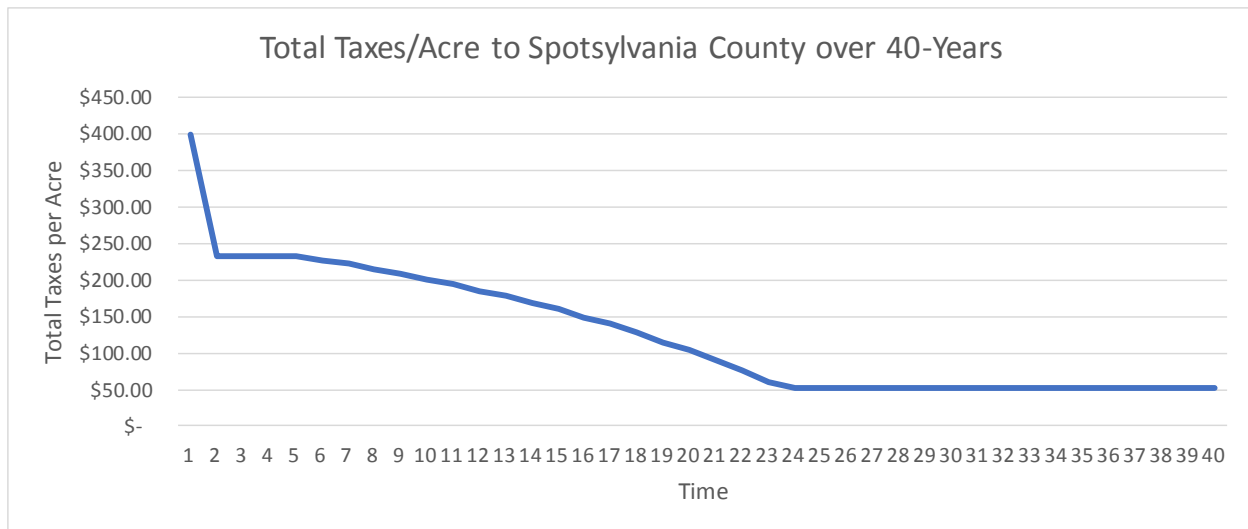
In Table 3 on page 19 of the Mangum report, you will see that in Year 1, Dr. Mangum has estimated that the County will receive \$1,395,167 in total tax revenues. Of the approximately 6,500 acres allocated for the Spotsylvania Solar Energy Center (SSEC) proposed project, Dr. Mangum writes that “approximately 3,500 acres will be developed into the solar project, with the remaining 3,000 acres preserved as undeveloped, vacant land.”² When divided by the 3,500 developable acres, Spotsylvania County will receive \$398.62 in taxes per developable acre ($\$1,395,167 / 3,500 \text{ acres} = \398.62 per acre) in Year 1 (this tax revenue is a combination of the roll back taxes and the current year tax revenues). By Year 40, the County will receive \$180,557 in total tax revenues or \$51.59 in taxes per developable acre.

On the next page, we constructed a table for you to review. The data shown in columns A-D come from Table 3 in the Mangum report. In column E, we divided the total annual County taxes in column D by the 3,500 developable acres.

²Mangum Report dated February 13, 2019, Page 1.

	A	B	C	D	E
	From Table 3 of the Mangum Economics Report				Per-Acre
Year	Roll Back Taxes	Annual R.E. Taxes to County	Annual Solar Taxes to County	Total Annual County Taxes	Total Developable Acres 3,500
1	\$ 579,121	\$ 101,121	\$ 714,925	\$ 1,395,167	\$ 398.62
2		\$ 101,121	\$ 714,925	\$ 816,046	\$ 233.16
3		\$ 101,121	\$ 714,925	\$ 816,046	\$ 233.16
4		\$ 101,121	\$ 714,925	\$ 816,046	\$ 233.16
5		\$ 101,121	\$ 714,925	\$ 816,046	\$ 233.16
6		\$ 101,121	\$ 691,094	\$ 792,215	\$ 226.35
7		\$ 101,121	\$ 675,207	\$ 776,328	\$ 221.81
8		\$ 101,121	\$ 651,376	\$ 752,497	\$ 215.00
9		\$ 101,121	\$ 627,545	\$ 728,666	\$ 208.19
10		\$ 101,121	\$ 603,715	\$ 704,836	\$ 201.38
11		\$ 101,121	\$ 579,884	\$ 681,005	\$ 194.57
12		\$ 101,121	\$ 548,109	\$ 649,230	\$ 185.49
13		\$ 101,121	\$ 524,278	\$ 625,399	\$ 178.69
14		\$ 101,121	\$ 492,504	\$ 593,625	\$ 169.61
15		\$ 101,121	\$ 460,730	\$ 561,851	\$ 160.53
16		\$ 101,121	\$ 421,011	\$ 522,132	\$ 149.18
17		\$ 101,121	\$ 389,237	\$ 490,358	\$ 140.10
18		\$ 101,121	\$ 349,519	\$ 450,640	\$ 128.75
19		\$ 101,121	\$ 301,857	\$ 402,978	\$ 115.14
20		\$ 101,121	\$ 262,139	\$ 363,260	\$ 103.79
21		\$ 101,121	\$ 214,478	\$ 315,599	\$ 90.17
22		\$ 101,121	\$ 166,816	\$ 267,937	\$ 76.55
23		\$ 101,121	\$ 111,211	\$ 212,332	\$ 60.67
24		\$ 101,121	\$ 79,436	\$ 180,557	\$ 51.59
25		\$ 101,121	\$ 79,436	\$ 180,557	\$ 51.59
26		\$ 101,121	\$ 79,436	\$ 180,557	\$ 51.59
27		\$ 101,121	\$ 79,436	\$ 180,557	\$ 51.59
28		\$ 101,121	\$ 79,436	\$ 180,557	\$ 51.59
29		\$ 101,121	\$ 79,436	\$ 180,557	\$ 51.59
30		\$ 101,121	\$ 79,436	\$ 180,557	\$ 51.59
31		\$ 101,121	\$ 79,436	\$ 180,557	\$ 51.59
32		\$ 101,121	\$ 79,436	\$ 180,557	\$ 51.59
33		\$ 101,121	\$ 79,436	\$ 180,557	\$ 51.59
34		\$ 101,121	\$ 79,436	\$ 180,557	\$ 51.59
35		\$ 101,121	\$ 79,436	\$ 180,557	\$ 51.59
36		\$ 101,121	\$ 79,436	\$ 180,557	\$ 51.59
37		\$ 101,121	\$ 79,436	\$ 180,557	\$ 51.59
38		\$ 101,121	\$ 79,436	\$ 180,557	\$ 51.59
39		\$ 101,121	\$ 79,436	\$ 180,557	\$ 51.59
40		\$ 101,121	\$ 79,436	\$ 180,557	\$ 51.59

Generally speaking, over the long term, real estate is generally treated as an appreciating asset but the County's "return on investment" (by voting to approve the proposed project and permit 3,500 acres to be used as a utility scale solar facility) is an annual *declining* income stream on a per acre basis. In aggregate, the \$17,610,021 in estimated taxable revenues over the 40-year holding period may seem like a lot of money to some people but, in reality, the County is leaving a lot of money on the table in *foregone* tax revenues.



This annual *declining* income stream on a per acre basis is graphically illustrated in the above chart. If the trend-line shown in the above chart represented the future income stream over 40 years for an individual's 401(k) retirement plan or stock market portfolio, then that individual would not be too happy. Likewise, the County should not accept a future revenue stream of taxes for *any* proposed project (not just the sPower proposed project) with the future trend line shown above.

Foregone Tax Revenues to the County are substantial

Every land use decision that the County makes (whether these decisions pertain to zoning, changes to the County long-range comprehensive plan, or approving applications for proposed development projects) has an economic implication to the County's annual operating budget. Just like any investor, the County has choices. The County can elect to approve one proposed project and not approve another. Economic and fiscal impact analyses help the County to make informed decisions. Once the County has reviewed the non-economic variables such traffic impacts, environmental impacts, school impacts, and the like, the County can then look at the economic and fiscal impacts of proposed projects. Ultimately, these studies help the County to understand whether the tax revenue

stream (the fiscal impact) and the benefits from new job creation, increased labor income, and the multiplier effect (the “ripple” effect) on the County’s economy are positive, negative or at the break-even point.

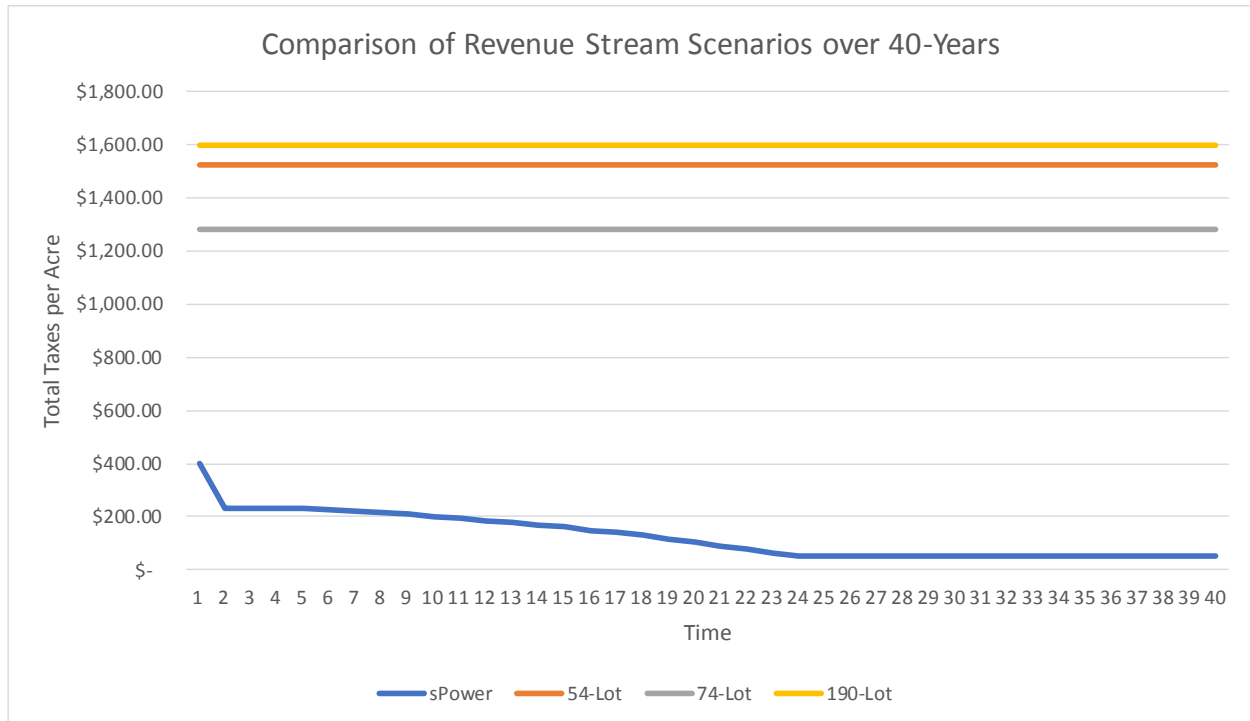
As part of the sPower application, additional land will need to be acquired from the adjacent Fawn Lake community. This land could be as low as 54-lots to as high as 190-lots. On the next page, we compared the tax revenue stream for the sPower proposed project to the tax revenue stream *foregone* (the tax revenue stream that the County would give up if lots that already have been approved for residential use were removed from the Fawn Lake community and, by extension, the residential tax base in the County).

We ran a sensitivity analysis on three alternative revenue streams: (a) the foregone revenues from 54 lots; (b) the foregone revenues from 74 lots; and the foregone tax revenues from 190 lots. As of the date of this letter, a recent review of sales data indicated that the average value of single-family houses selling in the area where the potential Fawn Lake lots would be removed was \$581,000 per single-family house.³ The County has reported that the fiscal break-even point for single-family detached houses is \$374,000; that is, at \$374,000 in value, the real estate tax revenues generated by homes assessed at \$374,000 coupled with the household income needed to support a mortgage on a \$374,000 house would generate sufficient tax revenue to the County to offset the cost of providing public services such as public safety, parks & recreation, public schools, public works, and other County services. Houses valued at the fiscal break-even point or higher generate a net fiscal surplus to the County while houses valued below the fiscal break-even point would generate a net fiscal deficit to the County.

We calculated the real estate tax revenue on the portion of the house valued above the fiscal break-even point. We applied that per-unit real estate tax revenue to each of the 54-lot, 74-lot and 190-lot scenarios. The findings are shown in the table on the next page. While the sPower proposed project generates a *declining* revenue stream on a per-acre basis, the three sensitivity scenarios all indicate that this revenue stream is constant on a per-acre basis. The trend lines for the proposed sPower project and the three alternative revenue stream scenarios are shown in the chart immediately following the table. In Year 1, the revenue stream from the three alternative scenarios range from a low of \$1,282.40 per acre to a high of \$1,598.14 per acre, compared to \$398.62 per acre for the proposed sPower project. In Year 40, the revenue stream from the sPower project decreases to \$51.59 per acre but the revenue from the three alternative scenarios continues to remain constant in the \$1,282.40 per acre to \$1,598.14 per acre range.

³Long & Foster review of comparable sales at Fawn Lake.

Per-Acre Revenue Stream Comparison over 40-Years					
<u>Year</u>		<u>Proposed</u> <u>sPower</u>	<u>Scenario A</u> <u>54-Lot</u>	<u>Scenario B</u> <u>74-Lot</u>	<u>Scenario C</u> <u>190-Lot</u>
1	\$	398.62	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
2	\$	233.16	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
3	\$	233.16	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
4	\$	233.16	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
5	\$	233.16	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
6	\$	226.35	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
7	\$	221.81	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
8	\$	215.00	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
9	\$	208.19	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
10	\$	201.38	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
11	\$	194.57	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
12	\$	185.49	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
13	\$	178.69	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
14	\$	169.61	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
15	\$	160.53	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
16	\$	149.18	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
17	\$	140.10	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
18	\$	128.75	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
19	\$	115.14	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
20	\$	103.79	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
21	\$	90.17	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
22	\$	76.55	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
23	\$	60.67	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
24	\$	51.59	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
25	\$	51.59	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
26	\$	51.59	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
27	\$	51.59	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
28	\$	51.59	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
29	\$	51.59	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
30	\$	51.59	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
31	\$	51.59	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
32	\$	51.59	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
33	\$	51.59	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
34	\$	51.59	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
35	\$	51.59	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
36	\$	51.59	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
37	\$	51.59	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
38	\$	51.59	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
39	\$	51.59	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14
40	\$	51.59	\$ 1,526.44	\$ 1,282.40	\$ 1,598.14



From the perspective of analyzing future County tax revenues on a per acre basis, the estimated fiscal revenues from *the three alternative scenarios are financially more advantageous to the County than* the estimated revenue stream from the proposed sPower project.

Foregone Economic Benefits to the County are substantial

The economic benefits (the economic impact) to Spotsylvania County and the City of Fredericksburg are measured by three metrics.⁴ These metrics are new job creation, new labor income, and the multiplier effect (sometimes referred to as the “ripple” effect) to the local economy. In Appendix Tables A-1, A-2, and A-3, we have calculated the estimated economic benefits from the three alternative revenue stream scenarios. We compare these three alternative economic benefits to the sPower estimated economic benefits in the table on the next page.

⁴The U.S. Department of Commerce, Bureau of Economic Analysis defines the local economic region as Spotsylvania County + Fredericksburg, Virginia.

	Proposed Revenue Stream Scenario		Alternative Revenue Stream Scenarios					
Economic Benefit	sPower	Per-Acre	54-Lots	Per-Acre	74-Lots	Per-Acre	190-Lots	Per-Acre
Acres Consumed	6,500 acres ¹ 3,500 acres (developed) 3,000 acres (undeveloped)		61 acres 61 acres (developed)		99.5 acres 99.5 acres (developed)		205 acres 205 acres (developed)	
Construction Phase (one-time)								
Jobs (FTE) ²	843	1 job for every 7.711 acres	92	1 job for every 0.663 acres	126	1 job for every 0.789 acres	323	1 job for every 0.635 acres
Earnings	\$45,828,320	\$7,050.51 per acre	\$4,271,256	\$70,020.59 per acre	\$5,853,203	\$58,826.16 per acre	\$15,028,495	\$73,309.73 per acre
Output	\$109,965,443	\$16,917.76 per acre	\$22,577,750	\$370,127.05 per acre	\$30,939,880	\$310,953.57 per acre	\$79,440,232	\$387,513.33 per acre
Operations Phase (annually)								
Jobs (FTE) ²	34	1 job for every 191.176 acres	16	1 job for every 3.813 acres	22	1 job for every 4.523 acres	57	1 job for every 3.596 acres
Earnings	\$2,450,506	\$377.001 per acre	\$616,661	\$10,109.20 per acre	\$847,794	\$8,520.54 per acre	\$2,176,769	\$10,618.38 per acre
Output	\$4,717,019	\$725.695 per acre	\$2,888,340	\$47,349.84 per acre	\$3,958,095	\$39,779.85 per acre	\$10,162,676	\$49,574.03 per acre

Source : Mangum economics; Urban Analytics, Inc.

Note : ¹Mangum Report (page 1). ²Full-time equivalent (FTE) jobs include jobs on-site, off-site, in the County, and outside the County.

When comparing the economic and fiscal benefits of various development projects, a common denominator must be used to make the findings of each development project both comparable and understandable. In the comparison of the proposed sPower project and the three alternative revenue stream analyses from the Fawn Lake lots, the common denominator is acres. Thus, to compare these four projects, we converted all the findings (both from the Mangum Report and from our calculations) to a per acre basis.

In addition to the jobs created by the sPower proposed project, jobs are also created by the residents of Spotsylvania County through their annual household spending. Household spending includes the purchase of goods and services associated with residentially serving activities such as grocery shopping, house repair and maintenance, visits to the doctor and dentist, eating out at restaurants, entertainment, and other activities. In Appendix Tables A-4, A-5, and A-6, the economic impact from household spending associated with these activities is shown for each of the three alternative revenue stream scenarios.

On a per acre basis, the 34 full-time equivalent (FTE) jobs supported by the sPower project during the operational phase requires 191.176 acres per job. That is, 34 jobs are estimated to be generated from the 6,500 acres set-aside for the sPower proposed project. The three alternative revenue stream scenarios require substantially less acres per job. For example, the 57 jobs created and supported if the 190 lots at Fawn Lake were not removed from the residential tax base would require only 1 job for every 3.596 acres. The comparison chart on the next page indicates that the three alternative revenue stream scenarios all generate substantial short-term and long-term economic impacts to Spotsylvania County *on significantly few acres*.

Finally, the true net fiscal and economic benefits to the County are not shown in the Mangum Report. This is because the *foregone* tax revenues and economic benefits from the three alternative revenue stream scenarios were not subtracted from the findings shown in the Mangum Report. For example, if 54 lots were removed from Fawn Lake for the sPower project, then the 34 estimated jobs supported by the sPower project *would be reduced by the 16 estimated jobs foregone in the County* due to the 54 fewer households spending their disposable income in the County each year. The Mangum Report does not calculate the economic and fiscal impacts from *foregone* economic activity that will occur if the sPower proposed project is built.

About the Author of this Letter

A biographical summary on the Consultant firm is presented in Appendix B. A biographical summary on Dr. Bellas is included in Appendix C. For 23 years, Dr. Bellas

has provided consulting services in 20 states and the District of Columbia. Dr. Bellas has analyzed the fiscal impacts to the federal government, states, counties, cities, and towns on over 98,000 residential units and over 38.7 million square feet of non-residential space. The total value of all land-uses analyzed is estimated to be over \$27 billion. Dr. Bellas has authored or co-authored over 125 research reports on the fiscal and economic impacts of real estate development.

APPENDIX A: Supporting Tables

Appendix Table A-1

Economic Impact Summary - Foregone Economic Activity Revenue Stream Scenario A: **54** Lots Removed from Fawn Lake Spotsylvania County, Virginia

Economic Activity Foregone	Direct Outlays	Indirect Outlays	Total Outlays
Short-Term (Construction Phase)			
Hard Costs	\$ 11,765,250	\$ 7,043,855	\$ 18,809,105
Soft Costs	\$ 2,353,050	\$ 1,415,595	\$ 3,768,645
Total	\$ 14,118,300	\$ 8,459,450	\$ 22,577,750
Estimated New Jobs ¹			92
Estimated Personal Earnings ²			\$ 4,271,256
Long-Term (Post-Construction Phase)			
From Residents	\$ 1,867,320	\$ 1,021,020	\$ 2,888,340
Total	\$ 1,867,320	\$ 1,021,020	\$ 2,888,340
Estimated New Jobs from Annual Household (Resident) Spending ¹			16
Estimated Personal Earnings of these New Jobs ²			\$ 616,661

Source:

Urban Analytics, Inc.; Woods & Poole Economics, Inc.; U.S. Department of Commerce (RIMS II).

Note:

¹ Includes jobs located on-site, off-site, in the county, and outside the county.

² Spotsylvania County + Fredericksburg, Virginia only.

Appendix Table A-2
Economic Impact Summary - Foregone Economic Activity
Revenue Stream Scenario B: 74 Lots Removed from Fawn Lake
Spotsylvania County, Virginia

Economic Activity Foregone	Direct Outlays	Indirect Outlays	Total Outlays
Short-Term (Construction Phase)			
Hard Costs	\$ 16,122,750	\$ 9,652,690	\$ 25,775,440
Soft Costs	\$ 3,224,550	\$ 1,939,889	\$ 5,164,439
Total	\$ 19,347,300	\$ 11,592,580	\$ 30,939,880
Estimated New Jobs ¹			126
Estimated Personal Earnings ²			\$ 5,853,203
Long-Term (Post-Construction Phase)			
From Residents	\$ 2,558,920	\$ 1,399,175	\$ 3,958,095
Total	\$ 2,558,920	\$ 1,399,175	\$ 3,958,095
Estimated New Jobs from Annual Household (Resident) Spending ¹			22
Estimated Personal Earnings of these New Jobs ²			\$ 847,794

Source:

Urban Analytics, Inc.; Woods & Poole Economics, Inc.; U.S. Department of Commerce (RIMS II).

Note:

¹ Includes jobs located on-site, off-site, in the county, and outside the county.

² Spotsylvania County + Fredericksburg, Virginia only.

Appendix Table A-3

**Economic Impact Summary - Foregone Economic Activity
Revenue Stream Scenario C: 190 Lots Removed from Fawn Lake
Spotsylvania County, Virginia**

Economic Activity Foregone	Direct Outlays	Indirect Outlays	Total Outlays
Short-Term (Construction Phase)			
Hard Costs	\$ 41,396,250	\$ 24,783,935	\$ 66,180,185
Soft Costs	\$ 8,279,250	\$ 4,980,797	\$ 13,260,047
Total	\$ 49,675,500	\$ 29,764,732	\$ 79,440,232
Estimated New Jobs ¹			323
Estimated Personal Earnings ²			\$ 15,028,495
Long-Term (Post-Construction Phase)			
From Residents	\$ 6,570,200	\$ 3,592,476	\$ 10,162,676
Total	\$ 6,570,200	\$ 3,592,476	\$ 10,162,676
Estimated New Jobs from Annual Household (Resident) Spending ¹			57
Estimated Personal Earnings of these New Jobs ²			\$ 2,176,769

Source:

Urban Analytics, Inc.; Woods & Poole Economics, Inc.; U.S. Department of Commerce (RIMS II).

Note:

¹ Includes jobs located on-site, off-site, in the county, and outside the county.

² Spotsylvania County + Fredericksburg, Virginia only.

Appendix Table A-4
Foregone Annual Economic Impacts of Household Spending
If Fawn Lake Lots are Removed
(Single-Family Houses will not be built if Lots are Removed for sPower Use)
Spotsylvania County, Virginia
2019

Calculation of HH Income					
	<u>Units</u>	<u>Average Per Unit Real Estate Market Value¹</u>	<u>Estimated Purchase Down Payment</u>	<u>Estimated Household Income Required for Purchase^{1,2}</u>	<u>Estimated Total Household Income¹</u>
Single Family	54	\$581,000	20%	\$123,500	\$6,669,000
Local HH Income Captured					
	<u>Units</u>	<u>Average Per Unit HH Income</u>	<u>HH Income Captured Locally</u>	<u>Estimated Per Unit HH Income Captured Locally</u>	<u>Estimated Total HH Income Captured Locally</u>
All Housing Units	54	\$123,500	28%	\$34,580	\$1,867,320
Local Economic Impact					
<u>Annual Outlays</u>	<u>HH Income Captured Locally</u>	<u>Estimated Total HH Income Captured Locally</u>	Economic Impact to the Regional Economy³		
			<u>Total Economic Activity</u>	<u>Total Earnings</u>	<u>Total Jobs</u>
Retail-Related (Other)	11.00%	\$ 733,590	\$ 1,163,400	\$ 231,888	7.96
Healthcare-Related	1.60%	\$ 106,704	\$ 166,437	\$ 42,148	0.64
Food Services/Drinking Places	3.81%	\$ 254,089	\$ 390,763	\$ 85,044	0.21
Transportation-Related	5.03%	\$ 335,451	\$ 503,176	\$ 132,033	3.22
Personal/Household Goods	3.76%	\$ 250,754	\$ 340,198	\$ 61,811	1.73
Personal Care Services	0.34%	\$ 22,675	\$ 37,143	\$ 11,133	0.41
Charitable/Cash Contributions	1.09%	\$ 72,692	\$ 137,802	\$ 19,547	0.55
Entertainment-Related	1.37%	\$ 91,365	\$ 149,419	\$ 35,057	1.59
Total	28.00%	\$ 1,867,320	\$ 2,888,340	\$ 618,661	16.32

Source:

U.S. Department of Commerce, Bureau of Economic Analysis Regional Multipliers-RIMS II (2007 National, 2016 Regional for Spotsylvania County + Fredericksburg); Long & Foster; Urban Analytics, Inc.

Note:

¹ In constant 2019 dollars.

² Subject to mortgage financing terms such as: rate, amortization period, debt-to-income ratio, real estate taxes, and hazard insurance.

³ Regional economy defined as Spotsylvania County + Fredericksburg, Virginia.

Appendix Table A-5
Foregone Annual Economic Impacts of Household Spending
If Fawn Lake Lots are Removed
(Single-Family Houses will not be built if Lots are Removed for sPower Use)
Spotsylvania County, Virginia
2019

Calculation of HH Income					
	<u>Units</u>	<u>Average Per Unit Real Estate Market Value¹</u>	<u>Estimated Purchase Down Payment</u>	<u>Estimated Household Income Required for Purchase^{1,2}</u>	<u>Estimated Total Household Income¹</u>
Single Family	74	\$581,000	20%	\$123,500	\$9,139,000
Local HH Income Captured					
	<u>Units</u>	<u>Average Per Unit HH Income</u>	<u>HH Income Captured Locally</u>	<u>Estimated Per Unit HH Income Captured Locally</u>	<u>Estimated Total HH Income Captured Locally</u>
All Housing Units	74	\$123,500	28%	\$34,580	\$2,558,920
Local Economic Impact					
<u>Annual Outlays</u>	<u>HH Income Captured Locally</u>	<u>Estimated Total HH Income Captured Locally</u>	Economic Impact to the Regional Economy³		
			<u>Total Economic Activity</u>	<u>Total Earnings</u>	<u>Total Jobs</u>
Retail-Related (Other)	11.00%	\$ 1,005,290	\$ 1,594,289	\$ 317,772	10.91
Healthcare-Related	1.60%	\$ 146,224	\$ 228,080	\$ 57,758	0.88
Food Services/Drinking Places	3.81%	\$ 348,196	\$ 535,490	\$ 116,541	0.29
Transportation-Related	5.03%	\$ 459,692	\$ 689,538	\$ 180,935	4.41
Personal/Household Goods	3.76%	\$ 343,626	\$ 466,198	\$ 84,704	2.37
Personal Care Services	0.34%	\$ 31,073	\$ 50,900	\$ 15,257	0.56
Charitable/Cash Contributions	1.09%	\$ 99,615	\$ 188,840	\$ 26,787	0.76
Entertainment-Related	1.37%	\$ 125,204	\$ 204,759	\$ 48,041	2.18
Total	28.00%	\$ 2,558,920	\$ 3,958,095	\$ 847,794	22.37

Source:

U.S. Department of Commerce, Bureau of Economic Analysis Regional Multipliers-RIMS II (2007 National, 2016 Regional for Spotsylvania County + Fredericksburg); Long & Foster; Urban Analytics, Inc.

Note:

¹ In constant 2019 dollars.

² Subject to mortgage financing terms such as: rate, amortization period, debt-to-income ratio, real estate taxes, and hazard insurance.

³ Regional economy defined as Spotsylvania County + Fredericksburg, Virginia.

Appendix Table A-6
Foregone Annual Economic Impacts of Household Spending
If Fawn Lake Lots are Removed
(Single-Family Houses will not be built if Lots are Removed for sPower Use)
Spotsylvania County, Virginia
2019

Calculation of HH Income					
	<u>Units</u>	<u>Average Per Unit Real Estate Market Value¹</u>	<u>Estimated Purchase Down Payment</u>	<u>Estimated Household Income Required for Purchase^{1,2}</u>	<u>Estimated Total Household Income¹</u>
Single Family	190	\$581,000	20%	\$123,500	\$23,465,000
Local HH Income Captured					
	<u>Units</u>	<u>Average Per Unit HH Income</u>	<u>HH Income Captured Locally</u>	<u>Estimated Per Unit HH Income Captured Locally</u>	<u>Estimated Total HH Income Captured Locally</u>
All Housing Units	190	\$123,500	28%	\$34,580	\$6,570,200
Local Economic Impact					
<u>Annual Outlays</u>	<u>HH Income Captured Locally</u>	<u>Estimated Total HH Income Captured Locally</u>	Economic Impact to the Regional Economy³		
			<u>Total Economic Activity</u>	<u>Total Earnings</u>	<u>Total Jobs</u>
Retail-Related (Other)	11.00%	\$ 2,581,150	\$ 4,093,446	\$ 815,902	28.02
Healthcare-Related	1.60%	\$ 375,440	\$ 585,611	\$ 148,299	2.27
Food Services/Drinking Places	3.81%	\$ 894,017	\$ 1,374,908	\$ 299,227	0.74
Transportation-Related	5.03%	\$ 1,180,290	\$ 1,770,434	\$ 464,562	11.33
Personal/Household Goods	3.76%	\$ 882,284	\$ 1,196,995	\$ 217,483	6.08
Personal Care Services	0.34%	\$ 79,781	\$ 130,689	\$ 39,172	1.45
Charitable/Cash Contributions	1.09%	\$ 255,769	\$ 484,860	\$ 68,776	1.94
Entertainment-Related	1.37%	\$ 321,471	\$ 525,733	\$ 123,348	5.60
Total	28.00%	\$ 6,570,200	\$ 10,162,676	\$ 2,176,769	57.42

Source:

U.S. Department of Commerce, Bureau of Economic Analysis Regional Multipliers-RIMS II (2007 National, 2016 Regional for Spotsylvania County + Fredericksburg); Long & Foster; Urban Analytics, Inc.

Note:

¹ In constant 2019 dollars.

² Subject to mortgage financing terms such as: rate, amortization period, debt-to-income ratio, real estate taxes, and hazard insurance.

³ Regional economy defined as Spotsylvania County + Fredericksburg, Virginia.

APPENDIX B: Qualifications of the Consultant Firm

From the Latin word “Urbanus” which means *of or relating to the city* and from the classical Greek “Analytikos” which means *of or relating to analysis*, Urban Analytics, Inc., is a real estate and urban planning consulting firm providing high-level urban development analytical services. Now in its twenty-third year of operations, Urban Analytics has provided specialized real estate financial analyses, market research studies, economic and fiscal impact studies, portfolio analyses, and analyses of public policy decisions to private, public and institutional sector clients. Urban Analytics is committed to providing its clients with the most effective analytical techniques available. These techniques include building models for almost any kind of economic, fiscal and financial analysis.

Examples of the Company’s public-sector and institutional-sector assignments include: a study of housing conditions in Charles County, **Maryland** for the Charles County Board of County Commissioners; a countywide fiscal and economic study for the Prince William County, **Virginia** Planning and Finance Departments; a citywide and countywide fiscal study (*with multiple school districts*) for the City of Topeka and Shawnee County, **Kansas**; an analysis of the economic and fiscal impacts of proposed first-time home buyer down payment savings legislation statewide in the states of **Iowa, Mississippi, New York, and Oregon**; a countywide fiscal study with long-term growth scenarios (including a no-growth scenario) for the Queen Anne’s County, Maryland Economic Development Authority; a town-wide fiscal, economic, and capital asset impact study for the eastern shore towns of Trappe, Denton and Vienna, Maryland; an economic and fiscal impact analysis of a proposed video lottery terminal (slots) gaming facility in Cecil County, Maryland and the Town of Perryville, Maryland; a fiscal impact analysis of the **U.S. Government Department of Defense** spending statewide in the State of Virginia; application review services for the U.S. Government *Department of the Treasury* Community Development Financial Institutions Fund; a fiscal and economic impact analysis of a proposed training facility for foreign service personnel for the U.S. Government *Department of State*, Bureau of Diplomatic Affairs; a fiscal impact analysis for the Government of the **District of Columbia** for hosting the federal government; and revenue enhancement analyses of the relocation of the *National Science Foundation (NSF)* and *Transportation Security Administration (TSA)* headquarters buildings to the City of Alexandria, Virginia.

Examples of the Company’s private sector assignments include: developing long-term financial forecasting and market simulation scenarios on almost eight million square feet of existing and build-to-suit commercial office buildings in northern Virginia; developing a pro forma model for the proposed Cold War Museum in Lorton, Virginia; and various economic impact, fiscal impact, and proffer analyses of large-scale residential and non-residential land use projects.

APPENDIX C: Qualifications of the Author

Dean D. Bellas, Ph.D., is president of Urban Analytics, Inc., an Alexandria, Virginia-based real estate and urban planning consulting firm providing urban development analytical services to public, private, and institutional – sector clients. Consulting services include fiscal and economic impact studies, market research analysis, real estate asset management, real estate development economics, project feasibility studies, and the analyses of public policy decisions. Since 1996, Dr. Bellas has provided consulting services in Arizona, California, Florida, Illinois, Indiana, Iowa, Kansas, Maryland, Michigan, Minnesota, Mississippi, Missouri, New York, North Carolina, Oregon, Texas, Virginia, Washington, West Virginia, Wisconsin, and the District of Columbia. Dr. Bellas has analyzed the fiscal impact on over 98,000 residential units and over 38.7 million square feet of non-residential space. The total value of all land-uses analyzed is estimated to be over \$27 billion. In addition, Dr. Bellas has authored or co-authored over 125 research reports on the fiscal and economic impacts of real estate development.

In addition to Urban Analytics, Dr. Bellas is an adjunct faculty member in the Real Estate program within the School of Continuing Studies at Georgetown University. He has previously been an adjunct faculty member in the Real Estate Development concentration within the School of Architecture and Planning at the Catholic University of America, an adjunct faculty member in the School of Professional Studies in Business and Education at the Johns Hopkins University, an adjunct faculty member in the School of Management at George Mason University, and a graduate teaching fellow at the George Washington University. Dr. Bellas has also taught candidates for the CFA designation on behalf of the Washington Society of Investment Analysts.

Dr. Bellas received a Bachelor of Science in Business Administration from Western New England University with a concentration in Finance (1982), a Master of Urban and Regional Planning from the George Washington University (1993), and his Doctorate in Public Policy with a concentration in regional economic development policy at George Mason University (2005). His doctoral dissertation was entitled, *“Fiscal Impact Simulation Modeling: Calculating the Fiscal Impact of Development.”* His research interests include regional and local developmental growth patterns, economic and fiscal impact effects of real estate development on municipal government, and economic development policy. Dr. Bellas is a member of the National Economists Club and Lambda Alpha International, an honorary society for the advancement of land economics. He is a full member of the Urban Land Institute. Dr. Bellas previously sat on ULI’s national *Public Development and Infrastructure Council*. He currently sits on the regional ULI Baltimore-Washington, DC *Transit-Oriented Development (TOD) Council*. Dr. Bellas was the economic advisor to the Southeast Fairfax Development Corporation

Board of Directors in calendar year 2012. He was appointed to the Board of Directors for the 2013 – 2014 term by Supervisor Jeffrey C. McKay (Lee District, Fairfax County, Virginia).

Over the past twenty-two years, Dr. Bellas has provided expert testimony on the economic and fiscal impacts of proposed real estate development projects at public meetings and public hearings of planning commissions and county supervisors meetings, as well as at community outreach meetings.

Donna Mayfield

From: Paulette Mann
Sent: Monday, March 11, 2019 10:34 AM
To: Wanda Parrish
Subject: Fwd: sPower rezoning applications
Attachments: BOS letter DENY.docx; ATT00001.htm

Sent from my iPhone

Begin forwarded message:

From: Magge <jmartinez703@aol.com>
Date: March 9, 2019 at 11:17:23 PM EST
To: "david.ross@Spotsylvania.va.us" <david.ross@Spotsylvania.va.us>, "GBenton@Spotsylvania.va.us" <GBenton@Spotsylvania.va.us>, "McLaughlinTJ@spotsylvania.va.us" <McLaughlinTJ@spotsylvania.va.us>, "BOS@Spotsylvania.va.us" <BOS@Spotsylvania.va.us>, "cyakabouski@Spotsylvania.va.us" <cyakabouski@Spotsylvania.va.us>, "kmarshall@Spotsylvania.va.us" <kmarshall@Spotsylvania.va.us>, "PTrampe@spotsylvania.va.us" <PTrampe@spotsylvania.va.us>, "gskinner@Spotsylvania.va.us" <gskinner@Spotsylvania.va.us>
Cc: "concernedcitizensspotsylvania@gmail.com" <concernedcitizensspotsylvania@gmail.com>, "ConcernedCitizensFawnLake@gmail.com" <ConcernedCitizensFawnLake@gmail.com>
Subject: FW: sPower rezoning applications

GREAT RESPONSIBILITY COMES WITH RESPONSIBLE LEADERSHIP; VOTE THE VOICE OF YOUR CONSTITUENTS

ATTENTION SUPERVISOR SKINNER:

As a fellow Military retiree, I am certain you are very loyal to your citizens needs. We are very apprehensive about the destruction of our environment and financial investments in the county as well as our peace and quiet living here in Spotsy. Thank you for considering our attached letter requesting you to DENY the sPower aapplications.

Respectfully, Dr Mike and Margaret Olichney

Sent from [Mail](#) for Windows 10

--

This email was Malware checked by UTM 9. <http://www.sophos.com>

10181 Landfall Lane

King George, Virginia 22485

7 March 2019

TO: BOARD OF SUPERVISORS OF SPOTSYLVANIA COUNTY

I am a property owner and over 100 of my family members reside in Spotsylvania County. This has been our homeland for over 250 years for many generations. We are extremely concerned about how you will vote on the sPower rezoning applications because we are surrounded by all three proposed sites. My property is on W Catharpin Road next to the entrance to the largest site—it is right in my front door! It is equally close to my relatives.

This massive intrusion will destroy our peaceful living and will not bring any major financial gain to the county as reported by the economists. Why would you sacrifice our beautiful county for the sake of pleasing the state and federal officials? They can find better locations away from residential areas which will be more suitable for their greening project.

You have been provided an ungodly mountain of data to support your decision to DENY all three applications. You are a reasonable and responsible leader and, therefore, you understand why the right decision is to DENY these rezoning applications. If the state or federal pressure persists, call any of your constituents and we will appear before any state or federal official and defend the BOS' decision to DENY these rezoning applications.

DO THE RIGHT THING – DENY DENY DENY !

Respectfully,

Dr Michael and Margaret Olichney

PH: 703-795-0710

Email:jmartinez703@aol.com

Donna Mayfield

From: Magge <jmartinez703@aol.com>
Sent: Saturday, March 9, 2019 11:17 PM
To: David Ross; Thomas G. Benton; Timothy J. McLaughlin; Aimee Mann; Chris Yakabouski; Kevin Marshall; Paul D. Trampe; Gary Skinner
Cc: concernedcitizensspotsylvania@gmail.com; ConcernedCitizensFawnLake@gmail.com
Subject: FW: sPower rezoning applications
Attachments: BOS letter DENY.docx

GREAT RESPONSIBILITY COMES WITH RESPONSIBLE LEADERSHIP; VOTE THE VOICE OF YOUR CONSTITUENTS

ATTENTION SUPERVISOR SKINNER:

As a fellow Military retiree, I am certain you are very loyal to your citizens needs.

We are very apprehensive about the destruction of our environment and financial investments in the county as well as our peace and quiet living here in Spotsy. Thank you for considering our attached letter requesting you to DENY the sPower aapplications.

Respectfully, Dr Mike and Margaret Olichney

Sent from [Mail](#) for Windows 10

--

This email was Malware checked by UTM 9. <http://www.sophos.com>

10181 Landfall Lane

King George, Virginia 22485

7 March 2019

TO: BOARD OF SUPERVISORS OF SPOTSYLVANIA COUNTY

I am a property owner and over 100 of my family members reside in Spotsylvania County. This has been our homeland for over 250 years for many generations. We are extremely concerned about how you will vote on the sPower rezoning applications because we are surrounded by all three proposed sites. My property is on W Catharpin Road next to the entrance to the largest site—it is right in my front door! It is equally close to my relatives.

This massive intrusion will destroy our peaceful living and will not bring any major financial gain to the county as reported by the economists. Why would you sacrifice our beautiful county for the sake of pleasing the state and federal officials? They can find better locations away from residential areas which will be more suitable for their greening project.

You have been provided an ungodly mountain of data to support your decision to DENY all three applications. You are a reasonable and responsible leader and, therefore, you understand why the right decision is to DENY these rezoning applications. If the state or federal pressure persists, call any of your constituents and we will appear before any state or federal official and defend the BOS' decision to DENY these rezoning applications.

DO THE RIGHT THING – DENY DENY DENY !

Respectfully,

Dr Michael and Margaret Olichney

PH: 703-795-0710

Email:jmartinez703@aol.com

Donna Mayfield

From: Elijah Brooks <lijabrooks@gmail.com>
Sent: Thursday, March 7, 2019 3:29 PM
To: Chris Yakabouski; Thomas G. Benton; Kevin Marshall; Timothy J. McLaughlin; David Ross; Paul D. Trampe; Gary Skinner
Cc: Wanda Parrish; Paulette Mann; Patrick White; concernedcitizensspotsylvania@gmail.com

Board of Supervisors for Spotsylvania,

This email is in regards to the proposed solar farm.

As a Born and raised Spotsylvania resident; it makes me sick to see what has become of this county There is already to many home and business structures and it is steadily increasing. We need to protect the trees and nature for as long as we can. I have recently purchased my first home on Orange Plank road, only months later I find out that there may be a solar farm in my back yard. It is a sickening feeling knowing that this may happen. It is my opinion and what seems to be the majority of others that this solar farm is not good for our county. This land should be left alone and let nature reclaim it. I do not oppose green energy. I do think that it is an awful location for a solar farm, especially one of this size. It would also make a difference if our county actually benefited from the green energy. It does not make sense to let a company build a solar plant on county land that doesn't supply the county. Fredericksburg.com recently posted a letter comparing North Anna power plant to this solar project, it seems that the size vs. energy produced is pointless in comparison. It makes me think that the technology is not quite what it could be. I believe solar panels have a long way to go before they are beneficial.

Please do what's best for Spotsylvania and deny this solar project.

Thank you for your time.

God Bless,

Elijah Brooks

--

This email was Malware checked by UTM 9. <http://www.sophos.com>

Donna Mayfield

From: Sean Fogarty <sfogarty77@verizon.net>
Sent: Wednesday, March 13, 2019 6:41 PM
To: Thomas G. Benton; Paul D. Trampe; Chris Yakabouski; Gary Skinner; David Ross; Kevin Marshall; Timothy J. McLaughlin; Aimee Mann
Cc: Wanda Parrish; Karl Holsten; Mark Taylor; sfogarty77@verizon.net; Dave Hammond; Spotsy Kathleen Hayden; kjmmusic@gmail.com; FishSteveDoss; FishSteveDoss; redredfox@verizon.net; Michael Anastasio
Subject: Important followup from hearing
Attachments: sPower_Supplemental_Memo_01082019.pdf; sPower_Supplemental_Memov2.pdf; BOS Communication- Answers to Questions-sPower Project 022219.pdf

Supervisors,

There was an important exchange at last night's hearing that I feel compelled to highlight. Mr. Skinner asked if sPower was buying property or lots in the Fawn Lake development. Ms. Parrish said she did not know the answer to the question. Mr. Payne then proceeded to inform us all that "we have no interest in acquiring real estate from the Fawn Lake developer, NTS." "Not buying land, not buying lots." In fact, he clearly implied that there never was a plan when he said "I don't know where this keeps coming from" at the previous hearing. The comments were dismissive, disrespectful and dishonest. He knows exactly where the information is coming from - his and the County's own written record.

Allow me to provide a brief history of this issue:

In a memo from Hirschler/Payne dated January 8, 2019 (attached) sPower's attorney stated (bottom of page 7):

"1.4 The proposed use is appropriately located near public facilities."

The Project is appropriately located near to a County water source, viz., the Fawn Lake subdivision water main. sPower would bear the cost of extending the water into the Project and half the cost of improving the line, which will mainly benefit the Fawn Lake community. The Project's water source is discussed further in section 2.2.4. Further, **sPower has under contract approximately two hundred acres located within the Fawn Lake development** for purposes of extending said public water line improvements and buffering the Project from the Fawn Lake neighborhood."

Hirschler then changed this memo on Jan 19th. This change was made after the Planning Commission meeting of Jan 16th but kept the original date on the memo. The same paragraph on the bottom of page 7 had been changed to read:

"1.4 The proposed use is appropriately located near public facilities."

The Project is appropriately located near to a County water source, viz., the Fawn Lake subdivision water main. sPower would bear the cost of extending the water into the Project and half the cost of improving the line, which will mainly benefit the Fawn Lake community. The Project's water source is discussed further in section 2.2.4. Further, **sPower has under contract approximately 60 + acres located within the Fawn Lake development** for purposes of extending said public water line improvements and buffering the Project from the Fawn Lake neighborhood."

This memo was posted on the county website with all other sPower documents supporting their applications and remains posted there today. This disparity was briefed to the BOS by Dave Hammond on Jan 22nd. No clarification was ever provided by sPower.

Finally, in response to Supervisors' questions about sPower's intentions with respect to sPower's purchase of Fawn Lake property, County Staff responded in a memo dated Feb 22nd (question #5 in attached memo):

"While not part of the Special Use Permit applications, the applicant has indicated they are under contract to purchase property in Fawn Lake to facilitate the upgrade of water infrastructure being considered under a separate cost-share agreement. Staff believes the area under contract is in the finger of TM 18C-A-N that extends south toward the sPower project area and is indicated by a star in the map on the next page."

So, in fact, before their announcement last night, sPower was in the real estate business and had under contract with the Fawn Lake developer (NTS) either 200 acres or 60+ acres of property depending on which version of the Hirschler memo you choose to believe. This information formed the basis for both the citizens group's and the staff's calculations of the potential impact of this sale on county tax revenue. This analysis done by CCSC and the staff was based on sPower published information and subsequent realistic analysis by staff and citizens. sPower's statements made it clear that their project would be directly impacting other projected development in the area.

sPower was not required then to provide the true version of their plan. It is imperative that this new stated intent to purchase easements be put in writing and that the County confirm these easements. Further, sPower should be required to show these easements on published site plans so their impact can be assessed.

The greatest concern, however, is that sPower has been dishonest with the citizens, the staff and the BOS about their intentions with this property. The comments last night were disrespectful and dismissive to all involved and call into question the reliability and credibility of this applicant. It should give you serious pause about trusting them in this 40+ year partnership.

I strongly suggest that the County accept NOTHING on verbal or written statements made by the applicant unless they are enforceable provisions contained in the SUPs.

Thank you and best regards,

Sean Fogarty, CCSC
Kathleen Hayden
Dave Hammond
Kevin McCarthy
Steve Doss
Moya Doss
Mike Mikolosko
Mike Anastasio

--

This email was Malware checked by UTM 9. <http://www.sophos.com>

COUNTY OF SPOTSYLVANIA



BOARD OF SUPERVISORS COMMUNICATION

Date: February 22, 2019

Purpose:

☒ BOS Follow-Up	☐ Schedule Notes *
☒ Future BOS Meeting	☒ Information Only *
☐ Emerging Issue	☐ Other: _____

* May be combined

Title: Answers to Questions – sPower Project

Summary/Analysis: The attached document provides answers to questions posed by Board of Supervisor members on the sPower project. Please feel free to contact me directly with any questions. Patrick White was the lead planner for these cases, but he resigned and is no longer working for the County.

On a separate note, I have found that there is some confusion in the community about the recommendation and approval process for the Special Use Permits and the fact that Staff's recommended conditions are not entirely consistent with the Planning Commission's. As with any zoning case, both the Staff report and the Planning Commission's recommendations are provided to the Board. Staff's recommendations do not reverse or supersede the Planning Commission's and it is ultimately the Board's decision of what the final conditions will be if the Special Use Permit(s) are approved. If the Board does approve the Special Use Permit(s), we recommend that the Board use the Staff conditions as the template for the final conditions document since it has undergone the most recent legal review.

Conclusion Recommended Action: N/A

Prepared By: Wanda Parrish

Reviewed By: 

Questions and Answers Related to the sPower Project

1. What is the opinion of the County's consultant related to reducing the surety for the decommissioning cost by allowing for a recycling credit?

- Dewberry Engineers, Inc. recommended not allowing a recycle value credit. This is a conservative approach that provides the greatest protection to the County since the recycling values are unknown in the future.
- In further conversations with Dewberry about the County's requirement that an engineer's estimate of the decommissioning cost be reviewed every two years and the bond adjusted appropriately, they noted that the County may feel comfortable with allowing for a recycling credit knowing that biannual re-evaluation would capture fluctuations in the commodity markets pertaining to steel, copper, metal, etc.

2. What tax revenues will the project generate for the County?

- The conversion of the property to a solar energy facility will result in rollback taxes since the property has been used for forestry purposes and has qualified for Land Use taxation. The estimated rollback including all properties in the 3 Special Use Permit applications is \$598,000. This is a one-time payment.
- The County will collect Real Property taxes based on the future assessed value of the property (assessment TBD). The current unreduced real property taxes for all parcels included in the 3 Special Use Permits totals approximately \$102,900 (vs. \$19,175 under Land Use taxation).
- The project will also generate Machinery & Tools (M&T) taxes, which are addressed under Question #4.

3. What effect do the tax breaks provided for in the Code of Virginia have on County revenues?

Under state law, utility scale solar energy projects are classified for different local tax exemptions based on the size of the project and the date of its interconnection agreement. For the 500 MW sPower project, the result is:

- An 80% exemption - the County can only tax 20% of the assessed M&T value of project (Code of VA § 58.1-3660).
- The tax rate is capped at the County's Real Property rate (currently \$ 0.833/\$100 assessed value) (Code of VA § 58.1-2606).

4. What will the State Corporation Commission's (SCC) role be in assessing the project and how accurate are they in determining a value?

Due to the size of the project, the SCC will assess the facility for M&T taxation. Staff consulted with SCC staff about the process and their experience. The assessment is formulaic. The fair market value of equipment and improvements on the property is reduced to 90% to account for depreciation. That value is reduced by 80% per state code and multiplied by the County's Local Assessment Ratio per the Virginia Department of Taxation (2018 – 91.4%). Finally, the County's real property tax rate is applied. The formula is shown below along with the calculation based on the fair market value asserted by sPower.

Fair Market Value x .90 = Depreciated Value	$\$552,500,000 \times .90 = \$497,250,000$
(Depreciated Value x .20) x .914 = Taxable Value	$(\$497,250,000 \times .20) \times .914 = \$90,897,300$
<u>Taxable Value</u> x .833 = Annual Tax 100	<u>\$90,897,300</u> x .833 = \$757,175 100

The Annual Tax shown in the table reflects the first year at full build out. Variables may change each year such as the Real Property tax rate and the Local Assessment Ratio but, due to depreciation, the tax collected over time will decrease.

The methodology discussed above is the same as the methodology used in the Magnum Economics Fiscal Analysis submitted by sPower. The only difference is that Magnum used the 2017 Local Assessment Ratio, which was 0.863, resulting in a lower taxable value and resulting tax than the analysis using the 2018 rate of 0.914. The Magnum analysis projects annual tax revenues of \$79,436 (in 2018 dollars) at a 90% depreciated value beginning in year 24 and holding steady in future years.

The major unknown factor is the Fair Market Value of the facility. The SCC uses the value as reported and proven by the operator of the facility. The SCC has assessed one other solar energy facility under the current law. That facility is in Southampton County and is 100 MW. Staff consulted with the Commissioner of Revenue in Southampton County and learned that the Fair Market Value for their facility is \$185,724,553. She noted that this value was only 79% of the value they anticipated so their tax revenues are less than expected.

While there are variables that will result in differences in Fair Market Value between facilities, the basic components are going to be the same between different facilities: solar panels, support framing, and inverters. A comparison of 1/5 the asserted value of the 500 MW sPower project ($\$552,500,000 / 5 = \$110,500,000$) to the 100 MW Southampton project shows that the actual value of the 100 MW Southampton project (\$185,724,553) is a little less than 1.7 times the asserted value of 1/5th of the sPower project. This comparison, while simplistic, shows that the value asserted by sPower in the Magnum study is a reasonable expectation.

5. Are all of the enabled lots in Fawn Lake platted?

While not part of the Special Use Permit applications, the applicant has indicated they are under contract to purchase property in Fawn Lake to facilitate the upgrade of water infrastructure being considered under a separate cost-share agreement. Staff believes the area under contract is in the finger of TM 18C-A-N that extends south toward the sPower project area and is indicated by a star in the map on the next page.

At this time, no site plans or final plats have been submitted for lots in the dashed area.



This image is taken from the Fawn Lake website and shows the proposed lot layout, including 54 lots in the area in question.



6. If the 54 lots are developed with residential homes, what is the expected tax revenue?

The Commissioner of Revenue's office has estimated that the median improved value of each lot in this section would be \$401,200. This value is based on the assumption that the land and improved values would be comparable to other non-lake-front lots in adjacent sections of Fawn Lake. At the current tax rate, the annual tax per lot would be \$3,342. For all 54 lots the annual tax revenue is estimated at \$180,468.

The County's break-even assessed value was last calculated in 2017 and at that time it was \$374,000. An updated value has not been calculated because the County's Fiscal and Economic Model is undergoing a recalibration and update. We will be able to re-calculate the break-even value in the next few months. The annual tax revenue associated with the break-even value is \$3,115. Deducting this amount from the tax revenue noted above results in annual tax revenue of \$12,258 above the estimated cost to provide County services for the 54 lots.

While not a tax, there is a cash proffer associated with each lot in Fawn Lake. The County is collecting a \$1,000 proffer for each new home built in Fawn Lake. Those funds are helping to pay down the debt on the Brock Road Elementary School water tower.

7. Provide a list of major concerns raised along with sPower's response, the Planning Commission recommendation, and Staff's recommendation.

Please see attached table.

Overview of Concerns Raised Related to the sPower Project

Concern	sPower Proposal	Planning Commission Condition	Staff Comment
Size / Scale	Agreed to a phased approach with limitations and measures in place to minimize potential impacts associated with the scale. Would like option of disturbing more than 400 acres at a time.	The Planning Commission found that Site A, Site B, and Site C are substantially in accord with the Comprehensive Plan under the Code of Virginia's requirement that they conduct a review of the project's location, character, and extent (15.2-2232).	There are numerous conditions that directly or indirectly minimize any potential negative impacts due to the project's size.
Habitat and Forest Loss	Preservation areas are identified within each site. These are primarily environmentally sensitive areas. Agreed to create wildlife corridors. Agreed to plant pollinators and to conditions related to identified threatened and endangered species that are or may be located on site. Provided an invasive species management plan.	Conditions included as noted to the left.	Conditions are consistent with Planning Commission. The project will result in the loss of approximately 2.3% of the forestland in the County and the associated benefits of managed forestry acreage.
Use of Panels Containing Cadmium Telluride	Propose the use of panels containing Cadmium Telluride (CdTe). Provided studies supporting the use as safe.	Prohibit use of panels containing CdTe.	County consultant concurs with the applicant that the use of CdTe panels should not be a concern if they are handled properly. Recommend conditions related to soil testing for CdTe and other heavy metals and reclamation if positive results. These are included in Staff's conditions.
Burning of Wood Debris	Propose burning of timber waste consistent with County ordinances and with a 2,000' setback to any residence. Emergency Management Plan - Construction includes other safety measures related to monitoring burning and limitations on burning during windy conditions.	Prohibit the burning of wood or other debris.	Staff's conditions do not prohibit the burning of timber waste, but do condition the use of newer model trench burners operated per specs and set back a minimum of 3,000' from the property boundary.
Use of Biosolids	Do not propose to use biosolids.	Prohibit the use of biosolids.	Conditions consistent with Planning Commission.
Use of Panels Manufactured Using GenX	sPower documented that none of the panels are manufactured using GenX.	Prohibit the use of panels manufactured using GenX	Conditions consistent with Planning Commission.

Overview of Concerns Raised Related to the sPower Project

Concern	sPower Proposal	Planning Commission Condition	Staff Comment
sPower Accountability in the Future	Provided information on corporate structure.	Conditions are linked to the Applicant and Owner of the property. Decommissioning surety required to be either a cash bond or an irrevocable letter of credit, which are the strongest types of surety most protective of the County.	Post Planning Commission, changed conditions to Operator on legal advice to encompass any and all involved parties.
Sufficiency of Decommissioning Plan and Cost Estimate	Decommissioning plan and estimate includes deficiencies identified by County Consultant. Includes credit for recycling value. Identify Planning Commission and Staff condition requiring either a cash bond or an irrevocable letter of credit as onerous. Would like to provide a surety bond through a AAA rated company and personnel guarantees from their parent company.	Decommissioning estimate requirements consistent with County consultant recommendations and recommended surety types are the most protective for the County. No credit for recycling value.	Conditions consistent with Planning Commission. County consultant notes that with a required biannual review of the engineer's estimate and updating of the surety, the County may feel comfortable allowing for a credit for recycling.
Property Value Impacts	Submitted study of the impact of solar farms on neighboring properties by Christian Kaila, MAI, SRA dated 12/28/2018 that concludes "there is no consistent negative impact to adjacent property that is attributed to proximity to an adjacent solar farm".	No specific condition, but setbacks and buffers are related to concern by minimizing visual impacts.	The County's Commissioner of Revenue conducted research among Virginia C of Rs and found in Louisa County - no decrease in real property values around the Whitehouse solar site, Essex County - no appreciable change in assessed-to-sales ratios (noted it is well screened and it will likely take 3-4 years to see any real impact). For Spotsylvania, review of Fawn Lake's sales data did not show a downward trend in any categories of land sales, improved resales, or new construction sales as of 1/15/19.
Use of - Fertilizers Containing Phosphorus / Chemical Cleaning Agents / Pesticides / Herbicides	Propose to use phosphorus fertilizer as needed. Water only cleaning of panels. Have not objected to the conditions related to these topics.	Phosphorus permitted, but by Certified Applicator and based on state standards. Other conditions limit pollution or impact on groundwater, streams, etc. Require soil testing and set remediation requirements.	Consistent with Planning Commission conditions. Note: in our research, phosphorus aids in groundcover growth and rapid site stabilization is critical.
Sufficiency of Aquifer	Provided a hydrology study. Applicant does not object to the prohibition on the use of groundwater.	Prohibit the use of groundwater.	Condition consistent with Planning Commission.

Overview of Concerns Raised Related to the sPower Project

Concern	sPower Proposal	Planning Commission Condition	Staff Comment
Setbacks	Propose minimum 100' setback from property line.	Consistent 350' setback for panels from property line.	350' setback for panels from property line adjacent to residential or planned residential properties. 100' setback elsewhere, except along public roads, which is 50'.
Buffers / Viewshed / Visual Impacts	Provided new buffer plan after Planning Commission vote. Varied landscape buffers depending on use of adjacent property/proximity of existing homes. The minimum is natural regrowth within the 100' setback and the maximum is a 8-ft berm with landscaping installed within the 100' setback along with natural regrowth.	Varied landscape buffers depending on proximity of existing homes and existing tree buffers. Maximum is 8' berm with landscaping and minimum is landscaping only.	Conditions consistent with Planning Commission. Staff notes that the applicant's proposed plantings may provide a better visual screen than proposed in the conditins since they are all evergreens.
Erosion and Run-off	Modified original grading plan to reduce the amount of grading needed. Applicant is seeking the ability to open more than 400 acres of land at a time.	Extensive conditions recommended that limit the disturbed land area to 400 acres total within up to two watersheds at a time, require E&S measures above Code requirements, additional monitoring and inspections, etc.	Conditions consistent with Planning Commission.
Heat Island Effect	The applicant disputes the conclusions of the County's consultant and is seeking a setback of 100'.	Condition setback of panels at 350' from all property boundaries.	County consultant opines there is no Heat Island Effect, but that a temporary temperature increase may occur supporting a 350' setback from residential properties as a conservative approach. The County consultant and the applicant's consultant agree that berms and plantings will lessen any effect from heat.

Overview of Concerns Raised Related to the sPower Project

Concern	sPower Proposal	Planning Commission Condition	Staff Comment
Security / Fire Hazards / Natural Disasters	Supplied Emergency Response Plans for construction and operations phases that address employee roles, training, and communication procedures; unique concerns from PV systems; fire prevention and response, storms and natural disasters; and spills. Will train FREM on PV systems. Will provide a wayfinding system within the facility to aid in FREM response. Providing two 50K gallon water tanks for FREM use. Will install a SCADA system to monitor for potential ground faults.	Condition 20' wide fire breaks between arrays. no storage of power in batteries. 400' setback of inverters and generators from property boundary. Condition 24 hour video surveillance.	Conditions consistent with Planning Commission. Installation and grounding will be required to meet Electric Code.
Traffic / Rural Roads	Submitted Traffic Mitigation Plan. Do not object to conditions related to traffic except that they would like to be able to use all private easements for all types of traffic and they assert the 70% shuttling provision is onerous.	Conditions limit oversize loads during prime school bus traffic hours, limit use of some private access easements to light vehicles only, shuttling requirement of 70% of employees, video haul routes and implement repairs related to construction traffic, and creation of a Joint Traffic Mitigation Team to address issues that may arise.	Consistent with Planning Commission, except reconsidered viability of the 70% shuttling requirement and lowered the requirement to 20%.
Lack of Fully Engineered Site Plan	Complied with requirements of SUP by providing required GDP and provided a conceptual plan of the 1st phase (Zone E in Site A) for E&S review.	N/A	A fully engineered plan will be required at the site plan process if the SUP is approved.
Lighting / Glare	Do not object to conditions.	Limit all lighting to 0.5 footcandles at the property line.	Conditions consistent with Planning Commission.
Height Limitations	Do not object to conditions.	Inverters and panels limited to 15' above grade.	Conditions consistent with Planning Commission.
Liability Insurance	Do not object to conditions.	Require public liability insurance with County co-insured and requirements for bi-annual review and increases as needed.	Conditions consistent with Planning Commission.
Noise	Do not object to conditions. Would like option to work on Sundays.	Inverters and generators 400' setback from property line. Limits on construction hours and pile driving hours. No construction work on Sundays.	Conditions consistent with Planning Commission except allows Sunday construction (but no pile driving).

Overview of Concerns Raised Related to the sPower Project			
Concern	sPower Proposal	Planning Commission Condition	Staff Comment
Fiscal Benefit	Provided fiscal and economic analysis prepared by Magnum Economics that shows one-time rollback payment of approximately \$579,000 and at build out, year 1 M&T tax revenues of \$714,925 and Real Estate taxes of \$101,121. Depreciation will reduce the tax revenues over time. The study shows the depreciation leveling out at 10% value in year 24 with an annual tax revenue of \$79,436 (based on the current real property tax rate).	N/A	Confirmed validity of methodology used in the Magnum study with State Corporation Commission. Confirmed rollback taxes of approximately \$598,390 (1 time payment).

M E M O R A N D U M

TO: Patrick White
Alexandra Spaulding
Spotsylvania County

FROM: Charlie Payne
Vicki Joyner
Hirschler Law

DATE: January 8, 2019

RE: SPower Solar Facility Special Use Permit (“SUP”) Analysis
SUP Proposals SUP18-0001, -0002 & -0003
Accordance with Comprehensive Plan
Adequate Mitigation of Impacts

Introduction

Sustainable Power Group (“sPower”), the leading independent producer of solar facilities, is the contract purchaser of multiple non-contiguous parcels¹ (the “Property”) located in Spotsylvania County, Virginia, (the “County”) on which it wishes to develop a 500 MW solar energy facility (“SEF”; the “Project”). The facility will generate electricity for sale to corporate clients, filling a growing need to supply energy to high-tech industries which are increasingly turning to renewable energy to meet their business needs.

sPower’s proposed project (1) conforms to the County’s specific zoning requirements; (2) significantly advances multiple goals of Spotsylvania County’s Comprehensive Plan (“Plan”), including its overarching development goal of promoting business and achieving increased commercial tax revenues; and (3) helps the Commonwealth achieve its goal of expanding solar energy. And it does so while minimizing any detrimental effects the Project may have on the surrounding neighbors and environment.

1. The Project conforms to the County’s specific zoning requirements.

sPower has under contract 6,350 acres of land located in western Spotsylvania County, approximately 650 feet south of the intersection of West Catharpin and Post Oak Road. The

¹ The Tax Map Parcels comprise three Solar Centers as follows: (1) Solar Center A – Tax Map Parcels 28-A-71, 29-A-2A, 29-A-2, 28-A-77, 16-A-1, 29-A-24, 29-A-25, 29-A-26, 29-A-27, 17-A-47, 29-A-28, 29-A-22, 18-A-15, 18-A-20, 28-A-1, 28-A-78, 29-A-1, 28-A-79, 30-A-1, 18-A-16, 17-A-4, 17-A-3, 17-5-19, 17-A-3A, 17-A-48 & 17-A-7; (2) Solar Center B – Tax Map Parcel 28-A-58; and (3) Solar Center C – Tax Map Parcels 29-A-7 & 43-A-3.

Property is currently zoned for Agricultural 3 (“A-3”) use, which allows development of SEFs with a special use permit. The Property is located outside of the Primary Development Boundary and is identified for rural residential development on the Plan’s Future Land Use Map. The surrounding property is largely composed of rural and low-density residential uses. The Fawn Lake subdivision lies to the northeast of the proposed project.

Under the Spotsylvania County Code Zoning Ordinance (the “Code”), A-3 districts are intended to promote and protect large lot size parcels in order to maintain the county’s rural character and to protect, support, and enhance the county’s agricultural economy.²

Permitted uses in A-3 zones include agriculture, bed and breakfast facilities, single-family detached dwellings, community centers, game preserves, golf driving ranges, and public facilities.³ The Code identifies specific standards for A-3 districts, including restrictions on floor area, proximity to numbered state roads, and restrictions on the use of outside storage of any vehicle, equipment or parts.⁴ Solar energy facilities are permitted in A-3 districts, subject to approval by the County Board of Supervisors by issuance of a special use permit.⁵ In 2017, the County added this special use when it amended County Code Chapter 23, permitting solar energy facilities by special use permit in the Agricultural 2, Agricultural 3 (A-3), and Rural zoning districts.⁶ “Special uses” are generally considered compatible with other land uses permitted in a zoning district.⁷ Along with the allowance of these facilities, the amendment set forth the criteria by which the County would approve special use permits for SEFs, as discussed in more detail below. Additional specific requirements for SEFs such as the use of biodegradable cleaning products and compliance with screening requirements are also set forth in the Code.⁸

In order to approve a special use permit for SEFs, certain criteria must be met, including the requirement that the use be in accord with the County’s Comprehensive Plan; that the proposed use will not adversely affect the health or safety of persons residing or working in the neighborhood of the proposed use; that the proposed use will not be detrimental to the public welfare or injurious to property or improvements within the neighborhood; that the proposed use is appropriately located near public facilities; and that the proposed use will not cause undue traffic congestion or create traffic hazards.

sPower has met these criteria and has implemented sufficient mitigating factors to offset any potential adverse effects potentially arising from the project.

1.1. The Project significantly advances multiple goals of Spotsylvania County’s Comprehensive Plan (“Plan”).

First, as further discussed in section 2, and as required by Code Chapter 23, the Project

² Code § 23-6.4.1.

³ *Id.* § 23-6.4.2.

⁴ Code § 23-4.5.7(b).

⁵ *Id.* § 23-6.4.3(45).

⁶ Spotsylvania County, Virginia Board of Supervisors Meeting, Nov. 9, 2017 Minutes.

⁷ Code § 23-4.5.1.

⁸ Code § 23-4.5.7(d).

aligns with and promotes the Plan's goals.

1.2. The Project does not adversely affect the health or safety of neighbors.

The Project also meets the Code's requirement that it not adversely affect the health or safety of people living or working near the Project. Citizens and the County have cited several health and safety concerns potentially posed by the Project, including the risk of fire and the damaging effect of burning, concerns of metals leaking into the environment, general hazardous materials concerns, risk of electro-magnetic exposure, and risk of a heat island effect. As discussed below, those concerns have either been addressed by sPower or are largely unwarranted.

1.2.1 The risk of fire at the Project site is very low.

First, citizens argue that the Project creates a risk of fire. This concern is largely unfounded. During operation, the risk of fire at an SEF is very low. This is due to the fact that only a very small portion of the materials and panels used at an SEF are flammable, and the heat from a flame is typically inadequate to ignite a panel. Further, there are no fuels feeding the facility as the project is a renewable energy resource.

Not only are the panels unlikely to ignite, but the Project site will be largely free of combustible vegetation, with only a ground cover of maintained vegetation adjacent and beneath the solar tracker.⁹ Further, the modified fuel areas and construction type and material are designed to resist ignition from ember showers.¹⁰ In the unlikely case a fire should occur, the facility has electric disconnects that can immediately cut off energy production and de-energize the Project.¹¹ The Project is further monitored 24-7 with personnel on the ground and by remote surveillance.

Further, sPower has invested a significant amount of money in safety and mitigation design in the rare event a fire should occur.¹² And in conjunction with the county's fire department, it has developed a robust emergency response plan to respond to any fires that should occur onsite. Although citizens have argued that the site is located 7 miles away from the nearest fire station, the County has already noted that a fire station is needed in the site area regardless of whether the Project is approved or not.¹³

That fact, combined with the low risk of fire and the strong emergency response plan already in place should alleviate any concern of risk of fire due to the Project.

Citizens have also expressed opposition to any burning of woody debris on the site because this can cause a health and safety hazard. But sPower has committed to only burning in accordance with Federal, state, and county regulations and will conform with requirements and

⁹ sPower Emergency Response Plan at 8 (Nov. 27, 2018).

¹⁰ *Id.*

¹¹ Emergency Response and Hazard Mitigation, sPower Response to Comments, Round 1 (June 11, 2018).

¹² Email from Ron Harris, REC, to Charlie Payne (Nov. 28, 2018).

¹³ Staff Report for SUP 18-0002, Planning Commission, County of Spotsylvania, at 14 (Dec. 12, 2018).

practices set forth in its emergency response plan.¹⁴ Further, burning will be only one of three methods to remove woody debris from the site and occur only in deep trenches with air-burning equipment to eliminate smoke. Burning, under county ordinance, is prohibited during the months of May through September, and sPower has further proposed that all burning will occur at least 2000 feet from any residence, which meets the County's most restrictive standards. Thus, any burning will not pose a health hazard.

1.2.2 The metal used in the solar panels is not harmful and leakage is highly unlikely.

Second, citizens have argued that the levels of the metal, cadmium telluride ("CdTe") in the PV panels present too high a risk due to the potential leaching of the metal should the panels break and come into contact with the site's acidic soils and water.¹⁵ These fears are unfounded for several reasons. First, cadmium naturally occurs in the environment without posing more risk than that found in solar panels.¹⁶ And if handled properly, the panels will not emit any toxicity into the environment. Second, even if the panels did break and leach out, the concentration of cadmium in the soil, air, and groundwater would still be below conservative human health screening levels. Moreover, the CdTe found in PV panels is not the same as free cadmium, but is an extremely stable, nontoxic compound, as evidenced by the extensive research and evidence sPower has already provided to the County.

Further, studies by third parties have found little evidence suggesting that CdTe-based solar panels present risk to the public or the environment. For example, soil testing at a solar facility in California concluded that solar farm operations do not appear to have impacted soils with cadmium.¹⁷ Although citizens have cited a sole study in support of their argument that the leakage of CdTe will cause a hazard, that study was based on simulated conditions and fails to mention results from the analysis were negligible.

Finally, sPower has established extensive protocol to monitor CdTe currently present at the site, including baseline soil testing, sample soil collections during the facility's operations phase, sample analyses for cadmium, reporting for each sample event, and remediation if cadmium levels are too high. And should remediation be necessary, sPower will undertake remediation in accordance with all applicable federal, state and local requirements.

1.2.3. The Project does not generate hazardous materials that will pose a threat to the public.

Given the simple construction and operation of SEFs, the Project does not present hazardous material threats to the public, despite citizen's general concerns that the Project will generate hazardous materials.

¹⁴ Fire, Rescue, and Emergency Management, sPower Response to Comments, Round 3 (Sept. 24, 2018).

¹⁵ Analysis of sPower SUP's Compliance with County Comp Plan, Concerned Citizens of Spotsylvania County 7 (Nov. 7, 2018).

¹⁶ Letter from Dewberry Engineers, Inc. to Wanda Parrish, County of Spotsylvania (Nov. 26, 2018) in Staff Report for SUP 18-0001, Planning Commission, County of Spotsylvania, at 58 (Nov. 29, 2018).

¹⁷ Limited Soil Sampling Report of Sierra Solar Greenworks, Terracon at 1, 4 (June 15, 2018).

Although the Project itself will not generate hazardous materials during construction, the field equipment used during construction will contain various hazardous materials, such as hydraulic oil, diesel fuel, and other petroleum-based solvents. These materials, like any other construction site, will be properly managed and controlled. But the SEF itself is simple in construction and operation and does not present hazards to the community or public. Further, PV technologies and solar inverters are not known to pose any significant health dangers to those neighboring the plant.¹⁸ Unlike other forms of energy, solar facilities do not require transfer of fuel to the project site, do not generate waste streams from use of fuel and do not exacerbate or create the potential for hazards such as flooding due to dam failure.¹⁹ As documented in numerous academic and industry studies, there is no potential for release of hazardous materials from the solar panels in the event they become damaged. But should the solar panels break during operations, they will be safely moved and returned to the manufacturer for proper recycling and disposal in compliance with all regulations.²⁰

Despite the minimal risk of hazardous materials, and although a disaster response plan is not warranted for the site, sPower has established standard health and safety plans for both the construction and operation of the facility. That plan includes collaboration between sPower and local emergency services to review potential natural disaster scenarios and the appropriate action that should be taken around an electrical facility during these conditions.²¹ Additionally, sPower staff is accessible to County representatives and EMS 24 hours a day, 365 days a year should any emergency arise.

In sum, the durability of the SEF is extremely important to sPower and the project is designed to meet stringent building and structural codes. All of sPower's project sites use standardized methods to ensure structural integrity of the projects, which are rigorously inspected throughout the installation and commissioning phases of the projects.²² As a result, the risk of hazardous materials impacting the public are minimal, if they exist at all.

1.2.4. Electro-magnetic exposure from the Project is negligible.

Citizens are also concerned that electro-magnetic radiation will potentially emanate from the site, causing adverse potential health effects. But this concern is unwarranted. Exposure to electric fields is negligible because the Project has relatively low voltage and amperage—even within the site, voltage and amperage is similar to that in other neighborhoods that contain low and medium voltage distribution lines.²³ Further, electromagnetic fields attenuate rapidly to background levels in less than 20–30 feet, or within the setback from the Project boundary. Thus, the public will not be adversely impacted by electromagnetic radiation emanating from the site.

¹⁸ Health and Safety Impacts of Solar Photovoltaics, NC State University at 1.

¹⁹ Emergency Response and Hazard Mitigation, sPower Response to Comments, Round 1 (June 11, 2018).

²⁰ Spotsylvania Solar Energy Center FAQs.

²¹ Emergency Response and Hazard Mitigation, sPower Response to Comments, Round 1 (June 11, 2018).

²² *Id.*

²³ Generalized Development Plan Narrative, SPower SUP for Center A, at 4.12.

1.2.5. Little evidence exists that the Project will cause a heat island effect

Citizens have expressed concern also about the potential for a heat island effect resulting from the Project. “Heat island effect” is a term that refers to the increase in ambient temperature in both natural and urban environments due to land use changes. Citizens argue that the project will create a heat island effect through the removal of 5,000 acres of trees in order to build the SEF and the potential threats from the SEF to the nearby Po River watershed. They believe that if the trees are not replanted, there will be a huge, permanent loss in greenhouse absorption capacity and that the heat island could affect the numerous streams and wetlands surrounding the facility, while increasing water evaporation rates and reducing rainfall.²⁴ Further, citizens argue that sPower wrongly relies on a study of a much smaller SEF that concluded only a small heat island effect would occur, asserting that sPower has not provided any research on how this conclusion would scale up to its much larger facility.

However, the research has not indicated that the scale of a solar farm has an effect on the heat island effect findings as the solar facilities increase in size. In fact, the existing empirical data regarding the heat island effect resulting from the installations of SEFs is limited, thereby calling into question the citizens’ argument.

Although it is true that temperatures within solar fields may be a few degrees higher than surrounding areas, studies have found that the temperature dissipates quickly in just a few feet above and away from the solar site, especially with the presence of vegetation, trees, and berms. The data also indicates that the site cools completely at night, making a heat island very unlikely.²⁵

Nevertheless, to address the concerns of citizens, sPower is designing the Project to allow for maximum setbacks (beyond 50 feet) from adjacent property owners, to include a minimum 100 –foot vegetation setback, including a minimum 250-foot setback from all of the properties in the Fawn Lake subdivision adjoining the project. sPower is also maintaining or installing berms and landscaping that would further reduce heat emanating from the PV solar arrays through absorption, thereby eliminating any heat island effect on neighboring properties.²⁶

Finally, it should be noted that sPower operation and maintenance staff regularly work within operating solar arrays on existing solar energy facilities in desert regions and are never exposed to unsafe temperature levels.²⁷

Given all of the aforesaid, citizens should not be concerned that the Project poses any heat island threat.

²⁴ Analysis of sPower SUP’s Compliance with County Comp Plan, Concerned Citizens of Spotsylvania County 3 (Nov. 7, 2018).

²⁵ Heat Island Executive Summary Literature Review

²⁶ *Id.*

²⁷ *Id.*

1.3 The proposed use will not be detrimental to the public welfare or injurious to property or improvements within the neighborhood.

Not only does the proposed Project not have an adverse effect on the health or safety of neighbors, but it is not otherwise detrimental to the public welfare, in accordance with the Code.

For example, the Project generates very little waste and over 90% of a the Project is recyclable. During construction, no export of materials is proposed; rather, grading and fill materials, as well as boulders and stones will be moved, if necessary, and remain onsite. Woody debris will be hauled away, mulched onsite and used for erosion control or burned. Construction waste will consist mostly of recyclable materials such as cardboard, steel, and electrical wiring and will be disposed of in accordance with county requirements. All panels that break during delivery or installation will be shipped back to the manufacturer for proper disposal.²⁸

During the facility's operation, waste is not expected to be generated in significant quantity during operation of the Project.²⁹ If the SEF is damaged in any way, any resulting waste will be broken down and shipped back to the manufacturer for proper disposal.³⁰

Therefore, waste is minimal and will not be detrimental or injurious to the neighboring properties.

Opposition forces have also stated that the proposed use will have an adverse impact on property values. This allegation is unfounded and without support. sPower recently retained the services of Chris Kaila, who is a certified Commonwealth of Virginia appraiser. He has been appraising and selling real estate in Spotsylvania County for over forty years. His report, dated December 28, 2018, concluded:

“There is no evidence that there is any negative impact on neighboring property values, despite unsupported claims to the contrary. The studies that have been done on this issue, that I find to be credible, also conclude and agree that there is no negative impact on property value resulting from proximity to solar farms.”³¹

1.4 The proposed use is appropriately located near public facilities.

The Project is appropriately located near to a County water source, viz., the Fawn Lake subdivision water main. sPower would bear the cost of extending the water into the Project and half the cost of improving the line, which will mainly benefit the Fawn Lake community. The Project's water source is discussed further in section 2.2.4. Further, sPower has under contract approximately two hundred acres located within the Fawn Lake development for purposes of extending said public water line improvements and buffering the Project from the Fawn Lake neighborhood.

²⁸ Construction and Decommissioning, sPower Response to Comments, Round 1 (June 11, 2018).

²⁹ Generalized Development Plan Narrative, SPower SUP for Center A, at 4.7.

³⁰ Heat Island Executive Summary Literature Review.

³¹ Christopher Kaila, MAI, SRA Report, titled “Solar Farms Impact on Neighboring Properties, Research and Conclusions of Spotsylvania County, Virginia Project,”

1.5 The proposed use will not cause undue traffic congestion or create traffic hazards.

One of the largest citizen concerns over the Project is the construction noise and traffic. Specifically, the Concerned Citizens of Spotsylvania (“CCSC”) have argued that sPower has not provided sufficient detail on sourcing their materials to determine whether its traffic mitigation measures are sufficient.³²

But sPower’s mitigation measures, as described below, are more than sufficient to minimize construction noise and traffic, and the Project is in compliance with the County’s impact mitigation policy.³³

First, citizens have argued that the noise and traffic resulting from construction of the project will be excessive, notwithstanding the County’s Noise Ordinance that expressly exempts noise from construction if the construction is performed during the day. Despite this exemption, sPower has drafted conditions to mitigate construction noise impacts on the neighbors.³⁴ Those conditions include:

- Placing all stationary equipment so that emitted noise is directed away from sensitive receptors;
- Locating pile drivers such that their rears face towards the noise sensitive receptors when the machine is being utilized;
- Locating equipment staging in areas that will create the greatest possible distance between construction-related noise sources and noise-sensitive receptors nearest the Project site during all project construction;
- Ensuring proper maintenance and working order of equipment and vehicles, and that all construction equipment is equipped with mufflers and baffles.³⁵

Further, the construction of the Project poses the only real source of noise, due to increased traffic and general construction activities at the site, which will last for approximately 18–24 months. But during that timeframe, construction noise will be at its peak for only four days, then will drop off dramatically.³⁶ Once the facility is operational, noise will be minimal.³⁷

Not only has sPower taken great measures to reduce the noise resulting from the Project’s construction, but it has crafted long-term solutions for noise mitigation through vegetative

³² Analysis of sPower SUP’s Compliance with County Comp Plan, Concerned Citizens of Spotsylvania County 9 (Nov. 7, 2018).

³³ Appendix A, Comprehensive Plan Analysis, Staff Report for SUP 18-0003, Planning Commission, County of Spotsylvania, at 31 (Dec. 12, 2018).

³⁴ Staff Report for SUP 18-0002, Planning Commission, County of Spotsylvania, at 7 (Dec. 12, 2018).

³⁵ Generalized Development Plan Narrative, SPower SUP for Center A, at 3.11.

³⁶ Staff Report for SUP 18-0002, Planning Commission, County of Spotsylvania, at 7 (Dec. 12, 2018).

³⁷ Spotsylvania Solar Energy Center FAQs.

screening and buffering.³⁸ In particular, to reduce potential noise to residents of the nearby Fawn Lake subdivision, sPower has proposed to erect an earth berm at the property boundary to reduce noise levels below the County ordinance's permissible level. The berms will be 6 to 8 feet tall and will have trees and shrubs planted in front or on it to make it more visually appealing.³⁹

In addition to construction noise concerns, citizens are also worried about construction traffic. Through a traffic impact analysis performed, sPower has concluded that during construction, a maximum of 800 employee trips during peak construction will occur, with an average of 350 employee trips and an average of 70 trips per day for construction equipment and deliveries. On-site staging and parking areas will be provided for employees and construction vehicles.⁴⁰

To offset the impact of the increased traffic, sPower has taken significant steps to address traffic concerns. For example, where sPower must use private access easements for ingress and egress, they will be treated with the utmost care: strict 15 mph speed limits will be enforced, and all appropriate flagging and signage will be in place to act as constant reminders. Additionally, health and safety inspections will regularly monitor and enforce site rules and speed limits throughout the project site and access easements. sPower will also notify all nearby neighbors of the construction activities and provide contact numbers for personnel, should any issues with traffic and construction activities arise.⁴¹

Citizens have expressed concern over the impact of this increased construction traffic on commuting activities and school buses. To address the issue, sPower has identified the peak traffic hours on school and workdays for West Catharpin and Post Oak Roads and has committed to having workers arrive and depart from the construction site before peak hours. Further, sPower will coordinate deliveries between 9 AM and 3 PM in order to further mitigate traffic impacts and avoid school bus activities. sPower is also requiring a carpool plan from the contractor to reduce traffic impacts in relation to the project.⁴²

As described above, sPower has adequately addressed traffic concerns during construction. And it should be noted that once the Project is complete, traffic will be minimal, as its operations require little maintenance, generates little noise, requires few vehicle trips for employees or materials, and requires little use of public services. This is due largely to the fact that the facility will be operated remotely and any onsite maintenance that is required will be scheduled to avoid peak load periods; thus, the traffic to and from the site will be minimal.⁴³

In sum, the Project has thoroughly anticipated and complied with the County's regulatory criteria for granting a SUP by addressing concerns related to the health and welfare of citizens

³⁸ Appendix A, Comprehensive Plan Analysis, Staff Report for SUP 18-0003, Planning Commission, County of Spotsylvania, at 38 (Dec. 12, 2018).

³⁹ Spotsylvania Solar Energy Center Project Noise Study Memorandum, Kimley Horn at 6, 14 (Sept. 20, 2018).

⁴⁰ Spotsylvania Solar Energy Center FAQs.

⁴¹ Generalized Development Plan Narrative, sPower SUP for Center A, at 3.6.

⁴² Access Management and Transportation, sPower Response to Comments, Round 3 (Sept. 24, 2018).

⁴³ Staff Report for SUP 18-0001, Planning Commission, County of Spotsylvania, at 5 (Nov. 29, 2018); Generalized Development Plan Narrative, sPower SUP for Center A, at 4.0.

and potential injurious effects on the surrounding properties. And not only has it achieved this technical compliance, it has also met the more precatory aspirations of the County's Comprehensive Plan, the guidelines of which are discussed next.

2. The Project significantly advances multiple goals of Spotsylvania County's Comprehensive plan.

2.1. The Project promotes the Plan's goals, although the Plan is not binding authority.

Under Virginia law, every local government must adopt a comprehensive plan as a general guide to development.⁴⁴ The comprehensive plan must be made in order to guide and accomplish a "coordinated, adjusted, and harmonious development" of the territory which will best promote the health, safety, morals, order, convenience, prosperity, and general welfare of the inhabitants.⁴⁵ The comprehensive plan shall be general, rather than specific, in nature.⁴⁶ Further, the comprehensive plan is *not* a zoning ordinance, but only a comprehensive guideline for zoning ordinances.⁴⁷ Therefore, in making zoning determinations, the local governing body must consider not only the general guidelines set forth in the Comprehensive Plan, but other factors as well, such as the location of property lines, the physical characteristics of the land, and other factors affecting "optimum geographical alignment."⁴⁸

The fact that the Comprehensive Plan is merely a guide for development, rather than an instrument of land use control, allows the governing body to overrule an action by the planning commission regarding zoning decisions.⁴⁹ Thus, a board of supervisor's decision to override the planning commission's denial of a special exception permit allowing a golf course to be built on land zoned for agricultural use, was proper because the minimum standards of the Comprehensive Plan were only guidelines, not requirements to be applied inflexibly by the board.⁵⁰ It was within the board's discretion to decide whether or not to adhere to those standards or to follow some other reasonable approach in determining whether to grant or deny the rezoning application.⁵¹ However, the caveat is that the board's approach must be *reasonable*. If its deviation from the comprehensive plan is arbitrary or capricious—such as randomly granting and denying rezoning applications for the same use in the same area, the governing body's decision is not justified.⁵²

Applying that principle, a Virginia circuit court found a board of supervisor's denial of a rezoning application that would allow higher-density development on a property unreasonable, because the proposed use was commensurate with the uses of the surrounding properties.⁵³ The

⁴⁴ Va. Code § 15.2-2223(A); *Kansas-Lincoln, L.C. v. Arlington Cty. Bd.*, 66 Va. Cir. 274, 283 (2004).

⁴⁵ Va. Code § 15.2-2223(A).

⁴⁶ *Id.*

⁴⁷ *Bd. of Supervisors v. Snell Constr. Corp.*, 214 Va. 655, 660 (1974).

⁴⁸ *Id.*

⁴⁹ *Guest v. King George Cty. Bd. of Supervisors*, 42 Va. Cir. 348, 352 (1997).

⁵⁰ *Id.*

⁵¹ *Id.* (quoting *Loudoun Cty. v. Lerner*, 221 Va. 30, 37 (1980)).

⁵² *Bd. of Supervisors v. Williams*, 216 Va. 49, 61 (1975).

⁵³ *Id.* at 50–51.

board denied the request on grounds that the higher-density development of the area should not occur until public facilities were adequate.⁵⁴ But the court determined that the public facilities were or soon would be available to serve the land in question; therefore, the board's denial of the application was discriminatory.⁵⁵ Further, a court will give weight to the manner in which a governing body itself interprets its own comprehensive plan.⁵⁶ Therefore, the comprehensive plan is an advisory guide that does not bind the locality.⁵⁷

With this analysis in mind, we now examine whether the proposed SEF does in fact align with the goals of the County's comprehensive plan.

2.2. The Project meets several specific Plan goals.

The County's Plan outlines its goals for future development and land use, which is designed as a guide to encourage the most appropriate use of land, water, and resources within the County consistent with citizens' interests. It sets forth the goals, objectives, policies, and implementation techniques that will guide development activity within the County while preserving and protecting the health, safety, and general welfare of its citizens.⁵⁸ As noted above, although instructive, the Plan is merely a guide—not law—and other rationales for zoning decisions may be used where necessary.

Most relevant to the instant Project is the Plan's overarching emphasis on promoting a business friendly community that prizes job creation, while aspiring to achieve annual growth of the industrial and commercial tax base at a rate greater than 2%. As part this emphasis, the Plan encourages innovative uses such as renewable energy generation in agricultural and rural areas, so long as they are designed to minimize detrimental impacts to neighboring properties, uses, and roadways.⁵⁹ The Plan also seeks to maximize the use of existing infrastructure and public facilities and encourages the most appropriate use of land, water, and resources while preserving historic and cultural resources and mitigating detrimental environmental impacts of development.⁶⁰ Each of these aspirations as relevant to the Project will be discussed in turn.

2.2.1. The Project promotes the County's economic goals.

The Plan supports development that promotes job creation. The County considers itself a business friendly community and appears to give preference to projects that promote job growth.⁶¹ Further, in 2018, the Plan was amended to add provisions encouraging the development of renewable energy projects.⁶² More importantly, the amended Plan expressly views renewable energy generation as a complementary land use in agricultural and rural areas.⁶³

⁵⁴ *Id.*

⁵⁵ *Id.* at 52.

⁵⁶ *Guest v. King George Cty. Bd. of Supervisors*, 42 Va. Cir. 348, 352 (1997).

⁵⁷ *Id.*

⁵⁸ Comp Plan, Introduction & Vision at 2.

⁵⁹ *Id.* at 4.

⁶⁰ *Id.* at 2.

⁶¹ *Id.* at 4.

⁶² *Id.*

⁶³ *Id.* at 5.

Thus, not only are SEFs compatible with the Plan, but the County has even deemed them complementary to agricultural uses.

In addition to providing a complementary land use to the current agricultural use, the Project will likely generate tremendous direct and indirect economic benefits: The project is anticipated to create between 700 and 1000 new construction jobs and pump approximately \$54 million into the local and regional economy. Initially, 25–30 full-time operational jobs will result from the development, creating approximately \$2.5 annual additional labor income. The total tax revenues will reach between \$9 and \$10 million, which is significantly higher than the current taxes generated, creating a 1300% increase in tax revenue. Further, the development will create up to \$25 million investment in the County, including parks, fire and rescue, roads, and schools over the life of the project.⁶⁴

This positive economic benefit greatly outweighs the current benefits being generated by the site's agricultural use, which only yields 228 full-time equivalent jobs, \$1.2 million in associated labor income, and \$2.8 million in economic output.⁶⁵

This data counters CCSC's argument that the loss of such a large rural tract close to the Wilderness and Spotsylvania Courthouse Battlefields, and the subsequent development of a SEF on those lands could have an adverse economic impact.⁶⁶ In truth, the research demonstrates that contrary to this argument, the Project will profoundly benefit the County's economy.

2.2.2. The Project promotes the County's fiscal goals.

The proposed Project greatly aids the County's goal of aspiring to achieve annual growth of the industrial and commercial tax base at a rate greater than 2% by generating approximately \$8.4 million in net local tax revenue payments over the next 40 years.⁶⁷ This significant growth is directly due to the increased tax revenue to the County as the result of changing the use of the property from agricultural to industrial, which increases the assessed value of the property for purposes of real estate taxes. In such instances, the County requires the owner to pay "roll back taxes" or the difference in the current and previous real estate taxes on the property for the previous 5 years.⁶⁸ For this Project, the roll back taxes will total a \$87,000 one-time payment to the County.⁶⁹

Further, the gross county revenue from the project is estimated at \$1.2 million for the first year of operation (exclusive of county fees for permitting), which will decline to \$79,436 in the

⁶⁴ The Economic and Fiscal Contribution that the Spotsylvania Solar Energy Center Would Make to Spotsylvania County, Mangum Economics at i (May 2018); Staff Report for SUP 18-0002, Planning Commission, County of Spotsylvania, at 13–14 (Dec. 12, 2018).

⁶⁵ The Economic and Fiscal Contribution that the Spotsylvania Solar Energy Center Would Make to Spotsylvania County, Mangum Economics at i (May 2018).

⁶⁶ Analysis of sPower SUP's Compliance with County Comp Plan, Concerned Citizens of Spotsylvania County 10 (Nov. 7, 2018).

⁶⁷ The Economic and Fiscal Contribution that the Spotsylvania Solar Energy Center Would Make to Spotsylvania County, Mangum Economics at 25 (May 2018).

⁶⁸ *Id.* at 17.

⁶⁹ Staff Report for SUP 18-0003, Planning Commission, County of Spotsylvania, at 11 (Dec. 12, 2018).

40th year.⁷⁰ And the Project will generate \$3.5 million in state and local tax revenue from the one-time pulse of construction activity and \$936,152 in net county revenue in the first year of operation (which would gradually decline to \$48,461 in the 40th year of operation).⁷¹

Not only will the Project generate significant tax revenue for the County, but it will also increase required school funding by approximately \$278,773 in the first year of operation with that figure expected to gradually decline to approximately \$30,975 in the project's 40th year of operation.⁷²

In contrast, if the project site was instead used for residential development, the estimated net fiscal impact would be approximately \$2,495 per year for a cumulative total of \$99,800 over 40 years. This is drastically lower than the approximately \$8.4 million in tax revenue resulting from the proposed Project.⁷³

This fiscal analysis counters CCSC's argument that locating this Project on agriculturally zoned land will result in a declining tax revenue of \$436,152 in the second year and dropping steadily every year thereafter, which, it argues, is not in accordance with the Plan's goal to achieve an annual growth of the industrial and commercial tax base at a rate of greater than 2%. The analysis above clearly demonstrates that the proposed use will result in significantly higher revenues than the current agricultural use, despite the gradually declining revenues over the 40-year life of the Project. Further, CCSC's argument fails to consider that should the Project be decommissioned after its first 40 years' operation, the land will be returned to its original state and can be developed for another use.

Additionally, CCSC argues that the Project will cause the assessed value of bordering homes to drop, resulting in reduced real estate tax revenue from those homes.⁷⁴ But no clear consensus on the issue exists, nor is there any indication of the Project's negative effect on property values. If anything, according to an economic study commissioned by sPower, the surrounding property values will increase by the proposed Project.

2.2.3. *The Project has been designed to minimize detrimental impacts to neighboring properties, uses, and roadways.*

As discussed above in Section 1, sPower has designed the Project to minimize any potentially detrimental impacts to neighboring properties, including construction noise and traffic, hazardous materials, waste, and negative environmental impacts. By adopting these

⁷⁰ The Economic and Fiscal Contribution that the Spotsylvania Solar Energy Center Would Make to Spotsylvania County, Mangum Economics at 18 (May 2018).

⁷¹ *Id.* at ii.

⁷² The Economic and Fiscal Contribution that the Spotsylvania Solar Energy Center Would Make to Spotsylvania County, Mangum Economics at 21 (May 2018).

⁷³ Hypothetical Residential Development of 74 Lots Contained in The Spotsylvania Solar Energy Center's Proposed Footprint, Mangum Economics at 2–3 (Dec. 4, 2018).

⁷⁴ Analysis of sPower SUP's Compliance with County Comp Plan, Concerned Citizens of Spotsylvania County 2 (Nov. 7, 2018).

measures, the Project complies with the Plan's recommendation that renewable energy facilities minimize their detrimental impacts.

2.2.4. The Project maximizes the use of existing infrastructure and public facilities.

The Project will maximize the use of existing infrastructure and public facilities, in particular, the existing water supply, by tapping into the water main of the nearby Fawn Lake subdivision thereby extending County water to the Project.⁷⁵ Contrary to citizen concerns over negative impacts on their water supply, the Project in fact, will improve distribution of their water supply, while reducing costs to the County and taxpayers.

Currently, the proposed site does not have access to the public drinking water system; however, public drinking water is available on the adjacent Fawn Lake subdivision property. The extension or connection to the public drinking water system is not prohibited and the cost of extending the public water connection would be borne by sPower. As part of its SUP, sPower proposes to use public water for construction and operation of the site by tapping into the Fawn Lake main, with supplemental use of groundwater from the Project site, if necessary. sPower would bear the cost of extending the public water system from the existing piping network to the proposed site.⁷⁶ Separate from the SUP, sPower has proposed to share costs entailed in improving a replacement water line to Fawn Lake and a new storage tank, which the Project requires to support proposed operations during construction. sPower's proposal not only benefits the Project, but allows the County to improve conditions in the Fawn Lake neighborhood.⁷⁷

The County already had plans to accelerate water transmission to the surrounding area, specifically, Fawn Lake, because many houses in the area have water pressure below acceptable limits. sPower has proposed to accelerate the improvements by construction of the Project and share 50% of the costs of improvement.⁷⁸ Therefore, citizens' concerns that the project will negatively impact their water source are unfounded: rather, the project will expedite a project that has already been planned while reducing the cost to taxpayers.

Further, the new ground storage tank (again, already part of the County's future improvements) has been contemplated to be located adjacent to, or in the Fawn Lake subdivision. The ground storage tank would act as an additional reservoir and used to correct remaining deficiencies in the water system, including increasing marginal pressures in the zone. sPower has proposed a 50% cost share for the onsite tank, which would be conveyed to the County at the completion of construction.⁷⁹

⁷⁵ Appendix A, Comprehensive Plan Analysis, Staff Report for SUP 18-0003, Planning Commission, County of Spotsylvania, at 33 (Dec. 12, 2018).

⁷⁶ Appendix B, Utilities Memo, Staff Report for SUP 18-0002, Planning Commission, County of Spotsylvania, at 41 (Dec. 12, 2018).

⁷⁷ Staff Report for SUP 18-0002, Planning Commission, County of Spotsylvania, at 7 (Dec. 12, 2018).

⁷⁸ Appendix B, Utilities Memo, Staff Report for SUP 18-0002, Planning Commission, County of Spotsylvania, at 42 (Dec. 12, 2018).

⁷⁹ Appendix B, Utilities Memo, Staff Report for SUP 18-0002, Planning Commission, County of Spotsylvania, at 43 (Dec. 12, 2018).

Once the project is operational, water supply will be minimal and only used to annually clean the panels and periodically for landscaping. It is estimated that a maximum of 2 acre-feet of water per year would be needed during operation—not the 8 million gallons of water as stated by citizens. Additionally, due to the design of the panels, they can operate at high efficiencies when covered with varying amounts of dust, pollen, and other organic matter and the abundant rainfall in the area is sufficient to clean the panels without using the Project’s water supply.⁸⁰ This greatly reduces the need for water onsite and will reduce the Project’s consumption of water during operations.

Not only do citizens complain that the Project will negatively impact their water supply, but they argue that it conflicts with the Plan and could open up the land to a backdoor rezoning to industrial or commercial, since County water would already be available. And, they argue, because the Plan encourages complementary land uses in agricultural areas, industrial uses are inappropriate. As the basis for this argument, the citizens argue that extending County water to the Project clearly violates the intent of the Plan’s Primary Development Boundary guidelines, which state that a major aim of the Plan’s planning process is ensuring that the provision of community facilities is phased with demand and that 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 citizens cite the Plan’s requirement that rezonings outside of the PDB desiring to connect to public sewer and water should submit a Plan amendment.⁸¹ Even though the Project does not required a rezoning, but only a SUP, citizens argue that the same analysis and application of the Plan should apply.

But the citizens’ argument fails. First, they assert that only complementary uses, not industrial, are encouraged in agricultural areas. But renewable energy facilities have explicitly been deemed a complementary use by the County Code, despite their industrial character. Thus, it is irrelevant whether allowing the Project will “open up the land to a backdoor rezoning” because the use is already expressly permitted by County ordinance.

Second, citizens’ argument that development outside the Primary Development Boundary should be phased with demand and should be accompanied by a Plan amendment is misplaced—amendments to the Plan are required only for *rezonings* outside of the Primary Development Boundary, not for SUPs. This demonstrates that the County is concerned that rezonings might undermine the County’s development plan and alter that plan completely. Seeking approval for a SUP does no such thing: it merely seeks approval for that which is already considered an appropriate use within the existing zoning.

Finally, the Project affirmatively helps the County achieve one of its principal goals regarding the provision of public facilities and utilities. That goal is to provide community facilities and services to serve existing and new development in an efficient and cost effective manner, and to provide a sufficient water distribution system to serve the needs of the

⁸⁰ Generalized Development Plan Narrative, SPower SUP for Center A, at 4.6.

⁸¹ Analysis of sPower SUP’s Compliance with County Comp Plan, Concerned Citizens of Spotsylvania County 5 (Nov. 7, 2018).

community at the most economical price possible.⁸² One of the ways the county's aims to achieve this goal is by providing for a cost sharing program with developers to fund water improvements.⁸³

It is already established that the County's water distribution system to the Fawn Lake subdivision and surrounding area is deficient and therefore, that the County is falling short of its goal of providing a sufficient water system to this area. The Project would accelerate the County's plans to correct deficiencies in water pressure to the surrounding homes, thereby improving the distribution system at a significantly reduced cost to the County and taxpayers. Thus, the Project improves the County's distribution system.

In conclusion, citizens have not raised a compelling argument for not extending County water to the Project. And they completely overlook the benefits the Project bestows on the current water system for the surrounding area.

2.2.5. The Project encourages the most appropriate use of land, water, and resources.

2.2.5.1 The Project will not adversely affect the Property's agriculture use.

The Plan's goals for the County's natural resources include mitigating the impact of development upon unique and/or endangered resources, including rare species; encouraging land development practices which minimize impervious cover to promote groundwater recharge and/or tree preservation; and promoting multiple uses of forested land where appropriate such as outdoor recreation, wildlife habitats, and timber harvesting.⁸⁴ The plan also encourages location of land uses where their tolerance is compatible with existing or proposed noise levels and/or reduces impacts through vegetative buffering or building design.⁸⁵ As discussed below, the proposed Project achieves these natural resource goals.

As a preliminary matter, and one which has raised considerable citizen concern, is the Project's impact on the site's existing agricultural and silviculture values. The Plan has emphasized that prime agricultural and forestry lands should be preserved and protected from development, and encourages preservation of this land for its intrinsic economic benefits.⁸⁶ Special use permits are discouraged for land uses incompatible with adjacent agricultural, silvicultural, or forestal operations that would have an adverse effect on the continued viability of these uses.⁸⁷ As such, extension of public infrastructure into productive agricultural and silvicultural lands is discouraged, except in those instances where those areas are designated for future commercial, industrial, or office development.⁸⁸

⁸² Comp. Plan, Public Facilities Plan at 2.

⁸³ *Id.* at 20.

⁸⁴ Comp. Plan, Natural Resources Plan at 2–3.

⁸⁵ *Id.* at 3.

⁸⁶ Comp. Plan, Land Use at 4.

⁸⁷ *Id.*

⁸⁸ Comp. Plan, Introduction & Vision at 5.

According to the County, approval of the Project will result in loss of significant silvicultural acreage on lands historically used for the forest products industry, affecting approximately 3,500 acres of the site, which represents 2.3% of the forestland in the County.”⁸⁹ But even while noting its concern over this forestal fragmentation, the County notes that this has largely already occurred due to the timbering of the property.⁹⁰ And the County has admitted that this loss of agricultural and silviculture industry is not just limited to this Property, but is also true of much of the surrounding area.⁹¹ Tellingly, the County concedes that nothing assures that in the absence of the Project, the land will revert to forestry or agricultural uses.⁹²

In short, the County has concluded that the proposed project ultimately results in a trade-off between County interests in maintaining agricultural and forestry versus support for renewable energy generation, which is seen as a complementary use within agricultural and rural areas.⁹³

Given this tradeoff, and because the proposed Project does not adversely impact the agricultural landscape any more than any other future development would, and because renewable energy projects are encouraged, the loss of silvicultural acreage on the Property is not sufficient reason to halt the Project. Concerned citizens argue that although the Plan encourages complementary land uses such as renewable energy generation in agricultural areas, the Project’s sheer size makes it an uncomplementary land use. They argue that this property was previously used for forestal purposes and that use is now no longer available and the utility scale solar plant is not mutually supportive of agricultural use and will likely degrade the property for future agricultural land use. What the citizens fail to consider is that nothing in the Plan (or County Code for that matter) requires that a renewable energy facility be mutually supportive of agricultural use: the two uses are complementary, not contemporaneous, and therefore, need not occur simultaneously. Nor does the Plan require a property used for this complementary purpose to someday revert back to its original use.

As already noted, although the site is zoned for agricultural use, renewable energy facilities are specifically allowed with a special use permit in these districts. Thus, the proposed Project is not incompatible with the adjacent land uses, and by identifying renewable energy as a complementary use to agricultural and rural land use, the County has already anticipated that these uses will result in an industrial use, thereby warranting the extension of public facilities to the Project.

Notwithstanding this misinterpretation of the Code and Plan, sPower’s Project actually does allow for future reversion of the land back to agricultural use, while currently mitigating the loss of the current agricultural use. Specifically, as discussed below, sPower has plans to preserve and offset potential negative impacts related to the Property’s natural resources, erosion and stormwater, viewsheds, wildlife, and trailways.

⁸⁹ Staff Report for SUP 18-0003, Planning Commission, County of Spotsylvania, at 27 (Dec. 12, 2018).

⁹⁰ Appendix A, Comprehensive Plan Analysis, Staff Report for SUP 18-0003, Planning Commission, County of Spotsylvania, at 35 (Dec. 12, 2018).

⁹¹ *Id.* at 36.

⁹² Staff Report for SUP 18-0003, Planning Commission, County of Spotsylvania, at 28 (Dec. 12, 2018).

⁹³ *Id.* at 29.

2.2.5.2. *The Project will protect natural resources.*

sPower is taking significant steps to protect the Property's natural resources during construction and operation of the Project. It is accomplishing this by preserving and protection the sensitive environmental features of much of the green space outside of the solar development area.⁹⁴ This accords with the County's preference that developers preserve existing trees and tree buffers rather than replacing mature vegetation with new plantings.⁹⁵ Although citizens argue that the Project directly conflicts with the desire to preserve the rural character of the county, the County has already determined that rural corridors and the Property's scenic character can be maintained through vegetative screening and buffering.⁹⁶

Further, the Project is being designed to avoid impacts to wetlands and all panels and equipment will be located outside the wetlands and preserve a minimum 100-foot buffer from wetlands. Any temporary impacts to wetlands during construction will be limited.⁹⁷ Any herbicides used to limit growth to grasses and other low-lying vegetation around the solar panels will be nontoxic and in accord with the Department of Environmental Quality's regulations.⁹⁸

Concern has been raised that the project might cause negative impacts on streams on and near the Property, including potential water quality degradation, water withdrawal concerns, and impacts from invasive species.⁹⁹ To alleviate these concerns, all streams on the Property that are impacted by the Project have 50-foot designated Resource Protection Area buffers surrounding them as well as other erosion and excessive runoff control measures.

Further, a thorough analysis of potential impacts to natural heritage resources and threatened and endangered species has been conducted. The analysis noted that the Property is a potential site for several threatened or endangered species (the dwarf wedgemussel, the northern long-eared bat, the yellow lance, and the small whorled pogonia), but ultimately concluded that no critical habitats exist within the site.¹⁰⁰ Thus, the Project will not adversely impact existing habitats.

2.2.5.3. *The Project will preserve and create adequate viewsheds.*

In addition to the environmental preservation measures taken above, sPower has also designed the Project with the goal of shielding it from neighboring properties by installation of vegetative buffers or berms within setbacks at locations that are not immediately adjacent to residences and residences and roadways for screening purposes. It does so in part, as a response to the County's concern that the Property's topography may result in visibility of the facility

⁹⁴ Appendix A, Comprehensive Plan Analysis, Staff Report for SUP 18-0003, Planning Commission, County of Spotsylvania, at 30 (Dec. 12, 2018).

⁹⁵ Comp. Plan, Land Use at 3.

⁹⁶ Appendix A, Comprehensive Plan Analysis, Staff Report for SUP 18-0003, Planning Commission, County of Spotsylvania, at 34 (Dec. 12, 2018).

⁹⁷ Spotsylvania Solar Energy Center FAQs.

⁹⁸ *Id.*

⁹⁹ Appendix A, Comprehensive Plan Analysis, Staff Report for SUP 18-0003, Planning Commission, County of Spotsylvania, at 35 (Dec. 12, 2018).

¹⁰⁰ Generalized Development Plan Narrative, SPower SUP for Center A, at 2.1.3.1.

from some properties, despite efforts made to keep the facility out of sight from neighboring properties.¹⁰¹

Citizens wrongly believe that sPower intends to remove all trees, including buffers, right up to the property lines in most cases, which they argue conflicts with the Plan's policy requiring that wherever possible, existing trees and tree buffers should be preserved rather than replacing mature vegetation with new plantings.¹⁰² They also argue that sPower has failed to minimize the Project's detrimental impact by only proposing 100 foot setbacks for almost the entire project. The citizens are incorrect. The Project actually has designed setbacks of 150 to 400 feet from property lines, vegetated berms ranging from 6 to 8 feet, and 100 foot vegetated visual buffers around property. Therefore, the actual plan does preserve the existing tree buffers, where possible, and setbacks at locations that are not immediately adjacent to residences and roadways (areas adjacent to forested lands) will be preserved for natural regrowth.¹⁰³

2.2.5.4. The Project's erosion plan far exceeds County and statewide regulations.

Not only has sPower taken multiple steps to mitigate potential adverse impacts of the Project, but its erosion plan goes well beyond County and statewide regulations.

First, erosion and stormwater control will be managed through sPower's already approved Stormwater Management Plan and implementation of its Best Management Practices, which will require among other things, detention ponds and replanting of native vegetation, to be put into place prior to construction.¹⁰⁴

Additionally, sPower has significantly revised its grading plan to reduce the amount of grading and earthwork previously proposed. And the project will be phased with only 400 acres open and active at any one time in any one watershed. CCSC has argued that sPower has failed to mitigate the Project's detrimental effects, stating that heavy rains and stormwater runoff will present serious risks to surrounding properties and wetlands if simultaneous 400-acre plots are developed as proposed. But this argument is speculative and not based in fact, as the Project will not actually be simultaneously developed, but rather developed in phases, with more than adequate stormwater and erosion safeguards put into place prior to construction.

In sum, sPower's erosion plan goes well beyond County and state regulations, is consistent with the Chesapeake Bay Preservation Act and related regulations, and is adequate to mitigate any detrimental environmental impacts.¹⁰⁵

2.2.5.5. The Project will protect the Property's existing wildlife.

¹⁰¹ Staff Report for SUP 18-0002, Planning Commission, County of Spotsylvania, at 14 (Dec. 12, 2018).

¹⁰² Analysis of sPower SUP's Compliance with County Comp Plan, Concerned Citizens of Spotsylvania County 6 (Nov. 7, 2018).

¹⁰³ Generalized Development Plan Narrative, SPower SUP for Center A, at 4.10.

¹⁰⁴ Spotsylvania Solar Energy Center FAQs.

¹⁰⁵ Comments of the Department of Environmental Quality Concerning the Application of Pleinmont Solar, LLC at 24.

Not only has sPower established protocol to preserve the Property's natural resources and environment, but it has also taken steps to reduce potential adverse impacts on wildlife. To that end, sPower hired an independent consulting firm to research and survey the existing wildlife and habitats within the site. The research concluded that the Property contains no endangered species. For the existing wildlife, open spaces will be preserved during operations and the security fencing at the site will include wildlife supportive fencing every 2,000 feet along a fence line perimeter, which will allow wildlife to safely navigate through the site and will assist in increasing overall wildlife interconnectivity.¹⁰⁶

Citizens argue that the Project's potential impact to wildlife indicate that this proposal is not a complementary land use.¹⁰⁷ But this concern is speculative and not rooted in fact: the research has not demonstrated that any wildlife will be negatively impacted by the Project, and should they in fact experience adverse effects, sPower has already taken measures to ensure that wildlife can move freely throughout the site.

2.2.5.6. The Project accords with the County's Trailways Master Plan.

Spotsylvania County has adopted a Trailways Master Plan ("Trailways Plan") to provide a framework around which a comprehensive trailway system can evolve, both presently and in the future, with the overarching goal of developing non-motorized travel that will link neighborhoods, parks, schools, and businesses, as well as link and protect historic and cultural resources.¹⁰⁸ The Trailways Plan identifies several goals, objectives, and strategies to use in developing this integrated trailways system.¹⁰⁹ Those strategies include reviewing proposed development proposals for compliance with existing and proposed trailways and roadway improvements, including assuring that new developments will not negatively impact existing trails or further hinder development of new ones. Additionally, all land-use decisions must stimulate private sector development and public transportation improvements that are consistent with the County's desired trails network.

The County has recommended that the Project align with the Trailways Plan's goals. Several proposed trails would run through the Project: Todd's Tavern Spur, Lake Anna State Park Connector Trail, Po River Trail, and Virginia Central Rail Trail. All of these proposed trails lie outside the panel layout areas and therefore will not compromise implementation of the Trailways Plan.¹¹⁰ There are two sections of fencing just north of West Catharpin Road where the fence encroaches upon a potential future trail, but sPower will work with the County to develop a plan for this section of the trail to ensure that the Trailways Plan is not impeded in any way.¹¹¹

¹⁰⁶ Spotsylvania Solar Energy Center FAQs; Appendix A, Comprehensive Plan Analysis, Staff Report for SUP 18-0003, Planning Commission, County of Spotsylvania, at 35 (Dec. 12, 2018).

¹⁰⁷ Analysis of sPower SUP's Compliance with County Comp Plan, Concerned Citizens of Spotsylvania County 4 (Nov. 7, 2018).

¹⁰⁸ Spotsylvania County, Virginia Trailways Master Plan at 6 (Feb. 22, 2011).

¹⁰⁹ *Id.*

¹¹⁰ Additional GDP Details, sPower Response to Comments, Round 1 (June 11, 2018).

¹¹¹ sPower Response to Comments, Round 4 (Oct. 28, 2018).

2.2.5.7. *The Project Preserves the Property's historic and cultural resources.*

sPower will preserve the historic and cultural resources on the Property in accordance with the findings of a survey of the Property.

The Plan encourages and promotes the voluntary protection and preservation of scenic, historic, cultural, architectural, and archaeological resources by, among other things, promoting agricultural land preservation and protection of the County's rural farm and forest characteristics; and by promoting and protecting agriculture as the primary use of land in rural areas to promote the scenic character and economy of the area.¹¹²

Further, the Plan encourages developers to identify historic and cultural resources in proximity to proposed rezoning or special use projects and to evaluate the impacts of the project on the resources in question. Where appropriate, developers should also consider appropriate architectural treatment, transitions, or buffering between development projects and national or state historic register sites to prevent or minimize degradation of the historic property.¹¹³

The Project will be designed to avoid impacts to civil war battlefields or other cultural and historical resources in accordance with the results of an independent study, coordinated with Virginia's Department of Historic Resources.¹¹⁴

The research from that survey concluded that although the site is surrounded by features and landscapes representing the Civil War, there are no identified historical resources specifically related to the Civil War. However, a number of other important historic and cultural resources do exist on the site, including Native American sites, ruins, gold prospecting or mine sites. And the oldest lode gold site in Virginia, the White Hall Mine, is located to the southeast of the Property.¹¹⁵

Nevertheless, none of the historic or cultural resources have been recommended eligible for either the Virginia Landmarks Register or the National Register of Historic Places.¹¹⁶

Additionally, two known places of burial lie on or near the project site: one is an offsite cemetery immediately adjacent to the project area and one cemetery is potentially onsite. The northern cemetery is accessible via an improved road at Chancellor Meadow Lane; the second cemetery is located in a wooded area surrounded by wetlands and does not have traditional access. But after consulting with an Easement Specialist from the Commonwealth Heritage Group, sPower concludes that it is not required to improve access to the cemeteries or establish easements or any other legal right of ways.¹¹⁷

¹¹² Comp. Plan, Historic Resources Plan at 3.

¹¹³ *Id.* at 4.

¹¹⁴ Spotsylvania Solar Energy Center FAQs.

¹¹⁵ Email from Lorrie Coiner to Patrick White (Apr. 24, 2018).

¹¹⁶ Staff Report for SUP 18-0003, Planning Commission, County of Spotsylvania, at 9–10 (Dec. 12, 2018).

¹¹⁷ Cultural Resources, sPower Response to Comments, Round 1 (June 11, 2018); *see* Va. Code § 57-27.1.

CCSC argues that the Project poses a threat to the historic resources because of the conversion of the land into an industrial or commercial use.¹¹⁸ Yet this is not one of the Plan's criteria for determining whether or not historic and cultural resources are preserved by proposed development. Rather, the Plan encourages developers to identify and preserve these resources where they occur and to minimize degradation of the property. Nothing in the Plan states that the mere conversion of land into industrial or commercial use automatically threatens historic and cultural resources. Rather, the goal of preserving these resources should be evaluated in tandem with the Plan's goals of promoting business and economic growth.

As the extensive actions of sPower have demonstrated, the Project meets multiple significant goals of the County's Plan—despite the fact that it is not a binding requirement for proposed development—and the County's and citizens' concerns have been carefully and thoroughly addressed. And as will be discussed next, not only has sPower complied with the County's requirements, but it meets the Commonwealth's larger goal for expanding solar energy.

3. The Project helps the Commonwealth achieve its goal of expanding solar energy.

Not only does the Project advance the County's general and specific goals of supporting renewable energy, but it also advances the Commonwealth's stated goal of achieving at least 3,000 MW of solar and wind resources by 2022.

Under Virginia Code section 67-201, the Division of Energy of the Department of Mines, Minerals, and Energy is tasked with creating a 10-year energy plan. The current version of this plan promotes solar energy, asserting that the solar industry has the potential to assist “significant economic development,”¹¹⁹ and aspiring to achieve at least 3,000 MW of the 5,000 MW of solar and wind resources deemed in the public interest by 2022. The plan also includes recommendations to double the Commonwealth's renewable energy procurement target to 16% by 2022. This plan reinforces the General Assembly's 2015 legislation that deemed 500 MW of solar resources in the public interest, and its further expansion of that public interest goal to reach 5,000 MW of utility-owned and utility-generated wind and solar resources.¹²⁰

The Commonwealth's goal for renewable energy reflects the changing need of customers, and the growing demand of corporate energy customers who are requesting access to greater levels of renewable resources.¹²¹ Noting this shifting demand, the Energy Plan recognizes that Virginia is slated to embark on a period of accelerated renewable energy development, which will increase the obligations of local governments and state agencies tasked with land use, permitting, and environmental decision making.¹²² And not only will the shifting demand towards renewable energy accelerate the growth of that industry, but it lends itself to economic prosperity through increased jobs and environmental health. As a result, the Energy Plan recommends that solar energy should be streamlined to reflect the changing nature of the

¹¹⁸ Analysis of sPower SUP's Compliance with County Comp Plan, Concerned Citizens of Spotsylvania County 2–3 (Nov. 7, 2018).

¹¹⁹ Va. Energy Plan at 9 (2018).

¹²⁰ *Id.* at 12.

¹²¹ *Id.*

¹²² Va. Energy Plan at 14 (2018).

renewable energy industry and create a path for fast-tracked permitting for projects that meet certain requirements or standards.¹²³

The Project directly squares with the Energy Plan's aspirations and allowing the Project will bring the economic prosperity the Commonwealth desires. For example, Virginia currently ranks 10 out of 50 states in terms of electricity consumption, and only 81% of that demand is being met by in-state utilities independent producers and other sources. This means that Virginia had to import 19% of its energy, thereby exporting jobs, wages, and economic output.¹²⁴ Further, Virginia lags behind national trends in the wind and solar categories.¹²⁵ But allowing development of the Project would aid in attracting other high-tech industries to the County, due to the frequent partnership between these corporations and solar facilities, which would create new jobs and wages while promoting technology-driven economic development. Already in Spotsylvania County, data centers are becoming a key component of regional economic development. This Project would only add to those gains.¹²⁶

Conclusion

It is only natural that the County and local population is concerned over the introduction of a large solar facility into Spotsylvania County and concerned over the potential harmful effects of its operations and the loss of the County's pastoral qualities. But those concerns are largely rooted in fear of the unknown and the unfamiliarity with renewable energy facilities. As has been demonstrated in the discussion above, sPower has taken great pains to dispel the myths and misunderstandings surrounding an operation of this kind, and has gone above and beyond state and local requirements to mitigate the potential negative impacts of the Project. What remains is for the County and its citizens to recognize the great economic and fiscal boon a solar facility would bring to the area and to recognize their responsibility to help contributing to the creation of sustainable energy.

¹²³ *Id.* at 15.

¹²⁴ The Economic and Fiscal Contribution that the Spotsylvania Solar Energy Center Would Make to Spotsylvania County, Mangum Economics at 2 (May 2018).

¹²⁵ *Id.* at 5.

¹²⁶ *Id.* at iii.

This is the advertisement that just came in my mailbox today.

After I wrote on it, determined to send it back, I decided to photograph it and send a copy to you first.

The message is a LIE! Concerned Citizens of Spotsylvania is NOT "a dark money group ..." nor are our concerns "attacks backed by the fossil fuel industry" that we are echoing. We are not "outside fossil fuel special interests." **WE ARE YOUR CITIZENS THAT YOU ARE SUPPOSED TO PROTECT!!!**

I have attached a document identifying the Energy and Policy Institute. Since it's admonished I "check the facts," it took only 30 seconds for me to find who that group is ... they are the dark money group! (read the article).

This is HARASSMENT paid for by SPower! PLEASE! Do what you need to do NOW to protect us!

June 2017

What is the Energy and Policy Institute?



C A M P A I G N F O R

ACCOUNTABILITY

What is the Energy and Policy Institute?

EXECUTIVE SUMMARY

The Energy and Policy Institute (EPI) describes itself as a think tank and a watchdog organization.¹ One of EPI's top goals is to reveal the hidden influence of fossil fuel and utility companies. At the same time, however, EPI is opaque about its own funders.

The group's website includes extensive background information about groups and organizations supported by energy companies. A typical post from its homepage reads, "Front group paid by Dominion releases shady poll showing support for Dominion's Atlantic Coast Pipeline."²

Campaign for Accountability's new report, *What is the Energy and Policy Institute?*, reveals that the Energy and Policy Institute is just as secretive as the organizations it exposes. EPI is a dark money group: it does not appear to have nonprofit status, it is not registered with any relevant secretary of state, and no one admits to funding it.³ It appears that EPI may be simply the creation of a public relations firm. Nevertheless, journalists treat EPI as they would any other watchdog organization.

A WATCHDOG?

EPI's mission states that it "is a watchdog organization working to expose attacks on renewable energy and counter misinformation by fossil fuel and utility interests."⁴ The group claims that it aims "to disrupt fossil fuel-funded misinformation, separate polluters from policymakers, and accelerate the transition to a clean economy."⁵

To accomplish this mission, EPI profiles "front groups" that work to advance the goals of the fossil fuel industry – fourteen such groups are profiled on EPI's website. EPI relies on investigative journalism techniques to trace the funding for these groups back to oil and gas companies and utilities.

For instance, EPI has profiled the work of the Consumer Energy Alliance (CEA), a Houston based nonprofit that claims to be the voice of the energy consumer, but "really is a fossil fuel-funded advocacy group" run of the offices of a public relations firm.⁶ Recently, EPI published an article criticizing CEA for issuing a press release regarding poll results showing support for a proposed

Consumer Energy Alliance	Energy and Policy Institute
• Houston based nonprofit • Registered with Texas state officials • Releases IRS 990 forms • Discloses Board of Directors and Members	• Exact location unknown • Does not appear to be registered with any state officials • Unknown if IRS 990 forms exist • No known Board of Directors

¹ <http://www.energyandpolicy.org/about/our-mission/>; compare <http://www.energyandpolicy.org/clean-energy-think-tank-calls-for-public-records-between-governor-sandoval-and-utilities-on-solar-energy/>.

² <http://www.energyandpolicy.org/front-group-cea-releases-poll-showing-support-dominion-atlantic-coast-pipeline/>

³ A search of nonprofit donor databases including citizenaudit.org and opensecrets.org revealed no donors for EPI.

⁴ <http://www.energyandpolicy.org/about/our-mission/>.

⁵ *Id.*

⁶ <http://www.energyandpolicy.org/consumer-energy-alliance/>.

natural gas pipeline in the mid-Atlantic without disclosing financial support from companies interested in seeing the pipeline go forward.⁷

While its criticism may be accurate, CEA is more transparent than EPI. CEA actually is a bona fide nonprofit that releases annual tax returns as required by law – something that EPI does not do.⁸ CEA also discloses its board of directors and, notably, its members.⁹

EPI's work on CEA includes posts and reports regarding CEA's funders, which CEA itself discloses as members.¹⁰ In contrast, EPI does not disclose any information about its support.

DARK MONEY GROUP

The comparison between EPI and the CEA is illustrative. EPI is a self-styled watchdog and a think-tank, two categories that typically apply to 501(c)(3) nonprofit organizations.¹¹ Such charitable organizations are required by law to file 990 tax forms with the IRS annually and release those forms upon request. CfA asked EPI for a copy of its 990 on May 30, 2017 and received no response. A search of databases that maintain public copies of 990s, Guidestar and the Foundation Center, returned no results.

EPI does not disclose its location (though has criticized CEA for being housed within a PR firm). The only public address for the organization is a post office box in San Francisco.¹² EPI's website contains information about three employees and one fellow, but according to their LinkedIn profiles, only one of them, the executive director David Pomerantz, is based in San Francisco.¹³ Another lives in Chicago, the third near Boston, and the fellow in North Carolina.¹⁴



All organizations, whether they are for-profit or non-profit, are required to register with the secretary of state or similar office, in the state where they operate. CEA, for instance, is registered with the state of Texas.¹⁵ EPI, however, is not registered in California, or any other state associated with the organization.¹⁶

⁷ <http://www.energyandpolicy.org/front-group-cea-releases-poll-showing-support-dominion-atlantic-coast-pipeline/>.

⁸ Consumer Energy Alliance Inc, IRS Form 990, Initial Return 2016, filed February 20, 2017, available at <https://consumerenergyalliance.org/cms/wp-content/uploads/2017/02/2016-CEA-990-for-public-use.pdf>.

⁹ <https://consumerenergyalliance.org/about/>.

¹⁰ <https://consumerenergyalliance.org/about/our-members/>.

¹¹ <http://www.energyandpolicy.org/press/>.

¹² <http://www.energyandpolicy.org/contact-us/>.

¹³ <https://www.linkedin.com/in/david-pomerantz-14601515/>.

¹⁴ <https://www.linkedin.com/in/matthew-kasper-b21a3818/>; <https://www.linkedin.com/in/david-anderson-0083598/>; <https://www.linkedin.com/in/nancylaplaca/>.

¹⁵ See <https://mycpa.cpa.state.tx.us/coa/coaSearch.do>.

¹⁶ Campaign for Accountability searched corporation databases in California, the District of Columbia, Illinois, Maryland, Massachusetts, and Virginia.

Finally, EPI's website is registered through a privacy shielding company based in Panama.¹⁷

BEHIND THE CURTAIN

The only traceable aspects of EPI are its employees. According to its website, EPI has three current employees, all of whom previously worked for environmental advocacy organizations. The current executive director, David Pomerantz, previously spent eight years at Greenpeace.¹⁸ Research director Matt Kasper worked on the Energy and Environment Policy Team at the

“Mr. Elsner, CBP, and its parent organization, Renew American Prosperity (RAP), all have close ties to Tigercomm, a ‘cleantech marketing communications, PR and public affairs firm.’”

Center for American Progress,¹⁹ and the policy and communications manager, David Anderson, spent four years at the Union of Concerned Scientists and a year at Green Alliance.²⁰ Notably, the founder, former executive director, and current Senior Fellow, Gabe Elsner, has ties to the cleantech industry. Mr. Elsner is currently an MBA student and an intern at Tesla, the parent company of SolarCity, a solar panel manufacturer.²¹

Before working at EPI, Mr. Elsner worked for the Checks and Balances Project (CBP), a nonprofit project that employs similar tactics to EPI in attacking organizations and individuals supported by the fossil fuel industry.²²

Mr. Elsner represented himself to the media as a director of CBP until mid-2013, after which he changed his public affiliation to EPI.²³ On his LinkedIn page, however, Mr. Elsner claims he founded and worked for EPI beginning in 2011, and there is no mention of CBP.²⁴ Mr. Elsner's profile describes his work at EPI, in part, as defending “state-level clean energy policies by providing strategy and intelligence to companies and allied organizations.” He also claims to have “executed [a] development plan and raised over \$2M from foundations and individuals,” again suggesting EPI is a non-profit organization. Many if not most states require charitable nonprofits to register with the state before they solicit donations, yet EPI does not appear to have filed any such registrations.

¹⁷ <https://whois.icann.org/en/lookup?name=energyandpolicy.org>. The Consumer Energy Alliance's website is also registered through a privacy shielding company. See <https://whois.icann.org/en/lookup?name=consumerenergyalliance.org>.

¹⁸ <http://www.energyandpolicy.org/about/who-we-are/david-pomerantz/>.

¹⁹ <http://www.energyandpolicy.org/about/who-we-are/matt-kasper/>.

²⁰ See <https://www.linkedin.com/in/david-anderson-0083598/>.

²¹ <https://www.linkedin.com/in/gabrielesner/>.

²² <http://checksandbalancesproject.org/about/history/>.

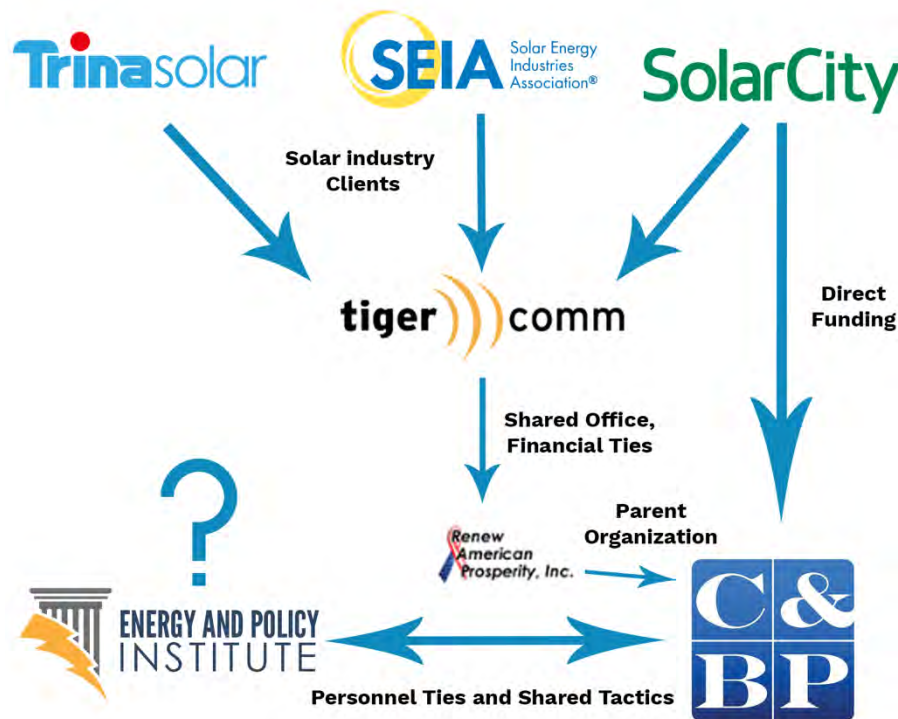
²³ This analysis is based on a review of Nexis searches for Checks and Balances Project and Energy and Policy Institute; see also <http://checksandbalancesproject.org/about/history>.

²⁴ <https://www.linkedin.com/in/gabrielesner/>.

Mr. Elsner, CBP, and its parent organization, Renew American Prosperity (RAP), all have close ties to Tigercomm, a “cleantech marketing communications, PR and public affairs firm.”

PUBLIC RELATIONS

In 2011, Mr. Elsner became the deputy director at the CBP after having worked as a social media associate at Tigercomm.²⁵ Tigercomm describes itself as “the top U.S.-based cleantech marketing communications, PR and public affairs firm.”²⁶ CBP’s website describes the organization as the brainchild of Tigercomm’s president, and states that it continues to receive strategic support from Tigercomm.²⁷



Shortly after joining CBP, Mr. Elsner responded to a casting call seeking individuals to appear in a television commercial promoting the oil and gas industry and express support for American-made energy.²⁸ At the audition, rather than sticking with the API approved script stating that he voted for American Jobs, he repeatedly stated that he voted for “American clean energy jobs,” and surreptitiously recorded the session.²⁹ The *Washington Post* reported that after setting up the sting, Mr. Elsner contacted journalists “with the help of his own public relations person from

²⁵ <http://checksandbalancesproject.org/about/history/>.

²⁶ <http://www.tigercomm.us/>.

²⁷ <http://checksandbalancesproject.org/about/history/>.

²⁸ Steven Mufson and Juliet Eilperin, *American Petroleum Institute Auditions Do Not Stick to Script*, *The Washington Post*, December 9, 2011, available at https://www.washingtonpost.com/blogs/blogpost/post/american-petroleum-institute-auditions-do-not-stick-to-script/2011/12/09/gIQAy3nliO_blog.html.

²⁹ *Id.*

Tigercomm.” Soon thereafter, a description of the events also was posted to Greenpeace’s website.³⁰

CBP itself is a project of a 501(c)(4) organization called Renew American Prosperity (RAP). In 2014 and 2015, RAP and Tigercomm shared the same office in Arlington, Virginia.³¹ In 2015, RAP paid more than 80 percent of its budget directly to Tigercomm for “management.”³² Tigercomm previously listed both CBP and RAP as clients on its website.³³

Tigercomm itself is openly and deeply tied to the cleantech industry. In addition to CBP and RAP, Tigercomm lists several solar companies as well as the Solar Energy Industries Association as clients on its website.³⁴ In 2015 SolarCity admitted that it funded CBP directly.³⁵

MEDIA SCRUTINY

Despite its opaque background, the media regularly covers EPI’s reports and interviews its employees without questioning the group’s affiliations. On May 9, 2017, EPI released a report claiming that “utility ratepayers are forced to fund the Edison Electric Institute and other political organizations.”³⁶ On June 3, 2017, *The New York Times* mentioned the report in an article about wind energy and simply characterized EPI as an organization “which supports renewables.”³⁷

**“A spokesman for the Energy and Policy Institute
would not say whether the organization is a nonprofit.”**

- E & E News

³⁰ See <http://www.greenpeace.org/usa/upcoming-american-petroleum-institute-vote-4-energy-tv-campaign-disrupted-by-undercover-activists/>.

³¹ RAP listed the same address and suite number on its 2014 990, and listed the same address without a suite number in 2015. See Renew American Prosperity Inc, IRS Form 990, Initial Return 2015, available at http://990s.foundationcenter.org/990_pdf_archive/454/454047394/454047394_201512_990O.pdf; Renew American Prosperity, IRS Form 990, Initial Return 2014, available at http://990s.foundationcenter.org/990_pdf_archive/454/454047394/454047394_201412_990EO.pdf; <http://www.tigercomm.us/contact>.

³² See Renew American Prosperity Inc, IRS Form 990, Initial Return 2015, at p. 8 available at http://990s.foundationcenter.org/990_pdf_archive/454/454047394/454047394_201512_990O.pdf.

³³ Luige del Puerto and Rachel Leingang, *Stump Accuses Critics of Acting Like ‘Mafia’*, *Arizona Capitol Times*, December 10, 2016, available at <http://azcapitoltimes.com/news/2015/12/10/stump-accuses-critics-of-acting-like-mafia/>.

³⁴ <http://www.tigercomm.us/>. Thomas Kimbis, Executive Vice President and General Counsel at the Solar Energy Industries Association (SEIA), told CfA, “There is no financial, contractual, or other relationship – direct or indirect – between SEIA and EPI and has never been any to my knowledge.” Email from Thomas Kimbis to Daniel Stevens, Executive Director, Campaign for Accountability, July 10, 2017.

³⁵ Ryan Randazzo, *SolarCity Funded Clean-Energy Advocacy Group that Targeted Arizona Utility Regulators*, *The Arizona Republic*, December 12, 2015, available at <http://www.azcentral.com/story/money/business/energy/2015/12/13/solarcity-funded-group-targeted-arizona-utility-regulators/77105808/>.

³⁶ <http://www.energyandpolicy.org/utility-ratepayers-fund-the-edison-electric-institute/>.

³⁷ Diane Cardwell, *Even as Wind Power Rises, It Falls Under a Political Cloud*, *The New York Times*, May 30, 2017, available at <https://www.nytimes.com/2017/05/30/business/energy-environment/wind-power-base-load.html>.

ThinkProgress and *Utility Dive* also covered the report with *ThinkProgress* describing EPI as “a research and watchdog group,”³⁸ and *Utility Dive* incorrectly describing EPI as a nonprofit.³⁹ Only *E&E News* asked the group about its nonprofit status, but included the response – that EPI “would not say whether the organization is a nonprofit” – at the end of an article devoted to the group’s report.⁴⁰

Additionally, EPI’s employees are regularly called on for interviews in national publications as experts, and their affiliation is barely noted. During Florida’s 2016 debate over a ballot initiative about solar energy, EPI’s work was regularly featured. The *Miami Herald* wrote an article about an EPI public records request, where the *Herald* claimed EPI was a nonprofit.⁴¹ Bloomberg referred to EPI as a “a clean-energy advocacy group.”⁴²

CONCLUSION

EPI’s stated purpose is to expose the groups working to advance the interests of the fossil fuel industry, questioning the funding and opacity of these dark money groups. At the same time, however, EPI itself is at least as secretive as the groups it seeks to expose. Journalists should acknowledge the double standard and treat EPI in the same manner as those the group targets.

³⁸ Mark Hand, *Electricity Customers Pay for Groups that Lobby Against Clean Energy, Report Says*, *ThinkProgress*, May 12, 2015, available at <https://thinkprogress.org/group-recommends-greater-oversight-of-trade-group-dues-6a748ee0741d>.

³⁹ Gavin Bade, *Report: Power Customers 'Forced' to Fund EEI Political Activities*, *Utility Dive*, May 10, 2017, available at <http://www.utilitydive.com/news/report-power-customers-forced-to-fund-eei-political-activities/442416/>.

⁴⁰ Sam Mintz, *Ratepayers Pay for Utility Political Activities — Report*, *E&E News*, May 9, 2017, available at <https://www.eenews.net/greenwire/2017/05/09/stories/1060054268>.

⁴¹ Mary Ellen Klas, *FPL Drafted Portions of Bill that Puts Tough Requirements on Rooftop Solar Companies*, *Miami Herald*, April 5, 2017, available at <http://www.miamiherald.com/news/politics-government/state-politics/article142904899.html>.

⁴² Ari Natter and Mark Chediak, *Messy Battles Over Energy Are on Ballot Across States*, *Bloomberg*, November 1, 2016, available at <https://www.bloomberg.com/news/articles/2016-11-01/messy-battles-over-energy-are-on-the-ballot-across-u-s-states>.

Donna Mayfield

From: Irvin Boyles <irv.boyles@verizon.net>
Sent: Wednesday, March 13, 2019 9:50 PM
To: Thomas G. Benton
Cc: Chris Yakabouski; Kevin Marshall; Timothy J. McLaughlin; David Ross; Paul D. Trampe; Gary Skinner; Aimee Mann; Wanda Parrish; Paulette Mann; Patrick White; davehammond@gmail.com
Subject: Lightning Effects on Photovoltaic Pannels per Mr. Benton Question
Attachments: Lightning effects Photovoltaic Farms.pdf

At the March 12, 2019 Spotsylvania County BoS Meeting, Dave Hammond was requested by Mr. Benton to address damage effects of tornados on solar panels, and the possibility of leakage of Cadmium Telluride from damaged panels. He was not asked about damage by the more likely scenario of effects of lightning strikes. Sandia National Labs, in the attached report for such incidents, found "In all six failed modules, there is damage evident at one or both upper corners, along one or both long edges, and at the bottom of the module. The panel is completely separated from the frame in some cases, while in other cases, only partial separation occurred." In other words, if the panels contained Cadmium or any Cadmium compound such as Telluride, there is plenty opportunity for leakage to soil and or waterways, even the aquifer.

While I can't dispute the claim that the melting point is above 1000 degrees C or the boiling point is above 1100 degrees C of Cadmium Telluride, I can ask that the Board and Planning Commission produce data on what happens to the Cadmium Telluride when a solar panel takes a direct lightning strike combined with the electrical energy generated the solar panels. Can we afford the risks of not knowing?

irvin Boyles
540-972-4404

--

This email was Malware checked by UTM 9. <http://www.sophos.com>

Lightning and Surge Protection of Photovoltaic Installations

Two Case Histories: Vulcano and Kythnos

François D. Martzloff

National Institute of Standards and Technology

Partial reprint of NISTIR-89 - 4113

Significance

Part 6: Textbooks, tutorials, and reviews

Part 7: Mitigation techniques

Two large installations of photovoltaic (PV) systems located on Mediterranean islands were damaged during lightning storms in 1986-88, even though the manufacturers and installers had provided protection hardware in the form of air terminals dispersed among the arrays, and surge-protective devices in the circuits. The two sites were visited and the damaged equipment that was still available on the site was examined for analysis of the suspected lightning-related damage. The evidence was insufficient to conclude that all the observed damage was caused by the direct effect of lightning. A possible scenario may be that lightning-induced overvoltages in the circuits caused insulation breakdown at the edges of the photovoltaic modules, with subsequent damage done by the dc current generated by the array. Other surge protection considerations were also addressed, and suggestions were presented for further investigations.

This partial reprint includes all the text and circuit diagrams. An extensive collections of photographs recorded on the sites is not included. See the last page of this pdf file for information on possible retrieval of the complete document from the National Technical Information Service.

Lightning and Surge Protection of Photovoltaic Installations

**Two Case Histories:
Vulcano and Kythnos**

François D. Martzloff

**Electricity Division
Center for Electronics
and Electrical Engineering**

**Prepared for:
Sandia National Laboratories
Albuquerque, NM 87185-5800**

June 1989



**U.S. DEPARTMENT OF COMMERCE
Robert A. Mosbacher, Secretary
NATIONAL INSTITUTE OF STANDARDS
AND TECHNOLOGY
Raymond G. Kammer, Acting Director**

Abstract

Two installations of photovoltaic (PV) systems were damaged during lightning storms. The two sites were visited and the damaged equipment that was still available on the site was examined for analysis of the suspected lightning-related damage. The evidence, however, is insufficient to conclude that all the observed damage was caused by the direct effect of lightning. A possible scenario may be that lightning-induced overvoltages caused insulation breakdown at the edges of the photovoltaic modules, with subsequent damage done by the dc current generated by the array. Other surge protection considerations are also addressed, and suggestions are presented for further investigations.

1. Introduction

Photovoltaic systems are inherently exposed to direct and indirect lightning effects. For high-capacity systems, the deployment of solar cell arrays requires a large area with commensurate exposure to direct lightning strikes at the local annual rate of ground strikes per unit area. The presence of a ground grid related to the PV system in an otherwise isolated area may act as a collector of lightning ground-current from nearby strikes. For PV systems tied to a local power grid, the exposure also includes surges coming from the power grid and the possible differences in the ground potential of the ac power system and that of the dc array system.

In the present development state of photovoltaic systems, occurrences of lightning strikes have been rare, thus field experience is still limited. Nevertheless, justifiable concerns exist, both from the economic point of view of damage versus cost of protection and from the less tangible impact on the perceptions of reliability for a technology still in the early stages of commercial utilization.

The Sandia National Laboratories, sponsored by the U.S. Department of Energy, are developing a Recommended Practice document for the electrical design of photovoltaic systems. As part of that project, the National Institute of Standards and Technology is contributing the lightning, surge protection, and grounding recommendations for these systems, based on known characteristics[†] of surge protective devices and on field experience. By this means, a review of the circumstances and effects of lightning in the few known or suspected cases of lightning damage to worldwide photovoltaic installations will contribute to more effective design and application of future systems.

In this report, two case histories are examined. These include the photovoltaic installations at Vulcano Island (Italy) and at Kythnos Island (Greece). Following the description of these two case studies, a discussion is presented, leading to firm conclusions when the evidence is sufficient, and allowing conjectures when the evidence is less conclusive. Both should serve as an indication of the need for further investigations, laboratory work, or theoretical study.

[†] Certain commercial devices are identified in this report in order to describe adequately the installation and expected performance of the system. Such identification does not imply recommendation or endorsement by the National Institute of Standards and Technology, nor does it imply that these devices are necessarily the best available for the purpose.

2. Surge Protection at the Vulcano Island Installation

2.1 Background

Vulcano is one of the islands in the Aeolian Group in the Tyrrhenian Sea, north of Sicily. The photovoltaic system in this island was designed by ENEL, the Italian national electric utility, as a research and demonstration facility and was commissioned in 1984 (Photograph 2-1).^{*} ENEL has been operating this facility since the commissioning. The visit, arranged by Dr. A. Previ of ENEL, took place in November 1988.

One case of damage attributed to lightning has been reported, with damage to only one panel (Photograph 2-2). No other damage occurred in the system, not even to the protective varistors provided at each junction box in the array

field. This history makes that site an interesting case study, considering the scarcity of documented lightning occurrences on photovoltaic systems.

2.2 System Configuration

The Vulcano photovoltaic system (see Figure 2-1) includes the following major components: the array (1); a storage battery (2); one self-commutated, stand-alone inverter (3); one line-commutated inverter (4); a rectifier for charging the battery (5); and a static switch (6). More complete system diagrams by ENEL are given in Appendix A [1].

Photograph 2-3 shows the block diagram of the system provided on the control cubicle. Interface with the 20 kV ac grid of the island is obtained by the three-winding 150/150/20 000 V transformer which is an integral part of the

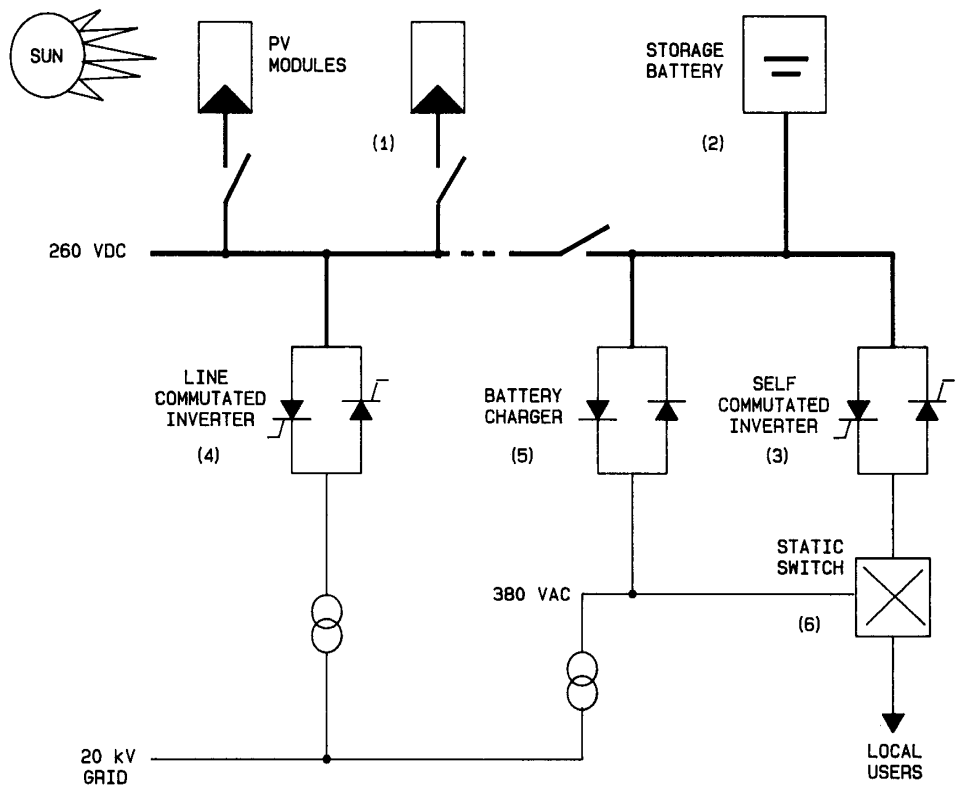


Figure 2-1. Block diagram of the Vulcano photovoltaic system

^{*} Photographs cited in this text are included in Appendix D, starting on page 37.

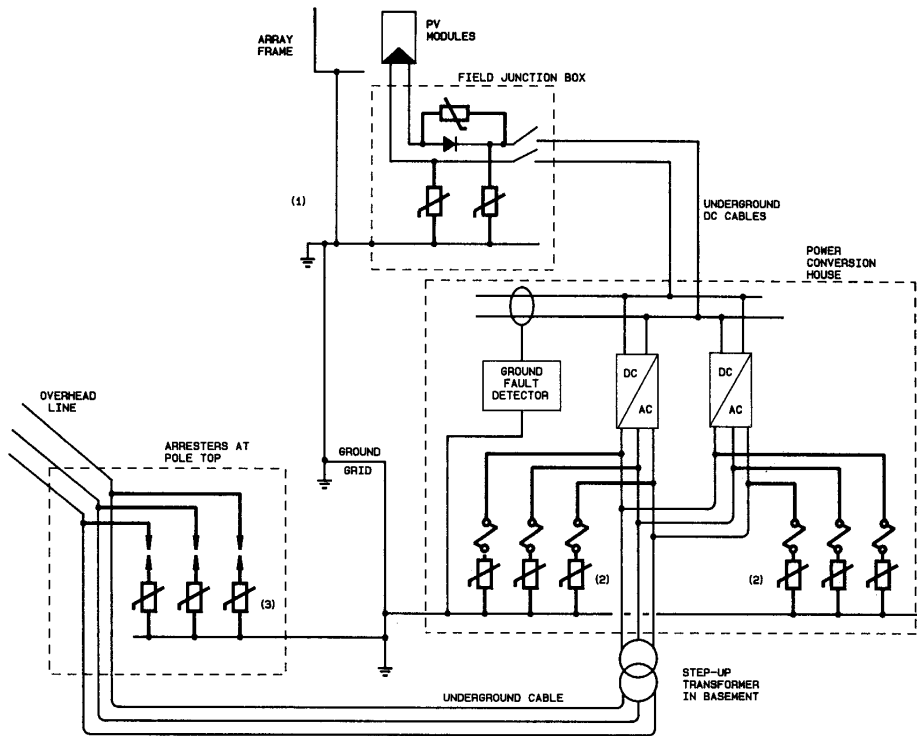


Figure 2-2. Surge protective devices at system interfaces

output circuit of the line-commutated inverter. A group of 40 local domestic users was originally supplied at 380 V by an existing substation connected to the 20 kV grid. The 380 V bus of the substation was modified to allow power flow from the output of the stand-alone inverter, through the static switch, to the local users.

With this configuration, the system can operate in two modes: grid-connected, and stand-alone. In the grid-connected mode, the tie to the grid is obtained through the 150/150/20 000 V transformer, absorbing all of the plant output. In that mode, the storage battery is not in the circuit, and the local loads are supplied by the ac grid. In the stand-alone mode, the local loads are supplied at 380 V directly from the self-commutated inverter. In that mode, the storage battery is connected to the dc bus and it can either absorb power from the array or deliver power to the inverter. The local loads can also be supplied, if necessary, from the island ac grid through a back-up transformer.

Individual strings from the array can be switched by dc contactors located in the control room, to be connected to the dc bus or discon-

nected from the dc bus according to the charge state of the battery. For maintenance purposes, a dc disconnect is located in terminal boxes next to the respective strings of the array (Photograph 2-4). Mechanical interlock is provided between the contactor and the cover of the terminal box, which prevents accidental opening of the disconnect under load.

2.3 Grounding Practices

A major design decision in a photovoltaic system is whether to ground or not to ground the dc side. In contrast to ac power systems, which are grounded in most cases (by generally accepted practice or by mandate, depending on the country), no general agreement has been reached on grounding practices for photovoltaic systems. Two reasons are generally cited for an ungrounded system:

- (1) the possibility to continue operating with one ground fault on the system, and
- (2) some limitation of single L-G fault currents and hence reduction of damage in case of a fault, because two ground faults are then required to produce a significant dc fault current.

In the Vulcano system, the dc system is not grounded. A ground fault detection system is provided (Figure 2-2), with alarm indication on the control panel (Photograph 2-3) but no automatic trip nor remote indication of the fault condition (the system is unattended). Experience with this system is described as satisfactory after an initial period of reported difficulties associated with insulation deficiencies in the panels. (These were eventually corrected by field or factory rework on the panels.)

While the dc system is not grounded, a ground grid has been installed at the site, for safety, surge protection, and grounding of the ac side. In addition to a grid of ground cables running along the dc cables in the array (but outside of the plastic conduits containing the dc cables, see Photograph 2-5), ground rods (16 rods, each 2 m long) were driven into the earth. Considerable care was given to the implementation of this ground grid. For instance, the integrity and effectiveness of the grounding system for protection against step voltage and touch voltage, in case of a ground fault on the 20 kV system, were the subject of well-documented tests. Providing low impedance earthing was made easier by the volcanic nature of the soil, which resulted in the unusually low value of 1.8Ω for the earth resistance. The lower leg of each panel frame is bonded to the ground grid (Photographs 2-6 and 2-7).

Concerns frequently associated with grounding practices are corrosion of connections and leakage of the insulation from energized parts to ground. At this site, the ground grid was implemented with direct-burial copper cables with welded connections (Photographs 2-5 and 2-7), an effective assurance against corrosion problems. Some corrosion problems occurred in the original metal boxes containing the module by-pass diodes (Photograph 2-8). The problems were corrected by improving the insulation to ground with a better sealing of the metallic frames.

The significance of a history of corrosion/insulation tracking is that these insulation problems may be a clue to a scenario other than that of simple direct lightning damage. One may speculate on a scenario involving a double ground fault that could have resulted in panel damage; this scenario will be presented in the discussion of the observations of Section 2.5.

2.4 Surge Protection

Overvoltage protection for the Vulcano system is provided at three interfaces, as sketched in Figure 2-2:

(1) At the terminal box of each pair of strings (Photograph 2-9), between each of the two dc lines and ground, by one 32-mm diameter varistor (4 total) rated 560 V dc (GE Cat. No. V420HE400). No further protective devices are provided at the entrance of the dc cables to the power conditioner house (the capacitor bank at the input of the inverters can serve as overvoltage limiter for any impinging surge because the front time is relatively long as a result of the cable impedance). The blocking diode for each string, located in the field terminal box, is protected by one 32-mm diameter varistor (2 total), rated 560 V dc (GE Cat. No. V420HE400). This varistor has a clamping voltage of 1200 V for a 300 A peak surge current. The repetitive peak voltage rating of the diode (IR Cat. No. SD 70N12P) is 1200 V.

(2) At the 380 V ac interface of the output of the inverters, by three varistors connected line-to-ground (Photographs 2-10 and 2-11). These are also 32-mm diameter varistors, with a 420 V ac rms rating (GE Cat. No. V420HE400). A fuse rated 8 A, 500 V, 100 kA interrupting capacity is provided in series with each varistor (Photograph 2-12). About 50 cm of leads are used to connect the varistors to the 380 V terminals at the base of each inverter cabinet. (In this case, this length is not significant because of the front time limitation discussed above.)

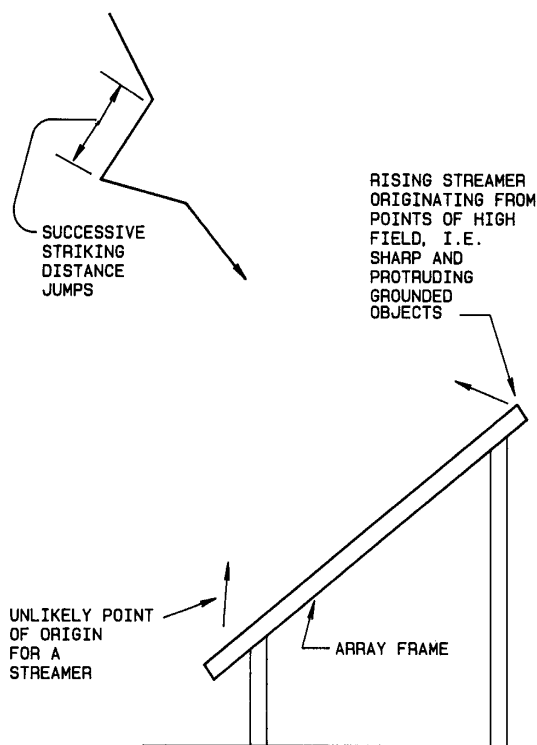


Figure 2-3. Descending stepped leader and rising streamer in a cloud-to-ground lightning strike

(3) At the 20 kV interface with the island system, by “conventional” surge arresters installed at the potheads of the underground connection, and connected line to ground (Photograph 2-13). The 20 kV overhead line stops about 200 m from the control room, with the final connection to the plant made by underground cable (Photograph 2-14).

2. 5 Discussion

2.5.1 Lightning damage report

The damage caused to the PV panel by the presumed lightning strike is shown in Photograph 2-2. (The photograph was supplied by Previ as part of the background history; the damaged module was not available for examination.) This damage occurred during the commissioning period of the plant in the autumn of 1984; it was found early in the morning by the ENEL staff after a thunderstorm occurred during the

night. The glass and part of the cells were described as “melted near the metallic frame of the module.” No failure of the blocking diode nor of the varistor of that string was found as a result of that incident.

2.5.2 Lightning damage scenarios

The damage to the module is located at the lower part of the array, as shown in Photograph 2-2. Postulating a scenario of a direct strike to the array, the point of attachment of the lightning would be the point of origin of the rising streamer that meets the descending stepped leader (Figure 2-3).

This position at the lower part of the array is rather unexpected for the point of initiation of the streamer. A more likely point for streamer initiation – and resulting termination of the strike – would be the upper edge of the array, which is 2 m above grade level (Photograph 2-15). Thus, there is some doubt on drawing a conclusion that the damage was the result of a direct strike terminating at the array.

In view of the reported insulation problems that occurred during the initial period of operation, one might ask whether the damage to that panel might be the result of a leakage of dc current to the frame, rather than the simple direct effect of a lightning strike. This dc leakage might be the consequence of a lightning induced overvoltage stress that created a double fault in one single event, or that created the second fault after the first had previously occurred but remained uncorrected. The scenario could unfold as follows:

Assume that two independent ground faults, (A) and (B) have occurred on the system (Figure 2-4). When the first, say (A), occurs, the fault detection system indicates that event but no immediate action is taken because of the unattended status of the system, and there is no ground fault current resulting from that first fault (except the insignificant current passing

through the detection circuit). A ground fault current can exist only after the second fault occurs, establishing the path through (A) and (B).

Assume now that one of the two faults, say (B), involves a very low resistance. Then, even for substantial fault currents, little heat is generated at fault (B). Assume further that (A) has a low enough resistance to produce a “sufficient” current in the fault path, where “sufficient” is defined as a level which, combined with the low but finite resistance of fault (A), will create heat dissipation in (A), in contrast with the negligible heat dissipation in (B).

In this manner, we have the elements that could create the observed effects, that is, an obvious fault with burning at (A), and a less obvious fault at (B), with a low resistance that may be eliminated during emergency maintenance work following the occurrence of the incident. The likelihood of such a double fault is admittedly low, but cannot be ruled out in view of the design of the ground fault detection system which indicates faults locally only. This scenario, still associated with lightning, would not be in contradiction with the observed low position of the damage since it does not require termination of the strike at that low point of the panel. Furthermore, the low point on the sloped array is also a place where moisture is more likely to accumulate and thus create a good candidate for a contributing cause in the scenario of two-stage insulation breakdown.

A variation on the theme of the double fault might even be that the fault was entirely caused by long-term insulation breakdown, without the “*coup de grace*” administered by the lightning incident. However, the observation of a damaged module soon after a lightning storm would point to the lightning-induced overvoltage scenario.

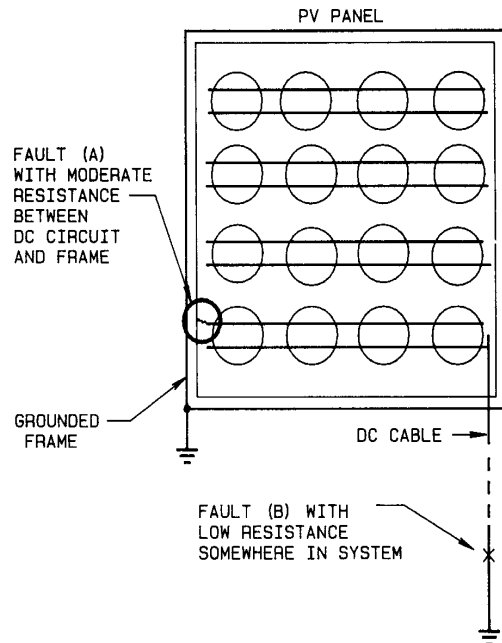


Figure 2-4. Scenario of double ground fault

One significant aspect of the failure mode is the reported shattering of the glass cover of that module. The question is whether it could have been produced by the less violent action of a dc fault (glass breakage has been reported in the United States during dc ground faults), or could be explained only by the mechanical shock associated with a lightning strike. The reported melting of the glass is also a clue that could be investigated further.

If data were available on the failure modes of this type of module, some of the conjectures proposed in this discussion might be replaced by more positive conclusions. The incentive for reaching such positive conclusions is not merely one of intellectual curiosity. If overvoltages induced by indirect lightning are sufficient to cause insulation breakdown, then the provision of lightning air terminals is irrelevant – and thus becomes an unjustifiable cost – while improving the insulation levels in the modules would yield better results for the added expense.

2.5.3 Insulation coordination

Coordination of the protective devices with the withstand capability of the equipment to be protected is sometimes overlooked in system designs. At the Vulcano site, this coordination was presumed to have been incorporated in all the system design and was not audited during a visit aimed primarily at a review of the lightning incident.

However, given the concerns on the protection afforded by the varistors, the coordination for one example of protection can be evaluated by a simple comparison: From their catalog description, the blocking diodes of the array strings have a repetitive peak voltage rating of 1200 V (albeit not a perfect assessment of their transient withstand capability). Therefore, the maximum clamping voltage for the protective varistor should not exceed 1200 V. For a varistor rated 560 V dc, this maximum allowable clamping voltage of 1200 V corresponds to a 300 A surge crest current. In other words, protection can be expected as long as surge currents do not exceed 300 A in that string.

At first glance, this 300 A allowable level of surge current may appear low. However, when postulating a lightning-induced surge current level in the wiring, one should not be influenced by the thousands of amperes of the direct stroke, but rather consider the voltage required to drive the postulated current waveform along the inductance of the wiring: a high rate of current change means a high driving voltage. However, in this case, high driving voltage would not be possible because sparkover of the insulation would occur. Thus, the 300 A crest of an 8/20 μ s postulated waveform appears an appropriate order of magnitude. In this example, therefore, insulation coordination was in fact achieved for voltage levels that might be induced in the wiring.

2.6 Suggestions on the Design

In his role of sponsor of the visit, Previ asked for comments on the surge protection provided at this site. Accepting for the moment the hypothesis that lightning was the cause for damage to the panel, the successful operation of the installation and survival of the electronics through one lightning occurrence are already a testimonial of the adequacy of the protection system.

Taking a devil's advocate view in search of greater protection, a more conservative approach could have been to provide additional surge protection for the incoming dc cables at the interface with the inverter inputs, but experience so far has indicated survival without these additional protective devices. This observation, however, does not necessarily guarantee that another lightning strike scenario, with a different point of termination or higher amplitude, could not induce some damaging overvoltage along the cables between the array protections and the inverter input.

A concern expressed by Previ was the failure mode of the varistors installed at the base of the electronic cabinets at the ac interface. These varistors can be expected, in case of failure, to be promptly isolated from the power source by operation of their series-connected fuses (that have ample interrupting capacity). Therefore, the generation of hot gases during the short-circuit following failure of the varistor would be brief. Again, as an exercise in very conservative design, a further step could be applied to limit the consequences of a varistor failure by providing a partial metal shielding around the varistors to deflect any evolving gas away from the rest of the circuit. The 8 A rating of the fuses seems adequate to avoid premature aging of the fuses caused by repetitive surges [3], should such repetitive surges occur at that site.

Previ also asked about the possibility of monitoring the condition of the varistor aging for the purpose of anticipating an impending failure. This question has been raised by many users, sensitized to the issue by competitive claims from advocates of silicon avalanche diodes. At this time, no easy method has been proposed for field measurements (especially in dc circuits where a clamp-on transformer is not suitable [4]).

Increasing concerns on the issue are likely to catalyze the development of such measurements. For the moment, the only technically simple but operationally difficult method would be to remove each varistor from the circuit and compare its present nominal voltage to its original nominal voltage. In existing installations, that information is not likely to be available. An intermediate solution for this installation would be to implement monitoring the varistors, albeit at a late stage of the project, and watch for trends, even though the initial value is not available. As a last resort, a surface temperature measurement on the varistor might give a warning of impending failure.

This discussion of varistor failure scenarios should not be interpreted as an inference that the varistors are in fact in jeopardy. It is only

an exercise in asking and answering conservative "what-if" questions.

2.7 Specific Conclusions from the Vulcano Case

The experience accumulated at the Vulcano site indicates no major problem of surge occurrences, with only one reported case of damage to one panel among several hundred. This one case of damage is not conclusively attributable to lightning.

Furthermore, even if the damage were caused by lightning, then a partially satisfactory conclusion would be that sufficient protection could be provided for the electronic components in the power conditioning system, at least for that particular case. Power conditioning equipment is the most expensive part of the system and cannot be considered "expendable" in contrast with a few modules being lost with the rest of the system remaining operational. The ambiguity in attributing the damage to direct or indirect lightning might be resolved by further study of the failure modes of a panel (a module within its frame). One failure mode to be investigated would be under simulated lightning strikes; the other failure mode would be under dc stress with surface contamination. Further discussion of this issue, from the technical as well as economic and intangible aspects, is offered in the general discussion of Section 5.

3. Surge Protection at the Kythnos Island Installation

3.1 Background

Kythnos is one of the islands in the Cyclades Group, in the southern part of the Aegean Sea. The photovoltaic system on this island was designed and implemented in 1983 by Siemens. It is operated by the Greek Public Power Corporation. The visit, which was arranged by Dr. J. Chadjivassiliadis of Public Power Corporation, took place in November 1988.

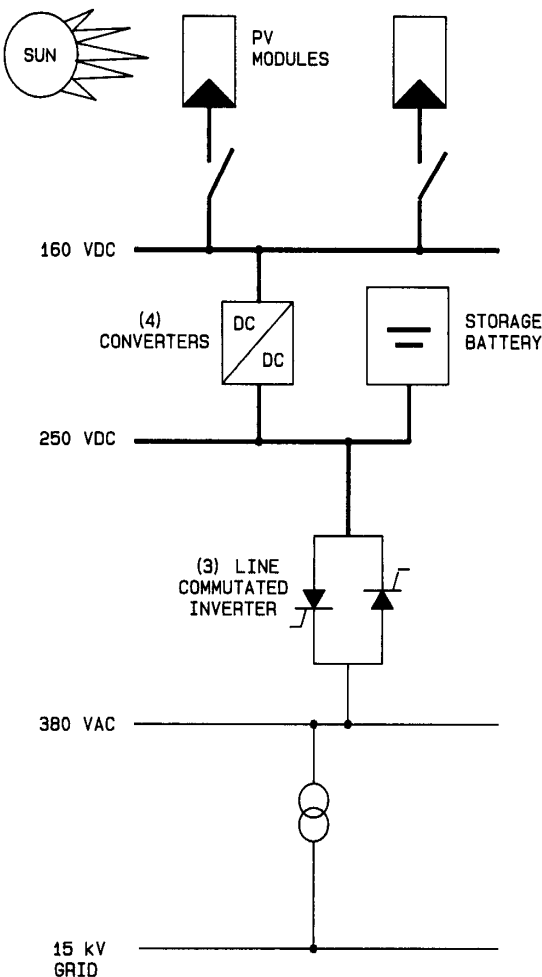


Figure 3-1. Block diagram of the Kythnos photovoltaic system

Several panel failures have occurred in 1986, 1987, and 1988, which have been attributed to lightning. Lightning rods and surge arresters are provided at this site, making it an interesting subject of study, both for an explanation of the presumed direct strikes occurring in spite of the lightning rods, and for a study of the protection afforded by the surge protective devices installed in the circuits, as well as their failure modes. Further information on the history of panel damage is included in Appendix B.

3.2 System Configuration

The installation was designed and implemented by Siemens, as one of the experimental facilities coordinated by the European Economic Community (Photograph 3-1). The plant has a nominal output capacity of 100 kW. Figure 3-1 shows a schematic of the system components. The modules are grouped in arrays formed by a series string of 20 modules, each producing a dc bus voltage of 160 V. Each of these 43 arrays is terminated in a junction box in the field, where two or three strings are connected in parallel to bring the dc power to the power conversion cabin (Photograph 3-2).

In the power conversion circuitry, the variable 160 V dc is raised and regulated to 250 V by a dc/dc converter to match the battery voltage for optimum charging conditions and operation of the solar cells. The dc/dc conversion is performed by four units, each rated 25 kW. Depending on the instantaneous power transfer, one to four converters are in service.

Conversion to ac power is performed by three inverters, each rated 50 kW. The output voltage of 380 V is stepped up to 15 kV for connection to the island power grid. Although the arrays and conversion equipment are located adjacent to the Diesel generating plant of the island, operation of the photovoltaic system can be

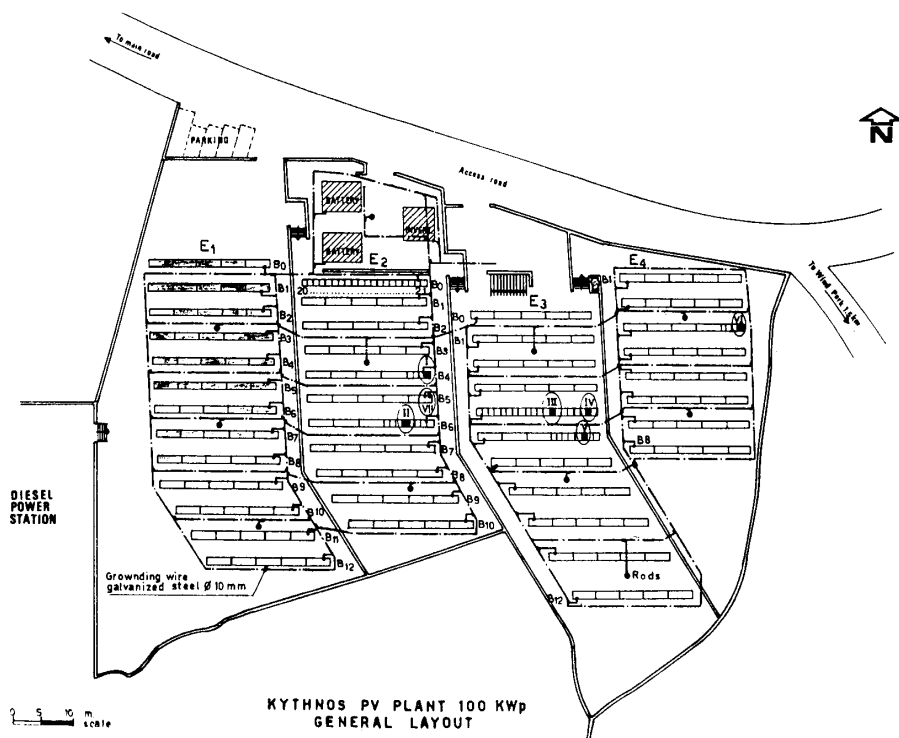


Figure 3-2. Location of ground cables, air terminals, and modules presumed damaged by lightning

Source: Kythnos records (Appendix B)

automatic, and does not require daily supervisory. Extensive monitoring and control of operating parameters is provided by a "Logistronic" control system and other controls incorporated in the design.

3.3 Grounding Practices

This site is located in the center part of the island next to the Diesel power plant, but with its ground grid isolated from that of the Diesel plant. This grid consists of several loops encircling each of the four groups of arrays. Part of the each loop follows the routing of the dc cables between the array junction boxes and the power conditioning cabin (Figure 3-2).

The perimeter of the field is defined by stone walls, in keeping with the prevailing island practice for marking boundaries between pastures and cultivated fields. Consequently, there is no metal fence around the photovoltaic field, and thus no perimeter grounding cable. The conductors are made of 10-mm diameter galva-

nized steel, buried directly at the bottom of a trench, with the dc cables above the ground conductors. There are no driven ground rods added to this grid. The choice of galvanized steel probably reflects the German practice, where concerns over corrosion effects by buried copper seem to deprecate the use of copper.

All the metal structures of the system, including the array supporting beams, junction boxes, lightning rods, and housings for the power conditioners and battery, are bonded to the ground grid. Connections are made using bolted connectors above ground (Photographs 3-3, 3-4, and 3-5), as well as under ground, with protection against corrosion being provided in accordance with the normal practices of the various manufacturers and contractors (these were not discussed during the visit).

The dc system is not grounded, but includes a ground fault detection circuit with fault indication available only in the control cubicle of the system. The separation of the photovoltaic ground grid from the Diesel plant ground grid

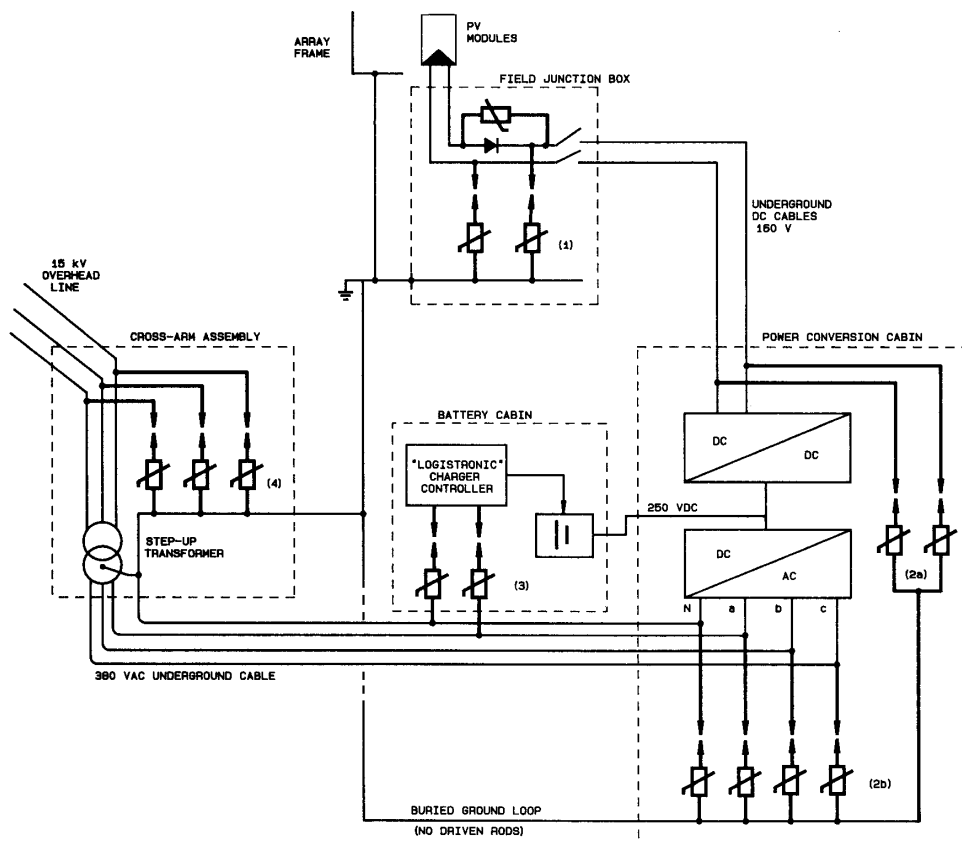


Figure 3-3. Overvoltage protection at system interfaces

raises the question of a possible difference of ground potential between these two systems during a lightning strike. If instrumentation or telemetry equipment spans across the two systems, the difference in ground potentials might become a problem. However, no such problem was identified at that site.

3.4 Surge Protection

This installation presents an interesting case history because it includes both lightning rods (air terminals) in the array and surge arresters in the circuits. Damage to several panels, presumably as a result of lightning over a period involving three separate occurrences, raises questions on the effectiveness of the protection against direct strikes. Damage to the surge arresters also occurred in one of the field junction boxes, but no damage occurred on the power conversion units. Some damage occurred in the control circuits of the battery charger during the initial period, when they did

not have surge arresters at their ac power input. After arresters were added to this ac input, no further damage events occurred but some upsets did still occur in the control system.

3.4.1 Air terminals

Air terminals (lightning rods) have been installed between rows of the array as shown on Photograph 3-6. The height of these air terminals is 10.5 m above grade level; the upper edge of the panels is 2 m above grade level, thus leaving a net elevation of the air terminals 8.5 m above the upper edges of the panels. Considering a 45° cone of protection, one of the classical criteria, the panel upper edges would then be "protected" within a radius of 8.5 m from each air terminal. Those panels located beyond that radius would be left unprotected. Reviewing the location of panels involved in the damage (Figure 3-2) shows the following horizontal distance from the nearest air terminal:

- Module E2/B4/1	- Location	10m
- Module E2/B6/5	- Location II	10m
- Module E3/B4/13	- Location III	10m
- Module E3/B4/19	- Location IV	12m
- Module E3/B5/18	- Location V	8m
- Module E4/B3/20	- Location VI	10m

Thus, five of the six damaged modules were beyond the 45° cone, and the sixth was on the fringe of the cone. Some panels in the array, not impacted by lightning, are further away from an air terminal, the greatest distance in the field being 15 meters. Another interesting statistic is the distribution of the panels with respect to being within a protected area of 8.5 meters radius (approximately 75%) or outside the protected area (25%).

Another protection criterion has been developed, that of the "rolling ball" [5], as discussed in section 3.5. According to that criterion, the protection radius would extend to 12 m so that all panels would have been expected to be in the protected zone.

According to yet another definition of the cone of protection, sometimes cited by less conservative designers, a 2:1 instead of a 1:1 ratio of radius to height may be considered. In such a case, one would expect all of the panels to be "protected" as the distance from the mast would increase to 17 m.

It is not known whether such a 2:1 cone, or the 1:1 (45°) cone, or the rolling ball with a 30-m radius was used in the initial layout of the air terminals. The design has been described as "installed according to VDE standards" (VDE is the acronym for Verein Deutscher Elektrotechniker) (see Appendix B).

3.4.2 Overvoltage protection

Overvoltage protection at the Kythnos installation is provided at four interfaces, numbered (1) through (4) in Figure 3-3:

(1) At the junction boxes in field - There are several slightly different types of junction boxes in the field. Some include termination for two or for three strings, while some also contain additional circuitry for the data collection system. Photograph 3-7 shows a typical three-circuit box (undamaged). One surge arrester is connected between each of the floating dc lines (+) and (-) and a ground bus inside the box. In turn, this bus is bonded to the footing by a copper cable (in parallel with the inherent bonding between the metallic junction box and the I beam of the footing).

These arresters appear similar to those for which the voltage response had been documented in a paper presented at the 1981 EMC Zürich Symposium (Appendix C). From the voltage response characteristic reported in that paper, it appears that the surge arrester consisted of a silicon-carbide varistor with a series gap. The presence of a series gap is significant in discussing the upset events cited for the control circuits at this site.

The string blocking diodes are mounted in the junction box and are protected by a metal-oxide varistor connected in parallel with each diode (Photograph 3-8). Photograph 3-9 shows another junction box with the additional data collection circuitry installed in the box cover. This particular box is the one where the lightning-suspected damage occurred, as shown in the close-up views of Photographs 3-10 and 3-11.

(2) At the power conversion units - The dc lines from the array are brought to the cabinets of the dc-dc converters where each of the four converter inputs is protected by two surge arresters (2a) (Photograph 3-12) connected between the (+) and (-) lines, and ground. This arrester is of the same type as that described for the array junction boxes.

Similarly, the ac outputs of the inverters are protected against surges from the ac grid by four arresters (2b); one is connected between each line (a,b,c) and ground, and one between neutral and ground (N) (Photograph 3-13). While the grounding connection of the 220/380 V system was not reviewed, presumably it follows the European practice of bonding to earth only at the secondary transformer, in this case the step-up transformer of the grid interface. This practice, different from that used in the United States, motivates and justifies the provision of the arrester between neutral and ground.

(3) At the Logistronic circuit power supply - The "Logistronic" circuit controlling the battery charger is powered from the 220 V ac line in the battery cabin. Thus, its power supply is exposed to surges that may occur on that supply. Initially, there was no protection on this ac supply; perhaps as a consequence, damage occurred three times in the early years of the system (Appendix B). Subsequently, two arresters were installed on the ac supply line ahead of the Logistronic input terminals (Photograph 3-14). After these ac arresters were installed, only upsets were recorded (four occurrences). This behavior is consistent with the voltage-limiting effect of the arresters but at the price of a steep voltage collapse when the gaps fire (Appendix C). This electromagnetic disturbance is a likely source of interference in nearby digital circuits.

(4) At the ac grid interface - Protection against surges coming from the island ac power grid is provided by the three distribution-type arresters mounted on a cross-arm above the transformer (Photograph 3-15). No information was available on these arresters; they are likely to be of the conventional design using a silicon carbide varistor with a series gap.

This type of arrester is perfectly adequate for protecting transformers against surges, but might not be sufficient for the electronic components on the 220/380 V side. For that reason, the secondary arresters described above are a good idea. However, gapless secondary arresters are now available that can offer a more comprehensive protection, including some degree of upset protection.

3.4.3 Examination of the damaged modules

3.4.3.1 Summary

At the date of the visit, the three modules damaged in 1986 had been replaced in the array. These modules were still kept in storage at the site, so that it was possible to examine them closely. The two modules damaged in 1987 and the one module damaged in 1988, however, were still in position in the array, as no spares were available. Detailed photographs and observations for each panel are given in the following paragraphs, in chronological order.

At this site, the arrays are only one module high, so that the long edge of the module reaches from the highest to the lowest edge of the array. In all six failed modules, there is damage evident at one or both upper corners, along one or both long edges, and at the bottom of the module. The panel is completely separated from the frame in some cases, while in other cases, only partial separation occurred. One of the modules has severe burn marks on the top corner of the frame, while on the other modules the damage ranges from none to some readily visible burn marks.

3.4.3.2 Detailed examinations

MODULE - 307 0423 This module was in storage and had been at location E2 B4 1 ("I" on Figure 3-2), 10 m from the nearest air terminal. There are burn marks along both long edges,

but not the complete length (Photograph 3-16). On the right side, the burns are mostly at the lower part of the edge, away from the most damaged corner (Photograph 3-17). On the left side, the burns are mostly in the upper part, with intriguing spots over some of the cells (Photograph 3-18). The top right corner shows some marks on the frame, with the most extensive damage at that corner (Photograph 3-19).

MODULE - 303 0267 This module was in storage and had been at location E3 B5 18 ("V" on Figure 3-2), 8 m from the nearest air terminal. There are burn marks along both vertical edges, but not over the complete length (Photograph 3-20). On the right side, the burns are mostly at the upper part of the module, with damage at both corners (Photographs 3-21 and 3-22). The top right corner (Photograph 3-21) shows heavy burn marks on the frame, while the top left corner (Photograph 3-23) shows light marks on the frame. It should be noted that this module, which has the heaviest burn marks on its frame among the six modules, is the only module that was located within the "cone of protection" of an air terminal. This remark will be discussed further in the next section.

MODULE - 304 0294 This module was in storage and had been at location E3 B5 19 ("IV" on Figure 3-2), 12 m from the nearest air terminal. There are burn marks along all of the right side, and part of the left side (Photograph 3-24). Both top corners show damage (Photographs 3-25 and 3-26). The top right corner (Photograph 3-25) shows light burn marks on the frame, while the top left corner (Photograph 3-26) hardly shows any burn marks on the frame. There is extensive separation of the panel from the frame along the right side (Photograph 3-27)

MODULE - 306 0417 This module is still in the array at location E2 B6 5 ("II" on Figure 3-2),

10 m from the nearest air terminal, and was found damaged on February 5, 1987. The bypass diode in the string allows the array to remain operational. The right edge shows burns (Photograph 3-28). Both right side corners show extensive destruction of panel material (Photographs 3-29 and 3-30), but the upper corner has no burn marks on the frame (Photograph 3-29).

MODULE - 304 0300 This module is still in the array at location E3 B4 13 ("III" on Figure 3-2), 10 m from the nearest air terminal, and was found damaged on February 5, 1987. The bypass diode in the string allows the array to remain operational. There is damage on three of the corners and some of the edges (Photographs 3-31, 3-32, and 3-33), but the heaviest damage is on the lower left corner (Photograph 3-34). The two upper corners show surface degradation on the frame, but these do not appear to be burn marks (Photographs 3-32 and 3-33).

MODULE - 310 0592 This module is still in the array at location E4 B3 20 ("VI" on Figure 3-2), 10 m from the nearest air terminal, and was found damaged on February 25, 1988. The bypass diode in the string allows the array to remain operational. The damage is concentrated on the left edge of the module (Photographs 3-35 and 3-37). The panel is separated from the frame (Photograph 3-38). The apparent discoloration of the frame at the top left corner does not seem attributable to burns (Photograph 3-36).

3.5 Discussion

3.5.1 Effectiveness of air terminals

Lightning protection of solar arrays by air terminals is still a subject of debate (effectiveness, shadow effects, cost, appearance). The observations made at the Kythnos site do not bring

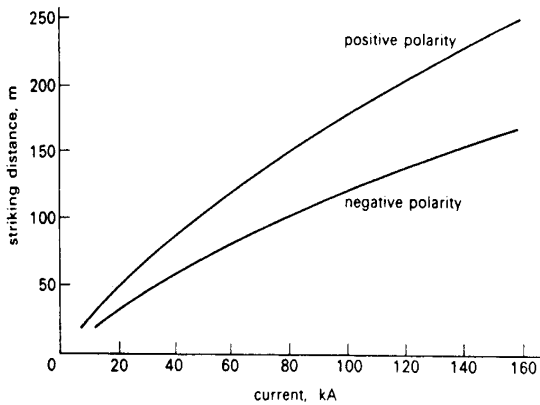


Figure 3-4. Relationship between potential current level of return stroke and striking distance
(Source: Reference [6])

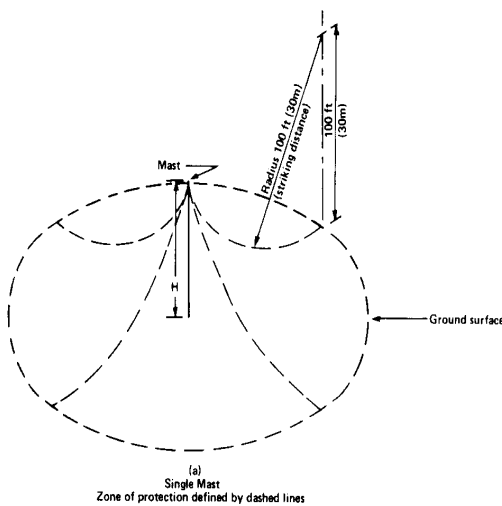


Figure 3-5. Rolling ball criterion
(Source: Reference [5])

conclusive evidence for or against the effectiveness of correctly designed air terminals, although they tend to weaken the case for providing air terminals.

The Kythnos experience involves points of (presumed) lightning termination that are at the edges of the zone of protection of several criteria, where this protection becomes more uncertain. Ironically, the most severe burn mark is found on the frame of the module that was

closest to an air terminal, and within the zone of protection as detailed in paragraph 3.4.1. Thus, a brief review of the uncertainties of the zone-of-protection concepts will provide the necessary perspective on the issue.

Indiscriminate application of the 45° cone of protection criterion to tall structures has led to contradictions. An example is occurrence of lightning strikes terminating on the side of tall buildings, within the cone of "protection". The original concept of a cone of protection is now generally replaced by the rolling ball criterion, based on the striking distance theory. According to this striking distance theory [6], the striking distance at the tip of the descending stepped leader increases with the amount of charge in the leader. Thus, the leaders having the highest potential current level have the longest striking distance (Figure 3-4). Conversely, leaders having the lowest potential current level have the shortest striking distance. The point of termination of a lightning strike can be anywhere within the striking distance from the last point of advance of the descending stepped leader. This fact can be represented by imagining a sphere with a radius equal to the striking distance, which is determined by the charge in the lower part of the leader. Any point at ground potential penetrating that sphere is a candidate for emitting a upward streamer that will complete the path for the return stroke. Thus, points at ground potential outside of the sphere are still "protected" while the points inside the sphere are not.

Considering now the configuration of a vertical mast on the ground plane (Figure 3-5), rolling a ball on the ground until it touches the tip of the ball defines the limiting condition when the descending leader will terminate at the tip of the mast, thus leaving other points below the sphere uninvolved. Figure 3-6 shows

graphically the configuration for the 10.5 m masts used in Kythnos, with the upper edge of the panels at 2 m above the ground plane.

Figure 3-6 shows the zone of protection as defined by the traditional 45° cone of protection, as well as that defined by a rolling ball of 30 m radius, as specified in the Lightning Protection Code [5]. Simple geometry shows a distance of 8.5 m from the mast for the 45° cone, while the graphical solution for the rolling ball shows a distance of 12 m from the mast. It should be emphasized that the selection of a 30 m radius for the ball is somewhat arbitrary, in view of the data shown in Figure 3-4. From Figure 3-6, it is apparent that a pessimistic assumption would be a smaller radius for the rolling ball: such a smaller ball would roll closer to the mast and thus would reduce the “protected” distance from the mast.

This observation needs to be combined with the statistical distribution of lightning current amplitudes as stated by Cianos & Pierce [2] to appre-

ciate that the 30 m radius is only a pragmatic choice, not an absolute criterion. Therefore, observing points of presumed lightning termination at distances of 8.5 m to 12 m from the base of an air terminal is not startling, especially for low-current strokes. This observation shows how precarious the assurance of protection can be when only sparsely distributed air terminals are provided. In other words, increasing the degree of confidence that sufficient protection zones are established might require such a density of masts (or overhead wires) that the cost, appearance, and shadow effects would loom large in the overall trade-off.

3.5.2 Lightning current path

The resulting return stroke would then draw charges from the earth via the grounded structure, that is, the return current would come out of the grounding cable at the base of the column, and proceed by the shortest route toward the upper edge of the panel. This shortest path does not include the lower half of the panel

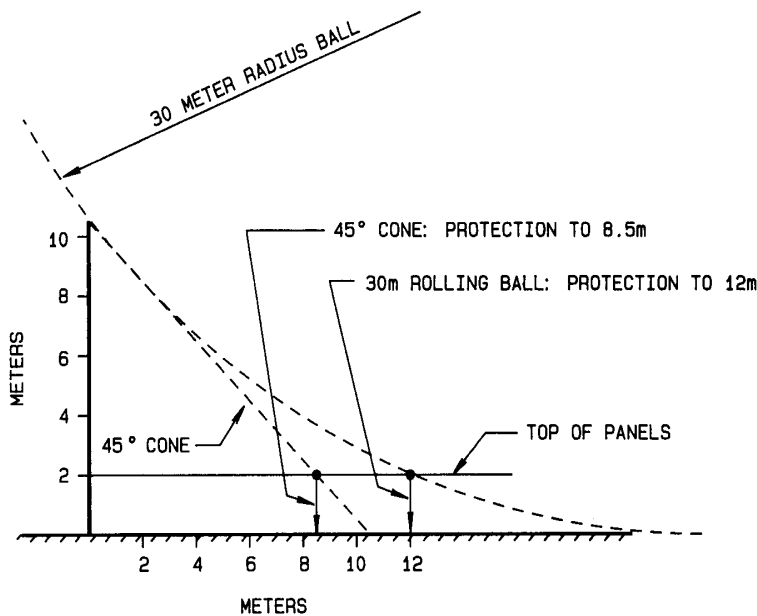


Figure 3-6. Cone-of-protection and rolling-ball criteria

edges, as it would require the lower panel brace plus the panel edge to become involved. While this path may still be somewhat involved, the major part of the current should only involve the upper half of the panel, a situation which is not reflected in the more or less even (or random) distribution of the damage observed on both upper and lower halves of the long edges of the modules.

3.5.3 Direct versus consequential effects

In the absence of definitive knowledge on the direct effect of a lightning current involving a module, only conjectures can be made on the failure mode of the panel. As discussed in the preceding paragraph, the presence of damage at the lower half of the panels is somewhat contradictory to the hypothesis of all the damage being done by the lightning current. This contradiction adds weight to the argument (also presented in the case of the Vulcano incident), that the observed damage may be the result of a dc fault current occurring after an initial insulation breakdown caused by an indirect lightning overvoltage induced in the dc circuit. The insulation breakdown would occur at the point of lowest withstand, not necessarily in the upper half of the panel, and the ensuing dc fault would proceed along the edge as the blowtorch effect associated with the high temperatures of the dc arc, lingering at the fault, would cause burning along the edges, similar to what was observed.

On the other hand, the extent of the damage in the E2 B5 box (Photographs 3-10 and 3-11) appears to be greater than what could be expected from the dc current alone. Damage caused by the occurrence of a lightning surge current is a more likely scenario in this case.

3.5.4 Mechanical effects

The top glass cover plates of the damaged modules generally had several cracks, but do not have the frosty appearance associated with the

tempered glass used in the Vulcano module. This difference may provide some clue about the sequence of the scenario, if it could be correlated with the mechanical characteristics of the glass. Damage to the glass during dc faults has been reported in the United States. However, no further detailed information is available in either case to pursue this line of thought. This subject could be part of a test program aimed at finding failure modes of PV modules related to dc faults and lightning (both direct and indirect).

3.5.6 Integrity of the grounding system

The grounding system has been implemented with galvanized steel conductors, in keeping with the standard German practice where concerns over cathodic corrosion have steered designers away from copper. In the salty environment of an island, questions may be raised on the long-term integrity of buried galvanized steel conductors. Even in the dry environment of the array footings, some signs of corrosion are apparent (Photograph 3-40).

3.6 Specific Conclusions from the Kythnos Case

The observed damage to the panels cannot be conclusively attributed to a direct lightning strike. The six reported incidents might involve a combination of effects, with one case involving a direct strike, and the others being an indirect effect. In other words, the evidence that might point to invalidating a particular scenario might not apply to the scenarios of other incidents. The surge-protective devices provided at the site performed well since no damage was inflicted to the electronics. Failure of one surge arrester in the performance of its protective duty can be viewed as the ultimate sacrifice of the device fulfilling its mission – but it raises the question of monitoring for failure of protective devices.

4. General Discussion

4.1 To protect or not to protect ?

The debate on whether to provide protection by air terminals or suffer the consequences of a direct strike is not settled by these case histories. In spite of the presence of air terminals at Kythnos, damage occurred. This damage may be a direct effect, or may be an indirect effect, or a combination of both. At Vulcano, with no air terminals, only one case of lightning-related damage has occurred, and this single case may be an indirect effect rather than a direct effect. Indirect effects are not eliminated by air terminals. A better argument could be made if a firm conclusion were reached on whether the damage was a direct or indirect effect.

If the damage is attributed to direct effects, then the conclusion is that the air terminals, at the spacing and height used at Kythnos, were ineffective. However, precisely because air terminals were distributed perhaps too sparsely, the Kythnos case history does not invalidate protection if it were ensured by appropriate air terminals with adequate height and density.

If the damage is attributed to an indirect effect, then one would argue that the air terminals cannot serve any useful purpose – the counter-argument being that the direct damage would have been even worse than what actually occurred.

4.2 Grounding practices

Differences in grounding practices leave many questions unanswered. On the materials aspects, there is the different approach of using copper or of using galvanized steel. On the circuitry aspects, there is the issue of grounding the dc circuit or leaving it floating (but with a ground fault detection scheme). This latter choice, however, raises questions on the implementation of a ground fault indication which is

available only to local operators. That design may raise concerns in the context of long-term operation where immediate action on a ground fault may not be perceived as important. This postponing of action may then lead to the occurrence of a second fault caused by lightning or by further pollution of insulation, with damage to components at that time.

4.3 Suggestions for further investigations

The ambiguity on the interpretation of the reported damage gives added weight to the desirability of consolidating all available data on panel failure modes, and eventually performing lightning simulation tests, as well as insulation failure (tracking) tests. Evidence from the lightning damage incident that occurred at the photovoltaic installation of the Sacramento Municipal Utility District (SMUD PV1) in California [7] should be compared to the damage observed at Vulcano and Kythnos.

The conjectural scenario of a nearby lightning strike inducing sparkover at points of weak insulation, followed by damage caused by the dc current, could be more credible if knowledge were available on two parameters: (1) dielectric withstand of the insulation between the modules and their frame, under various conditions of contamination, and (2) levels of the overvoltages that could be induced in the circuits. The first parameter would require tests on the actual configurations, and might be impractical in view of the large number of possible configurations. The second parameter might be evaluated by theoretical analysis, such as that reported Stolte [8].

The ambiguity in the post-mortem may be resolved by further study of the failure modes of a panel (module within its frame) under simulated lightning and under dc stress with

surface contamination. The value of such tests would be to determine the need of further protection or design improvements in the panels to avoid damage, or to better understand the mechanism of the failure in order to settle the dilemma on the exact scenario leading to the observed damage. Ultimately, the knowledge would also provide the basis for an informed decision on the cost-effectiveness of air terminals.

5. General Conclusions

The two case histories presented in this report demonstrate that it is possible to provide protection for the power conversion electronics in the face of inescapable lightning strikes to the array field. In several instances, damage was limited to the modules; the surge protective devices performed their function with no damage to themselves. In one instance, damage was inflicted to the surge protective devices, but even while failing, they protected the expensive downstream circuitry. Depending on the point of view, achieving protection at the cost of a failed protective device may be considered successful, while an alternate view might be to expect protection with no sacrifice of the protective device.

The observations made at these two sites, the evidence collected before the visits, and the preceding discussions lead to a set of conclusions, some still in the form of conjectures, some in the form of firm conclusions. Furthermore, implementation of the recommendations presented here may validate the conjectures and elevate them to the status of firm conclusions. A most important point to bear in mind, however, is that the unpredictability of lightning occurrences make it a risky business to draw sweeping conclusions based on only a few years of observation [6].

Protection against lightning damage to the array modules is a more difficult and less clear-cut issue than operation and survival of protective devices incorporated in the circuit:

- First, there is still some ambiguity in attributing all of the observed damage either to a direct effect of lightning, or to an indirect effect.
- Second, there is no sufficient evidence and long-term data on the effects and costs of a

presumed direct strike to rule out air terminals, although their cost-effectiveness appears questionable.

5.1 Conjectural conclusions

A likely scenario to explain the observed effect is a combination of lightning-induced overvoltages with low insulation withstand. This low withstand may be an inherent limitation of the photovoltaic module layout, or may be the result of pollution or moisture.

The evidence at Vulcano tends to point away from a simple direct lightning strike because the reported damage was limited to the lower part of the array. However, no direct inspection of the failed module was possible in this case.

The overvoltages associated with the one incident at Vulcano were successfully suppressed as no damage was inflicted to either the surge suppressor themselves, the first line of defense, or to the power conversion electronics, the potential victim equipment. However, since the amplitude of the lightning stroke in that incident is not known, the conclusion should not be that protection has been achieved for any level of severity.

The effectiveness of lightning rods appears questionable in view of the several incidents at Kythnos. However, a higher density of rods, or greater height, might have reduced the damage. Nevertheless, the scenario of possible damage by indirect effects leaves in doubt the justification for the expense and disadvantages of providing lightning rods.

5.2 Firm conclusions

The one obvious conclusion, not unexpected, is that lightning does represent a threat to photovoltaic arrays, either by direct damage or by indirect damage.

Good evidence has been provided that surge-protective devices with appropriate ratings (coordinated protection with the equipment to be protected, adequate surge current handling capability, and not excessively low clamping voltage for the systems voltage conditions) can protect the electronic equipment.

The one case of failure of a surge protective device that occurred shows that with suitable failure mode (i.e., short-circuit), protection of the electronics can be obtained for the first incident. However, if the protective devices are associated with fuses, as in the case of Vulcano, failure of the protective device would result in blowing the fuse and, unless an indication of that situation were provided, the equipment would then be left unprotected for the next occurrence.

5.3 Recommendations

The ambiguity in attributing the damage to a direct lightning strike may be reduced if the suggestions proposed in this report for simulated lightning tests and study of failure modes were implemented:

- Establish a common, world-wide data base summarizing all observations of documented or suspected lightning damage to panels.
- Establish a common, world-wide data base summarizing all observations of damage to surge protective devices
- Establish a common, world-wide data base summarizing all observations of documented dc insulation faults on panels.
- Perform laboratory simulation of lightning attachment to panel frames and to module surfaces.

In view of the prevalent practice, with apparent success, among European designers of not grounding the dc system, the quasi-axiomatic

practice by U.S. designers of multiple-point grounding should be re-examined, and a dialogue initiated between the two parties.

Operating procedures associated with the occurrence of the first fault in an isolated dc system should be reviewed and clearly defined.

An intriguing although not crucial question is that of the nature (and thus cost) of the materials used for the ground grid. The Italian practice calls for copper, while the German practice applied in Kythnos calls for galvanized steel. The question of copper versus galvanized steel in this context should be re-examined by specialists of cathodic protection schemes.

6. Acknowledgements

The two site visits described in this report were made possible by the cooperation and hospitality of A. Previ and V. Messina of ENEL, and of J. Chadjivassiliadis and A. Grielas of Public Power. T.S. Key provided insights in reviewing the draft of this report. Funding for this project was provided by the Sandia National Laboratories for the U.S. Department of Energy.

7. References

- [1] Previ, A., "The Vulcano Project," *Int. J. Solar Energy*, 1985, Vol 3, pp 124-141.
- [2] Cianos, N. and Pierce, E.T. "*A ground-lightning environment for engineering usage.*" Stanford Research Institute, Menlo Park, Ca, 1972.
- [3] Martzloff, F.D., "Matching Surge Protective Devices to their Environment, " *IEEE Transactions*, Vol IA-21, No.1, January/February 1985.
- [4] Shirakawa, S., F. Endo, H. Kitajima, S. Kobayashi, and K. Kurita, Maintenance of Surge Arrester by a Portable Arrester Leakage Current Detector," *IEEE Transactions*, Vol PD-3, No. 3, July 1988.
- [5] NFPA 78 "*Lightning Protection Code*," National Fire Protection Association, Boston, MA, 1986.
- [6] Golde, R.H., "*Lightning Protection*," Chemical Publishing Company, New York, NY, 1975.
- [7] Collier, D.E., and Key, T.S., "Electrical Fault Protection for a Large Photovoltaic Plant Inverter," *Proceedings, 20th IEEE Photovoltaic Specialist Conference*, September 1988.
- [8] Stolte, W.J., "*Photovoltaic System Grounding and Fault Protection Guidelines*," Contractor Report SAND83-7025, National Technical Information Service, 1985.

U.S. DEPT. OF COMM. BIBLIOGRAPHIC DATA SHEET <i>(See instructions)</i>	1. PUBLICATION OR REPORT NO. NISTIR 89-4113	2. Performing Organ. Report No.	3. Publication Date JUNE 1989
4. TITLE AND SUBTITLE Lightning and Surge Protection of Photovoltaic Installations Two Case Histories: Vulcano and Kythnos			
5. AUTHOR(S) Francois D. Martzloff			
6. PERFORMING ORGANIZATION <i>(If joint or other than NBS, see instructions)</i> U.S. DEPARTMENT OF COMMERCE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY GAITHERSBURG, MD 20899		7. Contract/Grant No. 8. Type of Report & Period Covered	
9. SPONSORING ORGANIZATION NAME AND COMPLETE ADDRESS <i>(Street, City, State, ZIP)</i> Sandia National Laboratories Albuquerque, NM 87185-5800			
10. SUPPLEMENTARY NOTES ☐ Document describes a computer program; SF-185, FIPS Software Summary, is attached.			
11. ABSTRACT <i>(A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here)</i> Two installations of photovoltaic systems were damaged during lightning storms. The two sites were visited and the damaged equipment that was still available on the site was examined for analysis of the suspected occurrence. The evidence, however, is insufficient to conclude that all the observed damage was caused by the direct effect of a lightning flash. A possible scenario may be that lightning-induced overvoltages caused insulation breakdown at the edges of the photovoltaic modules, with subsequent damage done by the dc current of the array. Other surge protection considerations are also addressed, and suggestions presented for further investigations.			
12. KEY WORDS <i>(Six to twelve entries; alphabetical order; capitalize only proper names; and separate key words by semicolons)</i> lightning; photovoltaic; surge; varistors			
13. AVAILABILITY ☒ Unlimited ☐ For Official Distribution. Do Not Release to NTIS ☐ Order From Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. ☒ Order From National Technical Information Service (NTIS), Springfield, VA. 22161			14. NO. OF PRINTED PAGES 76 15. Price \$14.95

Donna Mayfield

From: rickschwartzman@comcast.net
Sent: Thursday, March 7, 2019 1:05 PM
To: Thomas G. Benton; Chris Yakabouski; Kevin Marshall; Timothy J. McLaughlin; David Ross; Paul D. Trampe; Gary Skinner
Cc: Wanda Parrish; Samantha Horton
Subject: Mr. Leming has exposed a Zoning "Trap" you must avoid -- I wish to have my letter entered into the public record

I wish to have my letter entered into the public record

Dear Mr. Trampe and Board Members,

Please see the letter from Mr. H. Clark Leming to Mr. Paul D. Trampe, Chairperson, Spotsylvania County Board of Supervisors, dated February 25, 2019.

[Legal Opinion from Clark Leming for CCSC 25Feb2019](#) .

This letter has many merits that I hope have your attention, but I draw you specifically to the paragraph entitled, "Consistency with the Adopted Comprehensive Plan" and more specifically to the discussion of the ramifications of the Comprehensive Plan Compliance Review pursuant to Virginia Code Section 15.2-2232.

Bottomline: For the Board of Supervisors to retain control of the County's zoning future regarding solar facilities, the Board must OVERRIDE the Planning Commission's determination that all three sPower applications are in accordance with the adopted Comprehensive Plan.

I have decomposed several of Mr. Leming's points to clearly layout the consequences of the Board of Supervisor's determination of compliance with the adopted Comprehensive Plan. You will see that an enduring zoning "trap" relative to solar plants faces Spotsylvania County unless you act to reverse the Planning Commission's finding.

Extracted from the letter:

- The staff and, by extension, the Planning Commission, is statutorily charged with making a determination as to whether the project is in accordance with the adopted Comprehensive Plan.
- [The solar project] is not indicated anywhere on the Comprehensive Plan Map.
- The Board HAD the option of amending its plan, and specifically its Map, to identify particular portions of the County where a solar power plant might be compatible with adjacent uses.
- INSTEAD the Board adopted narrative that fails to address the specific location issue and suggests that a solar plant could be located virtually anywhere in the County in an agricultural zoning district.
- The Planning Commission has now made specific determinations, pursuant to its statutory authority that a solar power plant is substantially in accordance with the adopted Plan in all three sPower proposed locations.
- If the three varied sPower locations are all in accord with the adopted Plan... FLOODGATES OPEN...the Planning Commission would have to make similar determinations anywhere within the agricultural zoning district.

Mr. Leming completes his discussion addressing decisions before the Board, and the consequences thereof:

- At this juncture the Board has the authority under Virginia Code Section 15.2-2232 to review the Planning Commissions determinations and overrule or affirm them.
- Even though the Special Use Permit requirements include a finding by the Board of substantially in accord with the adopted Plan, any Board consideration of the Comprehensive Plan Compliance issue must occur in the context of and in the Board's review capacity of the Planning Commission determinations.
- Otherwise, the Planning Commissions determinations stand and have the weight of Virginia statutory authority that cannot be over ridden by a separate board determination independent of the statute.

Quite simply, Gentlemen, for the Board to retain control of the County's zoning future regarding solar facilities, the Board must overrule the Planning Commission's determination that all three sPower applications are in accordance with the adopted Comprehensive Plan, effectively stating that and, I quote Mr. Leming once again, "-- the proposed solar plant is not anticipated by the adopted Plan and specifically, is not shown or implied as a feature on the adopted Map, which governs location of the items designated by the statute."

Correspondingly, please vote to deny all three sPower Applications.

Richard A. Schwartzman

Livingston District

--

This email was Malware checked by UTM 9. <http://www.sophos.com>

Donna Mayfield

From: Paulette Mann
Sent: Monday, March 11, 2019 10:33 AM
To: Wanda Parrish
Subject: Fwd: Solar
Attachments: Dirty Little Secret.png; Dirty Little Secret.png

Sent from my iPhone

Begin forwarded message:

From: "Michael Medina" <spotsysalem@gmail.com>
To: "Paulette Mann" <PMann@spotsylvania.va.us>
Subject: Fwd: Solar

Sent from my iPhone

Begin forwarded message:

From: "Michael O'Bier" <obierplumbing@yahoo.com>
Date: March 10, 2019 at 1:42:53 PM EDT
To: Kevin Marshall <kmarshall@spotsylvania.va.us>, "spotsysalem@gmail.com" <spotsysalem@gmail.com>, "bos@spotsylvania.va.us" <bos@spotsylvania.va.us>
Subject: Solar
Reply-To: "obierplumbing@yahoo.com" <obierplumbing@yahoo.com>



This is what you will be letting in spotsylvania county
Michael Obier

[Sent from Yahoo Mail on Android](#)



--

This email was Malware checked by UTM 9. <http://www.sophos.com>

Donna Mayfield

From: Joanne Booth <jcbooth77@verizon.net>
Sent: Friday, March 8, 2019 6:51 AM
To: Thomas G. Benton; Chris Yakabouski; Kevin Marshall; Timothy J. McLaughlin; David Ross; Paul D. Trampe; Gary Skinner; Aimee Mann; Wanda Parrish; Paulette Mann; Patrick White; concernedcitizensspotsylvania@gmail.com
Subject: Please vote NO on this solar project

I write again to all of you on the Spotsylvania Board of Supervisors, asking, begging, and pleading with you to remember your constituents and VOTE NO on the solar power plant as it is currently written.

This resident of Chancellor Meadows Lane is not "nobody." However, the longer and longer and longer this drags on, with corporate pressure from SPower and misrepresentation by both the media and the applicants, the more threatened and angered I become. And I know for a fact I am not alone.

Yes, I remember that 4-wheeler many times riding in the woods that have been timbered. I am a neighbor.

The division and strife this has brought to what was once a peaceful, country community is grievous. I never realized any of that in all my years working with my desk in Spotsylvania Health Department – 17 years with VDH in Rappahannock Area Health District, 15 years based in Spotsylvania. But much apparently has changed in these past 10 years since I've changed careers.

May I suggest we citizens have 6 rights to solar plant administration: the right land, the right plan, the right size, the right location, the right construction, and **the right to refuse!**

VOTE NO to this super-sized project without any more delay! Get the right-sized project in the right location...site A and an entire project including 6350 acres is not right.

Respectfully submitted:

Joanne C Booth, MSPH Nutrition, BS biology, AAS Nursing
Renal Dietitian and Registered Nurse

--

This email was Malware checked by UTM 9. <http://www.sophos.com>

Donna Mayfield

From: Dave Hammond <davehammond@gmail.com>
Sent: Thursday, March 14, 2019 12:00 AM
To: Wanda Parrish
Subject: Re: sPower report by Dr. Fthenakis

Wanda -- thanks. Yes, I agree that this is the report that Dr. Fthenakis was quoting from. There is nothing new in this report about the tornado that hit Desert Sunlight - a couple of paragraphs reported 4 months after the incident. NextEra, one of the owners of the site, reported the number of panels was 170,000 in December, 2015, so the quoted sources in this report did not have the final figures.

Dave

On Wed, Mar 13, 2019 at 3:36 PM Wanda Parrish <WParrish@spotsylvania.va.us> wrote:

Dave. I believe he referred to this one that was published March 8th. Not by Dr. Fthenakis, but by VA Tech. Does this sound right?

Wanda

From: Dave Hammond [mailto:davehammond@gmail.com]
Sent: Wednesday, March 13, 2019 3:24 PM
To: Wanda Parrish <WParrish@spotsylvania.va.us>
Subject: sPower report by Dr. Fthenakis

Wanda - Charlie Payne mentioned that he sent you a new test report by Dr. Fthenakis a couple of days ago. Could you send me a copy (or link) to that report, please?

Thank you,

Dave Hammond

--

This email was Malware checked by UTM 9. <http://www.sophos.com>

Donna Mayfield

From: Wanda Parrish
Sent: Friday, March 8, 2019 3:35 PM
To: Sean Fogarty
Cc: Dave Hammond
Subject: RE: SUP length

Sean, There is no sunset date contemplated in the Special Use Permit (resolution).

Wanda

-----Original Message-----

From: Sean Fogarty [mailto:sfogarty77@verizon.net]
Sent: Friday, March 8, 2019 3:20 PM
To: Wanda Parrish <WParrish@spotsylvania.va.us>
Cc: Dave Hammond <davehammond@gmail.com>
Subject: SUP length

Wanda,

We can't locate anything in the SUPs that sets a project life for the sPower proposals. It must be there somewhere but we can't find it. Their decommissioning plan says 35 years and the attached Conceptual Cost Estimate says 25 years. Their fiscal analysis (Mangum) is for 40 years. However, none of those documents are part of the SUP anyway so it's unclear if the SUP's have a sunset date or is the SUP unlimited in length? Thanks,

Sean

--

This email was Malware checked by UTM 9. <http://www.sophos.com>

Donna Mayfield

From: Richard Genaille <richardgenaille@gmail.com>
Sent: Wednesday, March 6, 2019 11:01 PM
To: Paul D. Trampe; Thomas G. Benton; Chris Yakabowski; Kevin Marshall; Timothy J. McLaughlin; David Ross; Gary Skinner
Cc: grenewpc@gmail.com; 2012sheriffsmith@gmail.com; berkeleymaddox@gmail.com; spotsysalem@gmail.com; Wanda Parrish
Subject: Thank You \$Power and Charlie Payne for Proving Concerned Citizens' Points
Attachments: attachment 1.pdf; ATT00001.txt

Honorable Supervisors,

\$Power's/Mr Payne's presentation to the BoS on February 26 includes several overhead photographs of solar fields located in close proximity to residential areas and schools. (See attached) The first two photos show homes crammed together on small lots right across the street from a solar facility. The other photos show homes and schools 85 to 150 feet away from solar facilities of various sizes with no visual or sound buffers.

My immediate reaction to the photos was OMG! Is this really the model for solar development \$Power and Mr Payne are advocating for our future here in Spotsylvania? Apparently, it is. In a January 8, 2019 letter to the County, Mr Payne concludes that "What remains is for the County and its citizens to recognize the great economic and fiscal boon a solar facility would bring to the area and to recognize their responsibility to help contribute to the creation of sustainable energy". The message in this arrogant statement is that \$Power and Mr Payne know what is best for Spotsylvania residents. And what's best includes accepting a lower standard of living if necessary to support development of renewable energy.

It stretches \$Power's and Mr Payne's credibility to the breaking point to imply the people living in the houses shown in the photos are happy with their situation. I highly suspect the citizens in those areas are not happy with local government officials for failing to look after their best interests.

Spotsylvania County residents who live on or near the boundaries of the proposed solar sites are fortunate Concerned Citizens have focused County attention on numerous issues that could adversely impact their lives and property. Otherwise, what happened to the communities shown in the \$Power photos would be replicated in Spotsylvania.

My response to a future where urban sprawl competes with solar fields for the remaining open space in our community is a resounding NO THANKS! The BoS response should be the same.

Richard Genaille
Livingston District

--

This email was Malware checked by UTM 9. <http://www.sophos.com>

SPower Solar Facility

SUP Proposals SUP18-0001, -0002 & -0003

Who is sPower?

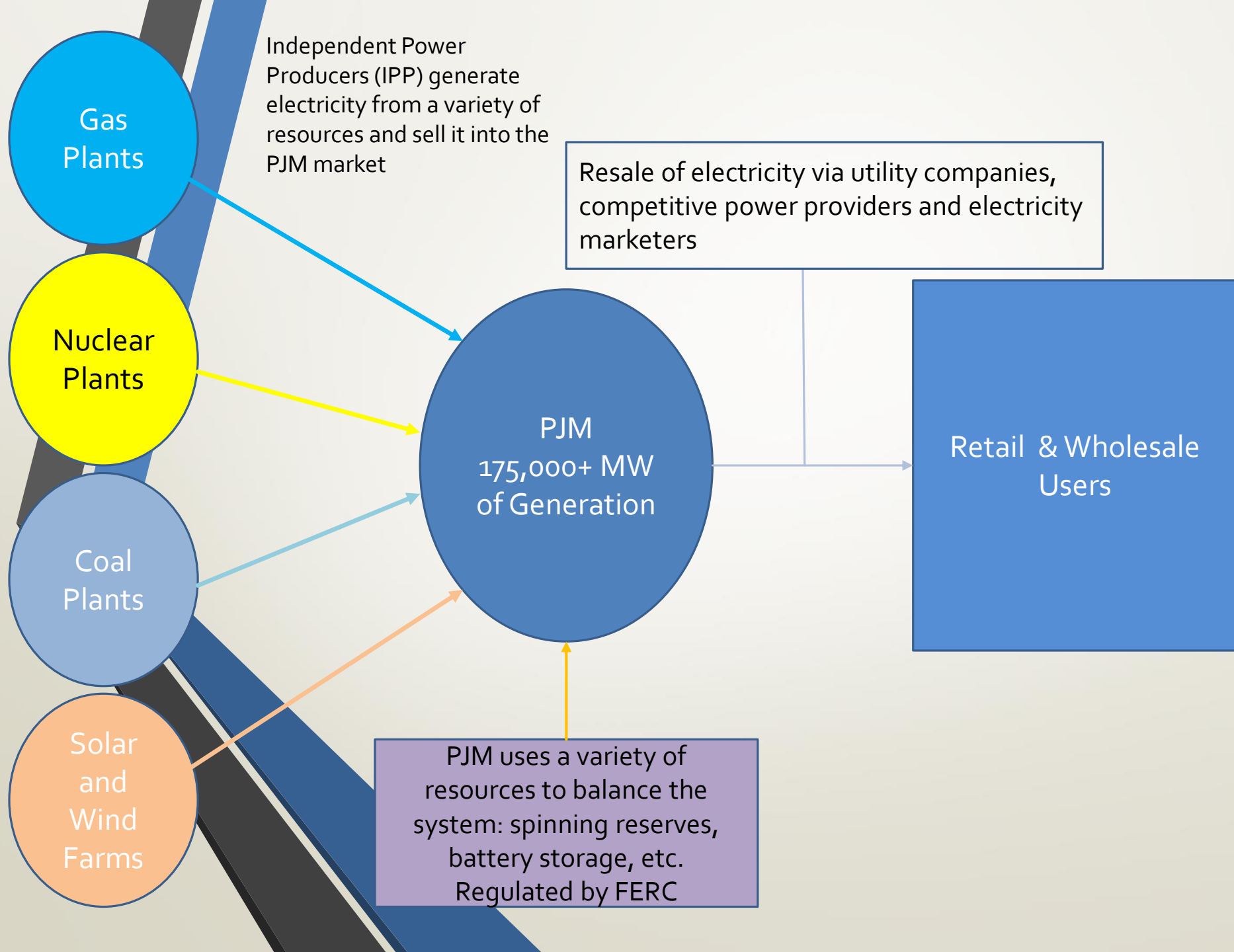
- A leading independent power producer (IPP) of solar facilities
- Owns and operates more than 150 utility systems in 12 states
- Owned by two major companies:
 - AES Corp. [Fortune 250 Energy Company]
 - Alberta Investment Management Corp (AIMCo)
- Headquartered in Salt Lake City, with offices in San Francisco, Long Beach, Richmond, and Spotsylvania
- Long term power supply contracts with Microsoft, Apple and University of Richmond

What is the Project?

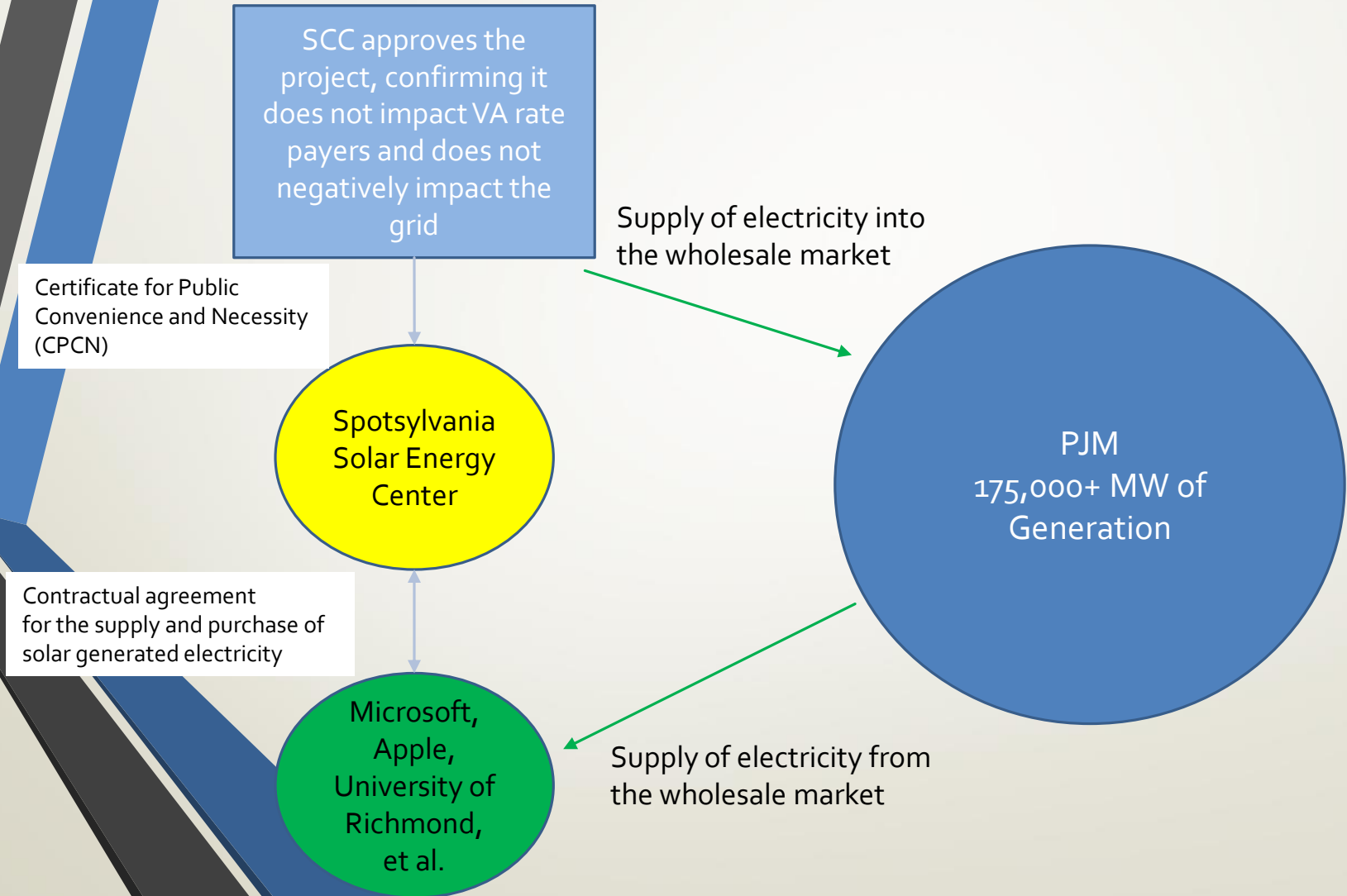
- A 21st century, innovative 500MW (AC) solar energy facility (new industry).
- The total area in the permit application is 6,350 acres:
 - 3,500 acres for the solar power plant; and
 - Over 2,800 acres will be undeveloped open space.
- Will utilize photovoltaic (PV) solar panels on a single-axis tracker system.
- Property was selected due to its rural location, available and relatively contiguous open acreage and proximity to the existing adjacent Dominion Substation (est. infrastructure).
- By-right zoned A-3: approximately 250 single family homes.
- Current Use: silviculture activities. Future Use?

SCC Approval

- SCC issued a certificate of public convenience and necessity on August 8, 2018.
- The SCC report found that the Project:
 - Will have no adverse effect on reliability of electric service nor impact consumer rates.
 - Will likely generate direct and indirect economic benefits to Spotsylvania County and the Commonwealth.
 - Will comply with all necessary federal, state and local environmental permits.
 - Is not “contrary to the public interest”.



Wholesale Market



Livingston Substation



Livingston Substation



Economic Development Benefits

- **SCC (SCC Approval):** Project will likely provide direct and indirect economic benefits to the County
- **Mangum Economics:** Project could aid in attracting high-tech industries to Spotsylvania County - 78% of Dominion's renewable generation is partnerships with data centers
- **John Warren --Virginia's DMME Director (letter to BOS):**
"Projects such as the one planned for your county have the dual effect of enabling the solar industry to grow and mature in Virginia, but also serve as one of the most effective business attraction tools for many large corporate prospects seeking sites for new operations or expansion."

Economic Development Benefits

- **Barry DuVal, President & CEO of Virginia Chamber of Commerce (op-ed FLS):** “An important element to the Commonwealth’s economic competitiveness is energy diversity. Put more simply: as corporate and consumer demand for solar energy increases, so must our ability to meet this demand in order to be an attractive state for future economic development and job creation”
- **Chris West, Executive Director for Conservatives for Clean Energy (op-ed FLS):** “This project is a huge opportunity for Spotsylvania County to generate new revenue, lead in the renewable energy space, and bring a good corporate partner to the area. In our view, this a very positive opportunity for Spotsylvania and the commonwealth as a whole.”
- **Mark Bozigian (retired), former City Manager of Lancaster, CA:** “sPower’s \$1.5 billion investment in Lancaster has had a profound direct and indirect economic impact, including supporting 700 construction employees for the last three years and creating 50 full time permanent jobs. Tax revenue to Lancaster increased dramatically and our local businesses continue to be benefactors of their investment in the area.”

What's in it for the County?

- Initial Economic Output (during 2 years of construction):
 - 843 FTEs
 - \$45.8 million in employment income
 - \$110 million in economic output
- Operational Economic Output:
 - 34 FTEs (avg. salary approximately \$95k)
 - \$2.5 million in employment income (annually)
 - \$164 million in economic output (during life of the project--\$4.7 million annually)
 - Top 10 County taxpayer

What's in it for the County?

- Taxes:
 - Over \$17.6 million in direct total tax revenues generated through the life of the project vs. current taxes generated from the site which are approximately \$17,000 annually (yielding approximately \$754,000 over 40 years).
 - 2,231% increase in tax revenues.
 - 1st year alone of projected tax revenues will generate approximately \$1.4 million in tax revenues (property tax plus \$579,000 in estimated rollback tax). #2 taxpayer in county.
 - Plus \$3.5 million in state and local tax revenue from one-time pulse associated from construction activity.
 - No County incentive requirement but return is significant with minimal to zero impacts to services.
- Community Investment. As part of s Power's corporate partner program, will invest another \$25 million in County priorities over the life of the project, including assisting the County in reducing its electricity cost by approximately \$1.5 million per year.

What's in it for the County?

- Will pay for 50% of the costs to construct an improved waterline within Fawn Lake community (See Ex. D of staff report --improve fire flow, capacity and pressure; and eliminate need for groundwater use) > + for public safety and sustaining property values
- Two 50,000 gallon water tanks which will assist with fire suppression in the immediate area
- Partnering with Verizon to locate a new cell tower on the site to benefit wireless users in the immediate area
- Continued support for public schools and institutions for higher learning
- Strong economic development partner with the County to assist in attracting new companies to the County, including technology, datacenter developers and manufacturing
- Preservation of over 2,800 acres of land and elimination of new housing development expansion in the subject area

What about Impacts of:

- **Heat Island? No impact.** A heat island effect would not occur at this location due to Virginia's climate, rate of heat attenuation, extensive amount of vegetation surrounding the site, and cooling temperatures at night. Heat Islands are not typical in vegetative agricultural land areas.
- **Dangerous Solar Panels? No Impact.** All panels for this project are safe and EPA compliant. Staff & county consultants concur
- **Property Values? No Impact.** Our expert provides that extensive research and interviews with experts regarding solar facilities demonstrates there is no support for any negative influence from solar farms to neighboring property values.
- **Groundwater? No Impact.** Project will utilize 100% public water and after construction water usage will be low.
- **Burning? No impact.**
- **Cost to County Taxpayers? No impact** (i) No tax incentives, (ii) little to no impact on county services & (iii) over life of the project extensive net gain of \$46 million in direct tax revenues and dedications; \$274 + million in economic output; \$145 million in employment income and 800 + jobs; and new economic development opportunities.

What is Decommissioning?

- Decommission plan includes all costs to remove solar equipment and return the site to its pre-existing condition after the facility has exhausted its reasonable use (40 + years).
- Updated every two (2) years during the life of the project (most jurisdictions it's 5-10 years).
- Includes corporate guarantee bonding requirements.
- In approximately 40 years or more, the Project will be decommissioned and returned to its previous land use.
- Decommissioning typically includes (net) salvage value of the assets as typically the salvage value is greater than the cost to decommission.
- Remember that the assets will remain valuable through the entire life of the project meaning little to no risk that the facility will not fully operate well through its expected lifespan.

Salvage Value

	Qty	Unit	Salvage Value
Remove & Recycle Substation Step Up Transformer	6	EA	(\$1,800)
Remove & Recycle Substation Disconnect Switches	12	EA	(\$720)
Remove & Recycle Substation Circuit Breakers	12	EA	(\$3,600)
Remove & Recycle Substation Pedestals	18	EA	\$441
Remove & Recycle AC Conductor	518,189	LF	\$652,918
Remove & Recycle Conduit	77,730	LF	\$97,940
Remove & Recycle Switchgear Assemblies	1	LS	(\$12)
Remove & Recycle Inverters & Xfmrs	169	LS	(\$15,654)
Remove & Recycle DC Conductor	9,694,572	LF	\$446,340
Remove & Recycle Photovoltaic Modules	1,615,762	EA	\$8,175,756
Remove & Recycle Support Assemblies	23,588	EA	\$9,075,893
Remove & Recycle W6 x 7 x 11' Foundations	214,585	EA	\$2,284,311
Remove & Recycle W6 x 9 x 11.5' Foundations	45,148	EA	\$646,017
Remove & Recycle W6 x 12 x 9' Foundations	22,574	EA	\$337,052
Remove & Recycle W6 x 20 x 11' Foundations	2,704	EA	\$82,242
Remove & Recycle W6 x 7 x 11' Foundations	19,235	EA	\$204,761
Remove SCADA and Met Stations	25	EA	(\$300)
Total Value of Salvage Material			\$21,981,586

- Material and salvage unit costs have been based on historical data for this type and size of project, and RSMeans Construction Cost Databases modified for scale and location.

- Final Salvage Value subject to change based on Final Site Design

- Estimate is based on a: current recycled steel value of \$276.5 per ton;
current 'clean' recycled aluminum value of \$0.455 per pound;
current 'dirty' recycled aluminum value of \$0.32 per pound;
current recycled copper value of \$1.465 per pound;
recycled glass value of \$0.07 per pound; and
electronic disposal waste fee of \$0.30 per pound.

Comp Plan

- Planning Commission and staff found all three projects are in substantial accordance with the comp plan.
- The use is complementary to County Ag and Rural area uses (added Solar this past May 2018 as guiding principle and policy and economic development within the proposed area).
- Project is ideal for a rural area due to its low impact including being quiet, buffered, low traffic, and modest maintenance and operation activities.
- Project is near a Dominion substation--so natural fit for the use and area plus no need for extensive transmission lines or new infrastructure in the area (e.g. ROW).
- Extends public nature trails in the area and protects natural and historic resources.

Comp Plan

- Adds to the commercial tax base (e.g. 30% goal) without impact to county core services or other impact to property values.
- Project creates long-term economic benefits by providing more opportunities for tech and industrial base industry to locate in the County.
- Project is designed in a manner to mitigate any impacts to our neighbors, including screening, setbacks, and the use of public water vs. groundwater.
- Project meets Commonwealth of Virginia (bipartisan support) renewable energy goals and priorities (5,000 MW by 2023).
- Protection of environmental resources (2800+ ac).
- Maintains acceptable transportation LOS long-term.

Construction

- See Staff Conditions Section B (24 conditions plus incorporation of plans & applicable state and local codes).
- Begin in Spring of 2019 and be completed by 2020.
- Employ approximately 800 (**local employment focus**), including tradesman like electricians, site contractors, landscapers, mechanics, heavy equipment operators, engineers, haulers, construction & waste management to security guards, technicians, and others (\$45 million in immediate employment dollars).
- Simple process of clearing and installing the panels and associated equipment.
- Construction work hour restrictions.

Transportation

- Traffic management plan addresses (see Section B of staff conditions—24 conditions):
 - Mitigation measures to avoid peak hour and school traffic periods
 - Restrict times for deliveries and access areas
 - Ridesharing and shuttle options
 - Temporary signage and traffic controls
 - Maintenance of any damaged traffic areas
 - Temporary reduction of speed limits during certain periods and areas
 - Improvements at entrances
 - Final review and approval by VDOT and County.
- Long-term operations will require very few trips and no impacts to LOS.

Operations & Safety

- During operations, Project would be operated and maintained by on-site staff and backed remotely 24/7.
- Facility includes a 24/7 monitored Supervisory Control & Data Acquisition (SCADA) Detection System within all facility structures.
- All structures shall be connected to the common grounding network which will reduce lightning strikes.
- If ever a fault or failure, the facility inverters immediately shut down and cease energy flow.
- Facility does not include flammable gases or liquids like fossil fuel energy generating facilities do. The solar panels themselves are not flammable nor are there flammable materials located near the facilities during operations.

Fire, Rescue & Emergency Management

- Emergency Response & Management Plans (see Staff conditions Section D—21 conditions plus incorporation of plans & applicable state and local codes):
 - Established in consultation with County FIREM
 - One for construction and another for operations
 - 24-7 surveillance of site > see conditions
 - Two 50,000 gallon water tanks on site
 - Consistent with Occupational Safety and Health Administration (OSHA) and Spotsylvania County requirements
 - Addresses emergency access to the site and procedures in the case of an emergency
 - Communication plan and training for all personnel
 - Firebreaks (20 feet) established between arrays, inverters, generation and property boundaries all in consultation with FIREM

Soil Erosion & Sediment Controls

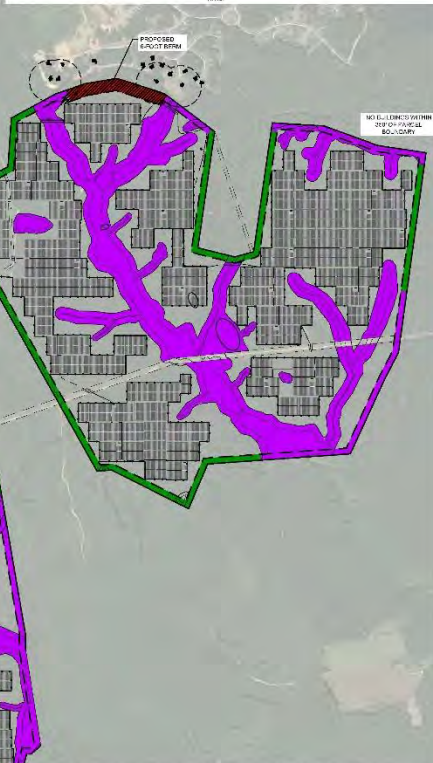
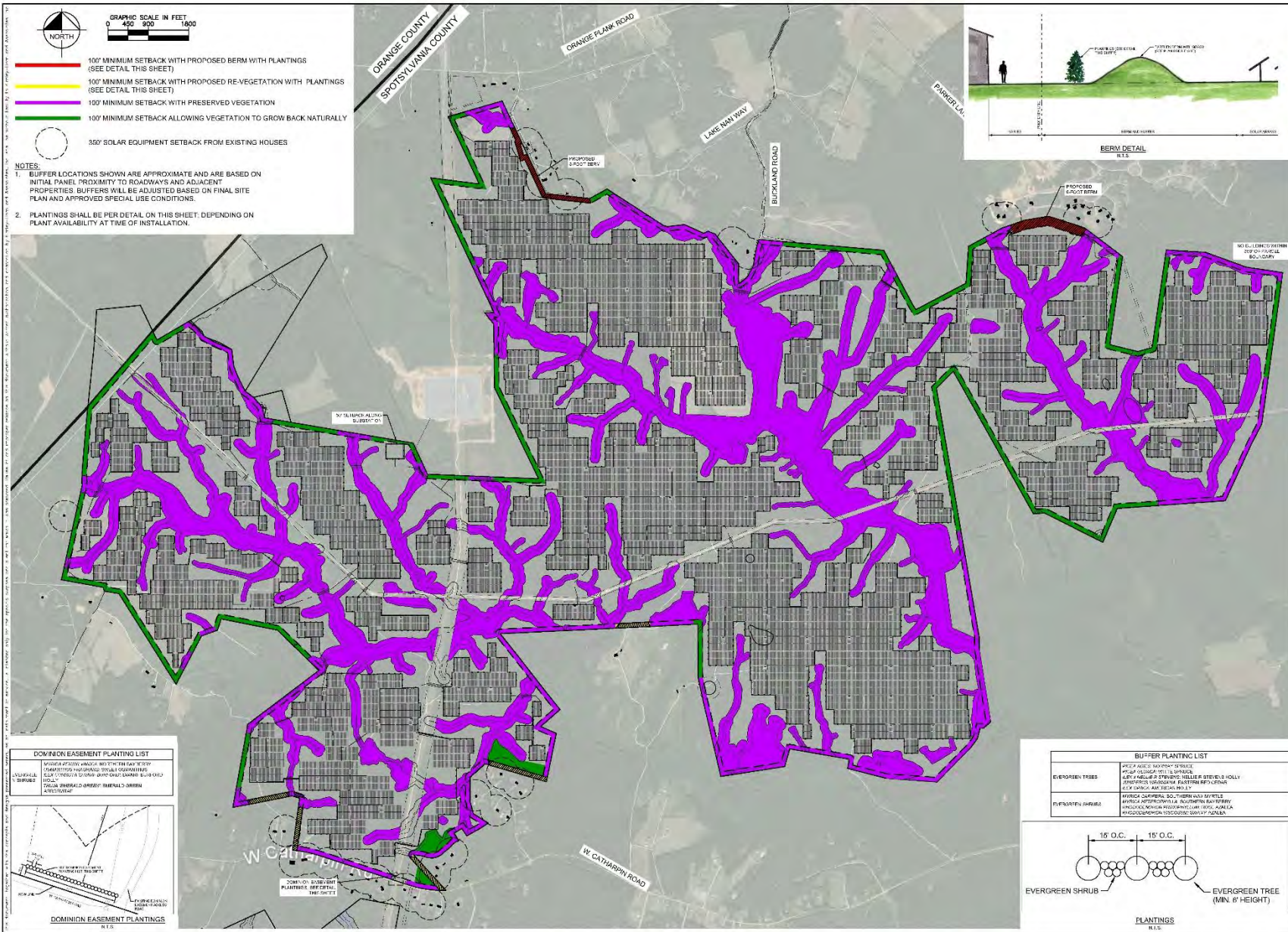
- See Staff Conditions Section C (14 conditions plus incorporation of SWM Plan plus applicable state and local requirements).
- Project includes permanent, innovative stormwater management and soil erosion control measures subject to internal and external scrutiny and inspection.
- County and all applicable State and Federal agencies will maintain regulatory control over the Project.
- Plan includes controlled clearing and immediate stabilizing methods.
- Plan includes series of erosion and sediment control measures to ensure proper runoff controls and treatment.
- Requirement for onsite remediation crews.

Open Space & Buffering

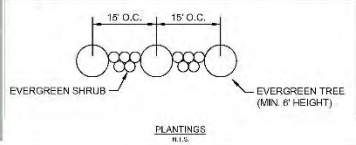
- Approximately 2,800 acres will be open space (including all RPAs)
- Designed to protect environmentally sensitive areas (oversight by DEQ and County)
- Project includes a Landscape, Revegetation & Management Plan

What are the proposed setbacks?

- At least 350 feet from any current residential structure
- Includes a minimum 100 foot vegetation/tree plantings/other landscaping/regrowth buffer
- Plus at least 6 to 8 foot tall berms (shielding) in areas requiring additional screening.



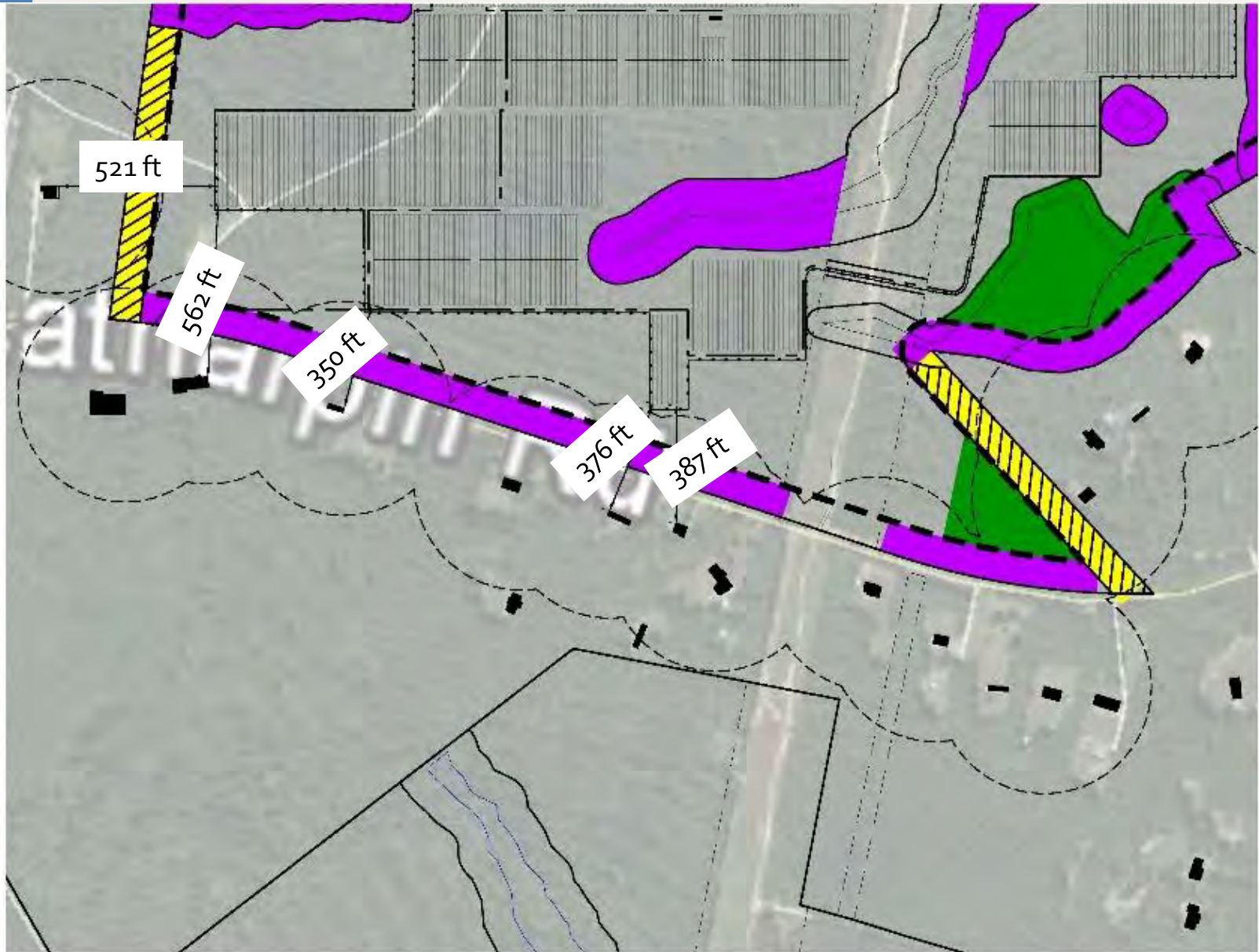
BUFFER PLANTING LIST	
EVERGREEN TREES	PIGEA ACUTE, DOGWOOD, SERVICE BERRY, CALAMAGINTS, SPRUCE AILEY, YACALUA, STYVENS, VALLERIE STEVENS HOLLY JENNYFERN, WILLOWHAM, PARTITION RED CEDAR BLUE PINOAK, AMERICAN HOLY
EVERGREEN SHRUBS	HYDRIC CALIFORNIA, SO-THERN WOOD NUTS ARCTIC INTERCOWLEY, SOUTHERN BAYBERRY PRINCE OF NORON, KINGSBORN, CUC, KUMALA HYDROPHORON, VISCOSUS, SAN V. AZUL



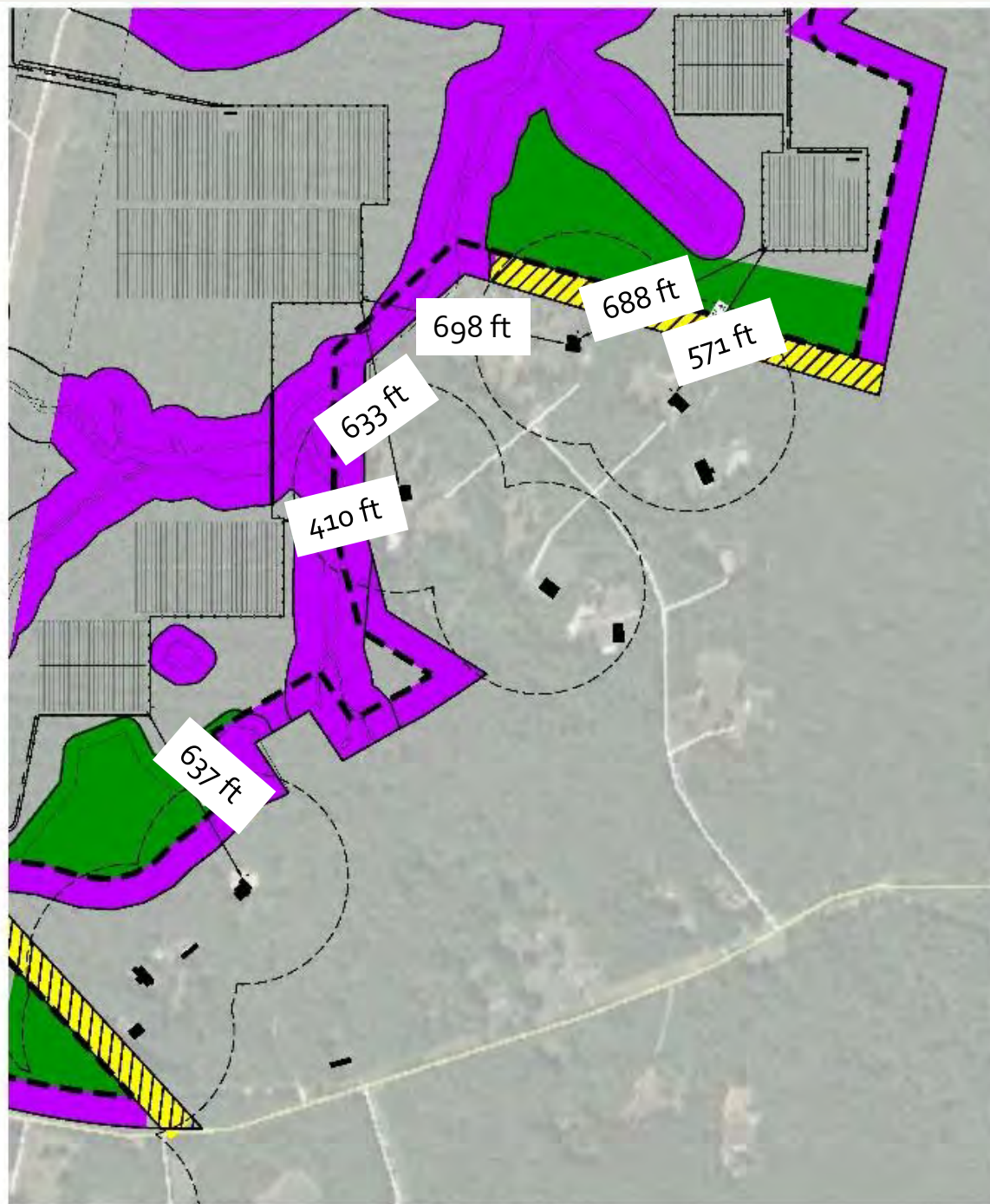
SUP 18-0001 LANDSCAPE AND BUFFER AREA PLAN	SPOTSLYVANIA SOLAR ENERGY CENTER A PREPARED FOR S-POWER	S-POWER AN AES AND AMCO COMPANY 7000 E. 5th Ave. Suite 100 Denver, CO 80231 303.733.4242 303.733.4242	Kimley-Horn 3000 N. 19th Ave. Suite 200 Denver, CO 80202 303.733.4242 303.733.4242	S-POWER AN AES AND AMCO COMPANY 7000 E. 5th Ave. Suite 100 Denver, CO 80231 303.733.4242 303.733.4242
--	--	--	--	--



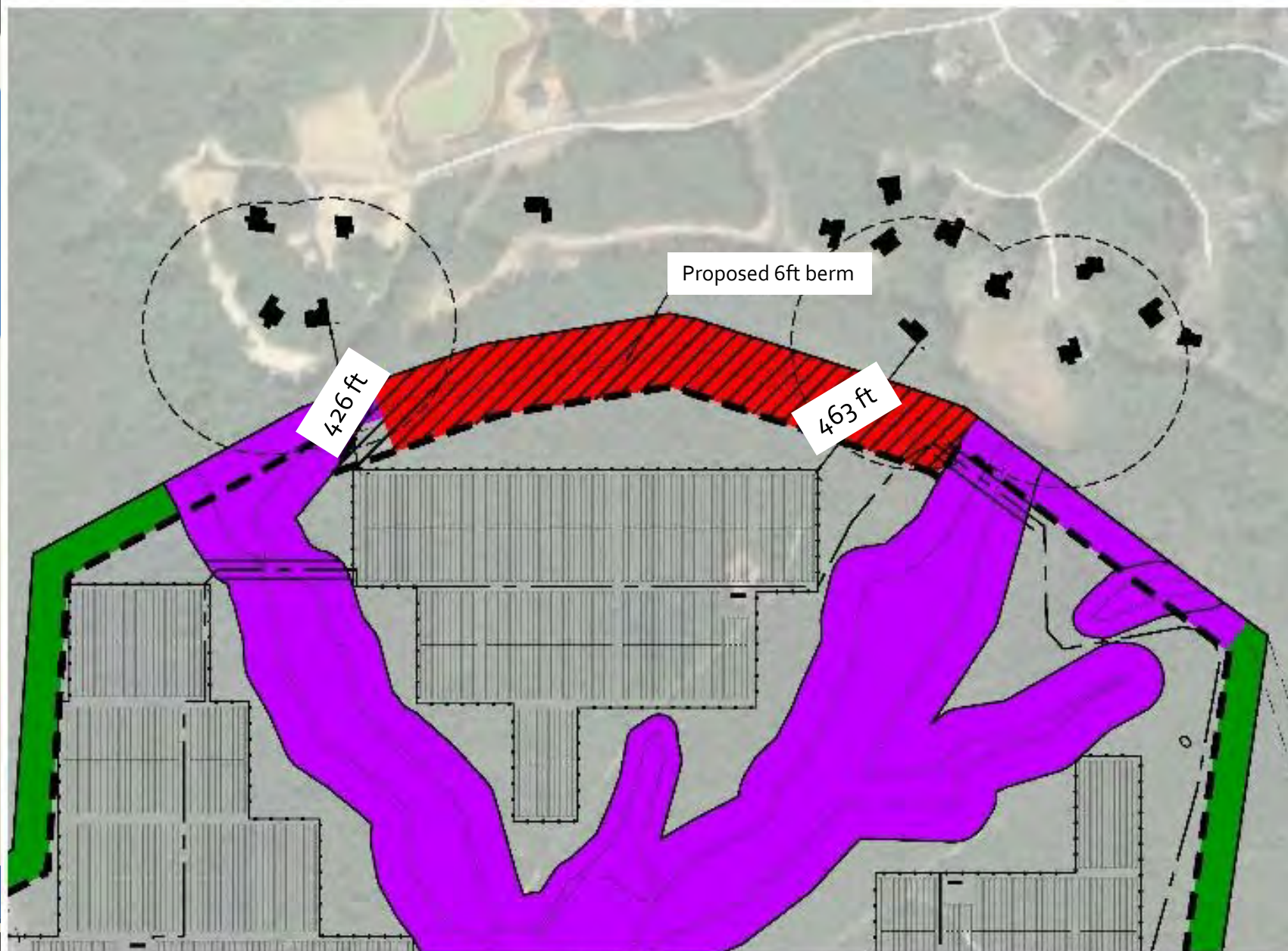
CHANCELLOR MEADOWS DETAIL



WEST CATHARPIN ROAD DETAIL



DEER PARK DRIVE DETAIL

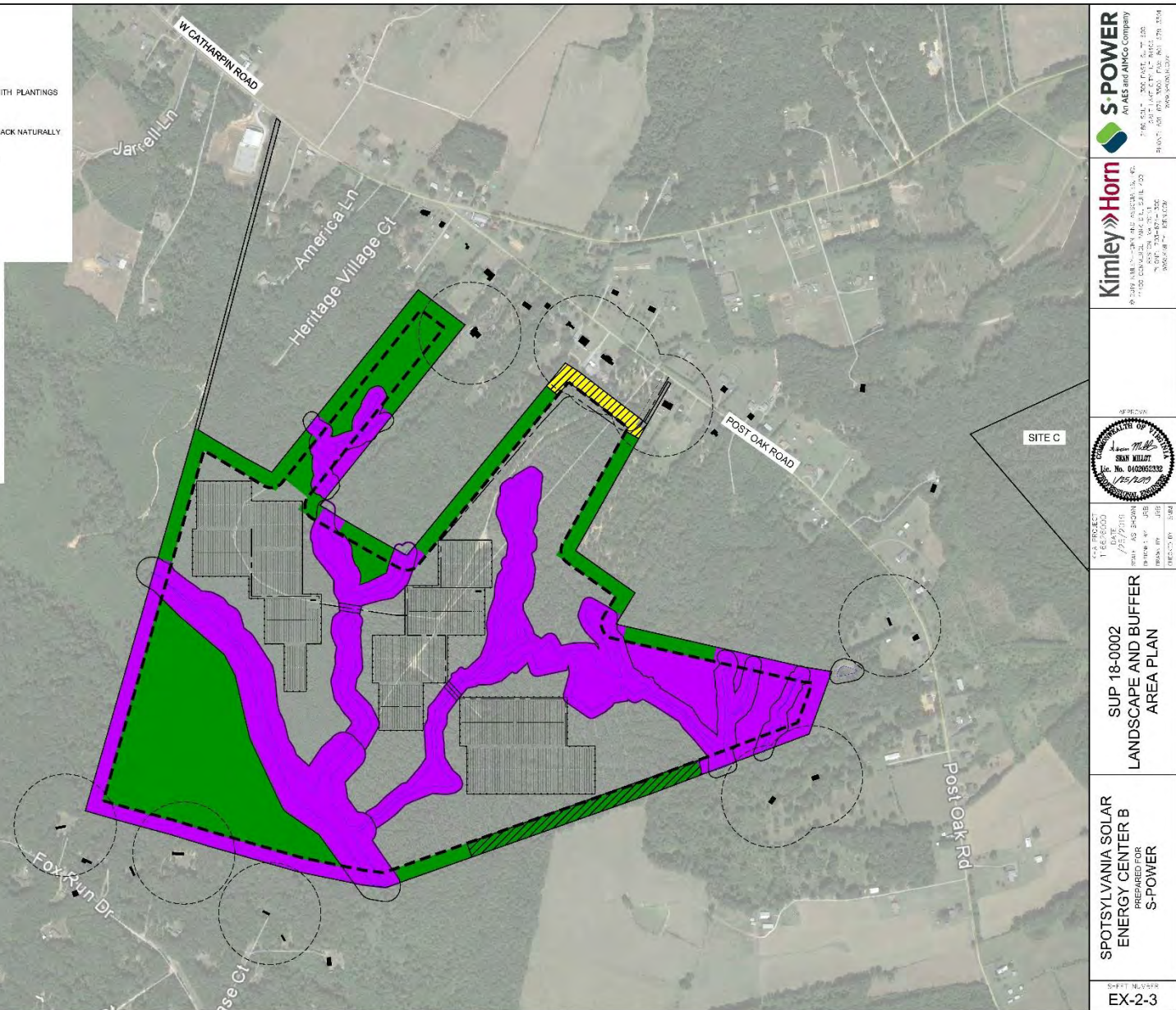
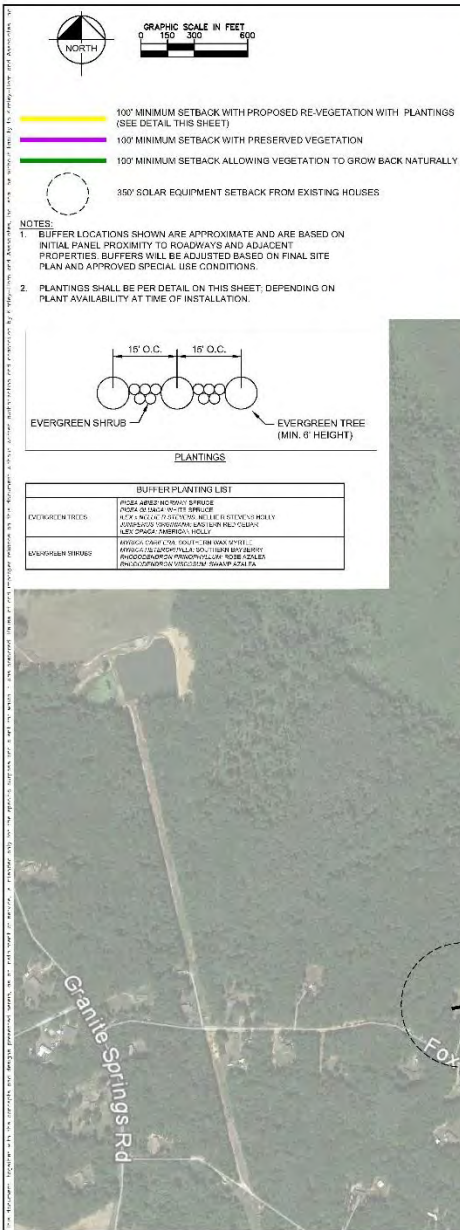


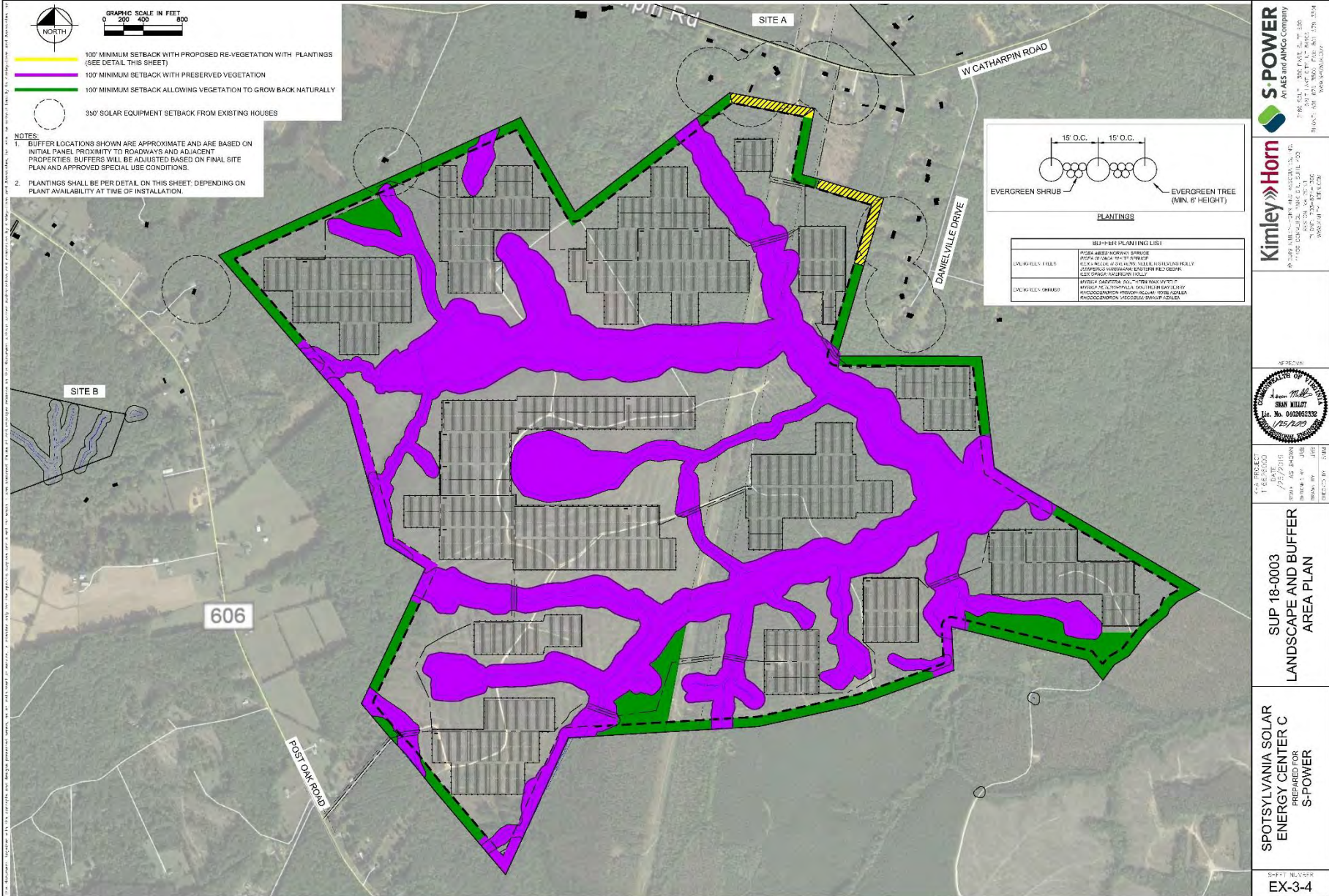
Proposed 6ft berm

426 ft

463 ft

FAWN LAKE DETAIL





NORTH

GRAPHIC SCALE IN FEET

0 200 400 800

100' MINIMUM SETBACK WITH PROPOSED RE-VEGETATION WITH PLANTINGS
(SEE DETAIL THIS SHEET)

100' MINIMUM SETBACK WITH PRESERVED VEGETATION

100' MINIMUM SETBACK ALLOWING VEGETATION TO GROW BACK NATURALLY

350' SOLAR EQUIPMENT SETBACK FROM EXISTING HOUSES

- NOTES:
1. BUFFER LOCATIONS SHOWN ARE APPROXIMATE AND ARE BASED ON INITIAL PANEL PROXIMITY TO ROADWAYS AND ADJACENT PROPERTIES. BUFFERS WILL BE ADJUSTED BASED ON FINAL SITE PLAN AND APPROVED SPECIAL USE CONDITIONS.
 2. PLANTINGS SHALL BE PER DETAIL ON THIS SHEET, DEPENDING ON PLANT AVAILABILITY AT TIME OF INSTALLATION.

EVERGREEN SHRUB

EVERGREEN TREE (MIN. 6' HEIGHT)

PLANTINGS

BUFFER PLANTING LIST	
LANDSCAPE TREES	PIKE ARBRED NORWAY SPRUCE PIKE ARBRED NORWAY SPRUCE PIKE ARBRED NORWAY SPRUCE PIKE ARBRED NORWAY SPRUCE PIKE ARBRED NORWAY SPRUCE PIKE ARBRED NORWAY SPRUCE PIKE ARBRED NORWAY SPRUCE PIKE ARBRED NORWAY SPRUCE PIKE ARBRED NORWAY SPRUCE PIKE ARBRED NORWAY SPRUCE
LANDSCAPE SHRUBS	PIKE ARBRED NORWAY SPRUCE PIKE ARBRED NORWAY SPRUCE PIKE ARBRED NORWAY SPRUCE PIKE ARBRED NORWAY SPRUCE PIKE ARBRED NORWAY SPRUCE PIKE ARBRED NORWAY SPRUCE PIKE ARBRED NORWAY SPRUCE PIKE ARBRED NORWAY SPRUCE PIKE ARBRED NORWAY SPRUCE PIKE ARBRED NORWAY SPRUCE

S-POWER
An ALS and AINCO Company

1001 E. 10TH ST. SUITE 100
DENVER, CO 80202
TEL: 303.733.8777
WWW.S-POWER.COM

Kimley-Horn

4000 N. 10TH AVE. SUITE 100
DENVER, CO 80202
TEL: 303.733.8777
WWW.KIMLEY-HORN.COM

PROJECT NO. 18-0003
DATE: 1/25/2018
BY: J. J. JONES
CHECKED BY: J. J. JONES
APPROVED BY: J. J. JONES

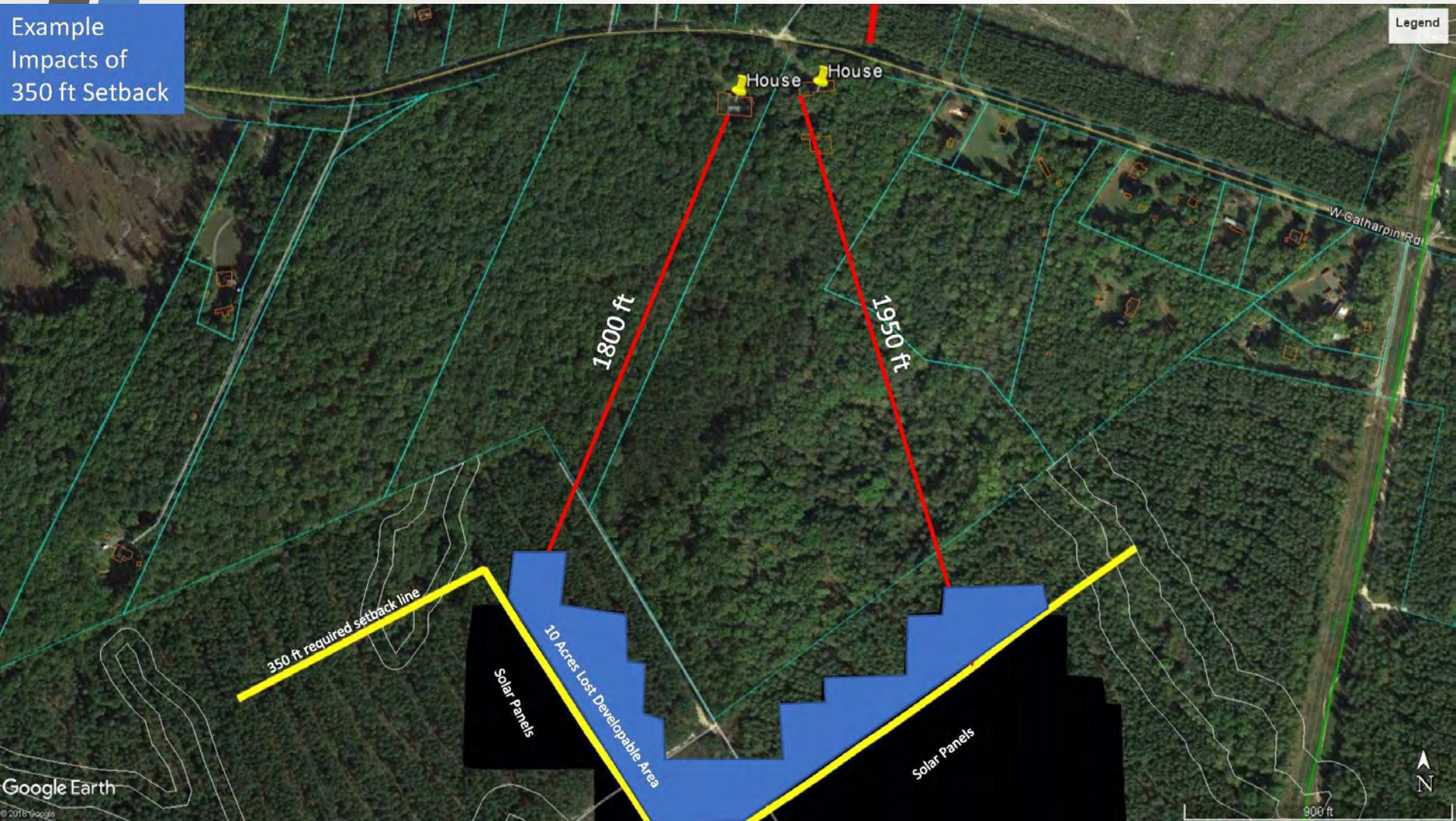
**SUP 18-0003
LANDSCAPE AND BUFFER
AREA PLAN**

**SPOTSYLVANIA SOLAR
ENERGY CENTER C
PREPARED FOR
S-POWER**

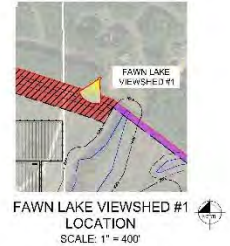
SHEET NUMBER
EX-34

Example of 350ft Setback

Example
Impacts of
350 ft Setback



Current View Shed from Fawn Lake



SPOTSYLVANIA SOLAR ENERGY CENTER
Spotsylvania County, Virginia



Fawn Lake View 1-
Original

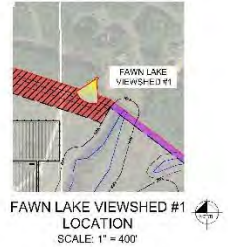
JANUARY 2, 2019

Kimley»Horn

Future View Shed from Fawn Lake



Landscaping shown at install height



SPOTSYLVANIA SOLAR ENERGY CENTER
Spotsylvania County, Virginia

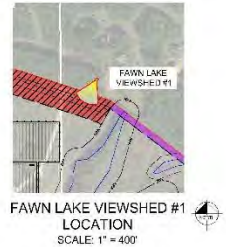


Fawn Lake View 1-
Perspective

JANUARY 2, 2019

Kimley»Horn

Future View Shed (at mature height) from Fawn Lake



SPOTSYLVANIA SOLAR ENERGY CENTER
Spotsylvania County, Virginia



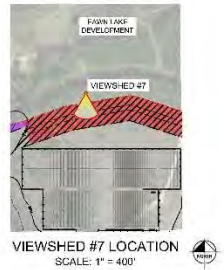
Landscaping shown at mature height

Fawn Lake View 1-
Perspective

JANUARY 2, 2019

Kimley»Horn

Current View Shed from Fawn Lake



SPOTSYLVANIA SOLAR ENERGY CENTER
Spotsylvania County, Virginia



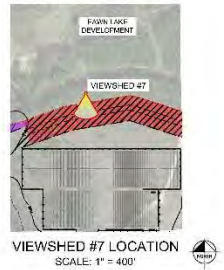
VIEW 7 - Original
JANUARY 2, 2019

Kimley»Horn

Future View Shed from Fawn Lake



Landscaping shown at install height



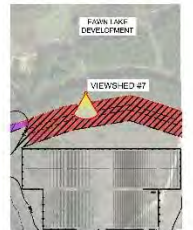
SPOTSYLVANIA SOLAR ENERGY CENTER
Spotsylvania County, Virginia



VIEW 7 - Perspective
JANUARY 2, 2019

Kimley»Horn

Future View Shed (at mature height) from Fawn Lake



VIEWSHED #7 LOCATION
SCALE: 1" = 400'

Landscaping shown at mature height

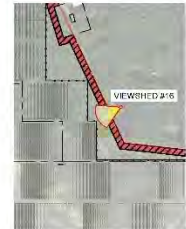
SPOTSYLVANIA SOLAR ENERGY CENTER
Spotsylvania County, Virginia



JANUARY 2, 2019

Kimley»Horn

Current View Shed from Chancellor Meadows Lane



VIEWSHED #16 LOCATION
SCALE: 1" = 400'



SPOTSYLVANIA SOLAR ENERGY CENTER
Spotsylvania County, Virginia

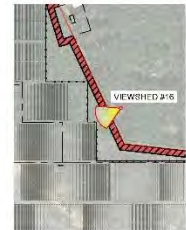


VIEW 16 - Original

JANUARY 2, 2019

Kimley»Horn

Future View Shed from Chancellor Meadows Lane



VIEWSHED #16 LOCATION
SCALE: 1" = 400'



Landscaping shown at install height.

SPOTSYLVANIA SOLAR ENERGY CENTER
Spotsylvania County, Virginia



VIEW 16 - Perspective

JANUARY 2, 2019

Kimley»Horn

Future View Shed (at mature height) from Chancellor Meadows Lane



Landscaping shown at mature height

SPOTSYLVANIA SOLAR ENERGY CENTER
Spotsylvania County, Virginia



VIEW 16 - Perspective

JANUARY 2, 2019

Kimley»Horn

Regrowth will provide 100% Screening within 2-3 Years



2 Growing Seasons of Regrowth – View from
Buckland Road into Project Site
100% screening



2 Growing Seasons of Regrowth – Shows Scale
and Screening of Regrowth

View Towards House



Is the project too close to homes?

- There are over 1 million homes in the U.S. that have solar panels on their roofs, including the White House.



(Figure 1: Workers installing solar panels on the roof of the White House in 2011)



(Figure 2: Solar panels on top of a home in Charlottesville, VA)

Is the project too close to homes?

- Solar projects are compatible with residential neighborhoods, and we see several examples throughout the U.S.



(Figure 3: A large solar farm next to a residential neighborhood in San Antonio, TX)



(Figure 4: A solar farm next to a subdivision in Denver, CO. Parts of the project are less than 100 feet from a row of homes, with no visual or sound barrier built)

Is the project too close to homes?

- Schools all over the U.S. have solar either on their property or very close by, and no problems have been reported.



(Figure 5: Solar farm on the campus of Furman University in Greenville, SC)



(Figure 6: Three current sPower projects are located next to Del Sur Elementary School in California)

Moyock, NC

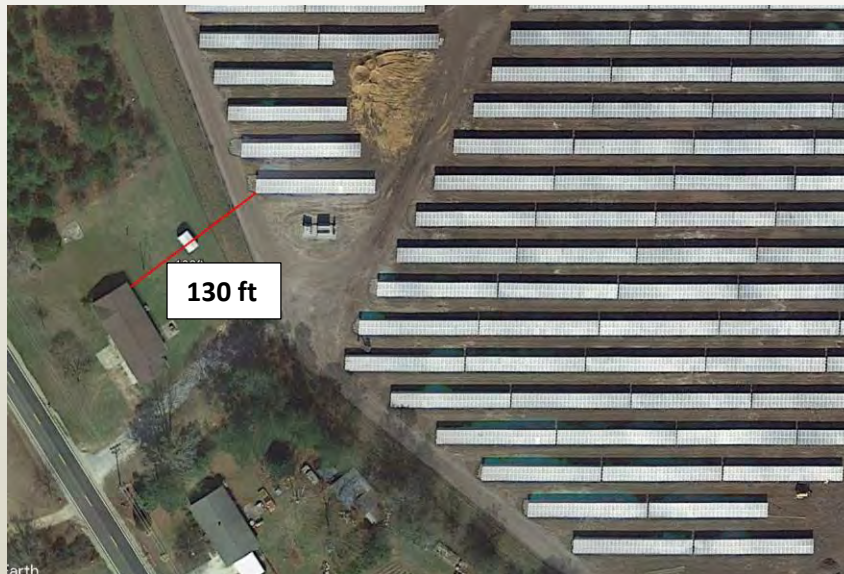


Moyock, NC
1200-acre Solar Farm surrounded by neighborhoods
Google Earth
©2018 Google

Fayetteville, NC



(Figure 1: A large solar farm in Fayetteville, NC)



(Figure 2: The Western portion of the project is only 130 feet from nearby homes and has no visual barrier.)

Elizabeth City, NC



(Figure 1: Large solar farm in Elizabeth City, NC)



(Figure 2: Parts of the project are 90 feet from residences with no visual or sound barrier.)

Roanoke Rapids, NC



(Figure 1: A solar farm in Roanoke Rapids, NC built on the runway of an old regional airport)



(Figure 2: A shown above, parts of the Roanoke Rapids project are within 25 feet of the property boundary and within 150 feet of nearby homes)

Forest City, NC



(Figure 1: The 61 MW Rutherford Solar Farm near dozens of homes in Forest City, NC)



(Figure 2: : Parts of the project are located less than 125 from homes)



The ground solar panel array by Sun Tribe Solar at Middlesex Elementary and St. Clare Walker Middle Schools in Middlesex County (Sun Tribe Solar)

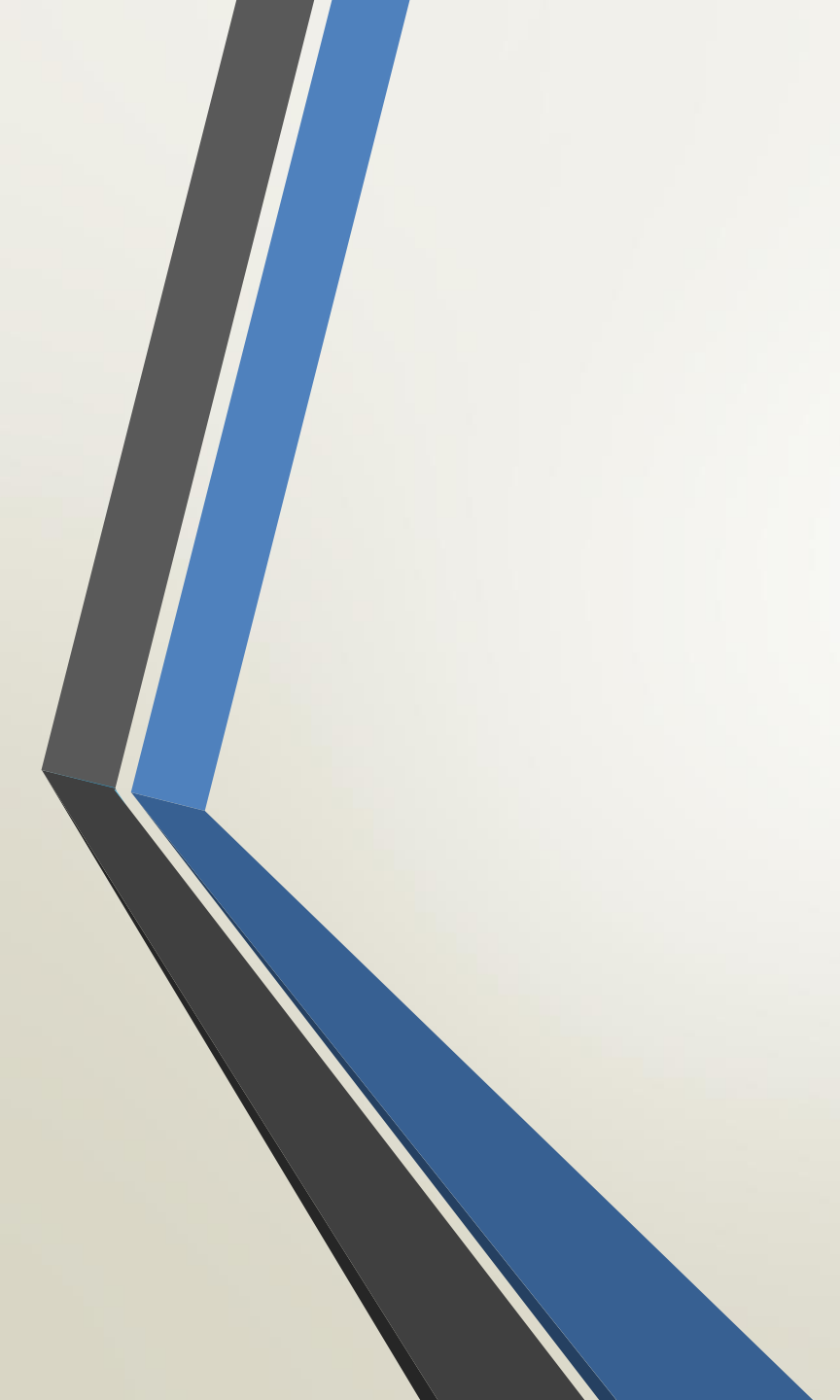
SUP Condition Concerns

1. Section A General:

- Decommissioning Plan
- Surety Bond vs. LOC or cash bond
- Salvage Value Inputs should be included
- See SB 1091

2. Section E Landscaping & Set Backs:

- Panel Setbacks 350ft from residential homes plus 100 foot screening buffer
- Landscaping plan should reflect the GDP and revised exhibits.
- Will agree to add screening if new homes are built on adjoining parcels.



Questions?

Community Concerns

- **Staff Conclusions:** “Once established, the solar energy facility should be clean, safe and a quiet neighbor.”
- **Concern 1: Groundwater**
 - *Solution:* public water connection only and no groundwater—wells capped
- **Concern 2: Burning**
 - *Solution:* Staff recommends burning 3000 feet from homes & PC no burning
- **Concern 3: Solar Panels**
 - *Solution:* All panels will be EPA compliant and safe
- **Concern 4: Impact to surrounding property values**
 - *Solution:* Kaila Report concludes no supportable impacts

Community Concerns

- **Concern 5: Future use ?**

- Not timbering
- Avoid new residential or industrial intense uses
- Highest and best use is renewable solar
- Property rights
- Downzoning in Rural Districts > 401 K plan

- **Concern 6: Economic development**

- Project is a positive marketing tool
- New opportunities associated with renewable projects
- MS, Apple and UR contract partners
- SCC; Mangum report; Virginia Chamber; Conservatives for Clean Energy; and Lancaster, CA experience

Community Concerns

- **Concern 7: Loss of tax revenue**

- There is none. In fact, sPower will be a top 10 county taxpayer with little to no impacts to county services during life of project and with no county incentives. The County will gain direct tax revenue of \$21 million over the life of the project vs. \$754k under current use.

- **Additional Investment:.**

- Applicant will invest an additional \$21.5 million over life of the project as part of its community investment programs
- + \$3.5 million in utility infrastructure improvements
- Will reduce county electricity cost by 15-20% annually, which could save the county approximately \$75 million thru life of the project.

- **Concern 8: No real employment opportunities**

- Solution: 800 + jobs and job training during first 2 years = \$110 million economic output including \$45 million in new employment dollars (e.g. spending income)

- Plus over life of project \$164 million in total output

Total Contributions During Life of the sPower Project

1. Real Estate & Personal Property Taxes: \$17.6 Million
2. Construction Generated Taxes (1 time pulse): \$3.5 Million
3. Corporate Community Investments: \$25 Million (includes utility & solar facilities)
4. Estimated Energy Savings Over Life of Project: \$70-75 Million
5. Employment Dollars:
 - (a) During Construction: \$45.8 Million
 - (b) After Construction (life of Project): \$100 Million

Total All In (with no County tax incentives and minimal impacts to County Services):

> Estimated \$262 Million Over Life of the Project <

Donna Mayfield

From: Sean Fogarty <sfogarty77@verizon.net>
Sent: Thursday, March 7, 2019 1:17 PM
To: Wanda Parrish
Cc: Dave Hammond
Subject: Decommissioning value

Wanda,

One of the documents posted with the agenda for March 12 is sPower's Concern Response Expert Table. Under the Decommissioning - Salvage Value section they have referenced a document that has never been included in any of their communications. It's a supposed DOE study - no reference provided.

Their decommissioning plan tries to take credit for recycling value not for salvage value. Their own decommissioning plan defines recycle as "material will be reconstituted into a new product" (page 7 of 8). The basis for all of their numbers on page 3 is recycle value not salvage value. So now at the 11th hour they're trying to say they'll resell the PV modules to some entity based on a non-existent study. Even the title of their topic includes Salvage Value which they have never proposed or documented.

Both the County and CCSC have been trying to get them to further document the source of these estimates in the Conceptual Cost Estimate with no success. I appreciate the staff's firmness and the solid decommissioning conditions that came out of the PC. As you know we feel the surety should be even higher than the PC's \$36M because of costs to recycle the panels and other materials.

I strongly recommend staff maintains the language in your table related to recycling value - sPower is trying to slip one by us all.

Thanks,

Sean

--

This email was Malware checked by UTM 9. <http://www.sophos.com>

claimed recycling value - \$5/panel - no supporting documentation
 - no resale/salvage value claimed
 - only claiming recycle value
 - estimated cost - \$42M

sPower Group
 Decommissioning Highlander
 Summary

Conceptual Cost Estimate
 November 15, 2018

Item Description	Qty	Unit	Labor/ Equip/Mat	Net Recycling	Total Cost
<u>SWPPP & Dust Control Measures</u>					
1 Stabilized Construction Entrances	1	EA	\$3,266		\$3,266
2 Perimeter Silt Fencing	52,040	LF	\$25,293		\$25,293
3 Spill Kits (Emergency Equipment Cleanup)	1	EA	\$305		\$305
4 Street Wash Down (Water Truck)	195	DA	\$129,652		\$129,652
5 Dust Control Watering (Water Truck)	195	DA	\$129,652		\$129,652
6 Mobilization/DeMobilization	1	EA	\$140,160		\$140,160
Subtotal SWPPP & Dust Control Measures			\$428,328		\$428,328
<u>Removal of Equipment</u>					
7 Remove & Recycle Substation Step Up Transformer	6	EA	\$39,251	\$1,800	\$41,051
8 Remove & Recycle Substation Disconnect Switches	12	EA	\$19,347	\$720	\$20,067
9 Remove & Recycle Substation Circuit Breakers	12	EA	\$19,179	\$3,600	\$22,779
10 Remove & Recycle Substation Pedestals	18	EA	\$114,251	(\$441)	\$113,810
11 Remove & Recycle AC Conductor	518,189	LF	\$212,725	(\$652,918)	(\$440,193)
12 Remove & Recycle Conduit	77,730	LF	\$22,582	(\$97,940)	(\$75,358)
13 Remove & Recycle Switchgear Assemblies	1	LS	\$24,126	\$12	\$24,137
14 Remove & Recycle Inverters & Xfms	169	LS	\$110,293	\$15,654	\$125,946
15 Remove & Recycle DC Conductor	9,694,572	LF	\$1,136,098	(\$446,340)	\$689,758
16 Remove & Recycle Photovoltaic Modules	1,615,762	EA	\$11,016,129	(\$8,175,756)	\$2,840,373
17 Remove & Recycle Support Assemblies	23,588	EA	\$1,560,052	(\$9,075,893)	(\$7,515,841)
18 Remove & Recycle W6 x 7 x 11' Foundations	214,585	EA	\$1,550,959	(\$2,284,311)	(\$733,352)
19 Remove & Recycle W6 x 9 x 11.5' Foundations	45,148	EA	\$326,317	(\$646,017)	(\$319,700)
20 Remove & Recycle W6 x 12 x 9' Foundations	22,574	EA	\$163,158	(\$337,052)	(\$173,894)
21 Remove & Recycle W6 x 20 x 11' Foundations	2,704	EA	\$19,544	(\$82,242)	(\$62,698)
22 Remove & Recycle W6 x 7 x 11' Foundations	19,235	EA	\$147,595	(\$204,761)	(\$57,166)
23 Remove SCADA and Met Stations	25	EA	\$17,841	\$300	\$18,141
Subtotal Removal of Equipment			\$16,499,447	(\$21,981,586)	(\$5,482,139)
<u>Site Demolition</u>					
24 Remove & Recycle 6' Chain Link Fence	349,570	LF	\$601,640	(\$393,354)	\$208,286
25 Remove & Recycle Gates	1196	LF	\$4,190	(\$1,511)	\$2,679
Subtotal Site Demolition			\$605,830	(\$394,865)	\$210,965
<u>Site Reclamation</u>					
29 Scarify & Blend ~40% of Site (Depth = 6")	1,230	AC	\$1,429,651		\$1,429,651
30 Seed Mixture across ~40% of Site (@ 25 LB/AC)	1,230	AC	\$2,558,020		\$2,558,020
Subtotal Site Reclamation			\$3,987,671		\$3,987,671
<u>Contingency, Escalation, PM, Insurance, Fee</u>					
31 Subcontractor Bonding	0.75%		\$170,101		\$170,101
32 General Contingency (% of Labor/Equip/Mat)	2.00%		\$453,603		\$453,603
33 Labor & Equip. Escalation (2% per Year for 25 Years)	50.0%		\$11,340,083		\$11,340,083
34 Recycled Material Escalation (0.6% per Year for 25 Years)	15.0%			(\$3,356,468)	(\$3,356,468)
35 Construction Management (% of Labor/Equip/Mat)	5.10%		\$1,156,688		\$1,156,688
36 Permits, Inspection & Fees (% of Labor/Equip/Mat)	3.25%		\$737,105		\$737,105
37 Liability Insurance (% of Labor/Equip/Mat)	0.97%		\$219,998		\$219,998
38 Overhead & Profit (% of Labor/Equip/Mat)	4.75%		\$1,077,308		\$1,077,308
39 County Administration Costs (Full-time for Contract Duration)			\$29,499		\$29,499
Subtotal Contingency, Escalation, PM, Insurance, Fee			\$15,184,385	(\$3,356,468)	\$11,827,918
Opinion of Probable Decommissioning Cost			\$36,705,641	(\$25,732,919)	\$10,972,743

Concrete recycle value unrealistic
 Swinerton Renewable Energy

Donna Mayfield

From: Sean Fogarty <sfogarty77@verizon.net>
Sent: Wednesday, March 6, 2019 11:41 AM
To: Mark Taylor; Edward Petrovitch; Mark Cole
Cc: Wanda Parrish
Subject: FW: Decommissioning salvage value
Attachments: Decom estimate marked up.pdf

Mr. Taylor/Mr. Cole/Mr. Petrovitch,

I realize that working with the legislature and VACO is under your portfolio but a Supervisor had informed me that sPower was mischaracterizing SB1091. I wanted to clear that up quickly because of the shortness of time. I encourage you to reach out to your contacts at VACO to confirm the history on this legislation as desired.

Thanks and best regards,

Sean Fogarty

From: Sean Fogarty [mailto:sfogarty77@verizon.net]
Sent: Wednesday, March 06, 2019 11:30 AM
To: GBenton@spotsylvania.va.us; PTrampe@spotsylvania.va.us; David Ross (David.Ross@Spotsylvania.va.us); McLaughlinTJ@spotsylvania.va.us; cyakabouski@spotsylvania.va.us; kmarshall@spotsylvania.va.us; gskinner@spotsylvania.va.us
Cc: 'mcole@spotsylvania.va.us'; wparrish@spotsylvania.va.us; mtaylor@spotsylvania.va.us; epetrovitch@spotsylvania.va.us; kholsten@spotsylvania.va.us; Dave Hammond (davehammond@gmail.com); BOS@spotsylvania.va.us
Subject: Decommissioning salvage value

Supervisors,

I understand that sPower is trying characterize pending legislation in the General Assembly (SB1091 – Reeves) as somehow forcing our county to allow salvage value in the decommissioning cost estimate (contrary to the PC and staff recommended conditions). I respectfully encourage you to contact the Virginia Association of Counties (VACO) for the history of this legislation. VACO came out strongly in favor of the SB1091 bill and in fact lobbied on behalf of all Virginia Counties to get the mandatory “shall” language (from the original bill) changed to “may” just so that the counties would have complete leeway to decide whether or not to allow recycling credit. They wanted counties to have the most flexibility because of the unknown recycling market. Here’s a release from them discussing the bill while it was under consideration – it’s the first item: <https://www.vaco.org/wp-content/uploads/2019/01/CC12419.pdf>

Key point from the press release: “Preservation of local authority to negotiate the terms of restoration upon removal solar energy equipment must be maintained.”

The Stanley bill listed there (SB1398) became part of the Reeves bill.

Contact info for Joe Lerch at Virginia Association of Counties (VACO):
804-343-2506

Lerch is VACO's director of Local Government Policy and very familiar with the bill and VACO's efforts to preserve the counties' flexibility on this issue. Why take away that flexibility because sPower is trying to twist the intent of this bill? There should be no doubt that the county has complete flexibility now and will have complete flexibility in the future.

Quote from SB 1091: "...such estimate shall not exceed the total of the projected cost of decommissioning, which may include the net salvage value of such equipment, facilities, or devices, plus a reasonable allowance for estimated administrative costs related to a default of the owner, lessee, or developer, and an annual inflation factor."

Additionally, I've attached a rough, marked up copy of the sPower (Swinerton) Conceptual Cost Estimate Summary from their latest decom plan. The Estimate is dated 11/15/18. I noted 3 main areas of concern:

- \$8,175,756 claimed net recycling value of the PV modules. Based on their panel quantity of 1,615,762 PV modules, this equates to a claimed recycling credit of \$5/panel. They define recycling as "material will be reconstituted into a new product" so this does not assume that the panels will be sold intact on some secondary market. Of course Swinerton provides no supporting documentation to support a recycling value of \$5/panel. My estimate directly from sPower's recyclers is a \$42M cost. Those details were provided in an email to you on Feb26th.
- Total number of panels is incorrect – should be \$1.8M which could affect other values on numbers of foundations etc
- The estimate counts a recycling credit for the foundations, which sPower's GDP indicates would be concrete. That's about \$3.5M for broken up concrete or preformed concrete pads. Really? In a separate part of the decommissioning plan they state that they may use concrete as fill material on site anyway.

There are many other problems with their decommissioning plan – these three are highlights and are related to their claims of recycling credits.

I strongly recommend supporting the Planning Commission and staff's recommendations to not allow recycling/salvage credits in the decommissioning cost estimate. The county doesn't need SB1091 to do it that way, but SB1091 (if signed) supports what the county PC and staff are recommending.

Thank you and best regards.

Sean Fogarty
540-972-4957

--

This email was Malware checked by UTM 9. <http://www.sophos.com>

claimed recycling value - \$5/panel - no supporting documentation
 - no resale/salvage value claimed
 - only claiming recycle value
 - estimated cost - \$42M

sPower Group
 Decommissioning Highlander
 Summary

Conceptual Cost Estimate
 November 15, 2018

Item Description	Qty	Unit	Labor/ Equip/Mat	Net Recycling	Total Cost
<u>SWPPP & Dust Control Measures</u>					
1 Stabilized Construction Entrances	1	EA	\$3,266		\$3,266
2 Perimeter Silt Fencing	52,040	LF	\$25,293		\$25,293
3 Spill Kits (Emergency Equipment Cleanup)	1	EA	\$305		\$305
4 Street Wash Down (Water Truck)	195	DA	\$129,652		\$129,652
5 Dust Control Watering (Water Truck)	195	DA	\$129,652		\$129,652
6 Mobilization/DeMobilization	1	EA	\$140,160		\$140,160
Subtotal SWPPP & Dust Control Measures			\$428,328		\$428,328
<u>Removal of Equipment</u>					
7 Remove & Recycle Substation Step Up Transformer	6	EA	\$39,251	\$1,800	\$41,051
8 Remove & Recycle Substation Disconnect Switches	12	EA	\$19,347	\$720	\$20,067
9 Remove & Recycle Substation Circuit Breakers	12	EA	\$19,179	\$3,600	\$22,779
10 Remove & Recycle Substation Pedestals	18	EA	\$114,251	(\$441)	\$113,810
11 Remove & Recycle AC Conductor	518,189	LF	\$212,725	(\$652,918)	(\$440,193)
12 Remove & Recycle Conduit	77,730	LF	\$22,582	(\$97,940)	(\$75,358)
13 Remove & Recycle Switchgear Assemblies	1	LS	\$24,126	\$12	\$24,137
14 Remove & Recycle Inverters & Xfms	169	LS	\$110,293	\$15,654	\$125,946
15 Remove & Recycle DC Conductor	9,694,572	LF	\$1,136,098	(\$446,340)	\$689,758
16 Remove & Recycle Photovoltaic Modules	1,615,762	EA	\$11,016,129	(\$8,175,756)	\$2,840,373
17 Remove & Recycle Support Assemblies	23,588	EA	\$1,560,052	(\$9,075,893)	(\$7,515,841)
18 Remove & Recycle W6 x 7 x 11' Foundations	214,585	EA	\$1,550,959	(\$2,284,311)	(\$733,352)
19 Remove & Recycle W6 x 9 x 11.5' Foundations	45,148	EA	\$326,317	(\$646,017)	(\$319,700)
20 Remove & Recycle W6 x 12 x 9' Foundations	22,574	EA	\$163,158	(\$337,052)	(\$173,894)
21 Remove & Recycle W6 x 20 x 11' Foundations	2,704	EA	\$19,544	(\$82,242)	(\$62,698)
22 Remove & Recycle W6 x 7 x 11' Foundations	19,235	EA	\$147,595	(\$204,761)	(\$57,166)
23 Remove SCADA and Met Stations	25	EA	\$17,841	\$300	\$18,141
Subtotal Removal of Equipment			\$16,499,447	(\$21,981,586)	(\$5,482,139)
<u>Site Demolition</u>					
24 Remove & Recycle 6' Chain Link Fence	349,570	LF	\$601,640	(\$393,354)	\$208,286
25 Remove & Recycle Gates	1196	LF	\$4,190	(\$1,511)	\$2,679
Subtotal Site Demolition			\$605,830	(\$394,865)	\$210,965
<u>Site Reclamation</u>					
29 Scarify & Blend ~40% of Site (Depth = 6")	1,230	AC	\$1,429,651		\$1,429,651
30 Seed Mixture across ~40% of Site (@ 25 LB/AC)	1,230	AC	\$2,558,020		\$2,558,020
Subtotal Site Reclamation			\$3,987,671		\$3,987,671
<u>Contingency, Escalation, PM, Insurance, Fee</u>					
31 Subcontractor Bonding	0.75%		\$170,101		\$170,101
32 General Contingency (% of Labor/Equip/Mat)	2.00%		\$453,603		\$453,603
33 Labor & Equip. Escalation (2% per Year for 25 Years)	50.0%		\$11,340,083		\$11,340,083
34 Recycled Material Escalation (0.6% per Year for 25 Years)	15.0%			(\$3,356,468)	(\$3,356,468)
35 Construction Management (% of Labor/Equip/Mat)	5.10%		\$1,156,688		\$1,156,688
36 Permits, Inspection & Fees (% of Labor/Equip/Mat)	3.25%		\$737,105		\$737,105
37 Liability Insurance (% of Labor/Equip/Mat)	0.97%		\$219,998		\$219,998
38 Overhead & Profit (% of Labor/Equip/Mat)	4.75%		\$1,077,308		\$1,077,308
39 County Administration Costs (Full-time for Contract Duration)			\$29,499		\$29,499
Subtotal Contingency, Escalation, PM, Insurance, Fee			\$15,184,385	(\$3,356,468)	\$11,827,918
Opinion of Probable Decommissioning Cost			\$36,705,641	(\$25,732,919)	\$10,972,743

Concrete recycle value unrealistic
 Swinerton Renewable Energy

Donna Mayfield

From: Sean Fogarty <sfogarty77@verizon.net>
Sent: Wednesday, March 6, 2019 11:30 AM
To: Thomas G. Benton; Paul D. Trampe; David Ross; Timothy J. McLaughlin; Chris Yakabouski; Kevin Marshall; Gary Skinner
Cc: Mark Cole; Wanda Parrish; Mark Taylor; Edward Petrovitch; Karl Holsten; Dave Hammond; Aimee Mann
Subject: Decommissioning salvage value
Attachments: Decom estimate marked up.pdf

Supervisors,

I understand that sPower is trying to characterize pending legislation in the General Assembly (SB1091 – Reeves) as somehow forcing our county to allow salvage value in the decommissioning cost estimate (contrary to the PC and staff recommended conditions). I respectfully encourage you to contact the Virginia Association of Counties (VACO) for the history of this legislation. VACO came out strongly in favor of the SB1091 bill and in fact lobbied on behalf of all Virginia Counties to get the mandatory “shall” language (from the original bill) changed to “may” just so that the counties would have complete leeway to decide whether or not to allow recycling credit. They wanted counties to have the most flexibility because of the unknown recycling market. Here’s a release from them discussing the bill while it was under consideration – it’s the first item: <https://www.vaco.org/wp-content/uploads/2019/01/CC12419.pdf>

Key point from the press release: “Preservation of local authority to negotiate the terms of restoration upon removal solar energy equipment must be maintained.”

The Stanley bill listed there (SB1398) became part of the Reeves bill.

Contact info for Joe Lerch at Virginia Association of Counties (VACO):

804-343-2506

jlerch@vaco.org

Lerch is VACO’s director of Local Government Policy and very familiar with the bill and VACO’s efforts to preserve the counties’ flexibility on this issue. Why take away that flexibility because sPower is trying to twist the intent of this bill? There should be no doubt that the county has complete flexibility now and will have complete flexibility in the future.

Quote from SB 1091: “...such estimate shall not exceed the total of the projected cost of decommissioning, which may include the net salvage value of such equipment, facilities, or devices, plus a reasonable allowance for estimated administrative costs related to a default of the owner, lessee, or developer, and an annual inflation factor.”

Additionally, I’ve attached a rough, marked up copy of the sPower (Swinerton) Conceptual Cost Estimate Summary from their latest decom plan. The Estimate is dated 11/15/18. I noted 3 main areas of concern:

- \$8,175,756 claimed net recycling value of the PV modules. Based on their panel quantity of 1,615,762 PV modules, this equates to a claimed recycling credit of \$5/panel. They define recycling as “material will be reconstituted into a new product” so this does not assume that the panels will be sold intact on

some secondary market. Of course Swinerton provides no supporting documentation to support a recycling value of \$5/panel. My estimate directly from SPower's recyclers is a \$42M cost. Those details were provided in an email to you on Feb26th.

- Total number of panels is incorrect – should be \$1.8M which could affect other values on numbers of foundations etc
- The estimate counts a recycling credit for the foundations, which sPower's GDP indicates would be concrete. That's about \$3.5M for broken up concrete or preformed concrete pads. Really? In a separate part of the decommissioning plan they state that they may use concrete as fill material on site anyway.

There are many other problems with their decommissioning plan – these three are highlights and are related to their claims of recycling credits.

I strongly recommend supporting the Planning Commission and staff's recommendations to not allow recycling/salvage credits in the decommissioning cost estimate. The county doesn't need SB1091 to do it that way, but SB1091 (if signed) supports what the county PC and staff are recommending.

Thank you and best regards.

Sean Fogarty
540-972-4957

--

This email was Malware checked by UTM 9. <http://www.sophos.com>

claimed recycling value - \$5/panel - no supporting documentation
 - no resale/salvage value claimed
 - only claiming recycle value
 - estimated cost - \$42M

sPower Group
 Decommissioning Highlander
 Summary

Conceptual Cost Estimate
 November 15, 2018

Item Description	Qty	Unit	Labor/ Equip/Mat	Net Recycling	Total Cost
<u>SWPPP & Dust Control Measures</u>					
1 Stabilized Construction Entrances	1	EA	\$3,266		\$3,266
2 Perimeter Silt Fencing	52,040	LF	\$25,293		\$25,293
3 Spill Kits (Emergency Equipment Cleanup)	1	EA	\$305		\$305
4 Street Wash Down (Water Truck)	195	DA	\$129,652		\$129,652
5 Dust Control Watering (Water Truck)	195	DA	\$129,652		\$129,652
6 Mobilization/DeMobilization	1	EA	\$140,160		\$140,160
Subtotal SWPPP & Dust Control Measures			\$428,328		\$428,328
<u>Removal of Equipment</u>					
7 Remove & Recycle Substation Step Up Transformer	6	EA	\$39,251	\$1,800	\$41,051
8 Remove & Recycle Substation Disconnect Switches	12	EA	\$19,347	\$720	\$20,067
9 Remove & Recycle Substation Circuit Breakers	12	EA	\$19,179	\$3,600	\$22,779
10 Remove & Recycle Substation Pedestals	18	EA	\$114,251	(\$441)	\$113,810
11 Remove & Recycle AC Conductor	518,189	LF	\$212,725	(\$652,918)	(\$440,193)
12 Remove & Recycle Conduit	77,730	LF	\$22,582	(\$97,940)	(\$75,358)
13 Remove & Recycle Switchgear Assemblies	1	LS	\$24,126	\$12	\$24,137
14 Remove & Recycle Inverters & Xfms	169	LS	\$110,293	\$15,654	\$125,946
15 Remove & Recycle DC Conductor	9,694,572	LF	\$1,136,098	(\$446,340)	\$689,758
16 Remove & Recycle Photovoltaic Modules	1,615,762	EA	\$11,016,129	(\$8,175,756)	\$2,840,373
17 Remove & Recycle Support Assemblies	23,588	EA	\$1,560,052	(\$9,075,893)	(\$7,515,841)
18 Remove & Recycle W6 x 7 x 11' Foundations	214,585	EA	\$1,550,959	(\$2,284,311)	(\$733,352)
19 Remove & Recycle W6 x 9 x 11.5' Foundations	45,148	EA	\$326,317	(\$646,017)	(\$319,700)
20 Remove & Recycle W6 x 12 x 9' Foundations	22,574	EA	\$163,158	(\$337,052)	(\$173,894)
21 Remove & Recycle W6 x 20 x 11' Foundations	2,704	EA	\$19,544	(\$82,242)	(\$62,698)
22 Remove & Recycle W6 x 7 x 11' Foundations	19,235	EA	\$147,595	(\$204,761)	(\$57,166)
23 Remove SCADA and Met Stations	25	EA	\$17,841	\$300	\$18,141
Subtotal Removal of Equipment			\$16,499,447	(\$21,981,586)	(\$5,482,139)
<u>Site Demolition</u>					
24 Remove & Recycle 6' Chain Link Fence	349,570	LF	\$601,640	(\$393,354)	\$208,286
25 Remove & Recycle Gates	1196	LF	\$4,190	(\$1,511)	\$2,679
Subtotal Site Demolition			\$605,830	(\$394,865)	\$210,965
<u>Site Reclamation</u>					
29 Scarify & Blend ~40% of Site (Depth = 6")	1,230	AC	\$1,429,651		\$1,429,651
30 Seed Mixture across ~40% of Site (@ 25 LB/AC)	1,230	AC	\$2,558,020		\$2,558,020
Subtotal Site Reclamation			\$3,987,671		\$3,987,671
<u>Contingency, Escalation, PM, Insurance, Fee</u>					
31 Subcontractor Bonding	0.75%		\$170,101		\$170,101
32 General Contingency (% of Labor/Equip/Mat)	2.00%		\$453,603		\$453,603
33 Labor & Equip. Escalation (2% per Year for 25 Years)	50.0%		\$11,340,083		\$11,340,083
34 Recycled Material Escalation (0.6% per Year for 25 Years)	15.0%			(\$3,356,468)	(\$3,356,468)
35 Construction Management (% of Labor/Equip/Mat)	5.10%		\$1,156,688		\$1,156,688
36 Permits, Inspection & Fees (% of Labor/Equip/Mat)	3.25%		\$737,105		\$737,105
37 Liability Insurance (% of Labor/Equip/Mat)	0.97%		\$219,998		\$219,998
38 Overhead & Profit (% of Labor/Equip/Mat)	4.75%		\$1,077,308		\$1,077,308
39 County Administration Costs (Full-time for Contract Duration)			\$29,499		\$29,499
Subtotal Contingency, Escalation, PM, Insurance, Fee			\$15,184,385	(\$3,356,468)	\$11,827,918
Opinion of Probable Decommissioning Cost			\$36,705,641	(\$25,732,919)	\$10,972,743

Concrete recycle value unrealistic
 Swinerton Renewable Energy

Sent from my iPhone

Begin forwarded message:

From: Michael Medina <spotsysalem@gmail.com>
Date: March 12, 2019 at 6:52:52 PM EDT
To: <planning@spotsylvania.va.us>
Subject: Fwd: EMF Health Effects Survey 2019 RESULTSm

Sent from my iPhone

Begin forwarded message:

From: "Michael O'Bier" <obierplumbing@yahoo.com>
Date: March 12, 2019 at 1:44:50 PM EDT
To: Chris Yakabouski <cyakabouski@spotsylvania.va.us>, Paul Trampe
<ptrampe@spotsylvania.va.us>, "spotsysalem@gmail.com" <spotsysalem@gmail.com>
Subject: Fw: EMF Health Effects Survey 2019 RESULTSm
Reply-To: "obierplumbing@yahoo.com" <obierplumbing@yahoo.com>

[Sent from Yahoo Mail on Android](#)

----- Forwarded Message -----

From: "Michael O''Bier" <obierplumbing@yahoo.com>
To: "bos@spotsylvania.va.us" <bos@spotsylvania.va.us>
Sent: Tue, Mar 12, 2019 at 1:43 PM
Subject: Fw: EMF Health Effects Survey 2019 RESULTSm

[Sent from Yahoo Mail on Android](#)

----- Forwarded Message -----

From: "Sandi Maurer EMF Safety Network" <emfsafe@sonic.net>
To: "Obierplumbing@yahoo.com" <Obierplumbing@yahoo.com>
Sent: Tue, Mar 12, 2019 at 1:32 PM
Subject: EMF Health Effects Survey 2019 RESULTS

Hi, just a reminder that you're receiving this email because you have signed up with the EMF Safety Network.

You may [unsubscribe](#) if you no longer wish to receive our emails.



EMF Safety Network



Protecting people, children and nature from electrical pollution.

EMF Health Effects Survey 2019 Results

The EMF Health Effects Survey 2019 is an anonymous survey circulated online from 11/27/2018 to 1/27/2019 through the EMF Safety Network lists, website, and affiliate online EMF groups. There are 876 respondents and over 1300 comments. THANK YOU to all who took the survey and to all who helped to circulate it!

Ed Halteman, PhD of Survey Design and Analysis has prepared a report of the Survey Results. A summary of the results is 52% of all respondents stated "severely" or "a lot" in response to the question of "How much does the current EMF environment (cell phones/smart meters/wireless etc.) limit your lifestyle - your ability to work, shop, play, and or spend time with friends and family?" 22% said they are affected a moderate amount, 15.6% a little and 10.5% not at all limited.

Respondents were asked to best match themselves to the following descriptions which are synonymous with mild, moderate, and severe Electromagnetic Hypersensitivity (EHS).

- 49.3% said they are EMF Aware: "You are aware that electromagnetic fields and wireless radiation affect your health or make you feel unwell"

- 27.5% EMF Injured: "You have been injured by electromagnetic fields and/or wireless radiation"
- 19.1% Radiation sickness: "You have electromagnetic radiation sickness, a severe and chronic condition"
- 4.1% None of the above

The top health problems all respondents experience(d) and believe are related to EMF exposure are: Sleep; Fatigue; Concentration, memory or learning problems; and Stress and anxiety.

The top EMF device(s), all respondents believe caused or worsened their health problems are: Wi-fi; Cell phone; Smart meters; and Cell or radio tower.

The top remediations that people tried and reported as most helpful were: Prudent avoidance of EMF; turning electricity off at the breaker box, and shielding. The least helpful remedies were reported as: Medical doctors, prescription drugs and counseling or therapy.

When you look at the survey results segmented by self-description the numbers change. People with Radiation sickness had twice the number of health problems as EMF Aware, and 50% more than EMF Injured. 94% of people with Radiation sickness reported Concentration, memory or learning problems, compared to 47% of EMF Aware. People with Radiation sickness were more affected by cell or radio tower.

Cindy Sage, Editor, BioInitiative Reports comments on the survey:

"The many hundreds of comments written by people responding to the 2019 EMF Health Effects Survey by the EMF Safety Network are illuminating and profoundly disturbing. The Survey itself is invaluable to teach us what it is like to live a life with EHS limitations. It doesn't matter whether you live in the US, or Canada, or western Europe or Scandinavia. Or Asia. Or Australia. The accounts are so similar. The demoralizing effects are the same.

What is obvious is that these people are expressing the symptoms of microwave radiation illness that could be predicted based on decades of international scientific studies. The physiological basis for brain and body effects from microwave radiation exposures are well-accounted for in the science - so it should be no surprise to hear it. At least a dozen major studies and reviews of cell tower-level RF exposures (of 0.1 microwatt per centimeter squared or more) have identified these same health effects the Survey presents through the personal comments of responders..."

Read more of Cindy Sage's commentary, read the Survey Results Report and post comments or questions here: <http://emfsafetynetwork.org/emf-health-effects-survey-2019/>

Link to the Survey Results Report by Survey Design and Analysis: http://emfsafetynetwork.org/wp-content/uploads/2019/03/EMF_Wireless-Study-2019_Final-1.pdf

Link to Survey Summary and all comments: <http://emfsafetynetwork.org/wp-content/uploads/2019/02/EMFSN-EMF-Health-Effects-Survey-2019-All-responses.pdf>

Thank you!
Sandi Maurer
Director, EMF Safety Network

Please donate to support our work. To pay by check mail to EMF Safety Network PO Box 1016, Sebastopol CA 95473. Or click on the yellow donate button- Paypal has a credit card option.

[Donate!](#)

For information on how to make tax deductible donations, click here: <http://emfsafetynetwork.org/donate-now/>

How to order brochures: The "What are EMFs?" brochure to has been updated to include 5G. "What are EMF's?" is a basic overview and introduction of EMF problems, science, solutions.
<http://emfsafetynetwork.org/new-tri-fold-brochure-what-are-emfs/>

Solutions

We recommend prudent avoidance of EMFs, which means being cautious, sensible, and reducing or avoiding EMFs when and where you can.

- Use a corded landline for your home and work place. *(remove cordless phones)*
- Use analog utility meters on your home. *(remove smart meters)*
- Use a wired router for internet connection for faster and safer service. *(avoid wi-fi)*
- Reduce cell phone use. Keep cell phones away from your body. Keep cell phones away from children. *(Best to use cell phones for emergencies only)*
- Learn more safety tips: www.emfsafetynetwork.org/safety-precautions/



Oppose 5G! 5G would add another layer of harmful radiation in our homes and communities. <https://goo.gl/Hj4XrV>

EMF Safety Network mission is to educate and empower people by providing science and solutions to reduce EMFs to improve lives, achieve public policy change, and obtain environmental justice.

Become a member! Membership dues are \$50 annually. To pay by check mail to EMF Safety Network or donate on our website.



PO Box 1016
Sebastopol CA, 95472
(707) 827-0109

www.emfsafetynetwork.org

EMF Safety Network is a sponsored project of Ecological Options Network (EON) a 501 (c)(3) not-for-profit organization

What are EMFs?



STAY CONNECTED:



www.emfsafetynetwork.org

EMF Safety Network, PO Box 1016, Sebastopol, CA 95473

[SafeUnsubscribe™ Obierplumbing@yahoo.com](mailto:SafeUnsubscribe@Obierplumbing@yahoo.com)

[Forward this email](#) | [Update Profile](#) | [About our service provider](#)

Sent by emfsafe@sonic.net in collaboration with



[Try it free today](#)

Donna Mayfield

From: Russell J Mueller <rmueller540@comcast.net>
Sent: Thursday, March 7, 2019 9:07 PM
To: Karl Holsten; Wanda Parrish; Mark Taylor
Cc: Paul D. Trampe; David Ross; Gary Skinner; Timothy J. McLaughlin; Thomas G. Benton; Chris Yakabouski; Kevin Marshall
Subject: URGENT: Deficiency of Staff SUP Liability Terms—receipt requested

From Russ Mueller, FSA
10819 Perrin Circle
703-627-9767
Rmueller540@comcast.net

Please call me if you have questions.

As reproduced below, the Staff alternative SUP documents redefine the parties jointly and severally liable for the project as the “OPERATOR” with respect to all aspects of the SUP, including decommissioning.

DEFINITION OF OPERATOR DEFICIENT

Our legal analysis, as explained below, shows that this redefinition is DEFICIENT to protect Spotsylvania County and its taxpayers from the OPERATOR defaulting on the insurance and surety requirements, which could exceed \$50-60 million.

To fully protect the county and taxpayers, any definition of liable parties must include by name, in addition to the land owner and other LLCs, FTP Power, LLC and all parent corporations or similar entities (if not a corporation).

I have made this request to the Spotsylvania County Planning Commission, the Board of Supervisors and the SCC from the beginning of the this process.

To exclude FTP Power and parent corporations from liability would allow the manipulation of land ownership and other aspects of the project among thinly financed LLCs incapable of meeting the millions of dollars of exposure this giant facility will generate.

In making FTP Power a responsible OPERATOR under the SUP, the county should take into account the response of the SCC Joint Applicants to my March 10, 2018 Interrogatories, I-14, in which I ask “what corporations will be responsible for future costs of the project if one or more of the Joint Applicants experience financial difficulty”. Their answer was that “the Project is financially supported by FTP Power,....”.

DEFINITION OF “OPERATOR” in sPower SCC CASE

It should be noted that the SCC application states the the Joint Applicants in the case (Pleinmont Solar I, LLC; Pleinmont Solar II, LLC; Richmond Spider Solar, LLC; and Highland Solar Energy Stationer I, LLC) will be “responsible for developing, constructing, owning, and operating....” each phase of the 500 megawatt facility. My interrogation of the applicant’s representative, Daniel Menahem, on the stand created a record that these Joint Applicants, in fact, will not own the land (clearly now this aspect is Sustainable Property Holdings, LLC), develop or construct the project (answers to SCC staff interrogatories say this is sPower Development Corporation, LLC). The record in the case indicates that each Joint Applicant will “operate” the solar power aspect of each phase of the completed project through, as I recall, a lease arrangement.

These facts only emphasize that for the county to adequately define OPERATOR, it must be provided the legal parties to all contracts already made and that will be made pursuant to the SUP, including but not limited to agreements involving contingent/actual land purchases, so-called green credits (e.g. Microsoft, etc.), Dominion Power, PJM grid connections, Rappahanock Electrical Cooperative, and inter-corporate financials, etc. After these facts are exposed, the county will be in a better position to define OPERATOR in a legally effective and enforceable manner.

To give an example, that should make the Board very uncomfortable with the staff definition: what if a legal obligation arises, such as an issue just prior to or during the partial or complete decommissioning of the project and the OPERATOR argues in court that only the SCC application definition applies. Is it the intent of staff that only the four thinly financed SCC LLCs listed above be held liable (particularly if the land is sold to them prior to the triggering event)?

Underscoring this point, the Joint Applicants made clear in response to my SCC interrogatories (May 9, 2018, Mueller II-12) that “Joint Applicants will be posting a bond (in an amount agreed upon with Spotsylvania County) that will cover the costs of decommissioning the Project. In the event a Joint Applicant is unable to meet its obligations, the County can draw on the bond to pay for that Joint Applicant’s costs of decommissioning.”

SUP’S OPERATOR CAN ESCAPE LIABILITY

The following is an analysis of why the SUP definition of OPERATOR excludes the parties that should be held liable, that is FTP Power, LLC and the ever shifting parent owners (which now includes ULLICO, a 24% owner).

First the staff SUP definition of OPERATOR

“This Special Use Permit is issued to the owners of the Property and shall run with the land unless and until this Special Use Permit is revoked, lapses, expires, or is voided. The applicant acting on behalf of the owners of the Property in applying for this Special Use Permit is Sustainable Property Holdings, LLC. These conditions shall bind the applicant, any and all owners, occupants, and users of the Property, jointly and severally, which shall also be referred to at times collectively as the “Operator”.”

Parties liable under the SUP:

“Applicant” is Sustainable Property Holdings, LLC—The assets of this LLC can easily evaporate; either through transfer to another sPower LLC or parent or through the sale of the land to another LLC provided financing (through an sPower entity) that is only sufficient for the purchase of the land. How will the county recoup the costs of decommissioning from this LLC with the sole assets being the actual land ownership? Or more likely, how would costs be recouped from this LLC if it declares bankruptcy? Surety in the name of this LLC would not be worth the paper on which it is printed! In fact, leading up to the event, you can be assured that the LLC will not be extended a surety renewal given that a \$37-60 million surety policy would never be issued to an LLC with such a questionable asset balance sheet, nor one in bankruptcy.

“Owners of the property”—presumably “property” means the land, but not solar structures and electricity generated on the land. While this phrase would encompass entities acquiring subsequent partial or 100% “ownership” of the land, this adds nothing to prevent the county’s exposure as explained above.

“Occupants of the property”—FTP Power will not be an occupant of the property during any phase of the project. During development (e.g. clearing land and stabilization; creating berms and buffers, etc.) and construction (e.g. installation of solar panels, cables, inverters, etc.), exactly what LLCs will be liable?

Even sPower Development Company could argue that it does not “occupy” the land, but only its subcontractors do (is it the intent to make Swinerton and other subcontractors liable under this definition?).

“Users of the property”—It is a stretch to argue that FTP Power is a “user” of the property, particularly when the four SCC Joint Applicants, subsidiaries of sPower Development Corporation, LLC, are said to be the “operators” of the facility when electricity is being generated after all connections are completed and they hold the contracts for such “use”.

CONCLUSION: sPower MUST BE LIABLE

The staff SUP definition of “OPERATOR” is wholly insufficient to ensure the county that sPower entities having deep pockets will be held financially responsible for decommissioning and the other insurable risks of this project.

Even sPower Development Corporation, a direct subsidiary of FTP Power, LLC, would appear to escape liability under the term OPERATOR.

For these reasons, the Board of Supervisors must amend the SUP to make liable FTP Power, LLC and the company’s parent corporations.

This request is also consistent with the statement by Mr. A.G. Randol, III to the SCC on behalf of the Virginia Scientists and Engineers for Energy and the Environment that “All Owners, operators, power purchasers, and financiers of each phase of the solar facility must be parties with joint and several liability for the costs of remediation and decommissioning”.

Please also factor in the following risks:

QUESTIONABLE MEANS FOR MEETING DECOMMISSIONING COSTS--As I stated to you from a year ago and in my testimony as a Respondent in the sPower case before the State Corporation Commission, the thinly financed LLCs that were said to ultimately own the solar facility does not give me any assurance that the 6,350 acres involved in this project won’t at some point be abandoned, thus leaving the county with no recourse and upwards of a \$50 million cost to clean up and decommission this potentially toxic waste site.

This could occur for any number of likely reasons—the lapse of federal and/or state solar subsidies; the bankruptcy of an otherwise liable LLC; the evaporation of profits from the declining efficiency or cost basis of solar panels; the introduction into the market of more efficient or less costly power sources; the distressed sale of the project to another even more thinly financed LLC; the destruction of property from fires, tornadoes, hurricanes, earthquakes, etc. which would make reconstruction unprofitable; the washout of substantial areas during construction preventing project continuation; and any number of other reasons.

Is the Board willing to place a \$50-60 million bet on Spotsylvania taxpayers that one of these cost shifting scenarios won’t occur in the next five, ten, twenty or even thirty years?

Reproduction of staff SUP DEFINITION

This Special Use Permit is issued to the owners of the Property and shall run with the land unless and until this Special Use Permit is revoked, lapses, expires, or is voided. The applicant acting on behalf of the owners of the Property in applying for this Special Use Permit is Sustainable Property Holdings, LLC. These conditions shall bind the applicant, any and all owners, occupants, and users of the Property, jointly and severally, which shall also be referred to at times collectively as the “Operator”.

3. The Operator shall secure and at all times maintain public liability insurance for personal injuries, death, and property damage, and umbrella insurance coverage, for the duration of the Special Use Permit in the minimum amounts set forth below, and shall include the County as co-insured:

- a. Commercial General Liability covering personal injuries, death and property damage: \$2,000,000 per occurrence/ \$6,000,000 aggregate;
 - b. Automobile Coverage: \$1,000,000 per occurrence;
 - c. Excess Liability: \$5,000,000;
 - d. Workers Compensation and Employers Liability Insurance in accordance with applicable statutory amounts.
4. The Operator's Commercial General liability insurance policy and excess liability policy shall specifically include the County and its officers, boards, employees, volunteers, attorneys, agents, and consultants as additional insureds.
5. The Operator's insurance policies shall be issued by an insurance company licensed to do business in the State and with a Best's rating of at least A.
6. The Operator shall provide the Zoning Administrator Certificates of Insurance annually, and the amounts of required insurance shall be reviewed every two years for adequacy of coverage by the County's carrier. As determined solely by the County's insurance carrier, insurance premiums or coverage shall be increased when necessary to protect the County.
7. The Operator's insurance policies shall contain an endorsement obligating the insurance company to furnish the County with at least thirty (30) days prior written notice in advance of the cancellation of the insurance.
8. The Operator's insurance renewal or replacement policies or certificates shall be delivered to the Zoning Administrator at least fifteen (15) days before the expiration of the insurance that such policies are to renew or replace.
- Prior to the issuance of a land-disturbing permit, the holder of the Special Use Permit shall deliver to the Zoning Administrator a copy of each of the policies or certificates representing the insurance in the required amounts.

19. When the Facility reaches the end of its operational life, or its use is otherwise discontinued or substantially reduced, the Operator shall decommission it according to the following requirements, as well as those found in the Spotsylvania County Code of Ordinances, Section 23-4.5.7, all of which requirements supersede the decommissioning plan submitted by the Operator. To the extent these conditions are more restrictive or intense than those in Section 23-4.5.7, as determined solely by the County, these conditions shall control:
- a. The decommissioning of the Facility must include the complete removal of the Facility, including, but not limited to, all of the facilities and structures above and below ground on the Property related in any way to the collection, conduction, or storage of solar energy and their appurtenances, installed at any time during the construction or operation of the Facility. This must include, at least, the removal from the Property of all of the following: solar panels, panel trackers, anchors, supports, footers, mounts, inverters, inverter buildings, electrical conductors, electrical cables, substation components, internal fencing, structures, and all other equipment and structures on the Property unless otherwise limited herein.
 - b. The decommissioning must also include at least the following: the Facility will be disconnected from the utility power grid; solar panels must be disconnected from the on-site electrical system; all work must be undertaken with conventional construction equipment; all materials must be disposed of safely; solar panels must be removed from their support frames and packaged in a manner that ensures that they sustain no damage during their disconnection and removal from the Property; all hazardous materials must be removed and disposed of or recycled in accordance with all applicable laws and regulations; all concrete must be removed and recycled offsite by a recycling facility or used onsite as fill material as part of a stabilization or regrading plan which meets all applicable laws and regulations as determined solely by the Program Administrator or Zoning Administrator, as applicable; and grading must be minimized to the maximum extent possible under all applicable laws and regulations as determined solely by the Program Administrator or Zoning Administrator, as applicable. To the extent possible, all solar panels and equipment must be delivered to a designated recycling facility for recycling and material re-use; all electrical interconnection, transmission, and distribution lines and cables must be recycled offsite at a recycling facility; all steel and metal including, but not limited to, support posts and internal fencing must be recycled offsite by a recycling facility; and electrical and electronic devices

including, but not limited to, inverters, transformers, panels, support structure, lighting fixtures, and their respective shelters must be recycled offsite by a recycling facility.

c. After removal of the above, the ground must be restored to the original topography prior to the beginning of the decommissioning. In other words, holes, ditches, ruts, and the like created by removing underground conduit, support footers, or any other decommissioning activity must be filled in to restore the topography of the Property and allow for stabilization.

d. At the outset of the decommissioning, the Operator shall produce to the County an inventory of all the materials on the Property which will be removed or are otherwise subject to the provisions herein. At the completion of the decommissioning, the Operator shall produce to the County a report detailing compliance with all of the requirements herein including, but not limited to, details of the removal and disposition of materials required herein, including an explanation of why any material was not recycled. This detailed report must explain how each requirement related to the decommissioning set out herein has been met and must be certified by a third party engineer licensed in Virginia.

e. The decommissioning of the Facility may include, at the discretion of the person depicted in the land records of Spotsylvania County as of the date of completion of decommissioning as the Property owner, the removal of perimeter fencing surrounding outside perimeter of the Property. All fencing internal to the perimeter fencing must be removed as set out above. The decommissioning must not include the following: removal of stream crossings, de-compacting or removing gravel roads or paths established for the operation of the Facility, or removal of permanent stormwater management features.

f. Further, the Property must be restored to the agricultural condition of the Property as of the date of approval of this Special Use Permit with the additional requirement that the Property must be stabilized so as to adequately control, prevent, and minimize, any and all erosion and sediment runoff. Stabilization must be completed according to all standards established under applicable laws and regulations as determined by the Program Administrator or Zoning Administrator, as applicable. Prior to stabilization, all soils compacted by decommissioning work or by construction or operation of the Facility, except gravel roads and paths established for the operation of the Facility, shall be de-compacted, scarified, and restored six (6) inches in depth.

g. All onsite decommissioning work must be performed only between the hours of 7:00 a.m. and 5:00 p.m. on Monday through Friday.

h. County staff shall be granted access to the Property on twenty-four (24) hour prior notice to monitor all decommissioning work.

i. The County must be provided a monthly report detailing the decommissioning work performed and progress toward completion.

j. The Operator, prior to the start of construction of the Facility, and throughout its operation until the decommissioning is complete, shall guarantee the decommissioning and stabilization of the Property by providing and maintaining for the County's benefit surety for performance of the decommissioning equal to the highest total estimated cost of decommissioning the Facility on the Property. Such surety must be irrevocable and must be maintained in full without decrease until the Facility decommissioning has been completed as required herein. The highest total estimated cost must be calculated by the Operator and include, at least, the following delineated by line item:

i. Total cost related to complying with all the decommissioning work required by this Special Use Permit.

ii. Costs related to creating, maintaining, and re-stabilizing all construction entrances identified on the Property, with a separate line item for each such construction entrance.

iii. Costs for mobilization.

iv. Costs for removal and disposal of all materials set forth above line itemed by category of facility. For example, "cost to remove conduit," "cost to remove panels," "cost to remove panel support structure" "cost to remove inverters," etc. Such costs must not be reduced by any estimated credits or setoffs for recycling, reuse, or otherwise.

v. Costs to de-compact, scarify, and restore all soils required herein.

vi. Costs to stabilize land disturbed by the decommissioning work and as otherwise required herein.

vii. Costs to meet the recycling requirements herein excluding any

anticipated credits or setoff generated by the recycling.

viii. Costs of trucking, hauling, and equipment use.

ix. Costs for soil testing pursuant to Condition A 15 (e) set out herein.

x. Costs of all labor and estimated man-hours to perform the decommissioning work required herein.

xi. Costs must assume an increase in labor and equipment costs of two percent (2%) a year every year until the completion of decommissioning and must assume commencement of decommissioning after year thirty (30) of operation.

xii. Costs for contingencies and for weather delay.

xiii. Costs for insurance.

xiv. Costs associated with transportation traffic planning, traffic mitigation, and road restoration on all roads utilized for decommissioning within Spotsylvania County for the duration of the impact of decommissioning on Spotsylvania County roadways.

xv. The certification of a third party engineer licensed in Virginia affirming that the Operator's cost estimate is sufficient to satisfy the decommissioning required herein.

k. The estimated costs cannot include or be reduced by any credits or setoffs. In other words, estimated costs must not be decreased by funds potentially generated, whether from resale, recycling, reuse, or otherwise, by the removed materials.

l. Prior to the issuance of a land-disturbing permit to construct the Facility and in no case later than three (3) months after approval of this Special Use Permit, the Operator shall produce to the County an estimate of the above costs by line item and the surety guaranteeing the payment of those costs and the decommissioning work. The amount of the surety shall be no less than the \$10,487 per disturbed acre, already estimated, and excluding recycling credits, as provided by the "Project Decommissioning and Site Restoration Cost Estimate" attached hereto as "Exhibit G". The estimate shall be signed and sealed by a third party engineer licensed in Virginia and shall include a statement by the engineer that "The total estimated cost provides for the complete decommissioning of the Facility and stabilization of the Property as defined and required in SUP18-0001."

m. Surety must be provided either by a cash bond deposited with the County or by an irrevocable letter of credit provided for the County's benefit. Cash bond shall be in the form of a cashier's check or certified check deposited with the County which has cleared all issuing institutions. Any interest accruing on such funds shall be added to the total amount and retained by the County for decommissioning. This deposit shall be accompanied by a letter agreement, acceptable to, and issued by, the Zoning Administrator, confirming that the cash deposit is to be held by the County to guarantee the performance of the decommissioning work required herein and should the Facility be abandoned, or should the decommissioning work not be diligently undertaken or performed according to the requirements herein, or should this Special Use Permit be revoked, lapse, expire, or be voided, all as determined solely by the County, the County may expend the deposited funds to undertake the decommissioning work required herein without more after providing written notice to the person identified as owner of the Property in the land records of Spotsylvania County as of the date of the notice. Within six (6) months of the completion of the decommissioning work required herein by a person or entity other than the County or a contractor engaged by the County, as confirmed by the Zoning Administrator, the cash bond and accrued interest, less any amounts expended by the County as allowed for herein, shall be released to the person identified as owner of the Property in the land records of Spotsylvania County as of the date of the completed decommissioning or as otherwise directed by that owner of the Property.

n. An irrevocable letter of credit shall mean an instrument provided by a lending institution guaranteeing payment to the County within seventy-two (72) hours of the County's written notice to the institution that the Facility has been abandoned or the decommissioning work has not been diligently undertaken or performed according to the requirements herein and demand to the institution for the funds, without more. This letter of credit shall have no expiration date or required renewal and shall remain in effect for the benefit of the County and shall under no circumstances be withdrawn before the decommissioning work required herein is completed or the amount guaranteed has been fully drawn by the County. The letter of credit shall require that the County be notified six (6) months prior to any cancellation or alteration of the letter of credit. Should the County receive notice that the letter of credit will be cancelled or otherwise become unavailable or decrease, or should

this Special Use Permit be revoked, lapse, expire, or be voided, the County may, without more, and without notice to the Operator, immediately draw down the entirety of the letter of credit and convert the surety to a cash bond to be deposited with the County and subject to the terms herein; this shall be specifically reflected in the language of the irrevocable letter of credit. The County may expend the guaranteed funds without more to undertake the decommissioning work required herein after providing written notice to the person identified as owner of the Property in the land records of Spotsylvania County as of the date of the notice. Within six (6) months following the completion of the decommissioning work required herein by a person or entity other than the County or a contractor engaged by the County, as confirmed by the Zoning Administrator, the letter of credit shall be released by the County.

o. The estimated costs and surety to meet the above requirements shall be reviewed by the Zoning Administrator who shall determine if the estimates adequately reflect the decommissioning costs and that the surety will guarantee performance. Should the Zoning Administrator determine that estimated costs and surety are insufficient, he shall determine adequate surety and communicate the deficiencies to the Operator who shall then provide the adequate surety prior to the issuance of any land-disturbing permit.

p. Should this Special Use Permit be revoked, lapse, expire, or be voided, the County may immediately draw down all of the surety funds and convert them into a cash bond for the purposes of decommissioning as set forth hereunder. In such a case, no contractual agreement shall be required for the cash bond. This shall be reflected in the surety provided.

q. The amount of surety for decommissioning shall be reviewed by the Zoning Administrator every two (2) years on the anniversary of the date this Special Use Permit is approved and an updated decommissioning plan shall be submitted to the County at that time. The decommissioning surety shall be adjusted by the Operator, if necessary, to reflect the then current decommissioning cost as determined by the Zoning Administrator. The decommissioning requirements set out herein shall not be amended, reduced, or otherwise changed through any decommissioning plan required to be submitted herein, or any approval thereof, without first amending this Special Use Permit. The Zoning Administrator shall not approve any decommissioning plan, but shall only use it to determine the adequacy of the surety.

r. Should the funds guaranteed for the decommissioning work for any reason not be sufficient to complete the decommissioning work, the Operator, which includes all owners, occupants, and users of the Property, jointly and severally remain liable to the County for the difference between the guaranteed funds and the amounts required to decommission the Property. The County shall not be liable to any party in any way for the funds drawn pursuant to the conditions set out herein and expended in relation to decommissioning.

s. Should the Facility be abandoned, or should this Special Use Permit be revoked, lapse, expire, or be voided, or should the decommissioning work not be diligently undertaken or performed according to the requirements herein as determined solely by the County and should the County draw down funds for the purpose of performing the decommissioning work herein and mobilize its contractors to perform the decommissioning work or otherwise incur liability to its contractors for the performance of the decommissioning work, the Operator shall have no right to perform the decommissioning work required herein unless specifically authorized by the County in a writing that confirms that the County has incurred no liability to any contractors to perform the work or any such liability is transferrable as deemed acceptable by the County.

t. The Operator shall immediately, upon written demand by the County or any person or entity authorized to act on behalf of the County, without more, grant or release to the County, or any person or entity authorized to act on behalf of the County, under terms deemed acceptable solely by the County, all necessary real property rights, personal property rights, either or both, as determined solely by the County, other than fee simple ownership or a leasehold interest of the real property, so that the County or any person or entity authorized to act on behalf of the County may undertake any decommissioning work required herein that has not otherwise been performed as required herein. This shall include, but not be limited to, releasing any interest in the personal property, facilities, fixtures, and structures which are to be removed and recycled, disposed or otherwise demolished.

u. The amount of surety guaranteed herein shall not be reduced for any reason except as allowed for herein.

v. Decommissioning shall begin immediately after the Facility has, for a period of three (3) months, ceased operating as a solar energy facility collecting and storing energy and then transferring and distributing it to the electrical grid (the "Decommissioning Commencement Date") and shall be diligently pursued, as determined

solely by the County, and completed within one (1) year from the Decommissioning Commencement Date, providing a one-year decommissioning period. Prior to its expiration, the County may extend this one year decommissioning period by six (6) months if the County finds, in its sole discretion, that the Operator commenced decommissioning the Facility immediately after the Decommissioning Commencement Date, diligently and continuously worked to decommission the Facility throughout the decommissioning period, and is reasonably expected to complete decommissioning within the additional six-month period. This provision does not in any way limit the County's authority under Section 23-4.5.7.

w. Periods during which the Facility is not operational for maintenance, repair, or due to catastrophic events beyond the Operator's control, during which the Operator works diligently to return the Facility to full operating status, shall not trigger the decommissioning requirement herein. The Operator must provide written notice and evidence of the above to the County during the period in which the Facility is not fully operational. Such notice shall identify the last day on which the Facility was fully operational. Failure of the Operator to provide such written notice or evidence precludes it from contesting the County's reasonable determination of the last day on which the Facility was fully operational. Regardless of the efforts of the Operator to return the Facility to full operational status, if the Property does not operate as a solar energy facility collecting and storing energy and then transferring and distributing it to the electrical grid after the catastrophic event, for a period of two (2) years, as determined by the County in its sole discretion, the Special Use Permit shall be void and the Operator shall commence decommissioning no later than the 730th day after the last day the Facility was fully operational.

x. Any change of ownership, lessee, or party responsible for decommissioning of the Facility, or change in any part of the contact information shall be reported to the Zoning Administrator within sixty (60) days of the change(s).

20. Prior to the issuance of a land-disturbing permit, the Operator shall request an informal review of the Facility by the Department of Defense's Siting Clearinghouse.

--

This email was Malware checked by UTM 9. <http://www.sophos.com>

From: Donna Mayfield
Sent: Thursday, March 14, 2019 2:24 PM
To: Wanda Parrish
Subject: RE: Combined emails 3/6-3/14
Attachments: Obier Dirty Little Secret; Study warns of environmental risks from solar modules, Daniel Wetzel, De Welt, 13May2018_pdf - Google Drive.mht

[The attached attachments](#)

From: Wanda Parrish
Sent: Thursday, March 14, 2019 2:22 PM
To: Donna Mayfield <DMayfield@spotsylvania.va.us>
Subject: RE: Combined emails 3/6-3/14

[Thanks. Which attachments?](#)

From: Donna Mayfield
Sent: Thursday, March 14, 2019 2:22 PM
To: Wanda Parrish <WParrish@spotsylvania.va.us>
Subject: Combined emails 3/6-3/14

Attached are the combined emails from 03062019-03142019. It was too large so I had to reduce the size. Also, I had 2 attachments that wouldn't convert to pdf or attach to this group of emails.

Have a nice day,
Donna Mayfield
Spotsylvania County
Planning Department
Office Technician
540-507-7438