

# **A Comprehensive Review of Utility-Scale Solar Ordinances in the PEC Service Area and Selected Localities**

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Photo Credit: Hugh Kenny, The Piedmont Environmental Council

**The Piedmont Environmental Council  
45 Horner Street  
Warrenton, Virginia 20186  
[pecva.org](http://pecva.org)**



## **Introduction**

In recent years, the Virginia Clean Economy Act, steadily declining cost of solar panels and the rising demand for green energy has spurred interest in the development of utility-scale solar facilities throughout Virginia. The Piedmont Environmental Council (PEC) has long promoted renewable energy in our 9-county region through outreach efforts such as the annual Solarize Piedmont campaign and legislative efforts on issues such as net metering. We have also long been an advocate for the proper siting of solar facilities. In 2019, [PEC released a policy document](#) summarizing the topics localities should consider when siting or formulating policy for utility-scale solar.

The policy document built upon the efforts of local planning district commissions that highlighted lands attractive to industry for the siting of utility-scale solar facilities, but relied solely on natural resources layers (floodplains, wetlands, slopes/grade, and prime agricultural land) and generally fell short of identifying other important cultural, natural, and historic resources in these areas.

PEC recommends that utility-scale solar projects be directed toward existing industrial-zoned areas or subject to a conditional or special use permit in agricultural areas with proper consideration of any significant impacts. While the 2019 policy document articulated PEC's stance on utility-scale solar siting, there was still an absence of a comprehensive analysis of how those criteria were accommodated by existing policy and regulations in the PEC service area. As interest in utility-scale solar has grown among PEC board members, community groups, localities and other PEC partners, the need for such an analysis has become more apparent.

This report aims to provide a comprehensive review of utility-scale solar policies in the PEC 9-County region as well as select localities with high pressure for utility scale solar development. It is meant as an additional resource to be used in conjunction with the 2019 policy document. As the Virginia Piedmont continues to face an influx of utility-scale solar proposals, this report and the accompanying policy document can assist advocates in seeking local policies that both create clean energy and protect important natural, agricultural, and cultural resources in our communities.

## **Methodology**

This analysis focuses solely on 'utility-scale solar' which generates solar power and feeds it into the grid. It does not review ordinances for small-scale facilities often called 'behind-the-meter' that directly supply homes and buildings with electricity. We reviewed the utility-scale solar policies of 13 Virginia counties: Albemarle, Clarke, Culpeper, Fauquier, Fluvanna, Greene, Lunenburg, Madison, Nelson, Orange, Prince William, Rappahannock, and Rockingham.

These policies were enumerated in zoning regulations, and policy documents (i.e. comprehensive plans) of the localities. Two localities, Culpeper and Rockingham Counties, had policy documents specific to utility-scale solar, which were included in the analysis. Culpeper

County currently only has a policy document addressing utility-scale solar.<sup>1</sup> While a policy document is not a codified ordinance, a robust policy document can still be effective in ensuring the appropriate development of utility-scale solar projects.

When a Special Use Permit or Special Exception was required, provisions for each process that were relevant to utility-scale projects were included in the analysis. In addition, provisions from underlying agricultural zones such as setback requirements or height limitations were also included in the analysis when relevant.

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<sup>1</sup> Culpeper County's policy document was accompanied by a list of draft example conditions the Board of Supervisors may impose, which were not included in this analysis because they are only applied at the discretion of the Board.

We organized text excerpts from the ordinances and policy documents of each locality around 5 broad categories and 26 individual measures raised by the 2019 policy document that account for the range of impacts that utility-scale solar projects can have throughout a project's life-cycle:

Permitting / Application procedures

Utility-scale Solar Defined	Permitted in Agricultural Zones by SUP	Separate Comprehensive Plan Consistency Review	Policy Document Addresses Utility-scale Solar
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Siting

Min. Land Area	Historic / Cultural Resources	Utility Infrastructure
Max. Land Area	Natural Resources	Proximity to other solar facility(s)
Access	Viewshed Impacts	Economic/Fiscal Considerations

Development Standards

Setbacks	Height of Solar Panels	Buffering / Screening / Landscaping
Groundcover	Fencing	Glare

Maintenance and Operations

Addresses Maintenance of Site Features	Addresses Compliance with Federal and State Standards
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Decommissioning

Decommissioning Plan Required	Cost Estimates 3rd Party Verified	Addresses Security	Prohibits Use of Recycled Value of Assets	Penalties for Default
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We then indicated on the attached Appendix whether a local ordinance addresses each measure.

## **Highlights**

This analysis was a qualitative assessment of each county's approach to regulating utility-scale solar rather than a quantitative ranking of policies. Provided are the highlights from our review of each County to summarize their approach to regulating utility-scale solar:

### **Permitting**

Utility-scale solar was not a by-right use in the agricultural zones of any of the counties. In almost all of the counties, utility-scale solar was permitted in agricultural zones by special use permit or special exception. Some counties provided a wider range of zoning districts where utility-scale solar would be permitted than others and a handful allowed for by-right uses in certain high-development zones. Madison County and potentially Culpeper County may limit utility-scale solar to industrial zones only. PEC is concerned that this could lead to rezoning of agricultural land for utility-scale solar, preventing the land from returning to agricultural use after decommissioning.

### **Decommissioning**

Five counties, Greene, Fluvanna, Orange, Prince William and Albemarle did not have decommissioning requirements. Although there may be an understanding by localities / solar developers that utility-scale solar sites be decommissioned, no decommissioning procedures were found in their codes that they would have to adhere to. Additionally, Fluvanna and Orange Counties did not define utility-scale solar specifically, instead regulating public utility uses as a whole. Overall, the five localities without codified decommissioning requirements had less extensive regulations that often defaulted to underlying zoning rather than accounting for utility-scale solar specifically.

### **Albemarle**

Albemarle County addressed many of the measures of interest to PEC but did so through conditions that MAY be imposed by Planning Commission and/or the Board of Supervisors for the approval of a special use permit. There were few requirements that were not left to their discretion.

### Fauquier

- The most third party reviews required of all the counties
- The only County that required a separate Comprehensive plan consistency review
- Maximum project size of 1,000 acres
- Requires a report from the transmission owner / regional transmission organization stating that the transmission system has sufficient capacity to support the proposed utility-scale solar project
- Utility-scale solar projects shall be located within two and one-half miles of electric transmission lines
- All newly installed utilities, including but not limited to electric, fiber, and telephone lines serving the site shall be placed underground
- Requires that no more than 8% of the land in a 2 ½ mile radius of any existing utility-scale solar project shall be approved for use for a new project
- Required setback of 1,000 ft. from a right-of-way line of a Corridor of Statewide Significance for utility-scale solar projects
- Screening must be fully established in 5 years
- Required vegetated groundcover for all projects, including under panels
- Frontage on a major collector road or higher classification is required
- The decommissioning cost estimate must be recalculated every five (5) years and the surety increased when the recalculated estimate exceeds the guarantee amount by 10%
- The County Comprehensive Plan acknowledges the need to ensure utility-scale solar doesn't detract from rural character

### Culpeper

- Applications limited to 300 acres of panel installation
- Approximately 2,400 acre cap or 240 megawatt upper target for solar development in the County
- Requires 3rd party verification of decommissioning cost estimates
- The utility-scale solar policy document considers the cumulative impacts of utility-scale solar
- Siting on prime agricultural soils is discouraged
- Mass grading is limited to 50 acres at a time
- Favor will be given to decommissioning plans that provide for recycling of equipment and panels
- The County Planning Commission approved a draft ordinance restricting utility-scale solar to industrially-zoned land with the BOS to take up the issue sometime in 2022

### Clarke

- 20 acre min lot size
- Utility-scale solar defined as greater than 100 Kilowatts (Direct Current)
- Utility-scale solar is excluded from Public Utility Facilities definition
- Requires location of utility-scale projects adjacent to or within one mile of 138 kV substation
- Decommissioning provisions are more general than other localities

### Rockingham

- 1,800 acre countywide cap for utility-scale solar projects
- 60 acre per site cap in agricultural zones or land rezoned for utility-scale solar
- 6 acre minimum site size in agricultural zones
- Utility-scale solar defined as greater than 2 acres
- Community meeting requirements
- Discourages placement on prime agricultural soils and wooded sites
- The County exhibits preference for the dual use of utility-scale solar sites (parking, grazing, agriculture etc.)
- Utility-scale facilities are prohibited from locating on a property in the Virginia Department of Historic Resources (VDHR) Landmarks Registry, National Registry
- No utility-scale solar facility can be permitted on land that has been clear-cut or heavily timbered in the five (5) years immediately preceding the date of the application
- Encourages placement on existing impervious surface
- Setback required for utility-scale solar facilities: 100 ft from property lines, 200 feet from existing dwellings. Facilities greater than 30 acres require greater setbacks
- The County has extensive buffer requirements for utility-scale solar projects, (plant diversity, climate-hardy etc.)
- Requires the designation of wildlife corridors and consultation with VA pollinator program
- Requires a shorter period to start decommissioning after operation ceases than other jurisdictions (6 months)



### Lunenburg

- The only county other than Culpeper to require third party verification of decommissioning cost estimates.
- Defines small, medium and large utility-scale solar facilities by megawatts generated (alternating current)
- The County comprehensive plan contains a specific policy area for solar facilities
- Recommends large utility-scale solar facilities locate on brownfields and County-owned capped landfills or near existing industrial uses
- Utility-scale solar prohibited within 1 mile from a Town and within in two miles of airport without FAA certification
- Extensive setback requirements for all facility sizes
- Medium and large facilities must be one mile from existing utility-scale solar facilities
- Groundcover on utility-scale solar sites shall consist of pollinator plants, grasses, forbs, and native wildflowers
- Required to designate wildlife corridors
- Written certification from expert for glare reduction measures required
- Lighting should comply with Dark skies ordinance
- Prohibits use recycled value of assets to reduce decommissioning costs
- Requires report on adjacent property values prepared by 3rd party

### Rappahannock

- Utility-scale solar permitted only when plants facilities, and grid interconnection, do not detract from the agricultural or rural character of the County tourist economy or scenic vistas of the County as set forth in the Comprehensive Plan
- County comprehensive plan acknowledges the need to ensure utility-scale solar doesn't detract from rural character
- 500 acre minimum site size
- Utility-scale solar not permitted on prime agricultural soils on slopes less than 15% as shown in the comprehensive plan
- Minimum 500 foot setback for utility-scale solar projects from lot lines and roads
- Installed facilities contained in a 100-acre contiguous area

### Nelson

- Large scale solar facilities are defined as projects 1 acre or greater for off-site consumption
- Requires the Applicant to provide a narrative describing approximate rated capacity of the solar energy system; the approximate number, representative types and expected footprint of solar equipment to be constructed
- Requires underground transmission and the identification of utility infrastructure locations
- Setbacks for large solar energy systems: 100 feet from all property lines and at least 200 feet from any residentially-zoned properties
- Decommissioning provisions require the removal of below-grade structures, restoration of the site to pre-existing condition and decompaction of compacted soils.

### Madison:

- Commercial solar energy facilities are permitted with SUP in M-1 (Light Industrial)
- Solar Farms permitted with SUP in M-1 (Light Industrial), M-2 (General Industrial)
  - “Solar Farms” are not defined in the Code
- Annual statement of activity is required to ensure that the facility is actively producing electricity for the power grid.
- No utility-scale solar facility shall be allowed on a property designated by the Virginia Department of Historic Resources as a battlefield area or other historic resource, or other sensitive area.
- Top soil shall be removed before grading, etc., and stored on site to be returned to the disturbed land to a minimum of four (4) inches to maintain the quality of the soil prior to final approval by the County.
- Requires a feasibility study demonstrating that the amount of generated power can be supported by the relevant electric company and electric grid required
- Size of facility shall be limited to 50% of the annual total power usage of all users in Madison County.
- Minimum 300 foot setback in addition to 50 foot stream buffer and a 150 setback from rivers required for utility-scale solar projects
- Requires the use of Environmentally-friendly herbicides
- The county is considering expanding utility-scale solar outside of industrial zones
- Moratorium on utility-scale solar development in effect until the end of 2022.

### **Future Developments**

This analysis was conducted prior to a number of significant developments that could have an impact on utility-scale solar in the PEC service area.

- Madison County may be expanding utility-scale solar outside of industrial zones. Its moratorium on utility solar development was recently [extended to the end of 2022](#).
- Culpeper County is planning to adopt a utility-scale solar ordinance to accompany its policy document in 2022. The Planning Commission approved a draft ordinance restricting utility-scale solar to industrially-zoned land with the Board of Supervisors to take up the issue sometime this year.
- [Culpeper County](#), [Nelson County](#) and [Greene County](#) are in the process of updating their comprehensive plans.
- Loudoun County is in the process of developing its own utility-scale solar regulations as it undergoes a [zoning ordinance rewrite](#).

While the 13 counties reviewed have varying degrees of alignment with the PEC 2019 policy document and some may have contained less detailed provisions or provided for more discretion than others, many of the existing ordinances reviewed contain sensible provisions that address PEC's concerns regarding permitting, project siting/design, decommissioning etc. We hope the information in this analysis can assist advocates and policymakers in the region in their future work. By knowing the current range of approaches to utility-scale solar regulation in the PEC service area, we can better anticipate and measure progress in utility-scale solar regulation in the region moving forward.

Appendix: Utility-Scale Solar Policy Summary Chart		X = Addressed by Ordinance	Lunenburg	Rockingham	Fauquier	Culpeper	Rappahannock	Nelson	Madison	Clarke	Albemarle	Orange	Greene	Fluvanna	Prince William
<u>Permitting / Applications Procedures</u>	Utility Scale Solar Defined	X	X	X	X	X	X	X	X	X	X		X		X
	Permitted in Ag Zones by SUP / SE	X	X	X	X	X	X	X		X	X	X	X	X	X
	Separate Comprehensive Plan Consistency Review				X										
	Policy Document Addresses Utility-scale Solar	X	X	X	X	X			X			X			
<u>Siting</u>	Min Land Area		6 ac in ag zones > 2 acres by definition			500 ac	> 1 ac by definition		20 ac				> 1 ac by definition		
	Max. Land Area		1,800 ac Countywide 60 ac Cap in ag zones	1,000 ac	Approx. 2,400 ac Countywide										
	Historic / Cultural Resources	X	X	X	X	X	X	X	X	X	X	X			X
	Natural Resources	X	X	X	X	X	X	X	X	X	X	X	X		X
	Viewshed Impacts	X	X	X	X	X	X	X	X	X	X				X
	Utility Infrastructure			X	X	X	X	X	X	X	X				
	Access / Frontage	X		X	X	X				X		/	X		
	Proximity to other solar facility(s)	X		X	X										
	Economic/Fiscal Considerations			X	X				X	X					
<u>Development Standards</u>	Setbacks for	X	X	X	/	X	X	X	X	/	/	/	/		/
	Height for Utility-scale Solar	X	X	X	/	X	X	X	X	/	/	/		/	/
	Buffering / Screening / Landscaping	X	X	X	X	X	X	X	X	/			/		
	Groundcover	X	X	X		X									
	Fencing	X		X	X	X			X	X					
	Glare		X	X	X		X		X	X					
		/ = Addressed in Underlying Agricultural Zone													
<u>Maintenance and Operations</u>	Addresses Maintenance of Site Features	X						X	X						
	Addresses Compliance with Federal and State standards	X			X	X		X	X	X					
<u>Decommissioning</u>	Decommissioning Plan Required	X	X	X	X	X	X	X	X	X					
	Cost Estimates 3rd party verified	X				X									
	Addresses Security	X	X	X	X	X	X	X	X	X					
	Prohibits use of recycled value of assets	X							X						
	Penalties for Default	X	X	X	X	X	X	X	X						

# UTILITY-SCALE SOLAR POLICY DOCUMENT

## WORKING DRAFT - JULY 2019



Photo Credit: Will Parson, Chesapeake Bay Program

**The Piedmont Environmental Council**  
**45 Horner Street**  
**Warrenton, Virginia 20186**  
[www.pecva.org](http://www.pecva.org)

## **FORWARD**

The Piedmont Environmental Council (PEC) is a 501(c)3 non-profit organization that was founded in 1972. PEC works with the citizens of our nine-county region (Albemarle, Clarke, Culpeper, Fauquier, Greene, Loudoun, Madison, Orange, and Rappahannock) to conserve land, create high-quality communities, strengthen rural economies, celebrate historic resources, protect air and water quality, build smart transportation networks, promote sustainable energy choices, restore wildlife habitat, and improve people's access to nature.

Virginia's Piedmont is an exceptional place. Located at the foot of the Blue Ridge Mountains, the Piedmont is beloved for its scenic beauty, unparalleled in its significance to America's history, and valuable for its productive family farms, thriving communities, and vibrant economy. Its forests, fields, and wetlands provide clean water for the people of this region as well as those downstream, and they offer bountiful habitat for numerous species of wildlife and native plants. This splendid natural setting, together with its distinctive towns and cities, make the Piedmont a wonderful place to live, work, and visit.

PEC has created this Policy Document to assist localities and their citizens in the proper planning of Utility-Scale Solar (USS) Facilities. Renewable energy will make up a large percentage of energy generation projects in the U.S. for the foreseeable future and are of the utmost importance to the future of our environment; however, in this pursuit, we must ensure that impacts to our cultural, natural, and historic resources are avoided and that proper mitigation is employed in instances where conflicts arise. PEC is well versed in the nature of Utility-Scale Solar (USS) projects and the considerations for siting. We hope to serve our local communities as a resource in determining appropriate size, scale and any potential sites - sites that avoid or minimize impacts from these industrial facilities.

For more information on PEC, [please click here to visit our website!](#)

## **INTRODUCTION**

PEC is an advocate for solar energy, especially distributed solar power generation - small scale solar (usually rooftop) primarily designed to meet the immediate demands of the property in which it is located. In comparison, the size and nature of USS Facilities create challenges for any locality to protect important resources and the public health, safety, and welfare of the community. Virginia has thousands of acres of rooftops, parking lots, and landfills devoid of solar panels in areas of moderate to high energy demand, in addition to contaminated and/or underutilized industrial sites. It is PEC's belief that we should be looking to these developed areas as the low hanging fruit of future solar sites.



The evolution of Commonwealth policy, steadily declining cost of solar panels and the rising demand for green energy has spurred interest in the development of USS Facilities throughout Virginia. These facilities are often sited in rural areas and referred to by many as *solar farms*. They have many of the same environmental benefits as rooftop solar, including zero emissions and the ability to provide power at times of peak-demand, but they are not agriculture. USS Facilities do not provide the positive outcomes associated with agricultural production; moreover, their only correlation to farms is their tendency to be located on farmlands associated with historical/potential agricultural production. With “small” USS Facilities consuming hundreds of acres, it is difficult at best to protect specific values associated with agricultural lands.

USS Facilities require a vast amount of acreage for energy production -- as much as 7 to 10 acres per megawatt (MW) of rated capacity. Based on size, location, visibility, impacts to agricultural and natural resources, and the potential for additional infrastructure, a locality needs the ability to determine the appropriateness of sites to address impacts.

USS Facilities will play a role in the Commonwealth’s energy mix. But they should not come at the cost of our most productive agricultural and forested areas. Nor should they impact important scenic and historic resources that we rely upon for tourism.

Although Planning District Commissions (PDC), such as the Rappahannock Rapidan Regional Commission (RRRC), have created documents that highlight lands attractive to industry for the siting of USS Facilities; these types of studies generally fall short of identifying important cultural, natural, and historic resources in these areas. This places the burden upon localities to protect and identify important resources that should not be subjected to, or may be in conflict with, USS Facilities. The Comprehensive Plan should act as an additional guideline when discussing proper siting for USS Facilities.

The RRRC relied upon the following natural resource data layers to address “Optimal Areas for Utility-Scale Solar” (Figure 1): floodplains, wetlands, slopes/grade, and prime agricultural land; however, the RRRC did not include additional data layers that would be addressed within a Comprehensive Plan to evaluate appropriate locations for USS Facilities

The Cricket Solar Application (Figure 2) is located within an area designated by the RRRC as “Optimal” for USS Facilities (Figure 1); however, the Cricket Solar Facility directly impacts many cultural, natural, and historic resources, including forested land (Figure 3); prime farmland and farmland of statewide importance (Figure 4); and core and study battlefield areas, proposed

historic district, registered historic sites, and the Rapidan River (Figure 2), that were not included in the RRRC analysis (Figure 1).

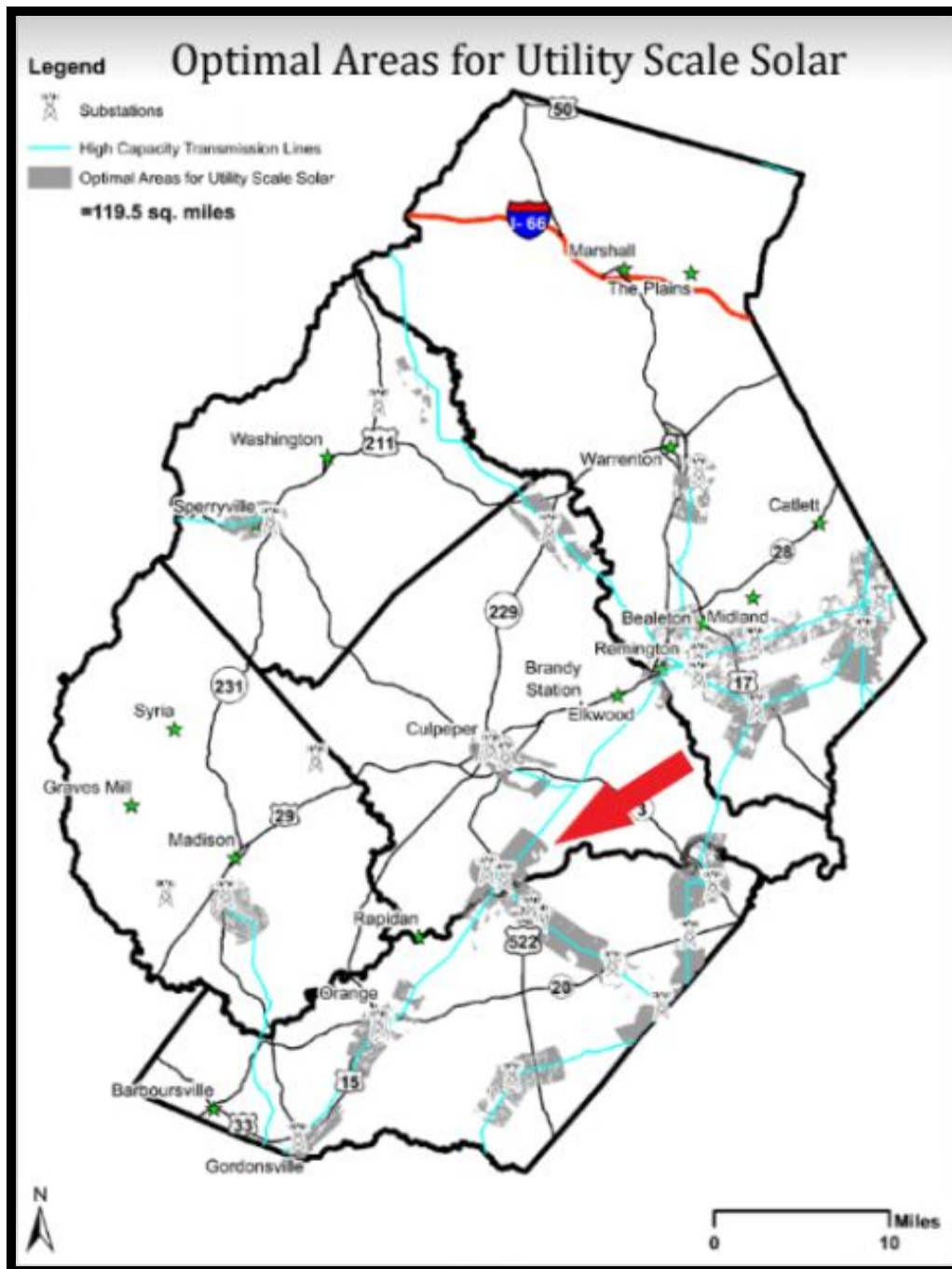


Photo Credit: RRRC, Utility-Scale Solar Suitability Analysis

**Figure 1:** Optimal Areas for Utility-Scale Solar (red arrow points to Cricket Solar Application)



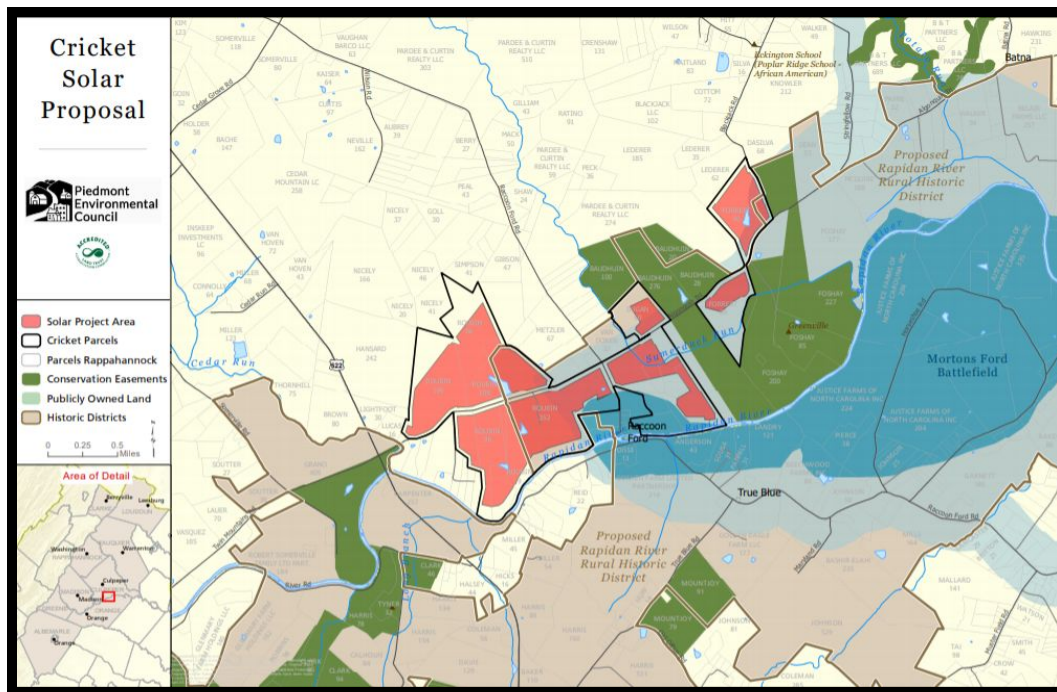


Photo Credit: PEC, Cricket Solar Proposal Site Location Map

**Figure 2:** Cricket Solar Application Site Location Map in Culpeper, Virginia.

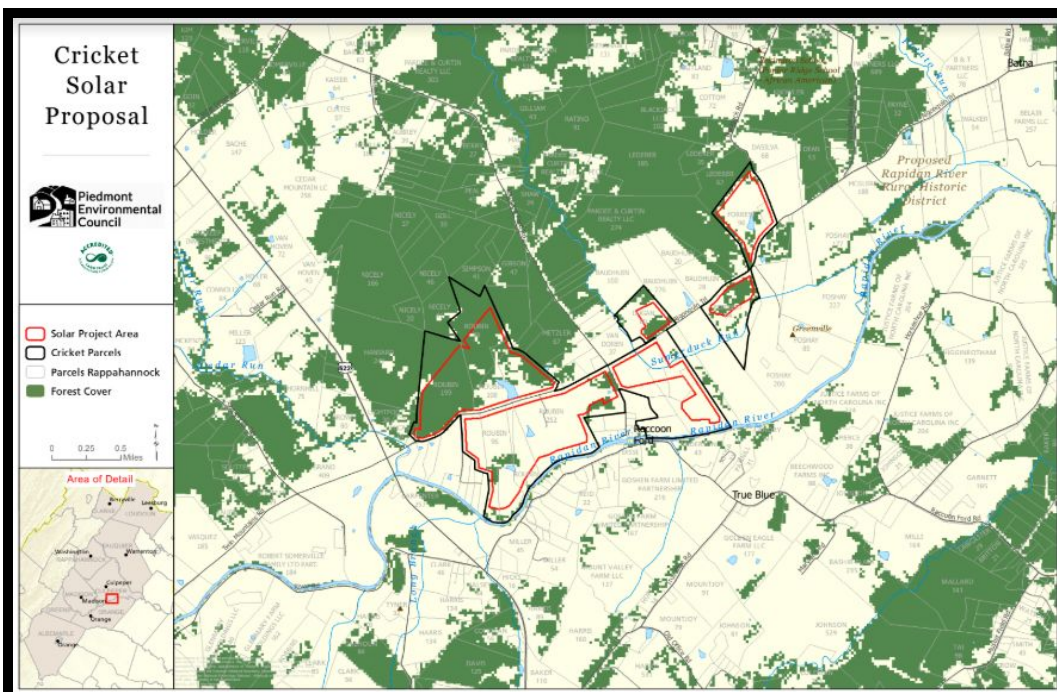


Photo Credit: PEC, Cricket Solar Proposal Forest Cover Map

**Figure 3:** Cricket Solar Application Forest Cover Map in Culpeper, Virginia.

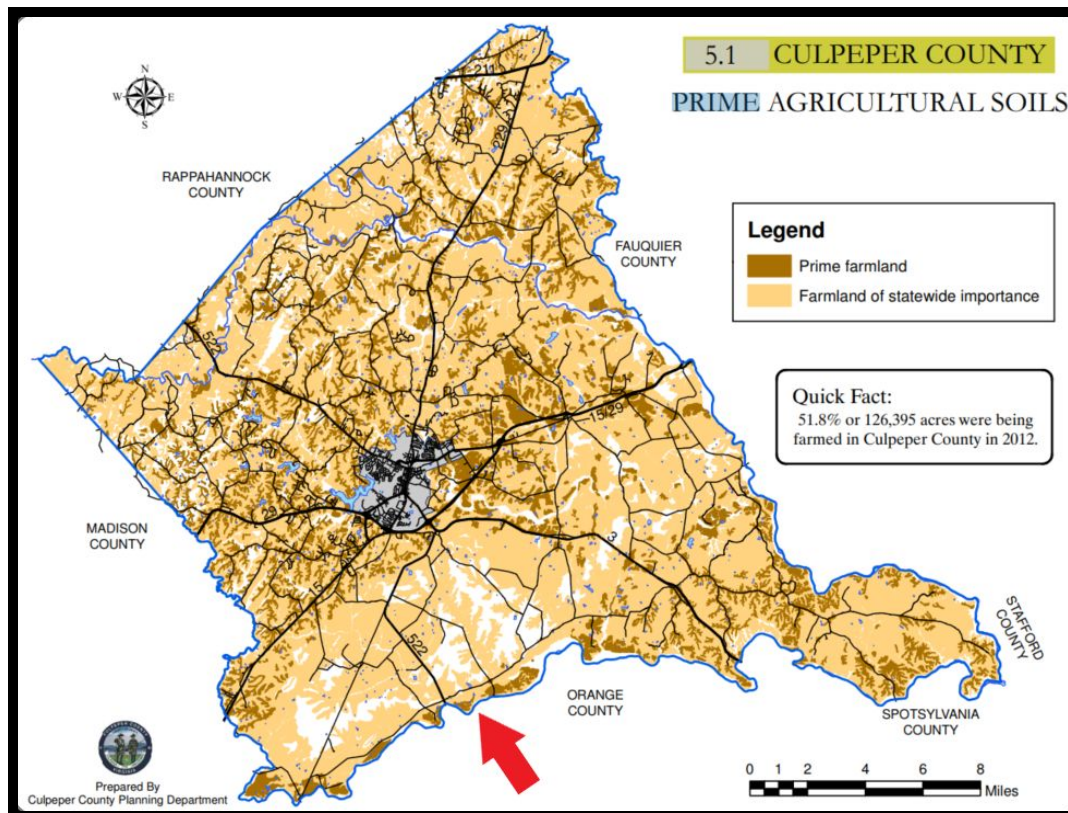


Photo Credit: Culpeper County, 2015 Comprehensive Plan

**Figure 4:** Prime Agricultural Soils (Prime Farmland and Farmland of Statewide Importance) in Culpeper.

When looking for new sites for USS Facilities, we believe developers and the County should be in general agreement on locations appropriate for these industrial uses - areas that contain marginal farm soils (at best), that are removed from important scenic and historic resources, and sites that provide appropriate visual buffers to neighboring communities - prior to any public hearing on an individual application.

### **POLICY PURPOSE**

This Policy Document addresses the following topics: 1) Public Process (Permits); 2) Siting Criteria Policy Document; 3) Tax Revenue; 4) Hydrologic Impacts; 5) Ecological Impacts; 6) Agricultural Land; 7) Grading and Fill; 8) Viewsheds and Natural/Historic Resources; 9) Screening Issues; 10) Noise Implications; 11) Property Values and Study Validity; 12) Decommissioning; 13) Transmission Impacts; and 14) Our Thoughts on the Future of Solar.

## **1. PUBLIC PROCESS (PERMITS)**

Utility-Scale Solar (USS) Facilities are industrial facilities and should not be allowed by-right on agriculturally zoned lands. Given their size and nature, they should be:

- Subject to a Conditional or Special Use Permit in agriculturally zoned areas with maximum acreage allowed per project and possibly per the entire County; and/or
- Limited to existing industrial zoned areas.
  - Agricultural land should not be spot zoned to create additional industrial zoned areas for USS Facilities.

Conditional or Special Use Permits on agriculturally zoned properties allow for a public assessment of the impacts and, where warranted, conditions put in place that mitigate those impacts. If severe impacts cannot be mitigated, the proposal should not go forward. As well, limiting the use to existing industrially zoned lands recognizes the nature of these large power generation facilities.

Avoidance of sensitive resources (e.g., cultural, natural, historical, public transportation, and public health, safety, and welfare) can eliminate the likelihood of a severe impact. Like all technologies, solar infrastructure will likely evolve into higher production value potentials, leading to more energy production per acre -- Counties should take this into consideration.

## **2. SITING CRITERIA POLICY DOCUMENT**

Counties should consider creating a siting criteria policy documents that, using the values/resources that are important to citizens (often well-defined within Comprehensive Plans), highlight potential impacts, mitigation measures, and conflicts with county resources from USS Facilities. The policy document should clearly delineate impacts to be avoided and those that could potentially be mitigated. It should set clear expectations and standards for the industry and provide the citizens some level of comfort that the county is protecting their health, safety, and welfare in the process. The remainder of this document addresses many of the areas that should be addressed in any policy.

## **3. TAX REVENUE**

Localities have vocalized two concerns over local tax revenue associated with USS Facilities: (1) implications of the machine and tool (M&T) tax (§ 58.1-3508.6 and § 58.1-3660); and (2) revenue due to lower land use value tax (LUVT).

### **M&T Tax**

The M&T tax offers the following tax exemptions for USS Facilities based on energy production:

- ≤ 5 MW: 100% tax exemption



- > 5 MW and < 150 MW: 80% mandatory tax exemption
- $\geq$  150 MW: not subject to mandatory 80% tax exemption (local government discretion)

The M&T tax exemption is applicable only to machine and tool property, and not the land itself. Items included in this exemption include machinery and tools, as well as “repair and replacement parts, owned by a business and used directly in producing or generating renewable energy” (§ 58.1-3508.6).

### LUVT

The following recurring question has been raised by multiple localities: *If a USS Facility is located within an agriculturally zoned area, can the County tax the USS Facility as a higher use (i.e. industrial)?* The answer to that question is yes.

Localities can capture the industrial use associated with USS projects in their assessment of the facilities. The Commissioner of Revenue for each locality is responsible for the assessment of a property’s actual use, regardless of how the property is zoned. Therefore, USS Facilities (industrial-related use) that are located within agriculturally zoned areas will be taxed for their industrial use, including roll-back taxes.

The following excerpts from the taxation section of the Code of Virginia are useful when understanding the taxes associated with LUVT and USS Facilities:

- § 58.1-3230
  - *Prior, discontinued use of property shall not be considered in determining its current use. Real property that has been designated as devoted to agricultural use shall not lose such designation solely because a portion of the property is being used for a different purpose pursuant to a special use permit or otherwise allowed by zoning, provided that the property, excluding such portion, otherwise meets all the requirements for such designation. The portion of the property being used for a different purpose pursuant to a special use permit or otherwise allowed by zoning shall be deemed a separate piece of property from the remaining property for purposes of assessment.*
- § 58.1-3237
  - *When real estate qualifies for assessment and taxation on the basis of use under an ordinance adopted pursuant to this article, and the use by which it qualified changes to a non qualifying use, or, except as provided by ordinance enacted pursuant to subsection G, the zoning of the real estate is changed to a more intensive use at the request of the owner or his agent, it shall be subject to additional taxes, hereinafter referred to as roll-back taxes. Such additional taxes*

*shall only be assessed against that portion of such real estate which no longer qualifies for assessment and taxation on the basis of use or zoning.*

- *Liability to the roll-back taxes shall attach when a change in use occurs, or, except as provided by ordinance enacted pursuant to subsection G, a change in zoning of the real estate to a more intensive use at the request of the owner or his agent occurs.*

#### **4. HYDROLOGIC IMPACTS**

Technically sound stormwater engineering practices are necessary to control runoff and pollution. Runoff and pollution are unavoidable impacts associated with impervious surfaces. Mass grading, coupled with the removal of agricultural and forested land, will result in detrimental stormwater runoff and pollution, if not properly handled. Figure 5 below depicts erosion issues during construction of a solar facility.

USS Facilities should have to submit an Erosion and Sediment Control Plan (ESCP), and include the following information:

- Extent of grading and appropriate grading phases;
- Runoff coefficients (soil type, cover type, slope);
- Management of runoff and pollution both during and subsequent to construction/grading activities and throughout the lifetime of the Project;
- Ground cover plantings that should utilize native species ranging from 1 to 3 ft in height; and
- Address the impervious nature of solar panels and the creation of “drip-line erosion” (Figure 6).



Photo Credit: [Environmental Science and Engineering Magazine](#)

**Figure 5:** Erosion during solar construction titled as “Turbid runoff from a solar project during construction”.

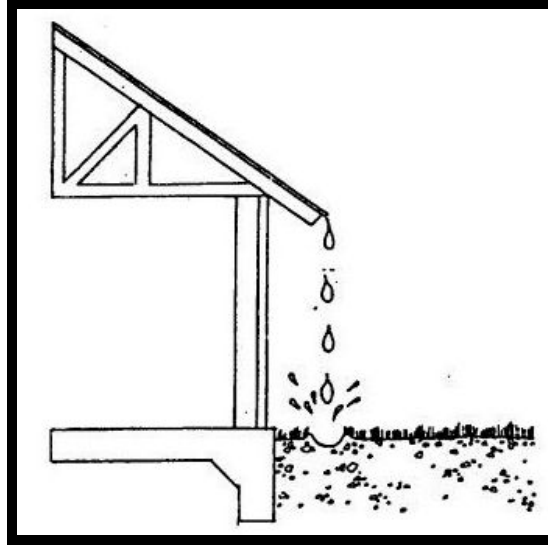


Photo Credit: [Fairfax County, Virginia](#)

**Figure 6:** Drip-line erosion illustration.

## 5. ECOLOGICAL IMPACTS

Silicon covered solar panels are the general industry standard, and appear to be environmentally friendly. Community members have raised the issue of toxics related to solar panel constituents. We agree that USS Facilities should not use, consider, or anticipates using panels that contain harmful substances that display toxicity characteristics. Concerns related to the use of heavy metals (cadmium) or GenX coating materials have been cited by the general public.

- Cadmium is a heavy metal that can pose potential impacts to soil and groundwater health. Some have expressed concern about contamination from the use of cadmium telluride (CdTe) contained in panels, especially if damage were to occur to the solar panels via natural disaster or during decommissioning. While PEC shares the general concern related to toxics, most of the studies related to CdTe have found there is little evidence that cadmium contamination would occur during the normal use of these panels. However, there is some evidence to suggest a release is possible if not properly disposed. PEC would recommend proper disposal or recycling of these panel types to ensure no contamination occurs. Figure 7 below displays the general layers of cadmium telluride solar arrays.
- Increasing research on GenX coatings by the EPA, such as the health effects related to *Per- and Polyfluoroalkyl Substances (PFAS)*<sup>1,2</sup>, raises environmental health concerns.

<sup>1</sup> <https://www.carolinajournal.com/news-article/policymakers-largely-unaware-of-genx-like-compounds-in-solar-panels/>

<sup>2</sup> <https://www.epa.gov/pfas/basic-information-pfas>

Counties should require panel types/materials to be specified in the application and have a condition excluding harmful substances, such as heavy metals and GenX materials, from being used at USS Facilities.

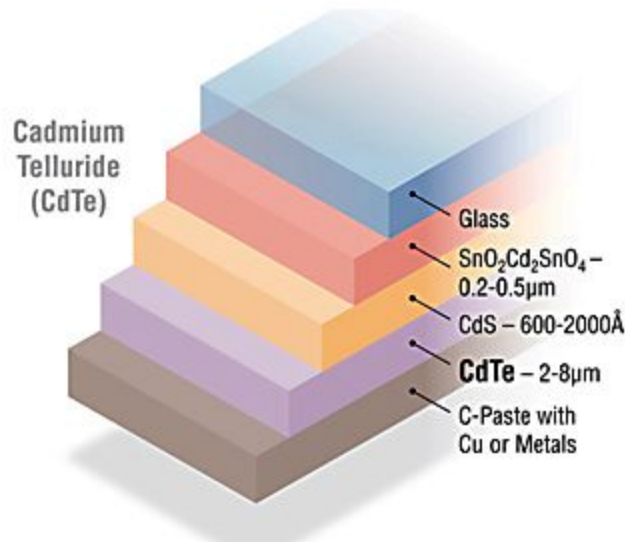


Photo Credit: [National Renewable Energy Laboratory](#)

**Figure 7:** Layers of Cadmium Telluride Photovoltaic Solar Cells.

## **6. AGRICULTURAL LAND**

USS Facilities should not be allowed on land that contains Prime Agricultural Soils (federally designated); and Soils of Statewide Importance should be avoided to the maximum extent possible. Proposals should not negatively impact the future use of a site as agriculture. Processes associated with the development, use, and decommissioning of USS Facilities could limit the future agricultural use of land, forgoing future use as productive cropland. All efforts should be made to return the land to its prior state, including its viability for different types of equal or higher use agriculture. Pasture land is not equivalent to productive cropland.

Proposals that retain some agricultural use or those that increase its value as habitat should receive greater support than those that do not. An example would be a design that allows for continued grazing, hay, and/or crop growing within the area of impact. This is difficult as many grazing animals are not compatible with USS Facilities. Designs that would allow for easy harvesting of crops to be planted in conjunction with panels are not common in projects of this scale. But if discussed with the applicant early, the project may be able to be designed to allow for the equipment or fencing necessary for crops and/or livestock (sheep primarily) in a limited fashion.

Another example of continued agriculture is the inclusion of beehives and beekeeping in conjunction with USS Facilities (Figure 8). Bees will provide pollination to buffers, screening, and neighboring farms while producing honey that can be sold by the landowners. As well, some



Photo Credit: [Dennis Schroeder/NREL InSPIRE](#)

**Figure 8:** Beekeeping activities on a USS Facility.

communities are requiring the establishment of native meadows as a way to increase habitat and decrease the use of herbicides or mechanical clearing on the site.

## **7. GRADING AND FILL**

Grading and fill should be avoided. Structural components can be included on ground-mounted systems, to avoid civil engineering (i.e., grading). Figure 9 below depicts solar arrays on sloped terrain, where grading and fill were avoided by utilizing structural components.

If any grading is required, it should not result in the loss of agricultural soils (topsoil) and should be completed in phases to reduce erosion and sediment from the site. In cases where grading is required, topsoil should be removed from the area prior to grading. That soil should be stored on site and replaced after the grading is completed. Compression mats (Figure 10) should be



employed to avoid compaction of soils from heavy equipment. Any existing natural vegetated buffers should be used to further reduce runoff from the site.

Solar panels are impervious surfaces, as they create drip line erosion. Additional impervious surfaces (e.g. roads, structures) should be minimized/avoided.



Photo Credit: [RBI Solar via Solar Power World](#)

**Figure 9:** Ground-mounted solar arrays located on a hill, avoiding grading and fill.



Photo Credit: [Paradox Access Solutions](#)

**Figure 10:** Compression mats used to avoid destruction of soils.

## **8. VIEWSHEDS AND NATURAL/HISTORIC RESOURCES**

The pursuit of historic resource protection and tourism associated with historic and scenic assets should be taken into consideration when evaluating viewshed implications. Impacts to scenic and historic resources and gateways to communities should be considered and addressed in any development of siting criteria. Counties should consider distance requirements from known resources (battlefields, register properties, historic districts, etc.) and require a site specific analysis of viewshed impacts, such as Figure 11 below. Impacted viewsheds will devalue historic and scenic resources and will deter tourists from visiting these areas.

For example, if a tour guide, while giving a tour of a battlefield, pointed to a large area of solar panels and said “the Northern Army cavalry was positioned upon the hill in the area of those solar panels”, the value of the history associated with the viewshed would be lost in the tourists inability to view the natural landscape associated with this hypothetical medical hospital.

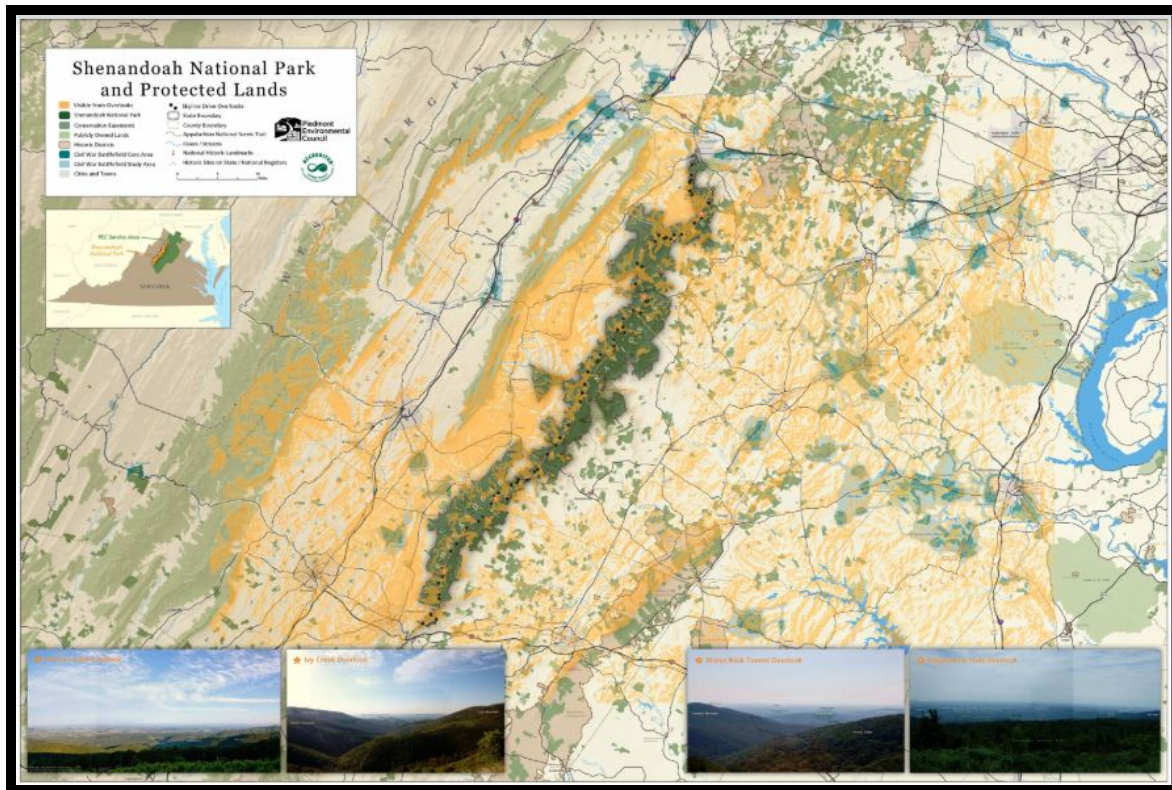


Photo Credit: PEC, Shenandoah National Park and Protected Lands

**Figure 11:** Viewsheds associated with the Shenandoah National Park

Replacing forested land, especially hardwoods and those classified by the Department of Forestry (DOF) as being high in “forest conservation value”, with solar panels does not make sense. Although solar power provides environmental benefit in their ability to reduce emissions, we should not seek to reduce that value by eliminating other important environmental services of our forests including their contribution as “carbon sinks” and enhanced water quality. Forests and agricultural lands can serve as “carbon sinks”, due to their natural ability to absorb atmospheric carbon dioxide via “carbon sequestration”<sup>3</sup>. Counties should not approve renewable energy projects that result in the loss of resources that naturally regulate carbon emissions -- forests and agricultural lands.

Counties should seek “Win, Win” opportunities, such as USS Facilities that create positive, renewable energy (“Win”) while avoiding cultural, natural, and historical resources (“Win”).

Counties should avoid “Win, Loss” applications, such as USS Facilities that create positive, renewable energy (“Win”) yet destroy carbon sinks (“Loss”) or important cultural and historic resources.

<sup>3</sup> <https://www.americanforests.org/blog/forests-carbon-sinks/>

## **9. SCREENING ISSUES**

Screening practices should be designed to hide any USS Facility and its appurtenant features (e.g., fences, solar panels, switchyard) to the maximum extent possible. Fences should be designed to blend in with surrounding screening and natural views. The size, nature, and mixture of vegetative species used to screen the USS Facility should seek to fully mitigate its viewshed implications; however, given the potential size and location of USS Facilities, this may be impossible.

General screening practices should be designed to:

- Protect property values by providing maximum benefits to adjoining landowners and viewsheds. Figure 12 displays poor screening qualities associated with a single row of evergreen trees;
- Provide maximum benefit to wildlife via creation of reliable habitat. Figure 13 displays the co-location of solar arrays and agricultural land that would provide habitat and assist with erosion control;
- Project water quality;
- Screening should consist of a mixture of native deciduous, evergreen trees, and shrubs.
- Established hardwoods should be left in place and utilized as natural screening;
- Pollinator friendly species would be of the highest recommendation, in order to add ecological benefits with the creation of new wildlife habitat;
- Deciduous and evergreen trees should have a minimum vertical planting height to immediately screen fence lines and solar panels; and
- Tree species that drop their lower limbs or open up as they mature should be avoided (white pine, etc.).

Permitting a landowner to waive proper screening practices indicates that said screening only affects the landowner. Lack of proper screening could cause negative, long-term viewshed implications for road travelers and future properties adjoining or in proximity to a USS Facility. Maximum attention must be paid to buffers and screening.





Photo Credit: [Cypress Creek Renewables](#)

**Figure 12:** Poor screening associated with USS Facility.



Photo Credit: [Borrego Solar](#)

**Figure 13:** Proper screening and agricultural co-location associated with USS Facility.

## **10.NOISE IMPLICATIONS**

Noise associated with both construction and general operation should be defined. Construction noises will likely be out of attainment, in regards to those counties that have noise ordinances for agricultural and residential zoned areas. Counties should request that applicants explore alternative installation measures that reduce noise for neighboring communities and livestock. Pile-driving techniques can continue for months on end, and pose serious implications to the public health, safety, and welfare, including both humans and animals (especially livestock). Figure 14 displays pile-driving installation at a USS Facility in Powhatan, Virginia.

Comprehensive evaluations of the noise associated with general site operations (e.g., inverters, transformers, panels) should be conducted. Counties should request project noise levels be disclosed at all relevant property lines, associated with both the construction period and general operations.



Photo Credit: [Virginia Solar, LLC](#)

**Figure 14:** Pile-driving installation of ground-mounted structures at Scott II Amazon Solar Farm US 5 East in Powhatan, VA.

For example, “the effects of noise on various production parameters of cattle may also vary depending on whether the animals are exposed to noise on continuous or on an intermittent basis. In the latter case, animals are more severely affected as they do not have the chance to adapt to the noise.”<sup>4</sup>

## **11.PROPERTY VALUES AND STUDY VALIDITY**

Property values will be affected. While anecdotal information should not be used in the findings related to any decision, answering the simple question of *Would you want to live next to one?* is a clear indicator that the value of adjacent properties will be impacted, at least for agricultural or residential purposes.

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<sup>4</sup> <https://www.dairyglobal.net/Health/Articles/2017/11/Effects-of-noise-on-cattle-performance-215715E/>

Many localities are wrestling with the question of *To what degree will a facility impact an adjacent property's value?*. While no agreed-upon figure has been established, some localities are seeking independent assessments after hearing questionable claims from the industry that impacts are nonexistent or negligible. The nonexistent and negligible claims are largely based on the fact that, due to the young age of USS Facilities in the United States, comparative pricing (i.e. sales price pre-solar vs. post solar) is not sufficient to determine the financial impacts that USS Facilities have on housing values.

USS Facilities should be considered as industrial use, as they provide industrial-sized energy production, result in industrial-scale consumption of land, and create visual impacts similar to other industrial uses.

## **12.DECOMMISSIONING**

USS Facilities are ground mounted systems that include materials aboveground and subsurface. In order to protect the future use of agriculture on the property, all measures should be taken to protect against damages (compaction, removal of topsoil, contamination) of the soils. All traces of the system should be removed at the end of a USS Facility's useful life. This can be accomplished with a contract condition (landowner) and bonding from the company.

USS Facilities should be returned to its pre-construction condition. For example, the post mounts, cabling, and road networks associated with the site should be removed from the property, along with any remaining infrastructure at the end of the facility's useful life (aboveground and subsurface elements). Use of concrete and other difficult to remove foundation measures should be minimized to primary structures (e.g., offices, substations, switchyards); and solar array racks should be installed without concrete footings.

At this time, there is little evidence of practical and profitable recycling of solar panels to accommodate the future recycling needs of USS Facilities. Until such time, bonding associated with decommissioning should reflect the full cost of decommissioning plus inflation and, given the lack of an established market, not include any discounts related to the future recycled value of solar panels.

## **13.TRANSMISSION IMPACTS**

Localities should make themselves aware of associated transmission and/or substation current locations and future upgrades. If required, the impacts of that infrastructure should be assessed along with the impacts of the facility. Figure 15 depicts the Fiber Optic Network and Electric Transmission Lines in the Northern Piedmont.



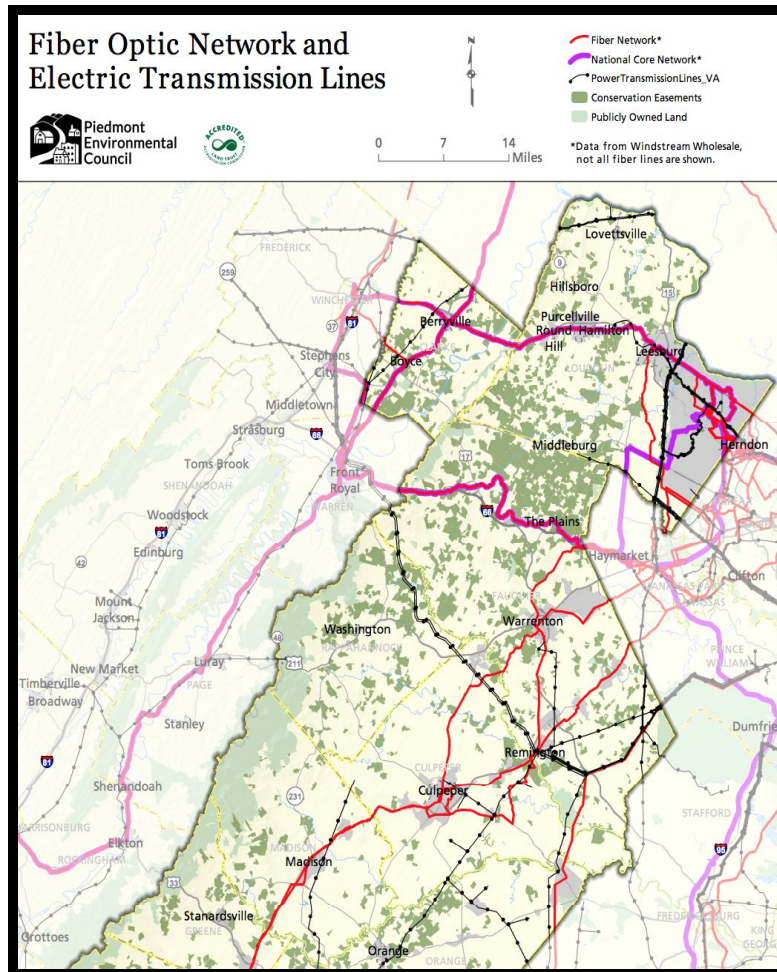


Photo Credit: PEC, Fiber Optic Network and Electric Transmission Lines

**Figure 15:** Fiber Optic Network and Electric Transmission Lines in the Northern Piedmont

## **14.OUR THOUGHTS ON THE FUTURE OF SOLAR**

As previously discussed within the Introduction of this document, Virginia has thousands of acres and sites we would define as *low hanging fruit* that should be used for solar prior to utilizing agricultural lands. These areas include:

- Rooftops
- Parking Lots
- Landfills
- Brownfields and other Contaminated Sites
- Underutilized Industrial Sites
- Airports
- Right of Ways (ROWs)



The vast majority of renewable energy discussed in [SB966](#) is of Utility-scale. According to the legislation, the code now calls for 5,000+ MW of Utility-Scale renewables of which, the vast majority is expected to be met with solar. It is unfortunate that the legislation failed to provide for greater use of distributed generation in the form of Small-Scale agricultural residential and commercial solar via net metering. In order to effectively deploy and rely upon renewable energy, Virginia should consider policies that provide for the greater use of small-scale solar that is not controlled by utilities, including removing current barriers (standby charges, limits on net metering, etc.) to customer and municipally owned generation.

## **SOURCES**

In addition to the footnote sources listed throughout this document, PEC found common ground with many of the following sources that could offer additional information for localities considering the adoption of, or changes to, their ordinances. Please note that, while PEC shares many of the same thoughts and ideals presented in these sources, we respectfully disagree with some of the information presented. We have also included hyperlinks to a few of our public submittals that address particular USS Facilities.

### **Footnotes (in order of appearance)**

GenX Compounds:

<https://www.carolinajournal.com/news-article/policymakers-largely-unaware-of-genx-like-compounds-in-solar-panels/>

Basic Information on PFAS:

<https://www.epa.gov/pfas/basic-information-pfas>

Carbon Sinks:

<https://www.americanforests.org/blog/forests-carbon-sinks/>

Effects of Noise on Cattle Performance:

<https://www.dairyglobal.net/Health/Articles/2017/11/Effects-of-noise-on-cattle-performance-215715E/>

### **Common Ground Sources**

*Industrial Solar Farms: An In-Depth Look How Industrial Solar Farms Impact the Rural Tidewater Counties of the Middle Peninsula and Northern Neck*, The Essex County Conservation Alliance, April 2019

*Utility-Scale Solar Ordinance Recommendations*, Alliance for the Shenandoah Valley, Shenandoah Valley Battlefields Foundation, March 2019

**Previous PEC Submittals (included via hyperlink)**

[\*Solar Farms and Criteria for Siting and Permitting\*](#), Letter Submitted to Page County Planning Commission, Piedmont Environmental Council, September 6, 2018

[\*Utility Scale Solar Application -- Cricket Solar, LLC\*](#), Letter Submitted to Culpeper County Planning Commission, Piedmont Environmental Council, March 6, 2019

[\*March 13, 2019 Work Session -- Utility Scale Solar Application -- Cricket Solar, LLC\*](#), Letter Submitted to Culpeper County Planning Commission, Piedmont Environmental Council, March 22, 2019