



CSA Semi-Annual Report to the Board of Supervisors

June 5, 2024

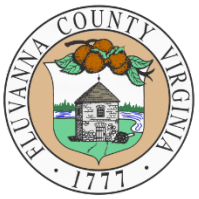
Bryan Moeller, CSA Program Manager



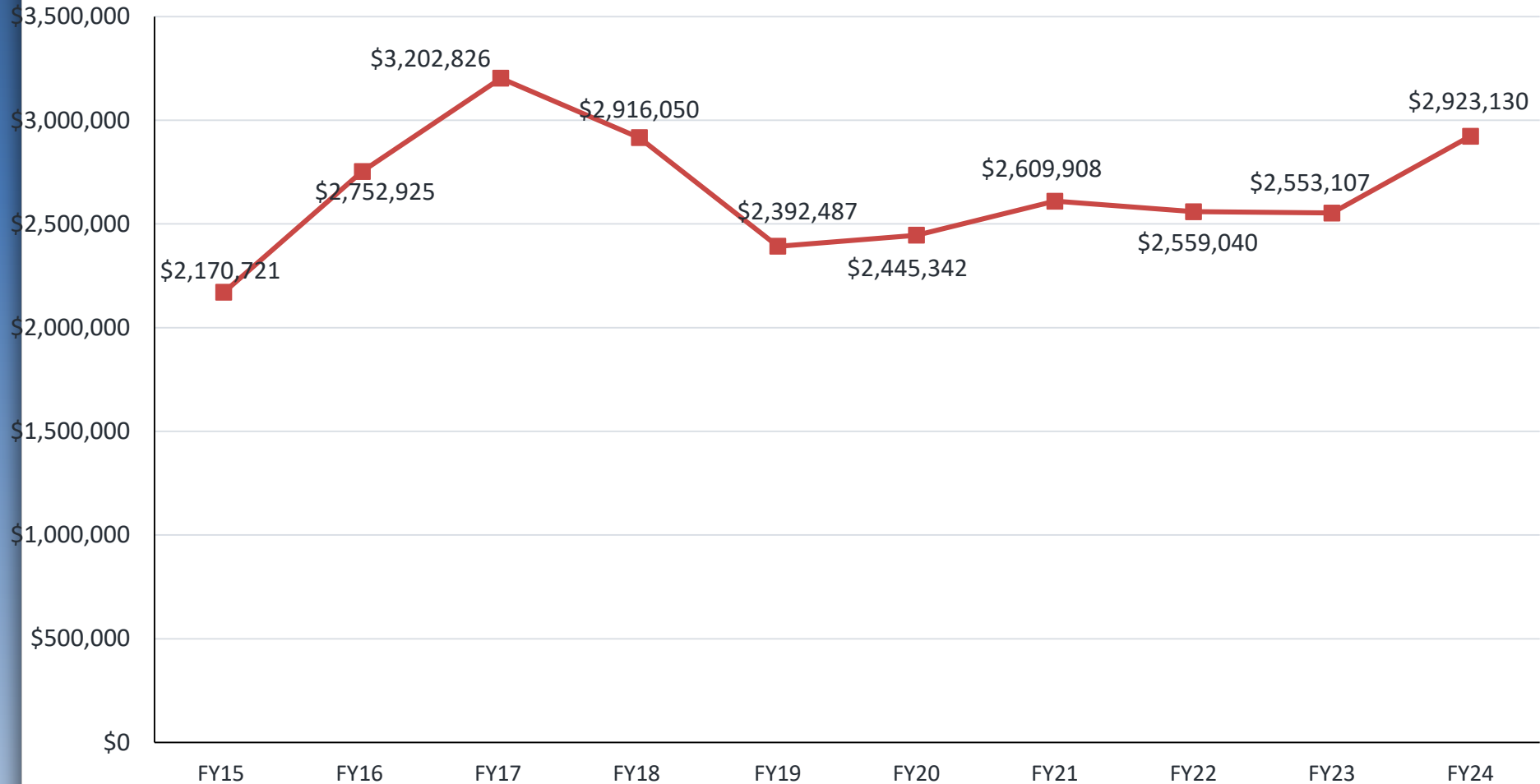
FY 2024 Spending (As of 6/4/2024)

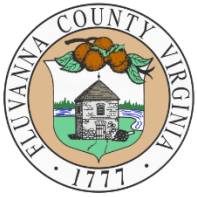
FY24 CSA Purchase of Services (POS)

- Adopted Spending Authority: \$2,956,286
- Expenditures + Encumbrances:
\$2,923,130
- Remaining Balance: \$31,080



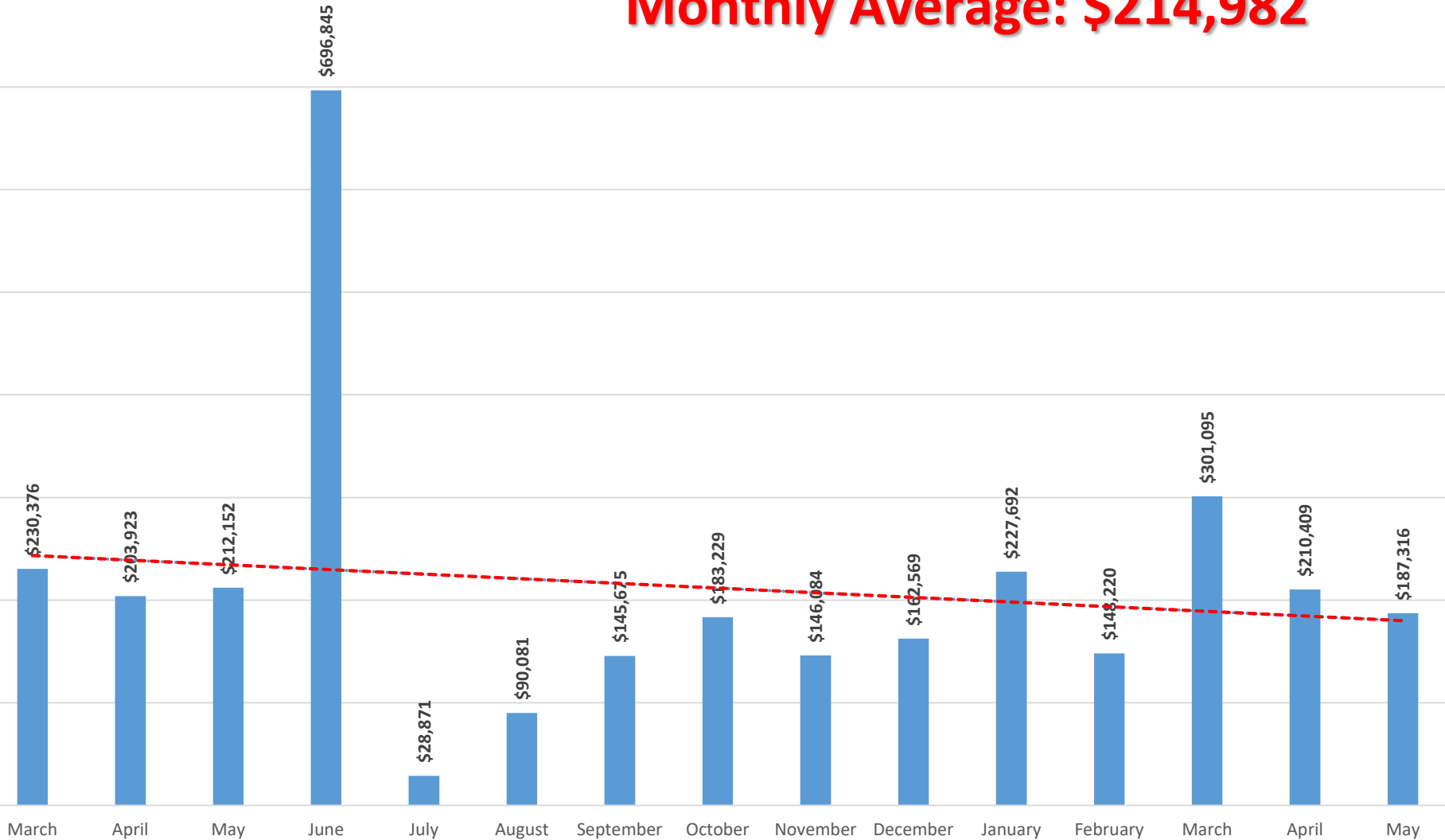
CSA Expenditure History (Purchase of Services)





CSA Expenditures by Month

March 2023 – May 2024
Monthly Average: \$214,982





Fewer youths served, but needs have increased.

Educational Day Placements expenses 25% higher in FY 2024 vs FY 2023

(\$1,332,748 vs \$ 1,067,849)

Residential Placement expenses 257% higher in FY 2024 vs FY 2023

(\$138,150 vs \$53,832)

Number of youth served decreased by 12%

(121 vs 106)



What's driving these increases?

Increases in Number of Days Paid for Youths in Residential Placements

Up 175% (estimated) from FY 2023

Increases in average cost for educational placement:

Up 25% from FY 2023

Spending for Wraparound Services for Children with Educational Disabilities was NOT a factor

Only increased by \$5,100 (4% increase)



Questions?



Department of Emergency Services

Kents Store Staffing

Jim True, Emergency Services Supervisor

June 5, 2024



EMS Building Current



- **Staffing to start July 1, 2024**
- **Kents Store EMS station 3**
- **Donated by Fluvanna County Rescue Squad**
- **Station to be staffed 0800-2000**
- **Two bunk rooms, bay able to hold equipment**
- **Kitchen, living quarters and training room**



Location Change Request



- **Move staffing to Kents Store Company 3 Fire House**
- **Staffing model same as Fork Union**
- **Better utilization of current space at Company 3**
- **Integration of EMS and Fire personal**
- **Supported by Fluvanna County FRA Fire subcommittee**



Kents Store EMS Station 3



- **Use of bay are to store county emergency service equipment including reserve units**
- **Transition the building to a training facility**
 - EMT Classes
 - Fire Classes (classroom only)
 - Continuing education
- **Generator backed up building when needed by county emergency services**



Kents Store EMS Station 3



Questions?

An aerial photograph of a rural landscape. In the foreground, there is a paved road and a white fence. To the left, a large brick house with a porch is visible. In the center, there are several smaller white houses. To the right, a large green house with a blue roof is prominent. The background is filled with dense trees and rolling hills under a cloudy sky.

2025

HOUSING STUDY

Thomas Jefferson Planning District

Laurie Jean Talun

2019 HOUSING NEEDS ASSESSMENT: A BASELINE





KEY TAKE-AWAYS FROM 2019

- Fluvanna experienced a 6% increase in median sales price in 2018, Fluvanna had the lowest median sales price of all 6 jurisdictions – the only under \$200,000.
- Households from 30-50% of AMI were the most severely cost burdened in the region: 36% pay more than half their income on housing costs in Fluvanna County. Of Fluvanna homeowner households from 0-30% of AMI, almost two-thirds spent more than half their income on housing costs.
- The share of owner households with severe cost burdens was 6% in Charlottesville, 8% in Albemarle County, and over 12% in Fluvanna County. This may reflect persistent poverty among long-term residents.
- 18% of housing units were vacant.
- Less than 40% of the population in our rural areas are under 34 years old.

2025 HOUSING STUDY

- More depth within each county we serve.
 - Where do our residents live, and what problems are they facing between wages and housing costs? Can people afford to live and work in Fluvanna?*
 - Specifically, what about teachers, mechanics, and CNA's?*
 - How do we maintain the rural construct of the region?*
- Looking specifically at Fluvanna's needs, and finding solutions that might only work in Fluvanna.
- Researcher from Virginia Tech will hold focus groups with Fluvanna citizens to identify solutions that they would and wouldn't work for them. Will partner with local leaders to identify a wide range of citizen voices.
- Data will be gathered and analyzed, which can be used to apply for grants to bring funding to our region.



NEXT STEPS

1. Letter of support for our application for funding from Virginia Housing.
2. Funding, in order to be included in the study.



"I'm a great believer in luck,
and I find the harder I work,
the more I have of it." –
Thomas Jefferson

Fluvanna Housing Needs

June 5, 2024



FLUVANNA-LOUISA HOUSING FOUNDATION

BETTER HOUSING. STRONGER COMMUNITY.

FLHF Purpose for Visit

1. FLHF Affordable Housing Overview 2024
 - CVRHP Update
 - Housing Conditions FLHF is experiencing in FluCo
 - Needs Assessment
 - FLHF Activities and Opportunities for Funding
- Requesting Input from BOS
 - Any needs/areas we should address
 - Any shift in our priorities
 - General input/concerns

CVRHP –Central VA Regional Housing Partnership

- CVRHP
 - Intent is collaboration between developers, local gov, NPs
 - Heavy urban focus, desire to increase actionable plans
- CREATED: Rural Housing Group
 - Comprised of Nelson, Albemarle, Fluvanna, Louisa
 - Participants from FluCo: Mozell Booker, Jennifer Schmack, Kim Hyland
 - Higher level discussion on housing needs – many Supes, Co Admins, NPs
 - Inviting Fluco Supervisors/Co Admin interested in participating
 - Findings so far . . .

Issues/Blocks	Clarification
<p>6 Infrastructure</p> <p>Transportation Density</p>	<p>not allowed or possible in some rural areas</p>
<p>6 Education of local BoS on housing as a strategy of economic development; Housing as economic development is vital and potentially more successful at long term economic development than STR/tourism</p>	<p>Recognize difference of workforce housing and the highly subsidized housing for residents below 60%AMI</p>
<p>1 Senior Housing vs. Workforce Housing</p>	
<p>4 NIMBY-ism</p>	<p>How to combat this - Education</p>
<p>4 Effect of Air BnB and STH rentals on housing availability</p>	
<p>6 Land trusts & land banks</p>	<p>Remove cost of land to increase affordability; retention of affordable units; identify residents who qualify. Protect NOAHs for local residents to stay in the county in their old age</p>
<p>5 Funding Sources</p>	<p>Good is that state level funding is high; some funding that is antiquated - Include technical assistance</p>
<p>2 Staffing of Housing Agencies</p>	<p>2. Technical Assistance for Grants</p>
<p>1 Data Collection is a challenge</p> <p>Advocates for change within the local government</p> <p>Combating costs of services due to higher population brought by having more affordable housing</p> <p>Get more rural localities involved in the conversation</p> <p>How can we lower the cost of Housing projects</p> <p>How will this help the people who live here/work here stay here vs. bringing in new people</p> <p>Discussion Group with planning commissioners & BOS - smaller group that are not part of the choir</p>	<p>Need to know details in the county regarding where the housing is; Collaboration with county revenue office</p> <p>with the goal of understanding their POV - to achieve buy in on housing as a priority- framing discussion will be important - Goes back to the definition of affordable housing - relate it back to teachers and police and first responders who can't find housing in our communities</p> <p>Look at models of other rural localities who have been successful</p>

CVRHP Rural Housing Discussion Group

Housing Conditions

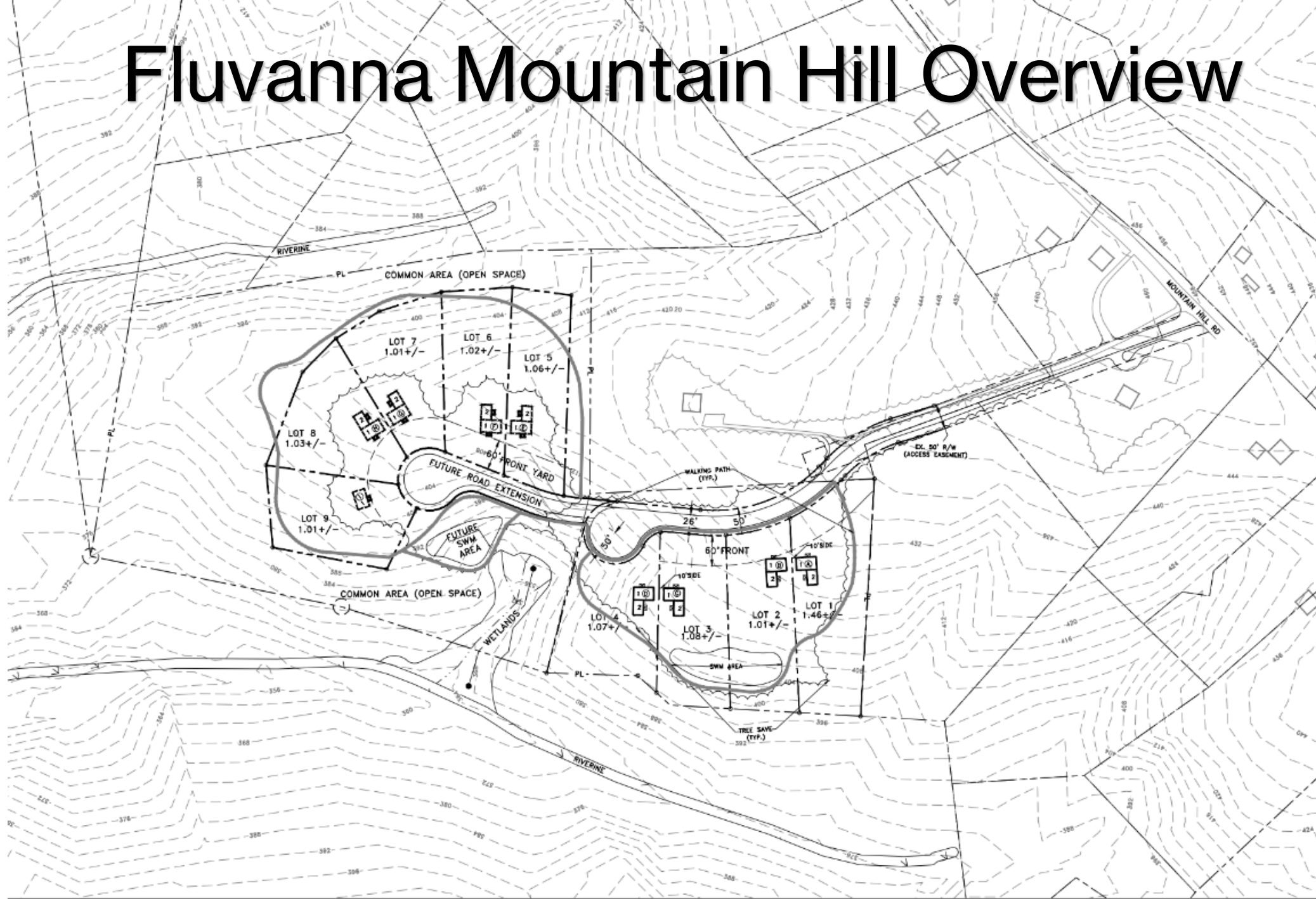
- FLHF has stabilized the backlog of core repair requests (Wanda Armstrong)
- Many homes outside of our scope or too severely damaged/neglected
 - Utilizing USDA 504 (not our program)
 - Need to identify further funding sources
 - CDBG – Scattered Site Rehab funds (\$1,250,000)
- Needs Assessments required
 - Fork Union has some stats but having reliable data is a must when requesting funding and to identify where needs are greatest.
 - Fluvanna median home age = 26 *but* Fork Union median home age = 70
 - Median home price Jan 2020= \$218,000 . . . Apr 2024 = \$345,000 = **63% increase!**



FLHF Update

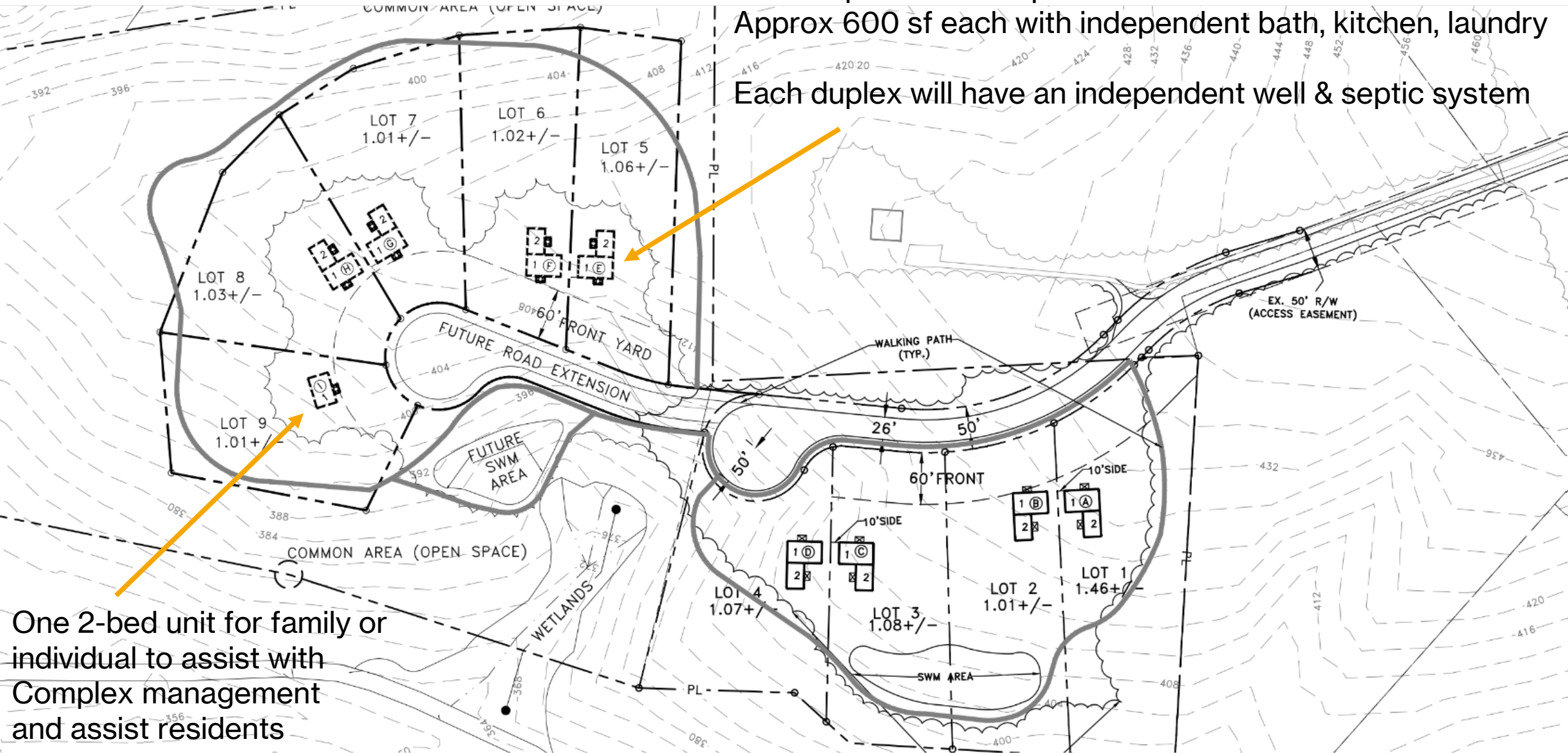
- FLHF Activities and Opportunities for Funding
- Mountain Road Update
- Essential Home Repair
- SPARC Funds - \$2,100,000 in mortgages reservations requested from Virginia Housing – the last four houses we sold in Fluvanna utilized SPARC funds which will lower the interest rate by 1% for qualified buyers.
- Meeting with Commissioner of Revenue and Treasurer to discuss local needs, tax sales, demographics of county, % tax relief, land values & home assessments.

Fluvanna Mountain Hill Overview



DATE: 05/11/2023	ENGINEER: MIM	CHECKED: AK	CAD: OJG/AK	JOB# 23143.000
SENIOR HOUSING PROJECT				
FLUVANNA COUNTY, VIRGINIA				
CONCEPT PLAN WITH FUTURE PHASE - 2				
SHEET	C1.00	SCALE	1" = 80'	
PLAN REVISIONS - DREV 6/5/23 PER CO. REVIEW				

Each duplex drawn represents two 1-bedroom units
Approx 600 sf each with independent bath, kitchen, laundry
Each duplex will have an independent well & septic system



One 2-bed unit for family or individual to assist with Complex management and assist residents

Project Component	Expense	HOME-ARP	HOME CHDO	HOME FY21-22	HOME FY23	HOME FY24	TBD Funds	VA Housing
Land	\$112,862.90			\$112,862.90				
FC Subdivision Application	\$1,500.00			\$1,500.00				
Site Plan Prep Work	\$2,590.00			\$2,590.00				
Wetlands Delineation	\$3,000.00			\$3,000.00				
Phase I Archaeological Survey	\$16,500.00			\$16,500.00				
RK&K Engineering Svcs	\$13,800.00							\$13,800.00
RK&K Engineering Svcs	\$22,020.00			\$22,020.00				
RK&K Engineering Svcs	\$10,160.00				\$10,160.00			
Road Plan Filing Fees	\$6,500.00				\$6,500.00			
CGP/VSMP permit filing	\$2,700.00				\$2,700.00			
Lot Subdivision&Easement	\$15,000.00				\$15,000.00			
R/W Lot Corner Setting	\$15,000.00					\$15,000.00		
Plan Printing	\$3,800.00					\$3,800.00		
Geotech Svcs per VDOT	\$8,500.00				\$8,500.00			
SWM Bond	\$800.00				\$800.00			
Road Bond	\$4,500.00				\$4,500.00			
Site Work	\$60,000.00			\$9,000.00	\$50,000.00	\$1,000.00		
Well 2 units	\$12,500.00	\$12,500.00						
Well 2 units	\$12,500.00		\$573.00			\$11,927.00		
Septic 2 units	\$15,000.00	\$10,364.00				\$4,636.00		
Septic 2 units	\$15,000.00		\$15,000.00					
One-Bed Unit 1	\$96,600.00	\$96,600.00						
One-Bed Unit 2	\$96,600.00	\$96,600.00						
One-Bed Unit 3	\$96,600.00	\$96,600.00						
One-Bed Unit 4	\$96,600.00		\$96,600.00					
Buffer - site work	\$50,000.00						\$50,000.00	
Other Infrastructure	\$50,000.00						\$50,000.00	
Road Construction Ph I	\$150,000.00						\$150,000.00	
Road Construction Ph II	\$100,000.00						\$100,000.00	
Phase II 4 one-bed units	\$384,000.00						\$384,000.00	
Well/Septic x2	\$55,000.00						\$55,000.00	
Phase III 8 one-bed units	\$768,000.00						\$768,000.00	
Well/Septic x4	\$110,000.00						\$110,000.00	
	\$2,407,632.90	\$312,664.00	\$112,173.00	\$167,472.90	\$98,160.00	\$36,363.00	\$1,667,000.00	\$13,800.00
					\$2,407,632.90			

Fluvanna County Mountain Hill Project

Current Status

- Land Acquired
- Preliminary Approval for Rural Cluster Subdivision
- Engaged Engineering for Final Design
- Environmental Review & DHR complete
- HOME funds committed
- Water/well tests
- Modular Home Builder design finalized

Future – Next Steps

- Finalize Engineering Plans for SWM, building sites, road work, infrastructure
- Submit Plat and final Concept Plan to County
- Identify additional funding sources to complete project

FLHF Funding Needs for Mountain Hill

- Funding obtained /committed = \$740,632
- Total Budget = \$2,407,000
- Funding needs
 - Road/infrastructure = \$350,000
 - Housing units = \$1,152,000
 - Septic/Well = \$165,000

Fluvanna County & FLHF Funding Potential through DHCD CDBG Opportunity

- Planning Grant = \$100,00
- Competitive Comprehensive Community Development
 - Two Activities = \$1,500,000
 - **Three Activities = \$1,750,000**
- Construction Ready Infrastructure/Water & Sewer = \$2,000,000

FLHF Funding Needs for Mountain Hill Project

- CDBG Comprehensive Community Development
 - 2 Activities = \$1,500,000
 - 3 Activities - \$1,750,000
- Funding needs
 - Road/infrastructure = \$350,000
 - Housing units = \$1,152,000
 - Well/Septic = \$165,000
 - Total = \$1,667,000

Virginia Homes Building Systems

- Modular Building
 - Chesterfield, VA show room
 - Middleburg, PA manufacturing facility
- 3-4 Month Production Time
- Quality materials as standard; not just least expensive
- Preliminary Pricing for structure ONLY:
 - Duplex (Two 1-BR Units) = \$140,000 (\$70,000/unit)
- Refining floor plans for efficiency and cost savings
- Affordable Housing Experience: Eden Village of Wilmington: tiny home community





Fluvanna BOS

- What can FLHF do to assist in Fluvanna needs?
- Columbia Task Force? Disbanded?
- What statistics do you need?
- What ideas do you have for direction to pursue?
- How do we maintain rural character and improve housing?



**AUTHORIZATION TO ADVERTISE FOR A PUBLIC HEARING TO AMEND
§ 6-1-5 OF THE COUNTY CODE TO INCREASE EROSION AND
SEDIMENT CONTROL FEES**

Dan Whitten, County Attorney

June 5, 2024

A great place to live, learn, work, and play!

County Code Amendment

- **The proposed amendment to County Code Section 6-1-5 simplifies the fee schedule by increasing two fees and eliminating other fees.**
- **Also, the proposed fee schedule more appropriately recoups staff time reviewing land disturbing permits and erosion and sediment control plans.**
- **Estimated revenue of \$10,000.**
- **The Public Hearing would be on July 3, 2024.**

QUESTIONS?

Mountain Hill Rural Cluster Subdivision Waiver Request

Board of Supervisors

June 5, 2024

Todd Fortune

Director of Planning

Fluvanna County
Planning & Zoning Department



"Responsive & Responsible Government"

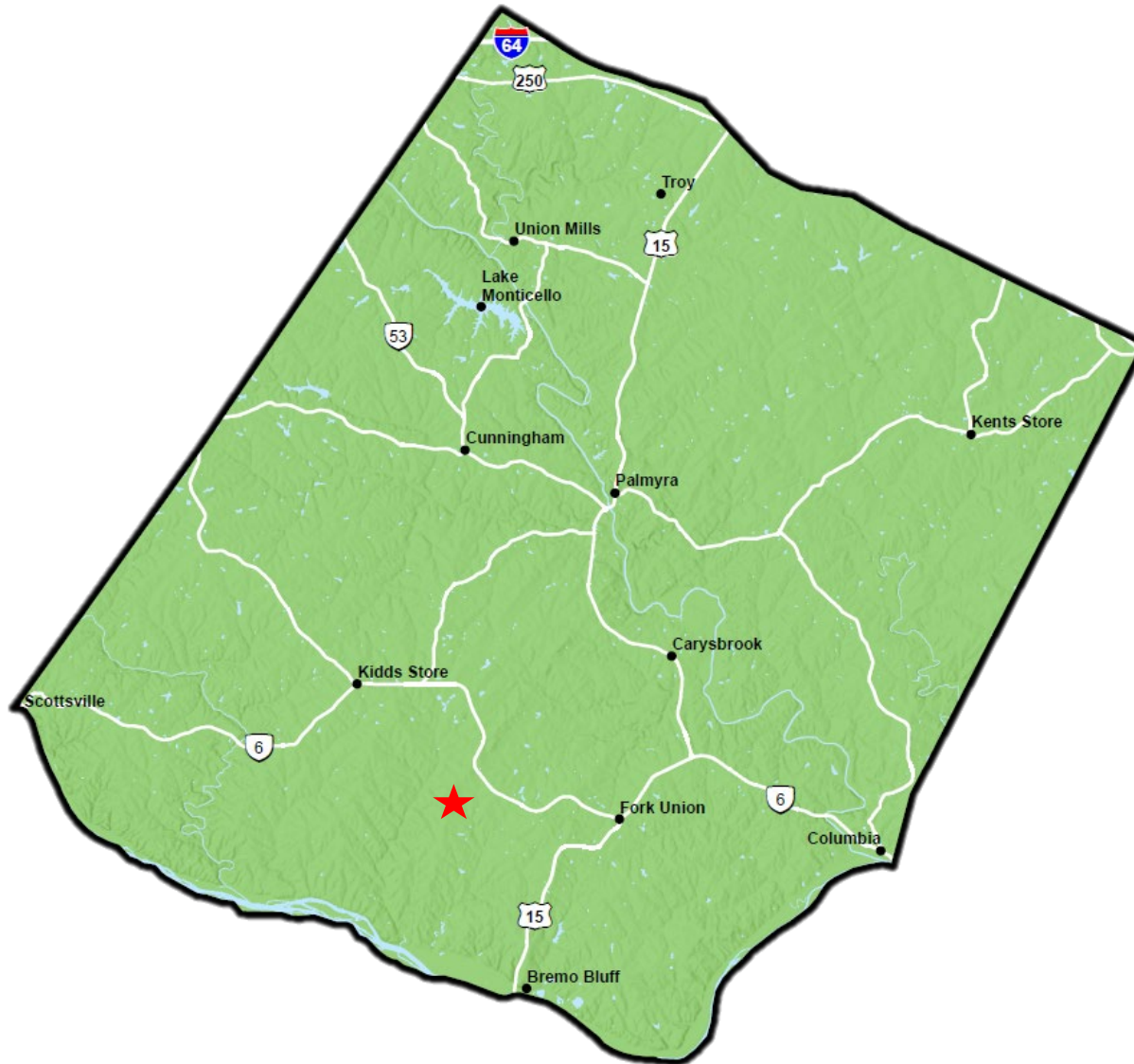
SUB 23:34 Mountain Hill Rural Cluster

Fluvanna County

- This is a Rural Cluster Subdivision. The property in question is located in the Fork Union District, Tax Map 50 A 33, and is zoned A-1. It was accepted by the Planning Commission at its regular meeting on September 12, 2023. However, the subdivision does not meet open space or density requirements per Section 22-4-10.3 of the Fluvanna County Code. A waiver of the Code requirements would be needed for the project to move forward.
- The subdivision has been proposed by the Fluvanna-Louisa Housing Foundation (FLHF). The development would provide affordable housing for residents in the community who are 55 and older or disabled and cannot find smaller, low-maintenance units in the community.

SUB 23:34 Mountain Hill Rural Cluster

Fluvanna County



SUB 23:34 Mountain Hill Subject Parcel

Fluvanna County



Density/Open Space Calculations

Fluvanna County

- Required open space:
- $25.462 \text{ acres} \times 75\% = 19.0965$
- Proposed open space:
- $15.712 \text{ acres} = 61.7\% \text{ open space}$
- $9 \text{ lots} = 9.75 \text{ acres}$
- Gross Density Allowed:
- $25.462 \text{ acres} / 2 \text{ acres} = 12.731 \text{ DU allowed (includes wetlands, steep slopes and other unsuitable areas for building)}$
- 1 DU per 2 acres allowed
- Proposed Housing Density:
- $17 \text{ DU} / 25.462 = 0.67 \text{ per acre}$
- 1 DU per 1.5 acres

Waiver Requests

Fluvanna County

The FLHF has requested a waiver for both the density and open space requirements for Rural Cluster subdivisions as stipulated in Section 22-4-10.3 of the Fluvanna County Code. A waiver of the Code requirements would be needed for the project to move forward.

Waiver Requests – cont.

Fluvanna County



**FLUVANNA-LOUISA
HOUSING FOUNDATION**
BETTER HOUSING. STRONGER COMMUNITY.

May 29, 2024

Todd Fortune, Director of Planning
Fluvanna County
132 Main Street
Palmyra, VA 22963
Sent via email: tfortune@fluvannacounty.org

Re: SUB 23:34 Mountain Hill – Request for Waiver from a portion of the Rural Cluster Subdivision Open Space Requirements

Dear Mr. Fortune,

The Fluvanna-Louisa Housing Foundation (FLHF) is a local, 501(c)(3) non-profit organization committed to providing a variety of stable and affordable housing opportunities for low-income residents of Fluvanna and Louisa counties. FLHF is currently developing a 25.462-acre parcel into a 17-unit rural cluster subdivision community for senior residents of Fluvanna County. The project is located off Mountain Hill Road, behind Fluvanna Community Holiness Church.

FLHF is requesting a waiver for a portion of required open space within a rural cluster subdivision from 75% (19.09 ac) to 61.7% (15.71 ac). The proposed rural cluster subdivision lot sizes, as reviewed by Planning Commission on September 12, 2023, are larger than those in nearby rural cluster subdivisions. However, the larger lots incorporate their associated wells and septic drain fields, which allows the remaining open space to be unincumbered. If granted, this waiver of 3.38 acres (13.3%) will allow the designated open space to be fully utilized, without limitations, by residents of the community.

Regards,

A handwritten signature in blue ink, appearing to read "Andrea S. Madison".

Andrea S. Madison, AICP
Operations Manager

CC: Kelly Harris, Assistant County Administrator, kharris@fluvannacounty.org
Dan Whitten, County Attorney, dwhitten@fluvannacounty.org

144 Resource Lane, Suite A, Louisa, VA 23093
Phone (540) 967-3483 Fax (540) 967-3488



**FLUVANNA-LOUISA
HOUSING FOUNDATION**
BETTER HOUSING. STRONGER COMMUNITY.

May 31, 2024

Todd Fortune, Director of Planning
Fluvanna County
132 Main Street
Palmyra, VA 22963
Sent via email: tfortune@fluvannacounty.org

Re: SUB 23:34 Mountain Hill – Request for Waiver from the Rural Cluster Subdivision Density Regulations

Dear Mr. Fortune,

The Fluvanna-Louisa Housing Foundation (FLHF) is a local, 501(c)(3) non-profit organization committed to providing a variety of stable and affordable housing opportunities for low-income residents of Fluvanna and Louisa counties. FLHF is currently developing a 25.462-acre parcel into a 17-unit rural cluster subdivision community for senior residents of Fluvanna County. The project is located off Mountain Hill Road, behind Fluvanna Community Holiness Church.

FLHF is requesting a waiver from the allowable gross density within a rural cluster subdivision from one (1) dwelling unit per two (2) acres to one (1) dwelling unit per 1.5 acres. FLHF worked extensively with previous Planning Department staff for several months revising the overall layout of the project. The configuration reviewed by Planning Commission on September 12, 2023, was the final version of the plan once staff recommendations were fully incorporated. If granted, this waiver will allow the project to proceed as designed and accepted by the Planning Commission. Senior housing needs are significant in the Fluvanna County community. Granting this waiver will allow the opportunity for 17 senior families to remain in Fluvanna County and age in place within their own community.

Regards,

A handwritten signature in blue ink, appearing to read "Andrea S. Madison".

Andrea S. Madison, AICP
Operations Manager

CC: Kelly Harris, Assistant County Administrator, kharris@fluvannacounty.org
Dan Whitten, County Attorney, dwhitten@fluvannacounty.org

144 Resource Lane, Suite A, Louisa, VA 23093
Phone (540) 967-3483 Fax (540) 967-3488

Board of Supervisors Motion

Fluvanna County

- **I move that the Board of Supervisors advertise a request for a waiver to the rural cluster requirements under Section 22-4-10.3 of the County Code for the Mountain Hill subdivision for a public hearing to be held July 3, 2024.**

Virginia Energy & Solar Siting in Virginia

Aaron Berryhill
Solar Program Manager
Virginia Department of Energy

June 5, 2024

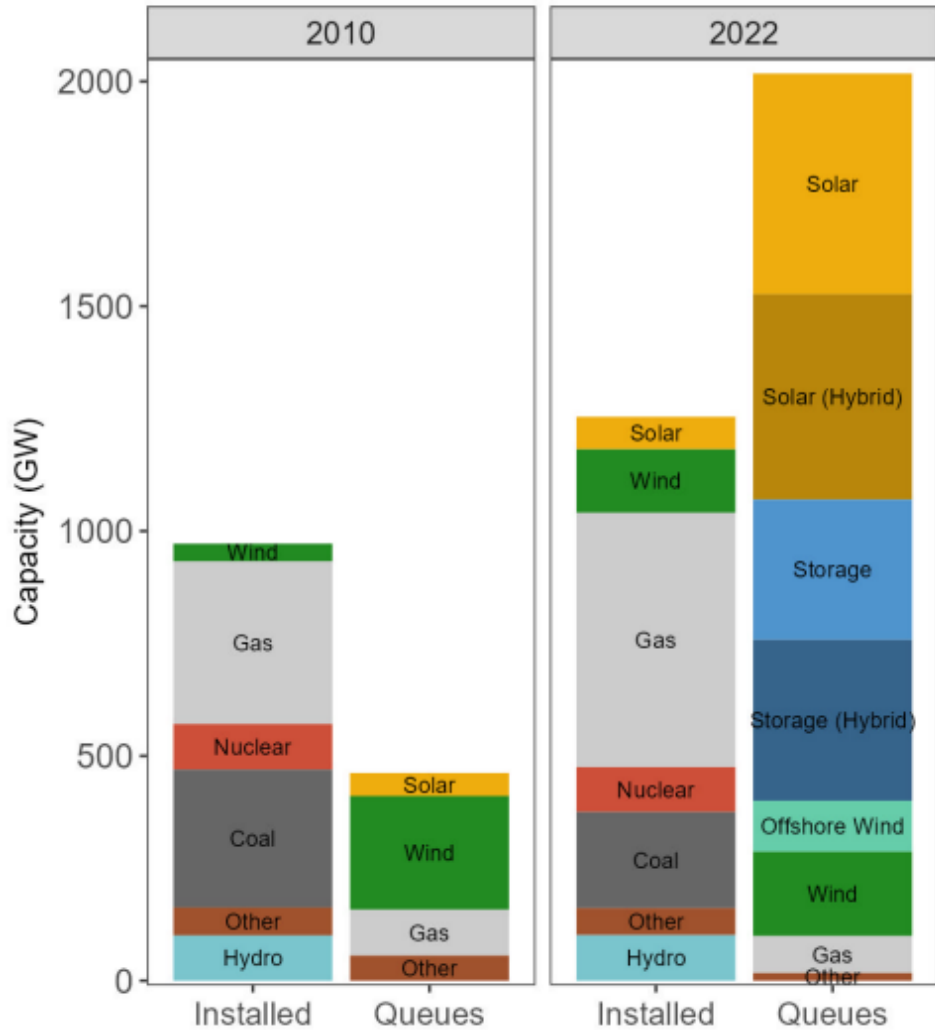


VIRGINIA'S CHANGING ENERGY LANDSCAPE

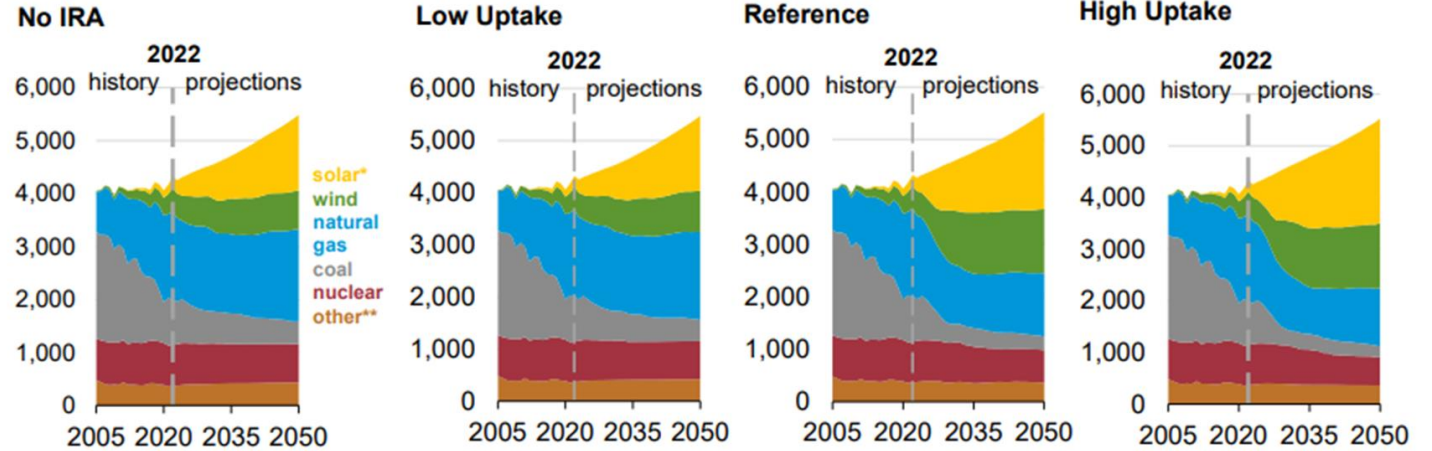
- Technology improvements, declining costs of renewable energy
- Federal policies (federal investment tax credits, Inflation Reduction Act, Bipartisan Infrastructure Law)
- State policies (Virginia Energy Plan, Virginia Clean Economy Act)
- Local community priorities
 - *Every community is part of the energy transition*

NATIONAL ENERGY LANDSCAPE

Entire U.S. Installed Capacity vs. Active Queues



U.S. net electricity generation by fuel
billion kilowatthours



Data source: U.S. Energy Information Administration, Annual Energy Outlook 2023 (AEO2023)

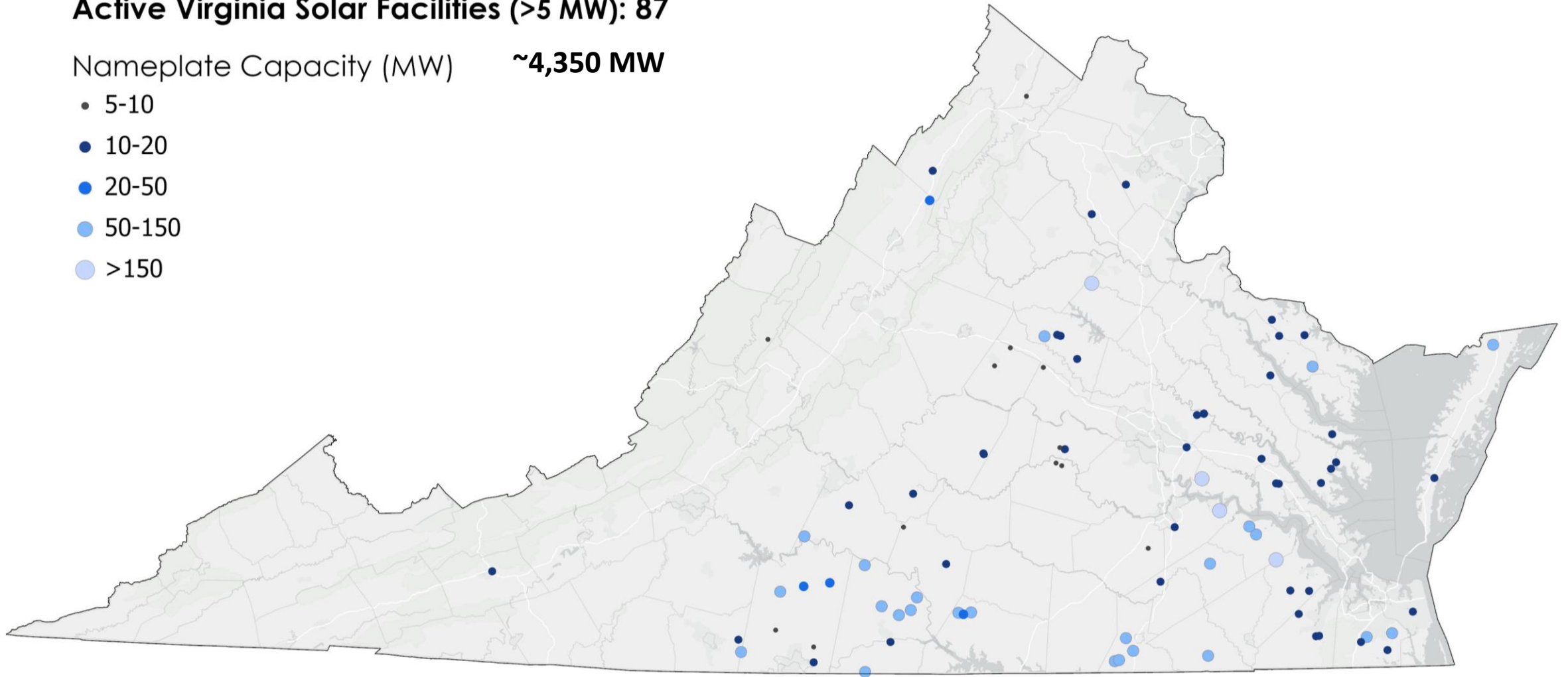


VIRGINIA'S LARGE-SCALE SOLAR DEPLOYMENT

Active Virginia Solar Facilities (>5 MW): 87

Nameplate Capacity (MW) **~4,350 MW**

- 5-10
- 10-20
- 20-50
- 50-150
- >150



MITIGATING ENVIRONMENTAL IMPACTS

- New VDEQ Stormwater Management Handbook will take effect July 1, 2024

- *Applies to all projects with interconnection approval after December 31, 2024*
- *New sections specifically for solar arrays*
- *Solar panels treated as unconnected impervious surfaces*

<https://online.encodeplus.com/regs/deq-va/doc-viewer.aspx?secid=1764>

- New VDEQ Permit-by-Rule Regulations will take effect by December 31, 2024

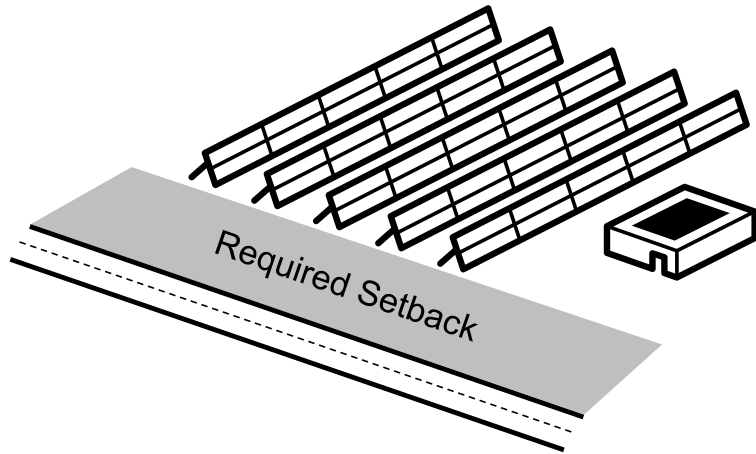
- *Applies to all projects with interconnection approval after December 31, 2024*
- *Comment period to start in next few months*
- *Avoidance of impacts strongly encouraged*
- *Mitigation required for impacts to ecological cores, prime agricultural soils, forest land.*

<https://www.townhall.virginia.gov/L/viewstage.cfm?stageid=10341&display=documents>

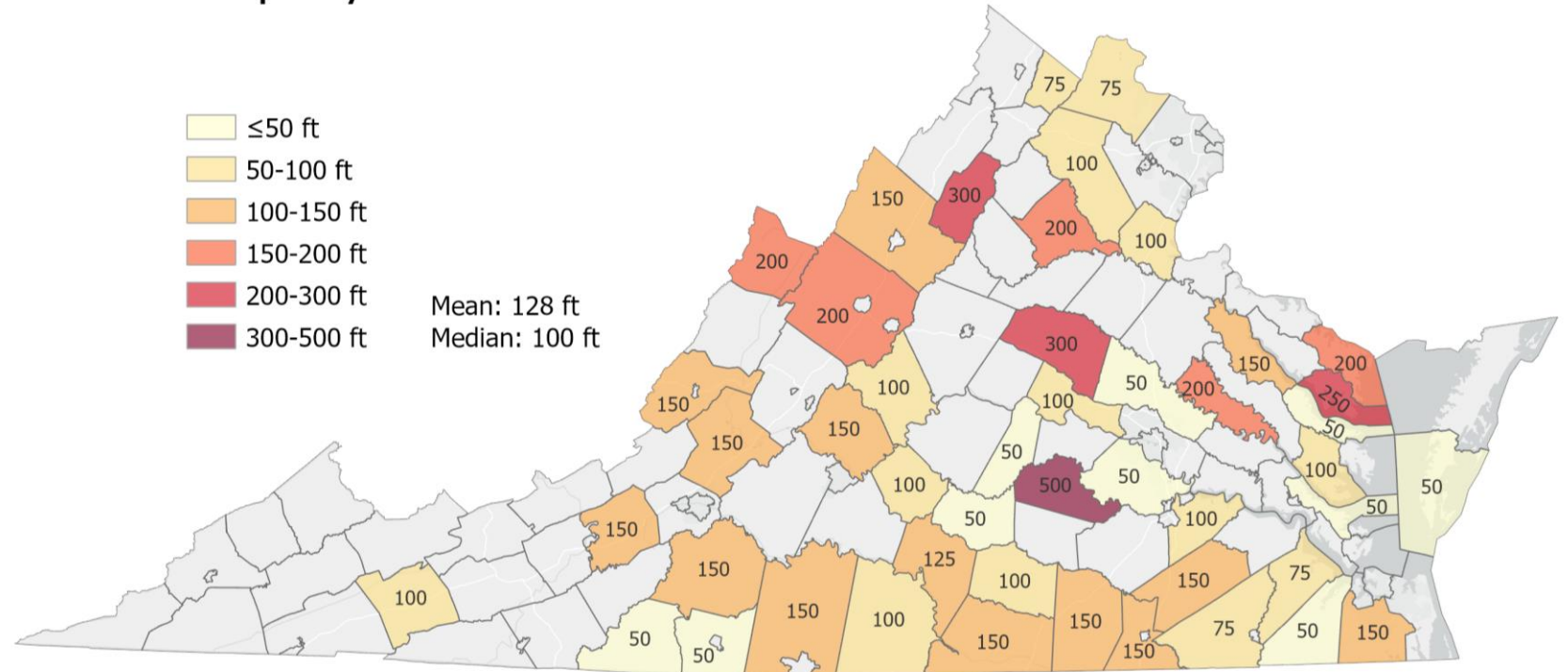
Development Standards for Large-Scale Solar

- Project Size/Density
- Zoning Districts
- Setbacks
- Agriculture, Forestry Protection
- Wildlife Corridors
- Stormwater, Erosion, Sediment
- Cultural, Hist., Env. Resources
- Ground Cover
- Siting Agreements
- Visual Impacts
- Fiscal Impacts
- Taxation
- Emergency Response
- Buffers
- Landscaping
- Construction Plan
- Operation Plan
- Decommissioning Plan

SETBACKS

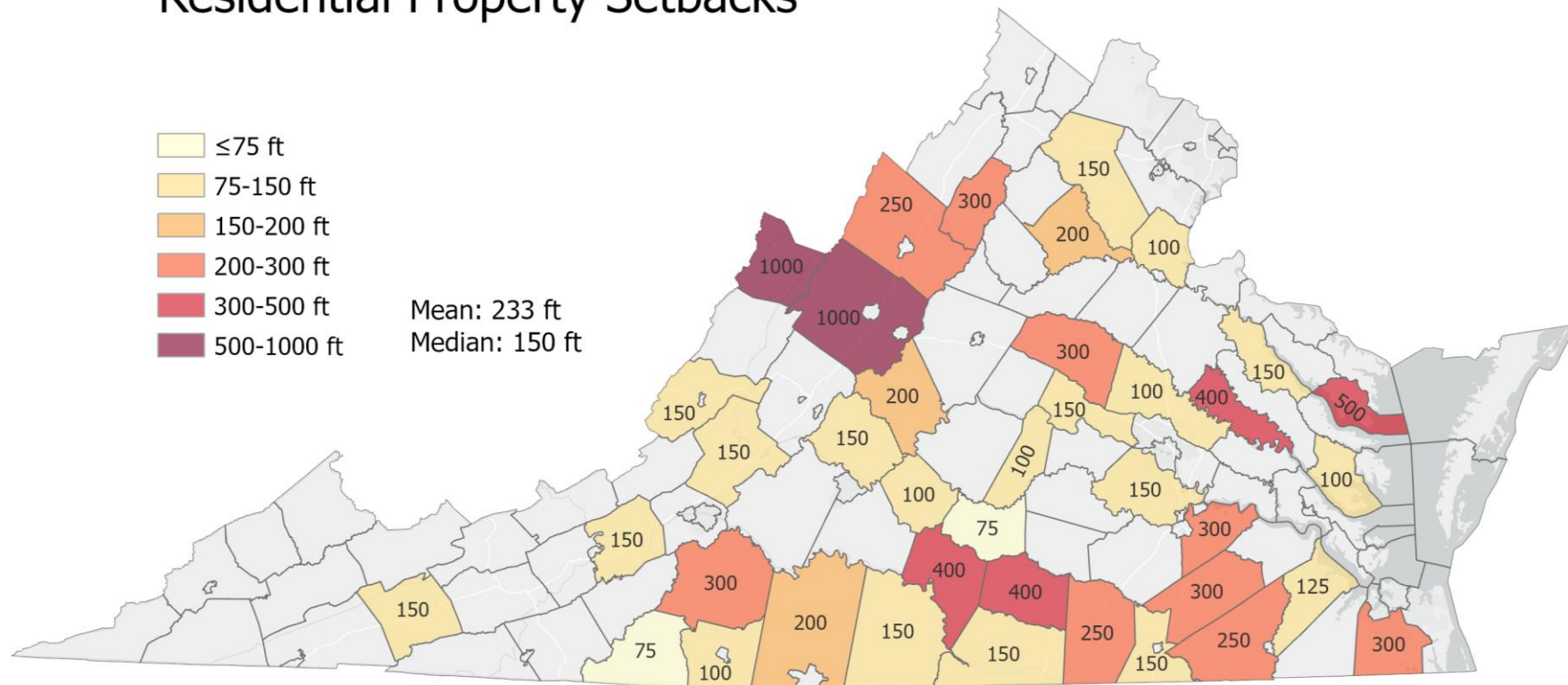


Property Line Setbacks



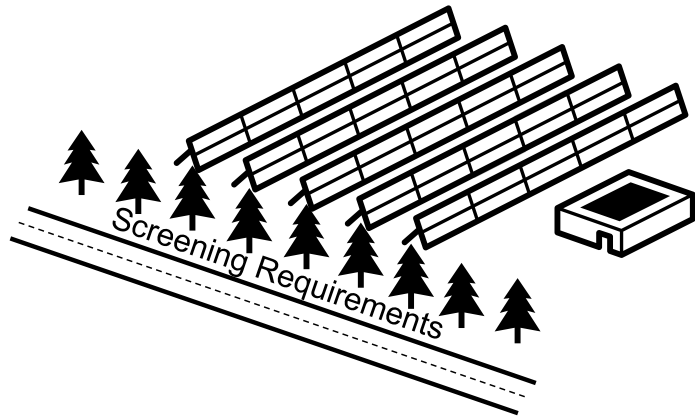
RESIDENTIAL SETBACKS

Residential Property Setbacks



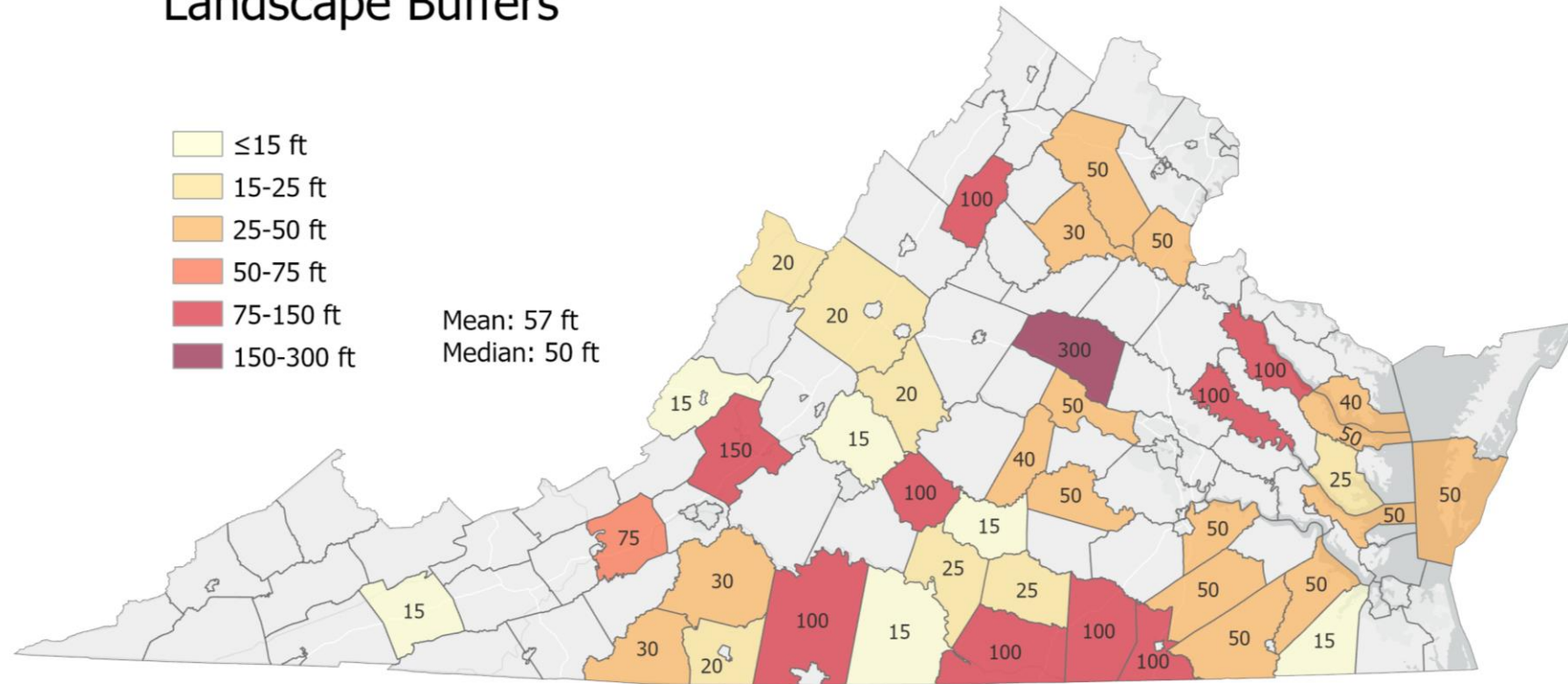
LANDSCAPE BUFFERS

Landscape Buffers



- ≤15 ft
- 15-25 ft
- 25-50 ft
- 50-75 ft
- 75-150 ft
- 150-300 ft

Mean: 57 ft
Median: 50 ft

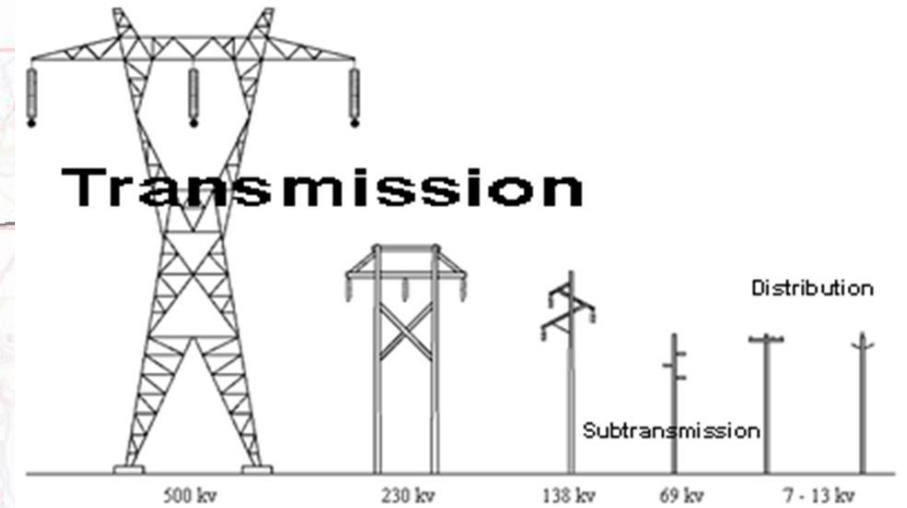
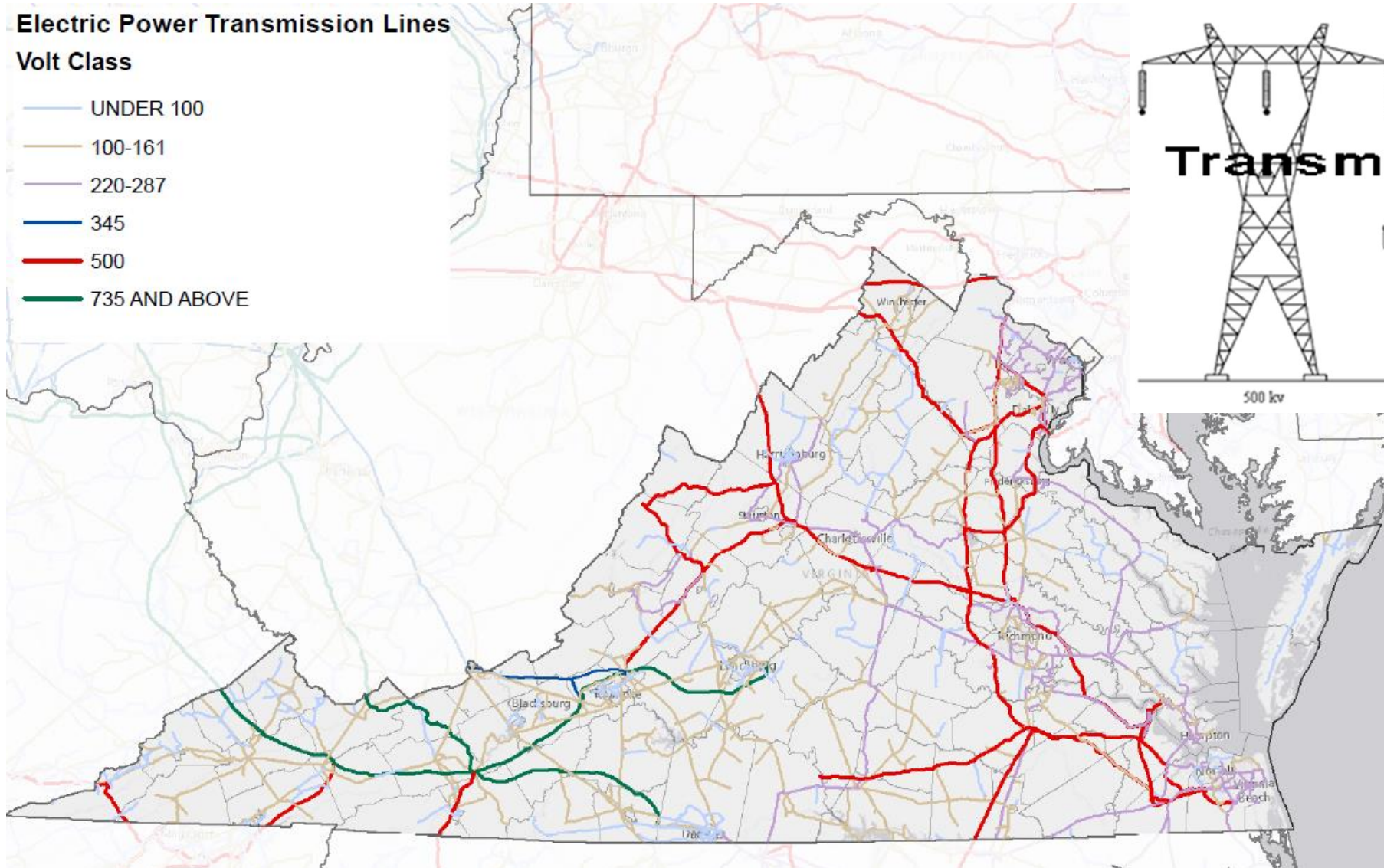


TRANSMISSION LINE PROXIMITY

Electric Power Transmission Lines

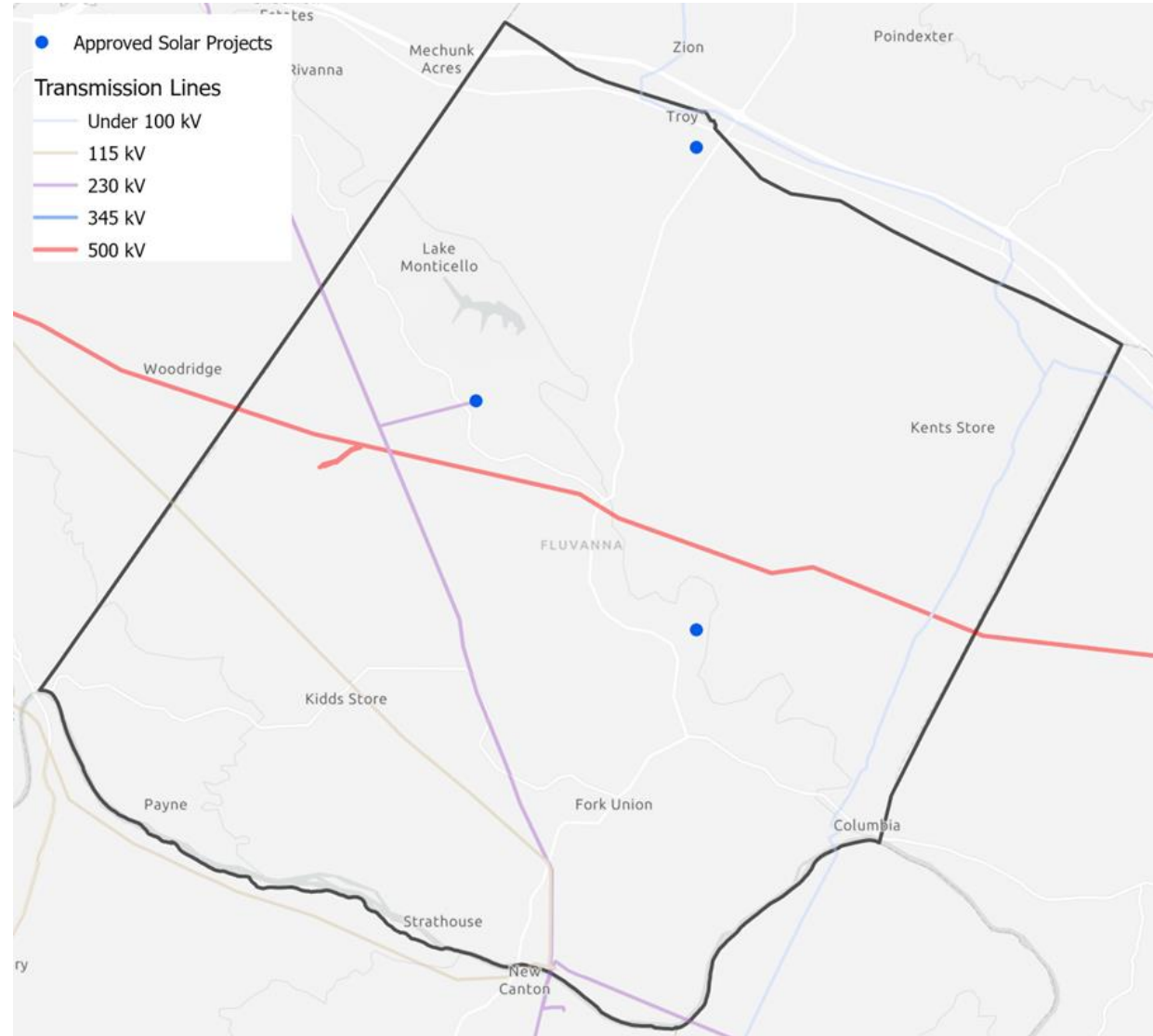
Volt Class

- UNDER 100
- 100-161
- 220-287
- 345
- 500
- 735 AND ABOVE



TRANSMISSION LINE PROXIMITY

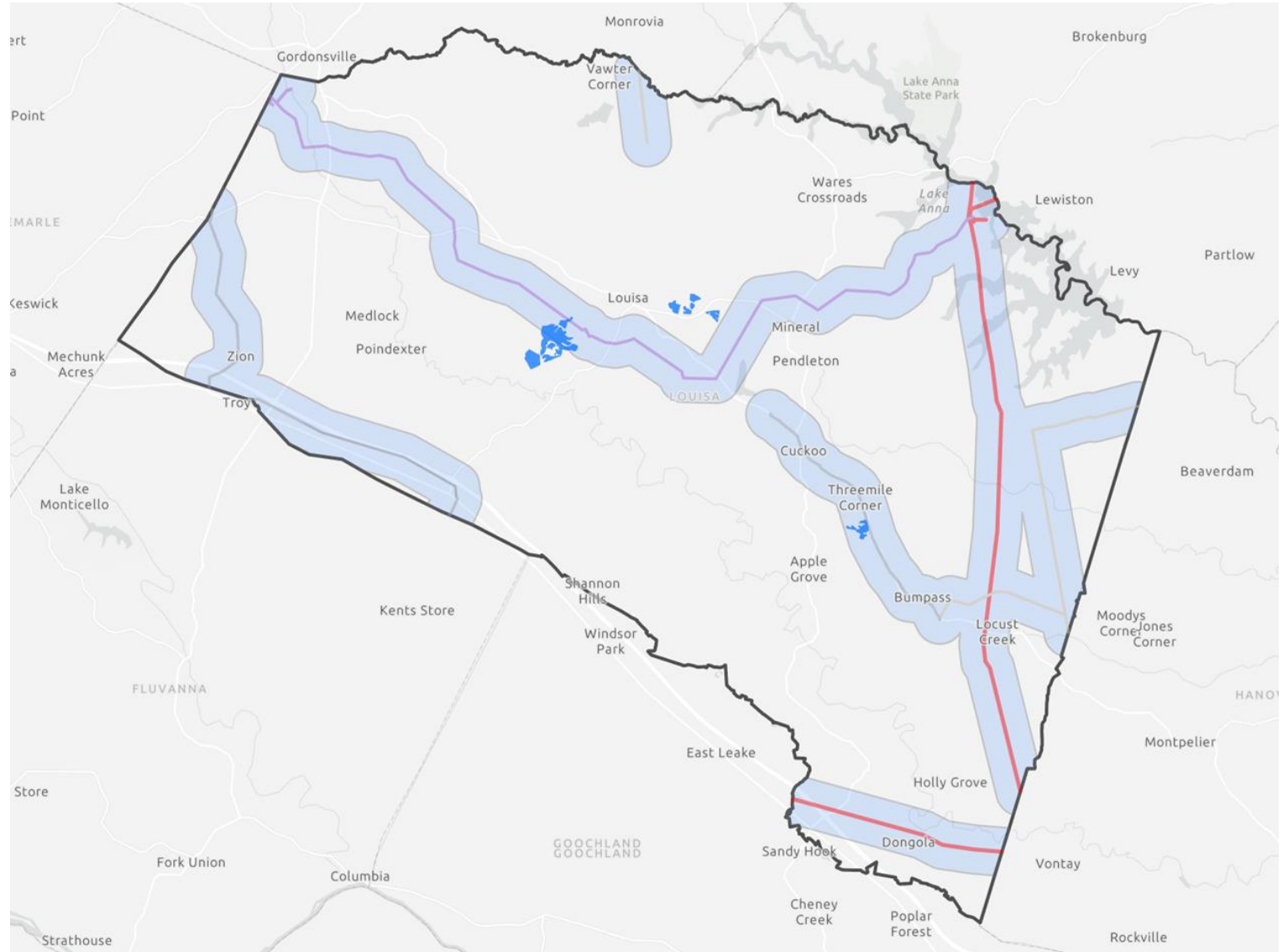
- Fluvanna County's three approved solar projects are interconnected to distribution lines and not a transmission line
 - *Palmer (5 MW): 1.0 miles from transmission line*
 - *Cunningham (5 MW) : 0.1 miles from transmission line*
 - *Carysbrook (3 MW): 1.7 miles from transmission line*
- Larger solar facilities are interconnected to larger transmission lines
 - *500 kV line: >150 MW solar facility*
 - *34.5 kV line : < 20 MW solar facility*
- Many solar facilities below 20 MW are not interconnected to transmission lines



TRANSMISSION LINE PROXIMITY

Example: Louisa County

- 4 active solar projects
 - 88 MW: Transmission
 - 11 MW: Distribution
 - 19 MW: Distribution
 - 20 MW: Distribution
- At least 50% of solar acreage is more than 1 mile from a transmission line



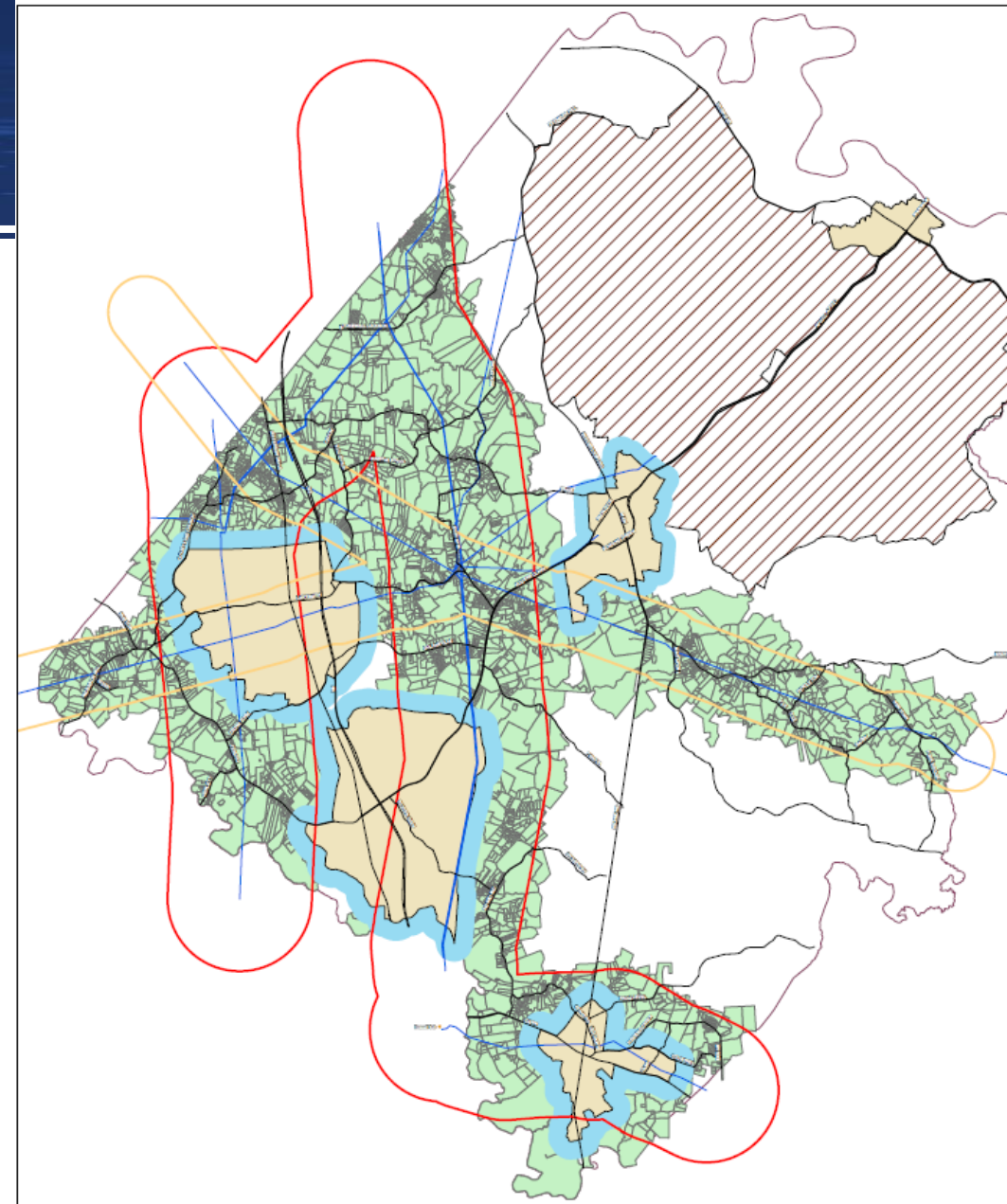
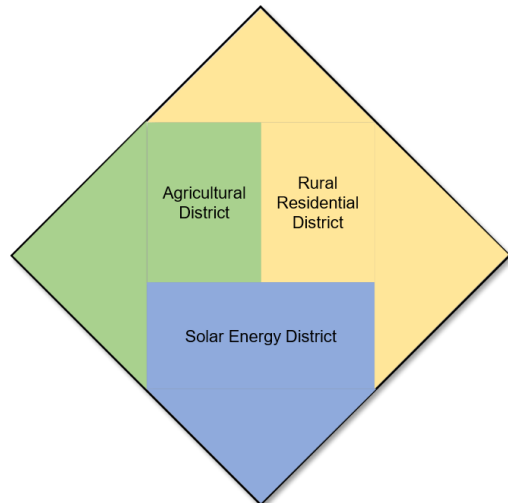
SPECIAL PURPOSE DISTRICTS

Specific Base Zoning District

- *Dinwiddie County*
 - Applies to projects larger than 2 acres
 - Requires rezoning and Conditional Use Permit

Overlay Zoning District

- *Caroline County* (Repealed)*
 - Applied to projects greater than 20 MW
 - 1-mile buffer from smaller transmission lines and 2-mile buffer from larger transmission lines, outside growth areas



**2 MILE & 1 MILE BUFFER
GROWTH AREA**

CAROLINE COUNTY, VIRGINIA

0 0.75 1.5 3 4.5 6 Miles

QUESTIONS?

Aaron Berryhill

aaron.berryhill@energy.virginia.gov

804-839-6978





**Dominion
Energy[®]**

**Fluvanna County
June 4, 2024**



Dominion Energy



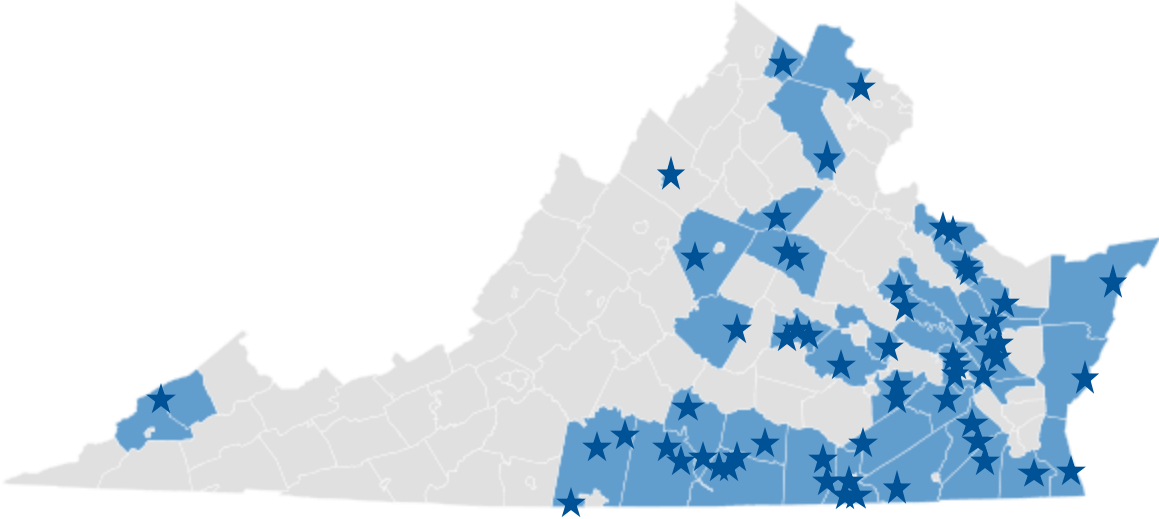
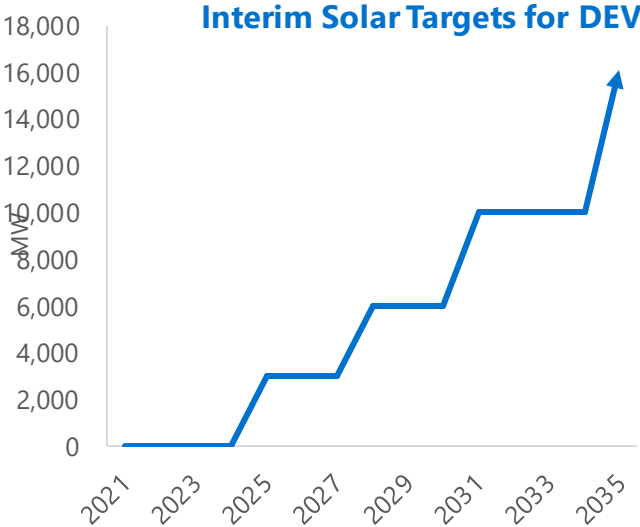
- **We are committed to serving our customers and the communities where we all live and work.**
- **Serves over 2.5 million customers in Virginia - over 3,000 in Fluvanna County**
- **2nd largest solar fleet in the U.S. ***
- **Support our communities with volunteer projects - Employees donated 100,000 hours in 2023 alone**
- **One in five new hires is a veteran and we strive to ensure that our workforce reflects our community – 28 Dominion employees live in Fluvanna County**
- **All the while keeping the lights on and energy rates below national, regional and state averages**

***for Investor-owned utility companies**

Dominion Energy Solar in Virginia

In Operation	In Development
1,525 MW	7,156 MW

Dominion Energy Solar Projects in Virginia
 Projects in Operation, Construction, or near-term Development

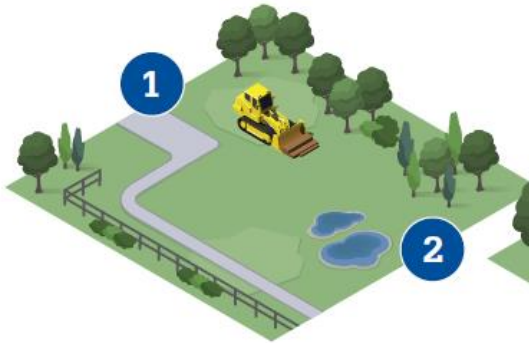


- ★ Projects in Operation
- ★ Projects Under Construction/In Development

Solar Construction

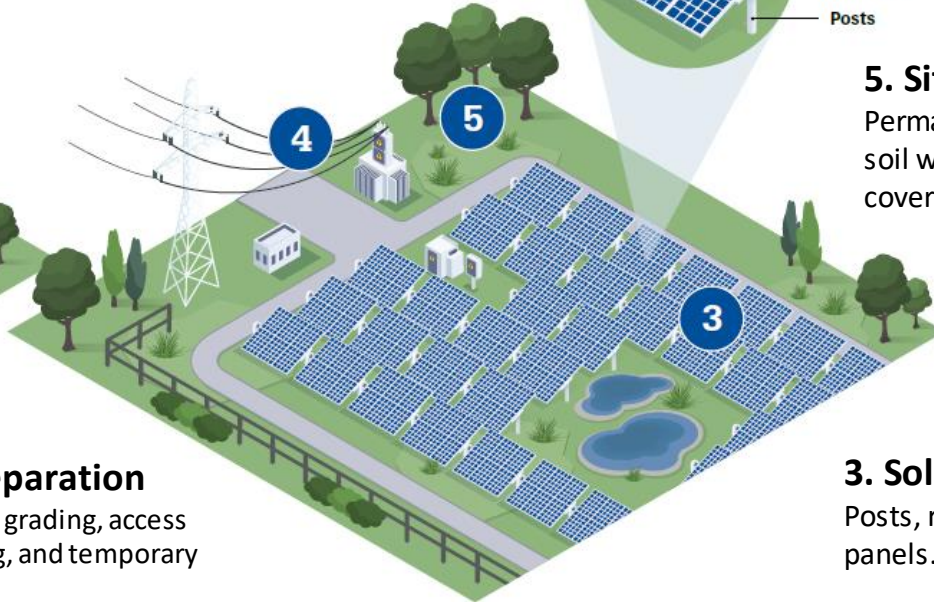
1. Environmental Controls

Construction of Buffers, silt fences and sediment basins.



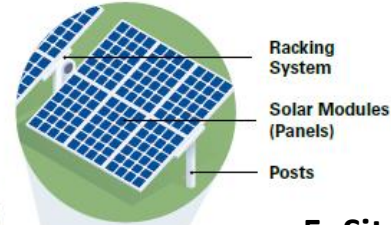
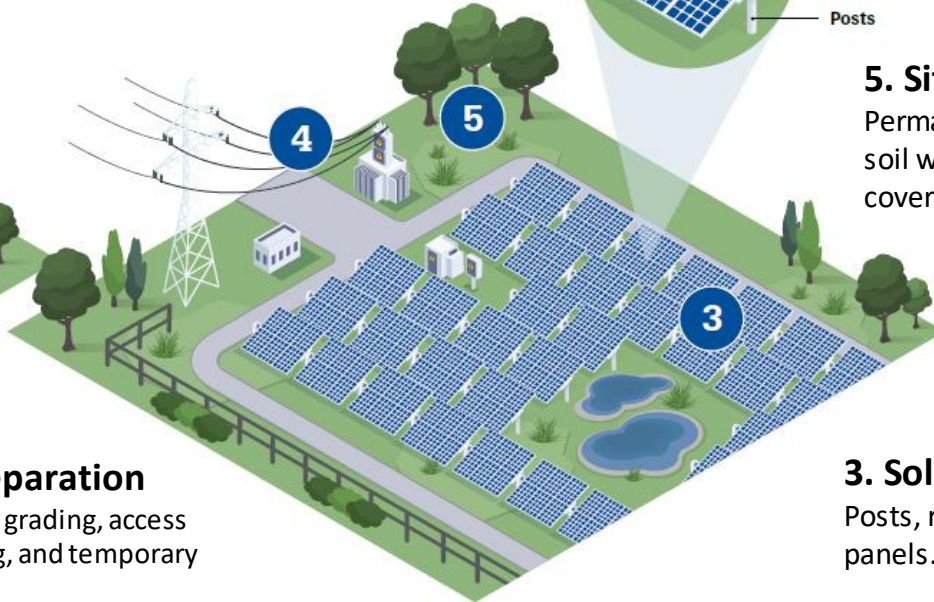
2. Site Preparation

Tree clearing, grading, access roads, fencing, and temporary stabilization.



4. Grid Connection

Inverters, substations and grid interconnection.



Racking System
Solar Modules (Panels)
Posts

5. Site Completion

Permanent stabilization of soil with native grasses and cover crops.

3. Solar Installation

Posts, racking system and solar panels.

Solar Best Practices - Stormwater Controls

Stormwater & Erosion Control Improvements



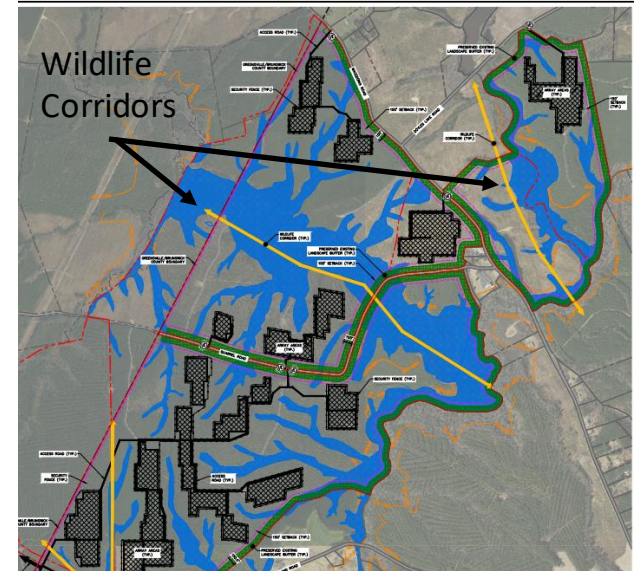
- **Enhanced perimeter controls – double-row silt fence with metal posts**
- **Exceed number of DEQ-required stormwater basins (smaller drainage areas)**
- **Stormwater features designed for large-volume & more frequent storms**
- **Prioritization of early ground stabilization throughout project**
- **Strategic construction phasing**

Solar Best Practices - Stormwater Controls

Viewshed and Wildlife

- **Creating wildlife corridors that allow easy passage of wildlife through facilities**
- **Maximizing the use of existing natural vegetation and mature tree buffers to maintain viewshed.**

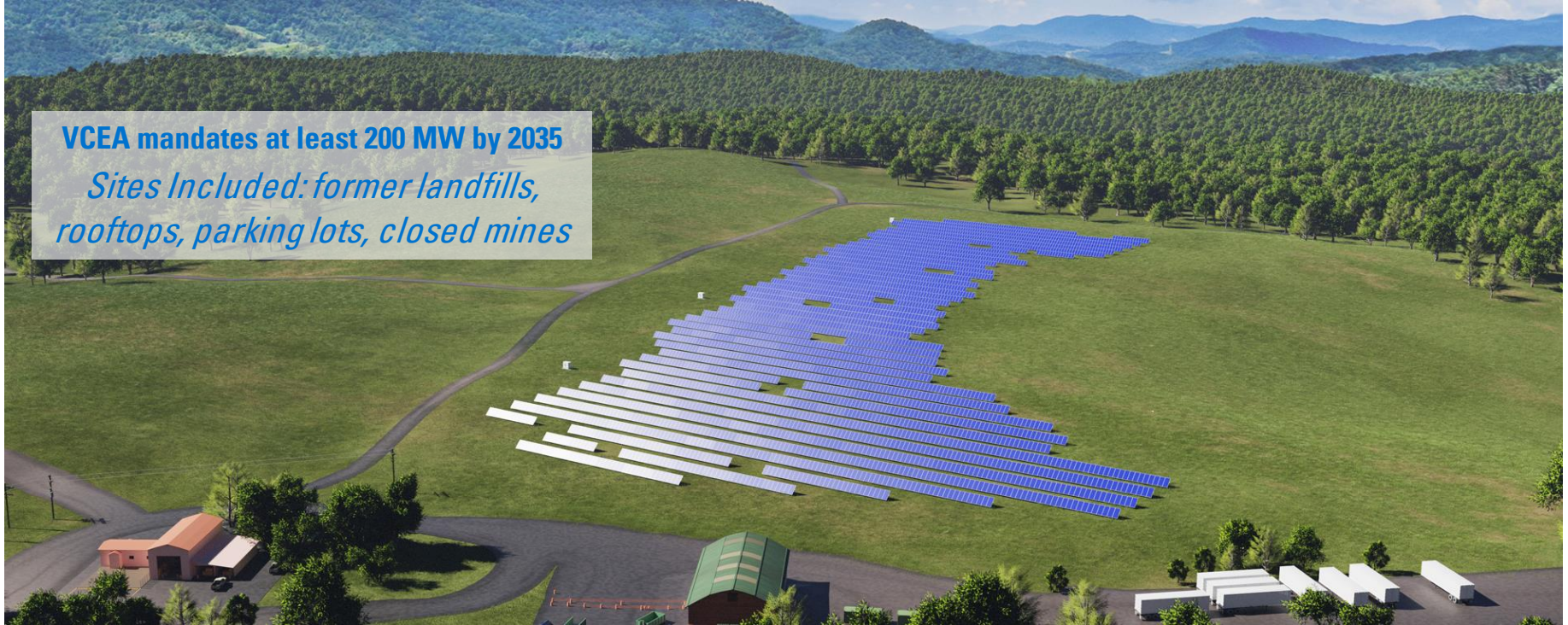
Natural Buffers



Deployment of Projects on Previously Developed Sites

Ivy Landfill Solar – 3 MWs, Albemarle County (Closed Landfill)

VCEA mandates at least 200 MW by 2035
*Sites Included: former landfills,
rooftops, parking lots, closed mines*



Solar Economic Benefits



Increased Tax Revenue

- Increased tax revenue through Real Estate taxes



Revenue Share

- \$1,400/MWac per year. Escalates at 10% every 5 years



Siting Agreement

- Negotiated payments for the benefit of the county



Economic Benefits

- Opportunity for local businesses
 - Construction related – suppliers, civil construction, aggregates, equipment rental, fencing, etc.
 - Hospitality, Restaurants, Gas Stations, etc.
 - Operations – vegetation management, regional operations hub potential

Mis-information on Solar

Soil



- Multiple studies have concluded panels pose no risk even under foreseeable accidents

Property Values



- Multiple studies demonstrate no negative market impacts for nearby residential properties

Agricultural Land



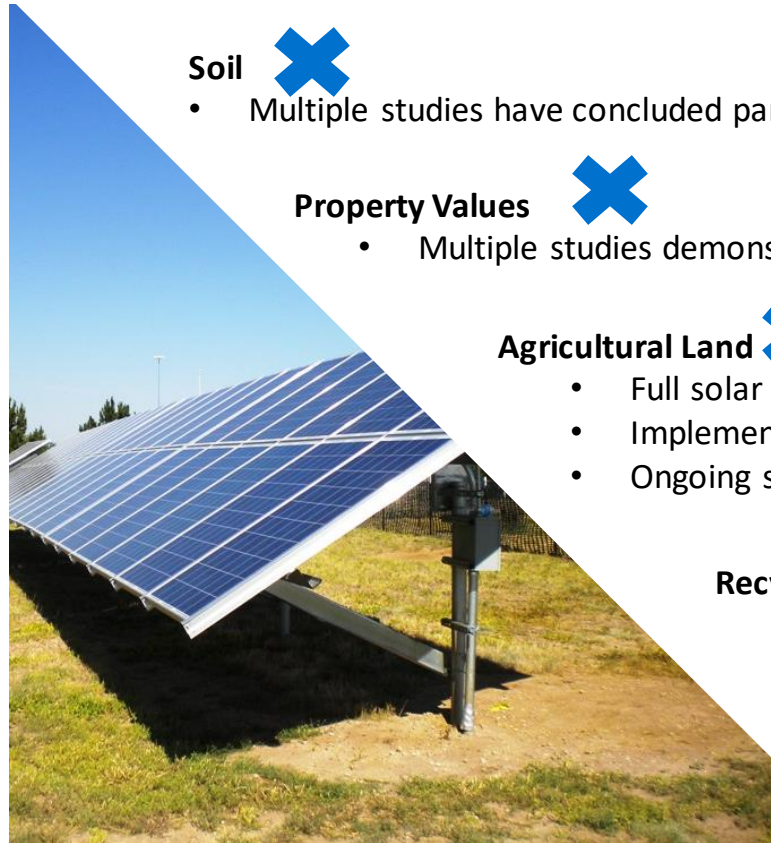
- Full solar buildout in Virginia will impact less than 1.5% of farm and forest land
- Implementing Agrivoltaics – pollinator plantings, sheep for maintenance
- Ongoing studies demonstrate increased land productivity after solar

Recycling of panels



- Panels can be recycled. Currently plants located in Ohio, California, Arizona, Pennsylvania, Washington, Utah and Colorado.

Reynolds, William T. Jr. and Karmis. Virginia Tech Virginia Center for Coal and Energy Research. Michael E. Assessment of the Risks Associated with Thin Film Solar Panel Technology . 03.08.2019





**Dominion
Energy®**

Todd Flowers
Director Business Development

Alex Rendon
External Affairs Manager

Soil-Site Management Protocols & Best Management Practices (BMPs) for Utility Scale Solar Site (USS) Development and Management in Virginia



USS Site Under Active Development in Southside Virginia (image from DEQ/AEP)



COLLEGE OF AGRICULTURE AND LIFE SCIENCES
SCHOOL OF PLANT AND
ENVIRONMENTAL SCIENCES
VIRGINIA TECH.

COLLEGE OF ENGINEERING
COLLEGE OF AGRICULTURE AND LIFE SCIENCES
BIOLOGICAL SYSTEMS
ENGINEERING
VIRGINIA TECH.



Virginia Cooperative Extension
Virginia Tech. • Virginia State University

Authors:

- W. Lee Daniels, Professor, Land Rehabilitation, wdaniels@vt.edu
- Ryan D. Stewart, Associate Professor, Soil Physics & Hydrology, rds@vt.edu
- John Ignosh, Advanced Extension Specialist, jignosh@vt.edu
- David Sample, Professor, Stormwater Management, dsample@vt.edu
- Pat Donovan, GIS Specialist, padanova@vt.edu
- John Fike, Professor, Forage & Grazing Management, jfike@vt.edu
- Ben Tracy, Professor, Forage Ecology, btracy@vt.edu



COLLEGE OF AGRICULTURE AND LIFE SCIENCES
SCHOOL OF PLANT AND
ENVIRONMENTAL SCIENCES
VIRGINIA TECH.

COLLEGE OF ENGINEERING
COLLEGE OF AGRICULTURE AND LIFE SCIENCES
BIOLOGICAL SYSTEMS
ENGINEERING
VIRGINIA TECH.



Virginia Cooperative Extension
Virginia Tech. • Virginia State University

Objectives of Whitepaper

Develop Protocol & Practice Recommendations for:

1. Minimizing Soil Disturbance
2. Remediating Soil Disturbance
3. Establishing Vegetation
4. Enhancing Soil Quality

Develop Better Estimations for:

1. Post-project Remediation Requirements
2. Stormwater Runoff



Integrate into Summary List of BMP Guidelines

Context - Solar

- Virginia DEQ currently estimates over 350,000 acres could potentially be affected by 2045
- Impacts vary dramatically based on local site conditions and infrastructure development practices
- Significant areas of most sites will remain bare for some period of time during active site installation
- Complete stabilization and revegetation generally takes several years
- While less than 40% of the USS site is generally covered by panels, the combination of soil disturbance/compaction and the impervious cover from the panels may lead to enhanced runoff, particularly in the early years before the site is fully stabilized

Context – Rationale for Whitepaper Development

- **Prediction, management and rehabilitation** of these soil and landform effects is critical for:
 - **Minimizing sediment losses**
 - **Managing and reducing stormwater impacts**
 - **Return of these lands to productive uses** following site decommissioning
- At Virginia Tech, we are working to address the range of issues and challenges associated with:
 - **Planning and permitting,**
 - **Installation & stabilization**
 - **Active management**
 - **Long-term closure of facilities** related to local soil and water quality protection.
- We **encourage and support full transparency throughout the project lifetime** with respect to:
 - **Planning and permitting procedures**
 - **Expected short- versus long-term impacts**
 - Science based **projections for medium/long-term site productivity potentials** for various uses

Context – Best Management Practices (BMPs)

- "White Paper" presents overview of the challenges that utility-scale solar development, active management and closure potentially pose to soil and water quality over varying time scales along with recommended best management practices
- Minimizing overall soil disturbance, particularly via limiting net cut/fill and grading is of paramount importance
- Limiting and remediating soil compaction during all phases of site development is critically important to enhance rainfall infiltration vs. runoff and overall soil quality
- Prompt compliance with existing DEQ and local erosion control guidelines, appropriate active site vegetation management practices, and final remediation upon decommissioning, can largely offset initial site disturbance impacts
- However, certain impacts for installation of essential infrastructure (e.g. stormwater conveyances and ponds) will more than likely be permanent

Context - Whitepaper

- The information is based on research and outreach experience on impacts and stabilization of land-disturbing activities, including mining, road construction, urbanization, and wetland restoration and creation
- The specific practices recommended are evolving and are based on our assessment of civil plans/geotechnical reports and actual site conditions for over 35 proposed or implemented utility-scale solar sites in VA since 2020
- The opinions and positions expressed are intended as supplementary to existing and developing Virginia DEQ (or other) regulatory requirements; and are complementary with existing SWM+ESC BMP requirements.
- We are currently collaborating with a range of scientists at Virginia Tech and other institutions in Virginia to monitor and describe the actual effects of large-scale solar development on runoff, water quality and soil conditions across a range of sites across Virginia; Thus, these summary recommendations will be reviewed and updated periodically.
- The current version of the White Paper reflects our scientific opinion and position on these issues as of May 12, 2024, and will be revised and updated as needed due to changes in research findings or regulations.



COLLEGE OF AGRICULTURE AND LIFE SCIENCES
SCHOOL OF PLANT AND ENVIRONMENTAL SCIENCES
VIRGINIA TECH



COLLEGE OF ENGINEERING
COLLEGE OF AGRICULTURE AND LIFE SCIENCES
BIOLOGICAL SYSTEMS ENGINEERING
VIRGINIA TECH

White Paper

Soil-Site Management Protocols & Best Management Practices (BMPs) for Utility Scale Solar Site (USS) Development and Management in Virginia



USS Site Under Active Development in Southside Virginia (image from DEQ/AEP)

Primary Authors:

*W. Lee Daniels, Professor¹, Land Rehabilitation, wdaniels@vt.edu
Ryan D. Stewart, Associate Professor¹, Soil Physics & Hydrology, rdst@vt.edu
John Ignosh, Extension Specialist², Alternative Energy, jignosh@vt.edu
David Sample, Professor³, Stormwater Management, dsample@vt.edu*

Collaborators:

*Pat Donovan, GIS Specialist¹, padanova@vt.edu
John Fike, Professor¹, Forage & Grazing Management, jfike@vt.edu
Ben Tracy, Professor¹, Forage Ecology, bttracy@vt.edu*

¹School of Plant & Environmental Sciences, Blacksburg Campus
²Department of Biosystems Engineering, Harrisonburg Extension Center
³Department of Biosystems Engineering, Hampton Roads AREC

<https://landrehab.org/home/programs/solar-farms/>

May 12, 2024

@ landrehab.org/home/programs/solar-farms

49 pages
40+ references

Objectives of Whitepaper

Develop Protocol & Practice Recommendations for:

1. Minimizing Soil Disturbance
2. Remediating Soil Disturbance
3. Establishing Vegetation
4. Enhancing Soil Quality

Develop Better Estimations for:

1. Post-project Remediation Requirements
2. Stormwater Runoff



Integrate into Summary List of BMP Guidelines

Soils – Profiles & Horizons

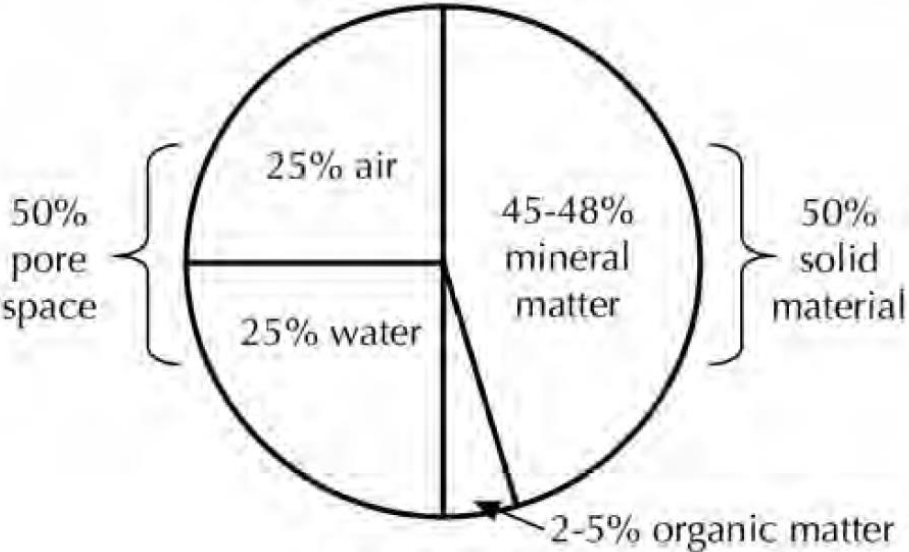


Figure 2.1. Volume composition of a desirable surface soil.

“topsoil” for supporting plant growth

“subsoil”

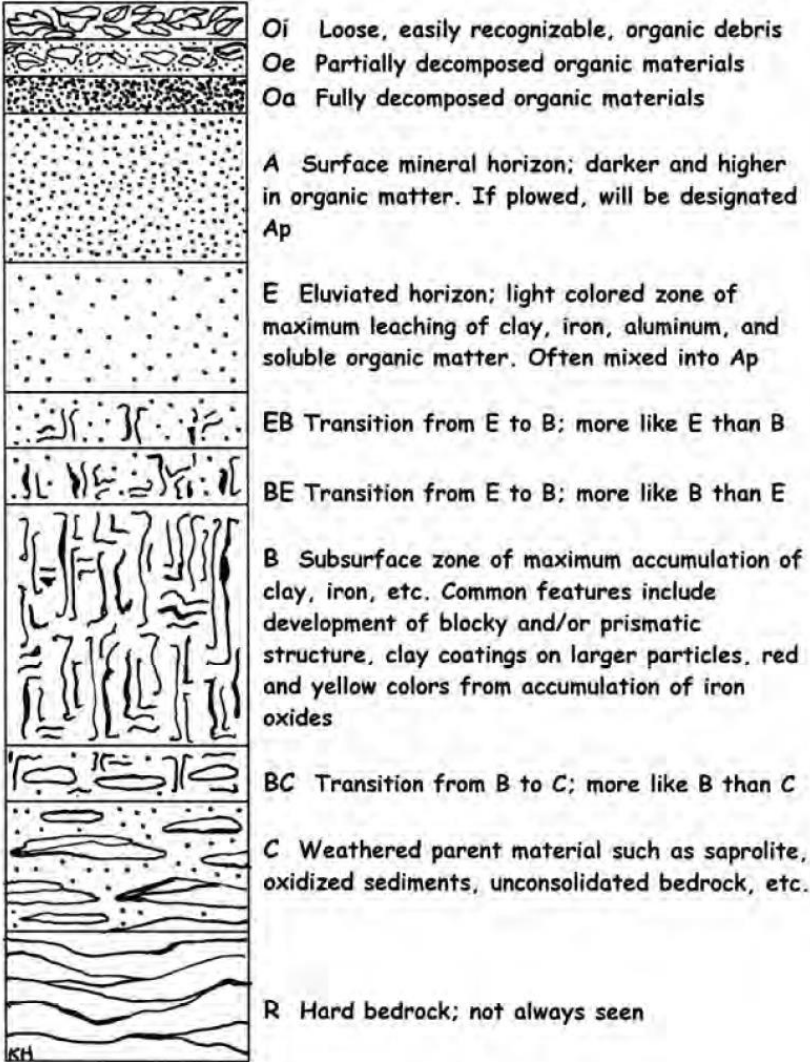


Figure 2.2. Soil profile horizons.

Graphic by Kathryn Haering.

Daniels, W. L., and K. C. Haering. 2018. General soil science principles. p. 2.1-2.13. In: M. Goatley and K. Hensler (ed.) Urban nutrient management handbook. Virginia Cooperative Extension Publication 420-350. Virginia Tech, Blacksburg, VA. http://pubs.ext.vt.edu/430/430-350/430-350_pdf.pdf

Minimizing Soil Disturbance

- Land-disturbing activity (LDA) is defined in Code of Virginia § 62.1-44.15:24 as: "*a man-made change to the land surface that potentially changes its runoff characteristics including clearing, grading, or excavation*"
- Within this paper, term is used for **any activity that leads to a significant alteration of the original soil profile that directly limits plant growth or increases surface runoff and potential for sediment losses.**
- **Examples of disturbance activities** commonly encountered in utility-scale solar development include:
 - **Removal, storage and reapplication of topsoil.**
 - **Grading** to level panel arrays or engineered structures and roads and/or interconnect corridors that leads to exposure of subsoil at the surface and/or significant soil compaction.
 - **Trenching** for cables.
 - Development of **stormwater conveyances** and **detention ponds** and **outlets**.
 - **Concentrated traffic** that compacts the soil to levels that limit rooting and water penetration.
 - **Stump pulling** and extensive root-raking/rock-picking following forest clearing.
 - Other practices that lead to disturbance and mixing of the pre-development soil profile to a depth > 6 inches.
- **Minimal surface grading that (a) disturbs <6" of the profile, (b) does not expose or highly compact the underlying subsoil (B and C horizons), and (c) is stabilized immediately (7-14 days) is not defined here as "significant".**
- **Complete removal, storage and return of the topsoil over an altered subsoil is considered "significant disturbance" and will likely lead to decreased soil productivity without appropriate remediation following soil profile reconstruction. Similarly, extensive exposure of bare subsoil materials for extended periods of time is also considered significant.**

Impacts from Soil Disturbance

- **Erosion** – During storms the exposed soil particles can become detached, suspended, and transported
- **Plant Growth** – Soil compaction due to solid particles filling soil pores, can impede root development; subsoils lower in organic matter and lower pH can inhibit nutrient availability
- **Runoff** – loss of soil structure and compaction reduces infiltration, and can result in more surface water runoff



Source: <https://aglab.ars.usda.gov/>

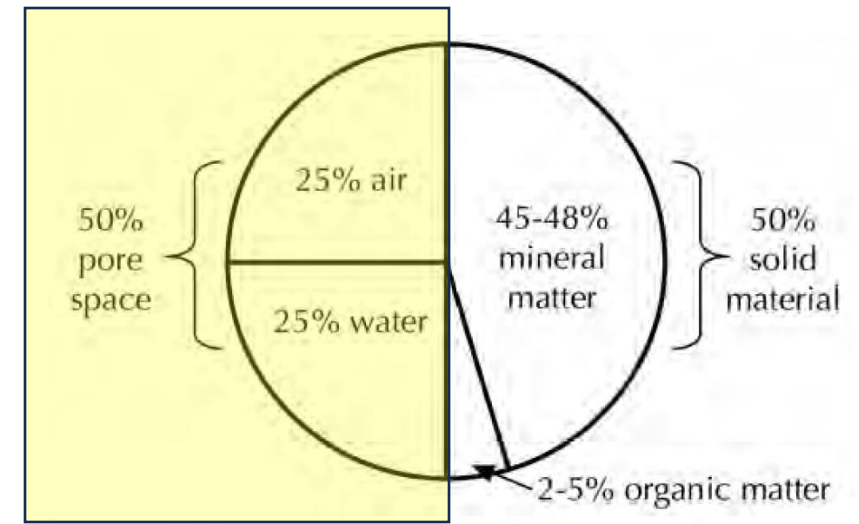
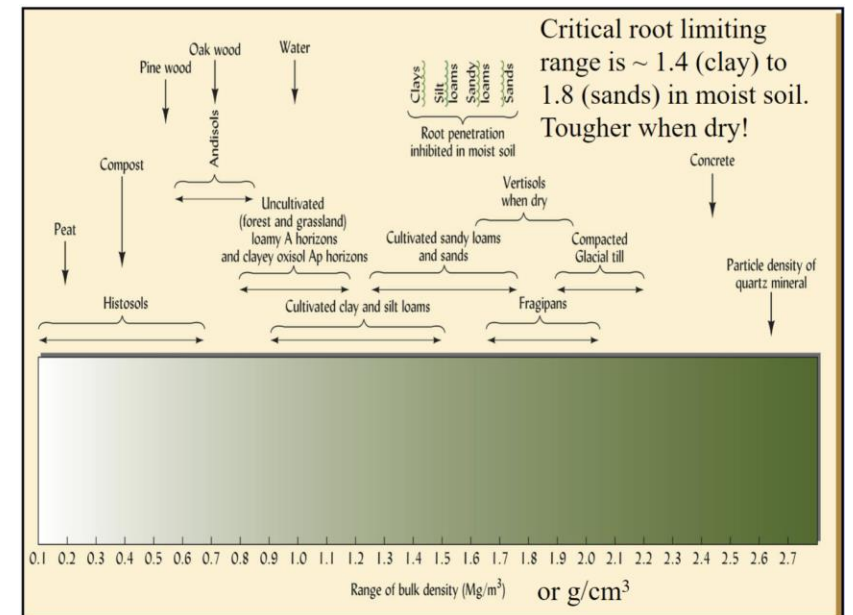


Figure 2.1. Volume composition of a desirable surface soil.



Source: Daniels 11/2/22
UAP Presentation

Initial Site Soil Assessments

- Initial investigations of site soil and landscape conditions should utilize available online mapping and interpretive resources, including:
 - NRCS Web Soil Survey**
<https://websoilsurvey.nrcs.usda.gov/app/>
 - USDI-FIW National Wetlands Inventory**
<https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper>
 - Virginia Land & Energy Navigator (VALEN)**
<https://valen.ext.vt.edu/>
 - Among others
- Information derived from these online resources can be useful in:
 - Assignment of runoff curve numbers (CN) or runoff values (RV)**
 - Preliminary **ID of wetland/hydric soils** and riparian buffer areas
 - ID of local surface drainage** networks
 - Determination of NRCS prime farmlands** per HB 206
 - Initial **ID of karst features**
 - Projections of overall **soil depth** and **rock outcrop** abundance
- While the online resources are informative, they **do not replace site-specific field verification and delineation by qualified soil scientists and wetland delineators.**

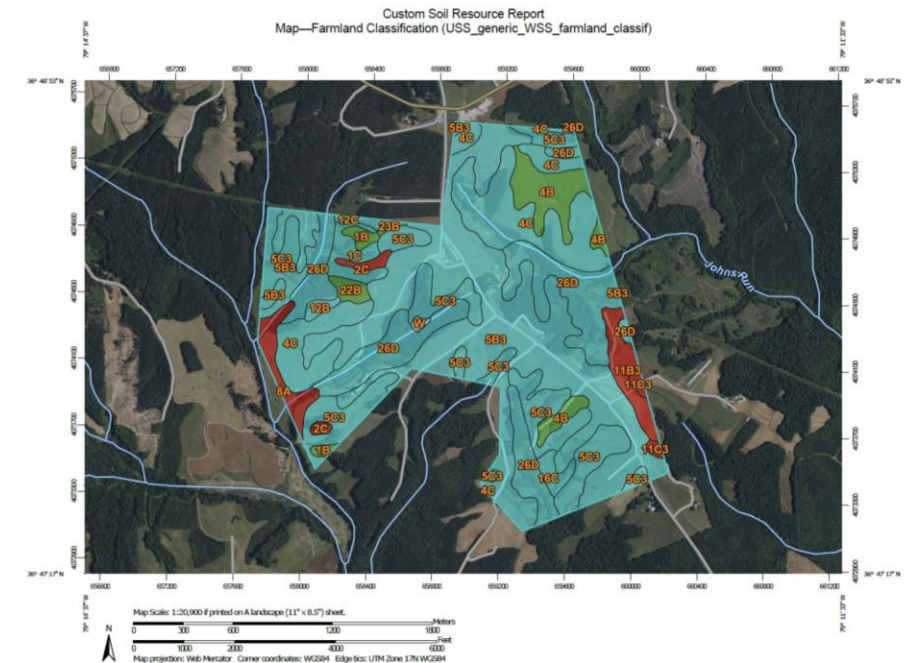
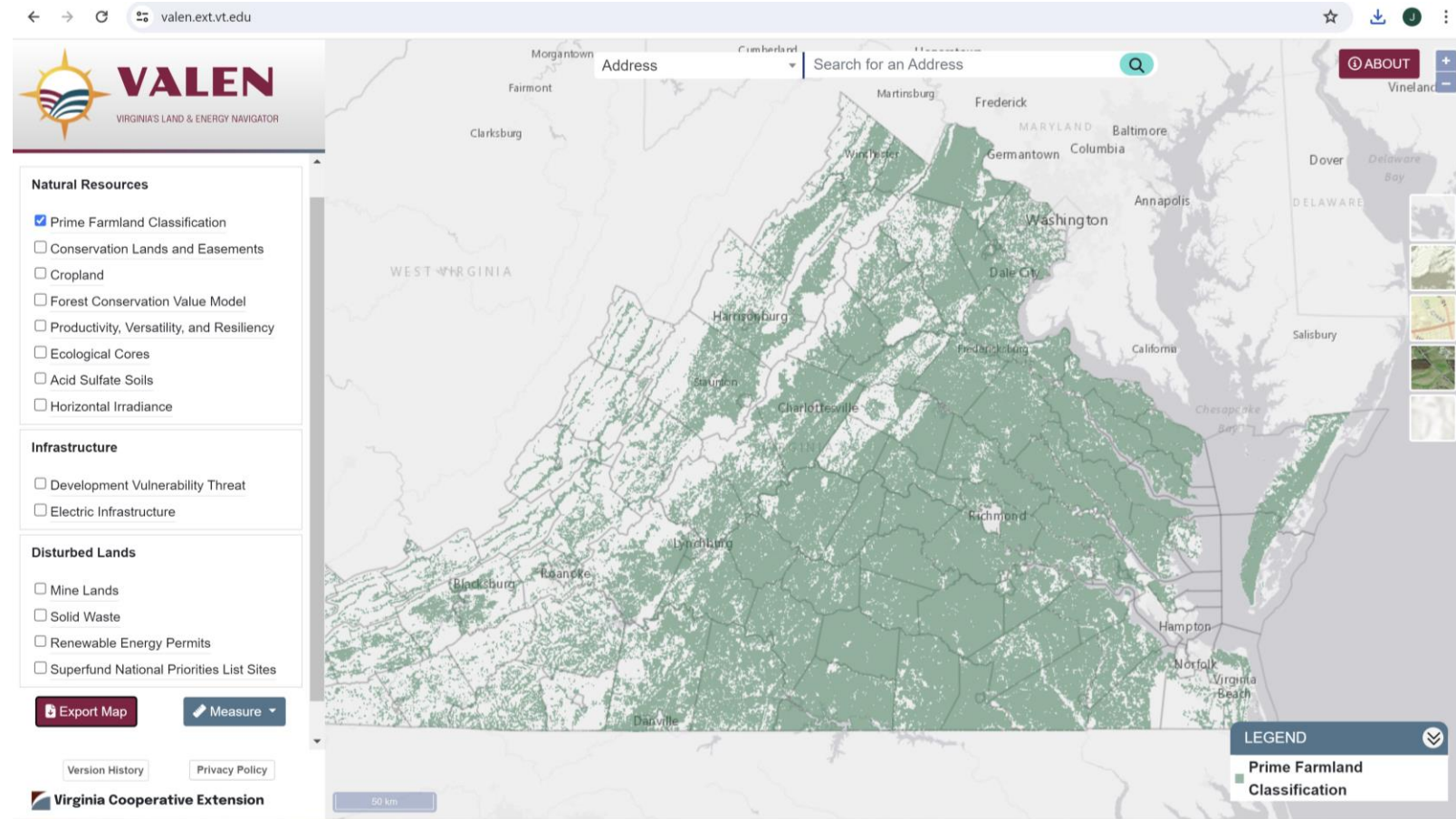


Figure 3. Web Soil Survey (WSS) soil map for a hypothetical USS area in Pittsylvania County south of Lucks. The areas in green shading qualify as NRCS prime farmland, total ~60 acres on gentle A and B slopes ($\leq 7\%$), and would require mitigation under Virginia HB 206. The areas in light blue shading are designated as farmlands of statewide importance, but would not require mandatory mitigation under HB 206. It is important to note that this soil map was produced at a final compiled scale of 1:24,000 and that any dissimilar soil bodies less than ~5 acres in size would not have been delineated separately.

Note mapping scales (e.g., 1:24,000)

Example Special Considerations: Prime Farmland

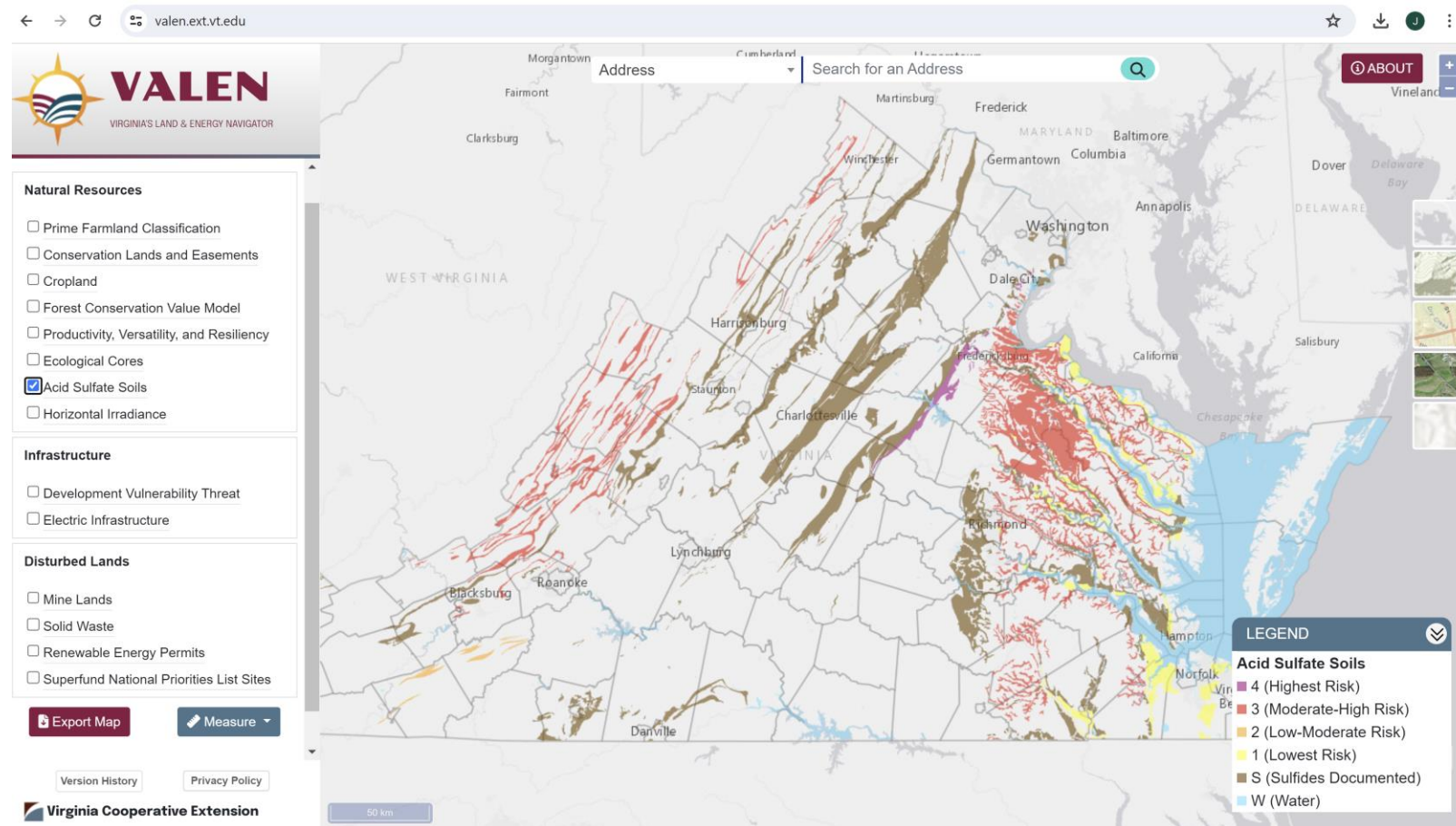
- **HB 206** requires mitigation protocols for any project directly regulated by Virginia DEQ (5 to 150 MW) with disturbance of **>10 acres of NRCS Prime Farmland**, or > 50 acres of contiguous forest resource.
- The **mitigation requirements** for HB 206 **vary based on the extent and depth of soil disturbance and whether appropriate soil/vegetation management practices are prescribed over time.**
- Prime Farmland is defined in the Code of Federal Regulations 7 CFR §657.5(a) as: *“...land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land, but not urban built-up land or water). ...”*



<https://valen.ext.vt.edu/>

Example Special Considerations: Acid Sulfate Soils

- Local exposure of sulfidic geologic materials that quickly weather into acid sulfate soil conditions poses the single greatest localized risk to soil and water quality at sites.
- Fortunately, acid sulfate soil impacts are usually limited to less than several acres, but the costs of remediating these materials is very high.
- Thus, all proposed sites should be evaluated for their potential to encounter and expose sulfidic geologic materials that can oxidize to generate acid sulfate soil and associated very low (pH < 4.0; Fanning et al., 2004) soil and surface water runoff conditions.



<https://valen.ext.vt.edu/>

Example Special Considerations: Acid Sulfate Soils

- Generally, the **highest risk of utility - scale solar development encountering acid sulfate soil materials occurs in the Coastal Plain region where intact reduced (anaerobic) sulfidic materials can potentially be exposed in stormwater ponds excavated into lower landscape positions**
- In general, as long as active grading and cut/fill operations remain in well-drained and oxidized upland soil landscapes with red/yellow subsoils, the risk is low.
- Additional, more limited, areas of high risk occur over certain mineralized formations in the Piedmont.



Figure 5. Exposure of acid sulfate soil (ASS) materials in a deep stormwater pond excavation in Miocene age Coastal Plain sediments in the Fredericksburg area. The darker gray sulfidic materials are reduced (anaerobic) and then oxidize to form sulfuric acid and very low pH (< 3.5) and metal enrichment (Al, Fe and Mn) in soil and receiving waters. Remediation of these materials requires very heavy lime applications (> 15-50 tons ag lime per acre six inches).

Soil Impacts: Short Term vs. Long Term

It is important to understand the nature and differences in duration of soil impacts, some examples:

- **Short Term**

- Exposure of Bare Soils

- Erosion losses can be **mitigated by immediate revegetation, mulching, or other short-term erosion control** measures
- Low pH and **infertile subsoil** materials can quickly be **remediated via lime and fertilizer additions with revegetation**

- Moderate Surface Soil Compaction (< 6" deep)

- Can be rapidly **remediated via conventional tillage practices**

- **Long Term**

- Significant Root-limiting Compaction (≥ 12 " deep)

- Unless remediated via deep ripping practices, should be **considered a permanent long-term negative impact that could potentially limit plant productivity and water penetration for the lifetime of the project.**





Avoidance, Minimization and Rehabilitation of Soil Impacts

- **Mitigation must be considered as an ongoing process** that first involves site development planning to:
 - **Avoid**: Direct surface soil impacts, e.g., use of low tire pressure equipment for panel infrastructure placement coupled with limited grading and topsoil removal.
 - **Minimize**: Impacts via limiting grading, trenching and the overall cut/fill footprint
 - **Rehabilitate**: Use measures such as surface tillage to loosen compaction and rapid topsoil return for quick revegetation of these areas
- **Certain impacts will more than likely be persistent limitations for the lifetime of the project** and will require a combination of deep and shallow tillage and soil amendment in the final site rehabilitation phase.
- **Complete restoration of areas of heavily disturbed prime farmland soils to 100% of their previous levels of row crop productivity may not be possible**

Soil Impacts Across Project Phases

- **SITE DEVELOPMENT**
 - Topsoil Removal & Storage
 - Grading, Cut & Fill
 - Trenching
 - Structural Pads
 - Stormwater
 - Roads
- **OPERATIONAL**
 - Soil Temperature and Moisture
 - Mowing
 - Roads & Structural Pads
 - Panel Drip Lines
 - Panel Imperviousness
- **DECOMMISSIONING**
 - Infrastructure Removal
 - Grading
 - Topsoil Return
 - Exposed Soil

Detailed Considerations for Soil Impacts for Each of These Areas are Described in the Publication

Revegetation and Vegetation Management Strategies

- **Primary goals for the revegetation and vegetation management strategy** at a utility-scale solar site:
 1. **Short-term/immediate control** of enhanced erosion/stormwater losses
 2. **Medium/long-term maintenance** of the site and projected operational phase land uses (simple ESC, grazing, natives/pollinators, etc.)
- **Requires changes in management strategy** and inputs over time; **demands over the entire project lifecycle need to be projected and planned** before any disturbance occurs
- **Specific recommendations should be tailored for application** to differing parts of the site depending on the intended operational land use. For example, very different establishment protocols would be used for:
 - **general mixed grass/legume mowed areas**
 - **native grass/pollinator plantings**
 - **livestock grazing systems**

Revegetation Concepts

- **Immediate Short-term Erosion & Sediment Control**: >75% living vegetative or intact litter/residue/mulch/EC matting cover should be established within 7 days of any final grading or 14 days of non-managed (inactive) exposure of bare (denuded) soils, regardless of prior installation of BMPs such as silt fencing, compost socks, sediment detention sumps, etc.
- **Pre-established BMPs**: Must be well-maintained, including vegetated buffers, drainage swales, stormwater berms and other prescribed site-specific SWM & ESC practices.
- **Temporary & Perennial Seedings**: Guidelines and resources are available for Virginia and specific regions, including recommended seed mixes successfully used in other disturbance sectors
- **Stabilization**: Disturbed areas need to be stabilized incrementally over time and that large, denuded areas are not left unvegetated, particularly during the winter that typically has enhanced runoff.

Detailed Considerations for Vegetation Establishment & Management for Each of These Areas are Described in the Publication

Supporting Concepts for Successful Revegetation

- Use VDOT green tag variety recommendations & VDACS certified seed
- All seeding rates should be on a **Pure Live Seed (PLS)** basis
- **Use at least 2 different perennial grasses and 2 perennial legumes** along with an appropriate cover/nurse crop
- A **rapidly germinating cover crop is important**
- Establishing **legumes in the permanent perennial stand is essential**
- All **legumes must be seeded with their** appropriate and genus/species specific Rhizobia sp. bacterial **inoculant**
- **Hydroseeding is the preferred method for rapid revegetation on most sloping** and disturbed sites
- **Hydroseeding efforts should include paper or wood fiber mulch**
- **Fertilizer additions are essential to hydroseeding mixes**
- To maintain legume viability, the **soil pH must be > 5.5**
- **Apply the specified lime rate;** use successive applications when adding lime at rates greater than the equivalent of 2-3 tons of CCE lime per acre
- Request supporting **evidence from the vendor when considering additives** and admixtures
- **Many native species (grasses, legumes and other forbs) are not compatible with hydroseeding**
- Conventional **soil testing procedures calibrated for expected natural soil conditions and may not accurately predict actual nutrient availability for highly disturbed soils**
- Any soil **pH test value < 4.2** should be considered as a **potential indicator of acid-sulfate soil conditions**
- **Extensive “tracking-in” and smoothing of final revegetation surfaces is counter-productive**
- Regardless of the guidance provided above, the **timing of seeding (particularly for perennial stands) is often the most critical factor for initial revegetation success**



Detailed Considerations for Vegetation Establishment & Management for Each of These Areas are Described in the Publication

Enhancing Soil Quality


- **Organic matter content, bulk density, rooting depth, and degree of aggregation are the most consistent indicators of soil quality**, complemented by local variables such as soil pH, texture, and relative fertility levels.
- Many of the original concepts of the soil quality have evolved into the current federal and private sector emphasis on **“soil health”, which incorporates added emphasis on soil microbial and biological functions, sustainability, and overall resiliency** to disturbance.
- For utility-scale solar, a range of **practices are encouraged that:**
 - **improve overall vegetation growth and resilience**
 - **protect local and regional water quality**
 - **potentially lead to development of carbon sequestration or nutrient reduction credits**

Soil, Site, and Animal Practices for Enhancing Soil Quality

- **SPECIFIC GRAZING MANAGEMENT PRACTICES**
 - **Intensive and rotational grazing practices** should be employed
 - Panel height, wiring, and mechanical configurations may need to be **modified for particular grazing species**
 - Site revegetation plans should be carefully tailored to **produce a forage stand suitable for the intended animal grazing system type and intensity**
 - Maintenance of **deep-rooted perennial vegetation in disturbed areas should lead to significant increases of soil organic matter and aggregation with time (e.g., over decades)**
 - **Periodic soil testing and recommended lime/fertilizer amendment for all contrasting management areas**
- **PRACTICES TO ENHANCE AND DOCUMENT CHANGES IN SOIL QUALITY**
 - Application of **organic soil amendments should be considered**
 - Differently managed **site zones should be sampled separately**
 - **Testing for specific soil quality-related parameters is recommended for sites at which assertions are being made with respect to carbon sequestration or other soil quality improvements**

**Soil, Site, and Animal Practices for Enhancing Soil Quality
are Described in More Detail in the Publication**

Develop Better Estimations for: Post-project Remediation Requirements

- Stakeholder acceptance of new utility-scale solar development projects is requiring the **development of closure plans that include projected protocols for either returning the site to its original land use or to some similar alternative use**
- To date, there has **not been any specific published research on the range of issues** covered in this whitepaper
- However, there have been a number of directly **related studies conducted in Virginia and the eastern USA from mining reclamation and highway revegetation efforts**
- Several pertinent studies are summarized here: 
- Virginia Tech has conducted **over 30 years of replicated research experiments and field studies on the restoration of prime farmlands to varying post-mining uses including prime farmland, hayland or pasture, and commercial loblolly pine plantings**
- Combined, these studies across a wide range of disturbance environments emphasize the **importance of being transparent with stakeholders from initial conceptual stages through to final closure to ensure that expectations are reasonable and clearly attainable based on the anticipated degree of disturbance and the final soil reconstruction and revegetation practices that will be employed**

RESULTS FROM SPECIFIC STUDIES IN VIRGINIA INDICATE

- Reclamation of significantly disturbed and reconstructed areas to productive row cropping systems is possible with adequate deep ripping, surface tillage, liming, and fertilizer applications. Utilization of organic amendments (e.g., biosolids) enhances the rate of recovery, but long-term yields (i.e., over 10 years) should still be expected to be reduced by ~15 to 25% relative to comparative adjacent prime farmlands under identical management. Limitations are due primarily to subsoil compaction, poor internal drainage, and associated seasonal wetness or drought stress.
- Reclamation of pasture productivity to pre-disturbance levels is possible for disturbed prime farmlands and highly likely for lower productivity non-prime areas. However, deep ripping may still be necessary to eliminate seasonal wetness due to poor internal soil drainage that can pose management limitations for hay production.
- Loblolly pine development is enhanced by weed control and direct fertilization into the planting hole. Compared with regional performance on undisturbed Piedmont soils, pine tree growth may be slower for the first few years after planting due to subsoil compaction, but can equal or exceed undisturbed soils for later years (e.g., 4-10 years after planting). Longer term effects of subsoil compaction on pine growth are still under study.

Predicting Effects of Soil Disturbance and Remedial Practices on Post-Closure Soil and Landscape Productivity are Described in More Detail in the Publication

Develop Better Estimations for: Post-project Remediation Requirements

- Recommendations for reconstruction protocols assume:
 - Project **infrastructure will be removed** and the area returned to a land use that is suitable to the landowner
 - **Soil remediation practices will be followed** and acceptable management practices will be followed over the site lifetime
 - **Soil quality will improve over the operational phase** of the project lifecycle
 - **Disturbed areas will be clearly identified** and mapped during installation and known to closure contractors
 - **Deep-ripping of subsoils and other major soil reconstruction efforts will be delayed until final closure**
 - **Final remedial practices may be applied** uniformly or differentially **based on disturbance maps and final soil quality observations**
- The **disturbance history of the project will need to be accounted for and will most likely increase soil spatial variability of the restored site** relative to the original undisturbed conditions

RECOMMENDED RECONSTRUCTION PRACTICES

- **Prime farmland:** Deep ripped to $\geq 24''$ with shanks $\leq 30''$ apart in two directions (90° opposed) followed by chisel plowing to just below the topsoil/subsoil contact as needed. Return of highly disturbed areas of prime farmland to 100% of their original row crop productivity may not be possible.
- **Pasture and hayland:** Disturbed areas will be chisel- or no-till plowed to a depth of $12''$ and reseeded into appropriate vegetation. Deeper tillage may be required in areas of excess surface soil wetness due to underlying compaction. Areas that remain undisturbed may be left in their existing state if the vegetation is suitable for the intended management system.
- **Forest lands:** Significantly disturbed areas (e.g., with root-limiting subsoil bulk density) will be deep-ripped to $> 18''$ in one direction consistent with intended planting spacing. Non disturbed and/or uncompacted areas may require no further remediation. Tree seedlings should be planted into ripper traces whenever possible.
- **Other uses:** Non-agricultural/forestry land uses are possible and site preparation and conversion practices will be dependent upon landowner/local governmental consent. We view continued energy production as a likely long-term land use for many sites.

Predicting Effects of Soil Disturbance and Remedial Practices on Post-Closure Soil and Landscape Productivity are Described in More Detail in the Publication

Develop Better Estimations for: Stormwater Runoff

There is a **lack of utility-scale solar-specific research and findings in the mid-Atlantic region that compare actual versus predicted stormwater runoff and sediment losses**. Recent practical experience by the industry, and initial research efforts by Virginia Tech, indicate that **the following areas deserve attention when developing or applying models to predict stormwater quantity and quality**:

- Guidance from NRCS regarding **assignment of Hydrologic Soil Groups (HSGs) states that the concept is not applicable to disturbed soils and alternative methods should be employed**. One recommended approach is for users to **adjust HSGs one letter (e.g., from B to C) when assigning values** for NRCS/TR-55 Curve Numbers or for VRRM Rv values
- Unless remediation measures are taken during stabilization to alleviate soil compaction and maintain other soil quality parameters (e.g., aggregation/infiltration), the **CN/Rv values for estimating runoff should be higher than original undisturbed conditions**
- Project developers should **understand the limitations of scale when using Web Soil Survey maps for aggregating modeled predictions** for runoff, sediment loss and nutrient loading; on-site validation and confirmation will often be necessary
- Assignment of CN/Rv values to stormwater and erosion estimates should attempt to **account for the influence of differences in soil disturbance and associated short-range variability and the unpredictability of essential infiltration/runoff partitioning estimators**
- There is debate regarding the validity of current estimates of the relative imperviousness of solar panel array fields and overall revegetation effectiveness on fully stabilized sites for maintenance of disconnected sheet flow conditions during most storm events, but very little if any actual site-specific research has been done to validate those assumptions; **Temporary ESC and SWM BMPs should be sized to account for impervious panel + bare ground runoff conditions during the site stabilization phase**
- In addition to the commonly used runoff modeling approaches discussed above, **more detailed and event-based approaches are available** (e.g., Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS), the USEPA Storm Water Management Model (SWMM), K2/O2 (Kineros2-Opus2), HYDRUS, among others).
- Recent **DEQ guidance on stormwater policy along with upcoming SWM & ESC Manual revisions (July 2024) list a number of specific provisions for solar farm permit applications**

Recommendations - Stakeholders

- All stakeholders should be committed to the sustainable development and management of **utility-scale solar projects**, including return of the decommissioned project area to productive agriculture, forestry or other pre-planned uses
- Essential to this commitment is the **application of a wide range of BMPs to minimize impacts to soil/water resources during site development and their careful integration into soil/vegetation management practices** during the multi-decadal operational phase
- Following infrastructure removal, developers should **rehabilitate/restore disturbed areas to optimize their productivity for the specific post-closure use** designated by the landowner
- Finally, we **encourage and support full transparency throughout project lifetime with respect to planning/permitting procedures, expected short/long-term impacts, and scientifically based projections for medium/long-term site productivity potentials for various uses**

Acknowledgments

We deeply appreciate the continuing support of:

- Industry Cooperators
- Virginia DEQ

**Soil-Site Management Protocols & Best Management Practices
(BMPs) for Utility Scale Solar Site (USS) Development and
Management in Virginia**

**Thank
You**



USS Site Under Active Development in Southside Virginia (image from DEQ/AEP)

White Paper Available at:
landrehab.org/home/programs/solar-farms

Authors:

- W. Lee Daniels, Professor, Land Rehabilitation, wdaniels@vt.edu
- Ryan D. Stewart, Associate Professor, Soil Physics & Hydrology, rds@vt.edu
- John Ignosh, Advanced Extension Specialist, jignosh@vt.edu
- David Sample, Professor, Stormwater Management, dsample@vt.edu
- Pat Donovan, GIS Specialist, padanova@vt.edu
- John Fike, Professor, Forage & Grazing Management, jfike@vt.edu
- Ben Tracy, Professor, Forage Ecology, btracy@vt.edu

Additional Recommendation Slides

Recommendations - Stakeholders

- All stakeholders should be committed to the sustainable development and management of utility-scale solar projects, including return of the decommissioned project area to productive agriculture, forestry or other pre-planned uses.
- Essential to this commitment is the application of a wide range of BMPs to minimize impacts to soil and water resources during site development and their careful integration into appropriate soil and vegetation management practices during the multi-decadal operational phase.
- Following infrastructure removal, developers should rehabilitate and restore any disturbed areas to optimize their productivity for the specific post-closure use designated by the landowner.
- Finally, we encourage and support full transparency throughout project lifetime with respect to planning and permitting procedures, expected short- versus long-term impacts, and scientifically based projections for medium- and long-term site productivity potentials for various uses.

Summary Recommendations – Pre Development

- Identify all soil types on site to categorize prime farmland units (via NRCS criteria), forested areas, wetlands and other sensitive areas and features.
- Verify presumed soil types, forested areas, wetland boundaries and other limiting features via on-site investigations by a qualified professional when needed.
- Collect baseline pre-development data on important soil health indicators, including topsoil depth, organic matter and aggregation, bulk density, and permeability.
- Establish and map appropriate and required buffers around sensitive features, riparian zones, Resource Protection Areas, drainage swales, sinkholes, rock outcrops, wetlands, etc.
- Utilize gathered information to minimize grading (cut/fill) and other site development impacts to existing soil resources while avoiding impacts to particularly sensitive features (e.g. sinkholes and wetlands).
- Utilize conservative runoff estimators (e.g., higher NRCS CN's and/or VRRM RV's) for stormwater and erosion prediction modeling and SWM BMP specifications, particularly during the development/stabilization phase.
- Adjust design BMP SWM volumes to account for site disturbance and panel imperviousness. This effort should include adjusting the Soil Hydrologic Group (HSG) designation per DEQ GM 22-2012 guidance.
- Develop detailed *a priori* vegetation establishment and management plans to meet initial site stabilization demands coupled with longer term operational vegetation management needs.

Summary Recommendations – Active Development

- Establish and maintain all required buffers, setbacks, and all temporary and permanent ESC + SWM BMPs.
- Minimize grading and cut/fill for roads and structures when leveling or reducing slope grade changes for panel arrays.
- Consider dual-axis tracking systems or U-joints in single-axis systems to minimize cut/fill requirements when working on steeper or more undulating terrains.
- Use rain sensors to trigger panels to move panels to more vertical positions when triggered by major rain events.
- Anticipate development of drip lines below downhill panel edges on slopes and develop appropriate strategies to maintain disconnected flow conditions, restore sheet flow, or increase the time of concentration.
- Predict and map all areas of significant soil disturbance including roads, infrastructure, trenches, temporary ESC measures, and engineered stormwater conveyances and ponds.
- Minimize topsoil removal wherever possible and maintain temporary topsoil stockpiles in an aerated condition, covered with deep-rooted vegetation and kept away from wet areas.
- Utilize light agricultural scale machinery with low pressure tires or tracks whenever possible for site development and maintenance activities. Avoid trafficking site soils during wet soil conditions.
- Assume that site development will compact the soil to some extent. Assess and remediate root-limiting compaction and smearing of disturbed surface soil materials to 4-6 inches with appropriate mechanical tillage methods. Add and incorporate soil amendments to all final revegetation surfaces based on appropriate field sampling and soil testing protocols.

Summary Recommendations – Active Development

- Sample topsoil stockpiles before return to disturbed areas to develop liming/fertilization/amendment seeding prescriptions.
- Where topsoil is not salvaged and returned, assume exposed cut subsoils will most likely be compacted and low in pH and plant-available nutrients; test all contrasting cut/fill regraded areas separately. Utilize compost, biosolids, or other appropriate organic soil amendments, and apply per requirements.
- Return topsoil to disturbed areas from stockpiles as quickly as site closure conditions allow, or utilize direct haul strategies to immediately move actively collected topsoil to adjacent soil reconstruction areas. Loosen returned topsoil or exposed subsoil for revegetation steps with equipment consistent with use in the confined panel array environment.
- Minimize final smooth grading (tracking in) on sloping areas and leave surface roughened up where possible.
- Establish temporary vegetation (to achieve > 75% living cover) within 14 days or less of disturbance wherever possible. Temporary seeding or stabilization with tacked mulch should include any internal rough-graded areas that will not be returned to final grade or permanent vegetation for more than 30 days.
- Establish permanent vegetation (to achieve > 75% living cover, with maximum bare areas of less than 250 square feet) on all exposed soils within 7 days of final grading with diverse species mixtures for perennial seedings. Ensure legume establishment ($\geq 25\%$ cover) unless intensive turf type management with routine fertilization is prescribed post-development management.
- Ensure that revegetation strategies meet both short and long-term ESC needs, including coupling with longer term active soil/vegetation/grazing management goals. For example, limit animal grazing activities until the permanent vegetation is fully established and viable (i.e., $\geq 75\%$ living cover).
- Use combined seeding, liming, fertilization, and organic amendment strategies to enhance initial vegetation establishment goals along with enhancing longer term soil health and quality. Avoid seeding DCR-listed invasive species such as Sericea/Chinese lespedeza and crown vetch into uplands or overall aggressive species such as reed canary grass into wetter pond and drainageway positions.

Summary Recommendations – Post Development

- Maintain diverse mixed grass/legume stands in panel array zones that are consistent with intended maintenance, mowing, or grazing regimes.
- Where possible, use pollinator-friendly and native species in seed mixes that are consistent with panel zone management goals.
- Monitor and document vegetation type, persistence, and cover in differing management zones including under and between panel arrays, disturbed road shoulders, stormwater conveyances and ponds, and in undisturbed buffers. Utilize these observations to adjust management and reseeding practices as necessary.
- Utilize buffers and other non-paneled areas for establishment and maintenance of native grasses and/or pollinator species where feasible.
- Avoid working on-site when soil is wet and use light, low-wheel-pressure vehicles for routine maintenance.
- Establish permanent soil quality sampling and monitoring locations for critical parameters such as organic matter, aggregation, permeability, and bulk density. These locations should include both actively managed undisturbed and reconstructed soil areas to allow for valid documentation of actual soil carbon sequestration rates (if desired for markets or offsets) and other parameters.
- Collect routine soil testing samples from vegetation monitoring areas at least every third year and apply lime, N-P-K fertilizers and other amendments as needed to maintain and meet vegetation management goals for differing management zones.
- Integrate animal grazing management practices such as rotational grazing where possible to assist with vegetation maintenance and enhance soil quality.

Summary Recommendations – Site Closure

- Reestablish all necessary ESC and temporary SWM controls
- Evaluate existing soil quality parameters, particularly subsoil compaction, for all areas, particularly those that underwent significant disturbance during site development
- Minimize repeat soil disturbance associated with infrastructure removal following similar or improved practices used during the development phase
- If indicated as necessary for a given land use (e.g., agriculture or intensive forestry), deep-rip all significantly disturbed areas to ≥ 24 inches, ensuring soils are at appropriate moisture levels to optimize bulk density remediation
- Soil test all areas for final revegetation prescriptions and apply appropriate lime, N-P-K fertilizer, and organic amendments
- If necessary, suppress the existing herbaceous stand to allow for establishment of final targeted agricultural, forest or other pre-planned uses such as urban re-development
- Use appropriate tillage practices (e.g., chisel plow, disk, or rototiller) to incorporate final soil amendments and remediate any final surface soil compaction to ≥ 6 inches
- Monitor rehabilitation efforts for two seasons to ensure appropriate ESC and SWM compliance along with successful establishment of intended vegetation or cropping system



Virginia Farm Bureau: Best Practices for Solar

Presentation to Fluvanna Co. | June 5, 2024

Katelyn Rose Jordan

LOCAL & STATE ADVOCACY SPECIALIST |
GOVERNMENTAL RELATIONS

**FARM
BUREAU**
VIRGINIA

Agenda

- ❖ Introduction to Virginia Farm Bureau Federation
- ❖ Virginia Farm Bureau Solar Policies
- ❖ **Creating Balance—**
 - ❖ Defining Prime Farmland
 - ❖ Farmland Preservation & Property Rights
- ❖ Agriculture & Prime Farmland in Fluvanna Co.
- ❖ Responsible Implementation & Regulations – HB206
- ❖ **Food for Thought** – Recommendations for Ordinances
- ❖ **Additional Perspectives to Consider**

Introduction to Virginia Farm Bureau

Agriculture is the heartbeat of Virginia, & the heartbeat of VAFB are our members.

- ✓ Dedicated to advocacy on the issues impacting agriculture at all levels of government.
- ✓ Offers "Member Benefits" and money saving programs to all members.
- ✓ Working to promote the understanding of Virginia's #1 private industry.
- ✓ Comprised of 88 County Farm Bureaus across Virginia with over 33,000 producer "farmer" members.
- ✓ Largest grassroots advocacy organization representing all commodities and types of agriculture across the state.





Farmers in Action

Virginia Farm Bureau: Farmland Preservation & Property Rights

- According to the 2024 USDA Census of Agriculture, the average age of the US farmer continues to rise. In 2022, the average age was 58.1 years. **In Virginia, our average farmer is 59.**
- The American Farmland Trust reports that nearly **300 million acres** of American farmland are expected to change hands in the next 20 years.
- As population increases, by 2050, farmers will need to grow 70% more food on less land and with less water.
- **Question:** How can you be purposeful in your zoning process in such a way that preserves our future food security while also acknowledging that not every farmer has an heir to the farm?

Virginia Farm Bureau Solar Policies – State Level

- ❖ We support requiring all utility-scale solar facilities to maintain a nutrient management plan prior to construction and throughout the existence of the facility.
- ❖ We support classifying solar panels as impervious surfaces for utility-scale solar facilities.
- ❖ We oppose any legislation that would allow state authority over localities in developing utility-scale solar projects
- ❖ We oppose any legislation that would allow state authority over localities or expand eminent domain authority in developing utility-scale solar projects.

Virginia Farm Bureau Solar Policies – State Level

- ❖ If a utility-scale solar facility is to be installed, we recommend it be located on brownfields, landfills, or mine reclamation sites.
- ❖ We oppose solar facilities being referred to as solar farms.
- ❖ We support a requirement to avoid prime farmland when locating utility-scale solar facilities. If these facilities are located on prime farmland, the solar developer should be mandated to return the land to productive farmland at the end of the project's life cycle.

Virginia Farm Bureau Solar Policies – State Level

- ❖ We believe more studies should be done on the impact that utility-scale solar energy has on agriculture, and the potential environmental impacts and lifecycle costs for the manufacture, disposal, re-use, or recycle of material inputs, before any additional projects are approved on agricultural lands.
- ❖ We support requiring a minimum of a 50-foot riparian buffer around all utility-scale solar facilities.

Virginia Farm Bureau Solar Policies – State Level

- ❖ We support more Virginia based research on the economic viability of agrivoltaics on utility-scale solar sites. We support more information or demonstration sites being made available to landowners.
- ❖ We support the local enactment of bond requirements that would protect landowners from clean-up costs that may be associated with decommissioning solar energy projects.

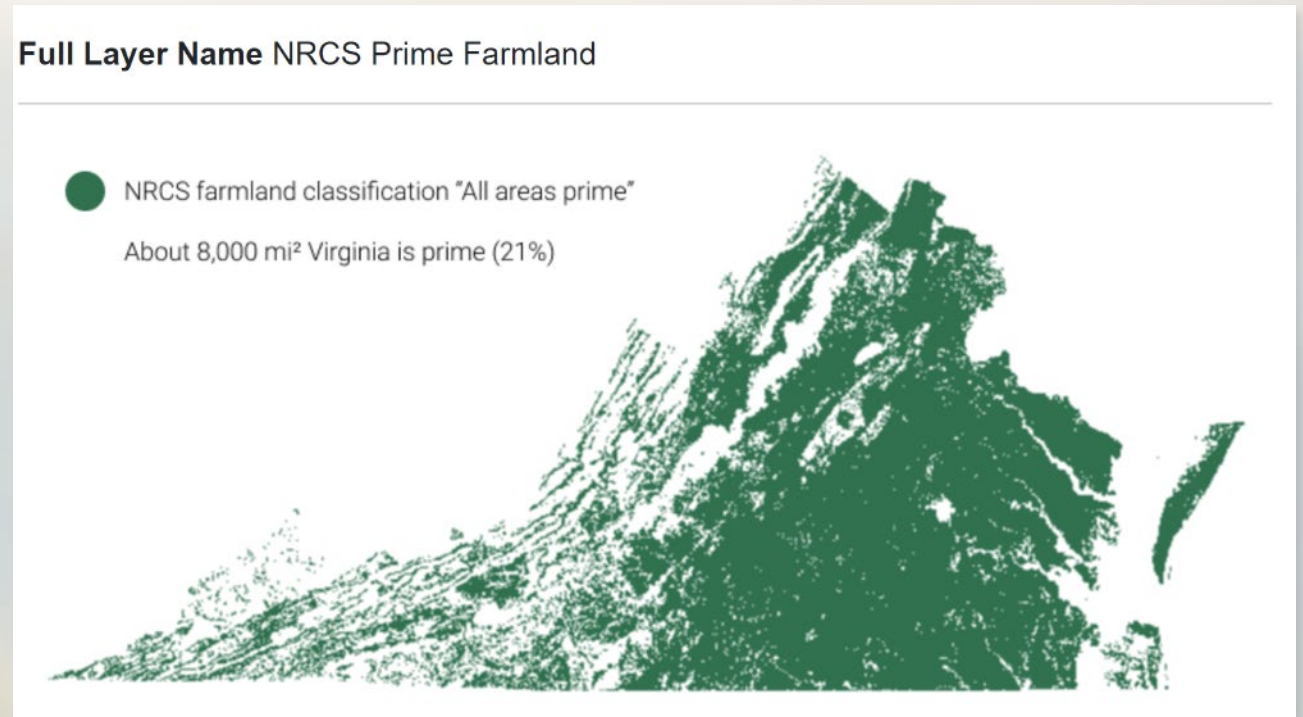
Virginia Farm Bureau Solar Policies – State Level

- ❖ We support the mandated use of non-invasive, weed-free, certified seed as determined by testing by the Virginia State Seed Lab for use on utility-scale solar projects as ground cover or pollinator habitats.
- ❖ We support the purchase of excess power generated by solar installed on agricultural buildings.
- ❖ We oppose utility-scale solar facilities being eligible for land use assessment.

Defining Prime Farmland

§ 3.2-205 Defining Prime Farmland” –

“Prime farmland’ is land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, nursery, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion. Prime farmland includes land that possesses the above characteristics but is being used currently to produce livestock and timber. It does not include land already in or committed to urban development or water storage.”



Virginia's Land & Energy Navigator (VaLEN)

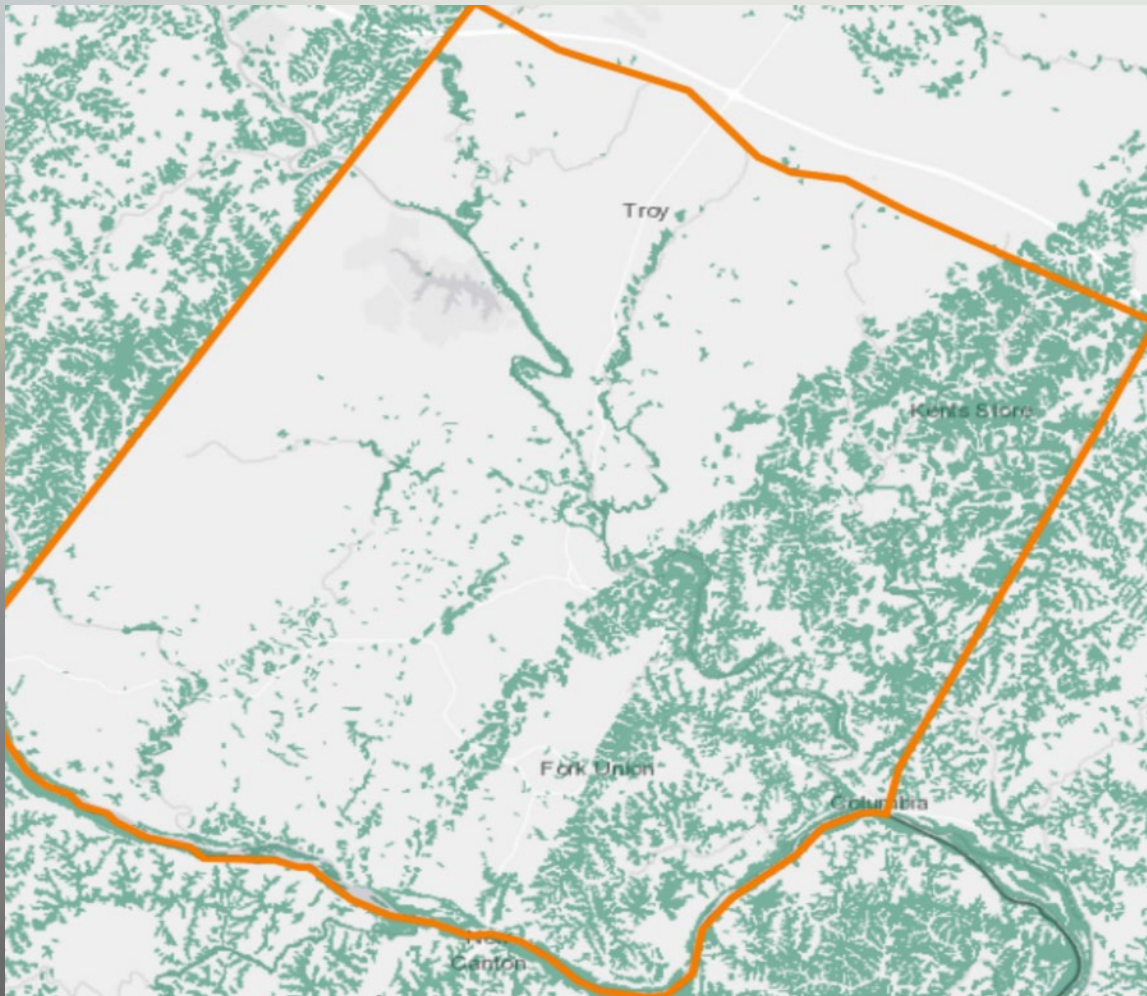
- Created by the Virginia General Assembly in 2022 (HB894– Kilgore) developed map or repository of prime farmland... to further assist localities in siting determinations regarding solar energy collection devices or energy storage devices.
- **A Collaboration of Efforts** – Led by the Virginia Cooperative Extension & funded by Dominion Energy
- **A Tool for Localities** – utilize different geospatial layering tools to inform effective and conscientious zoning and decision making.

Snapshot: Agriculture in Fluvanna Co.

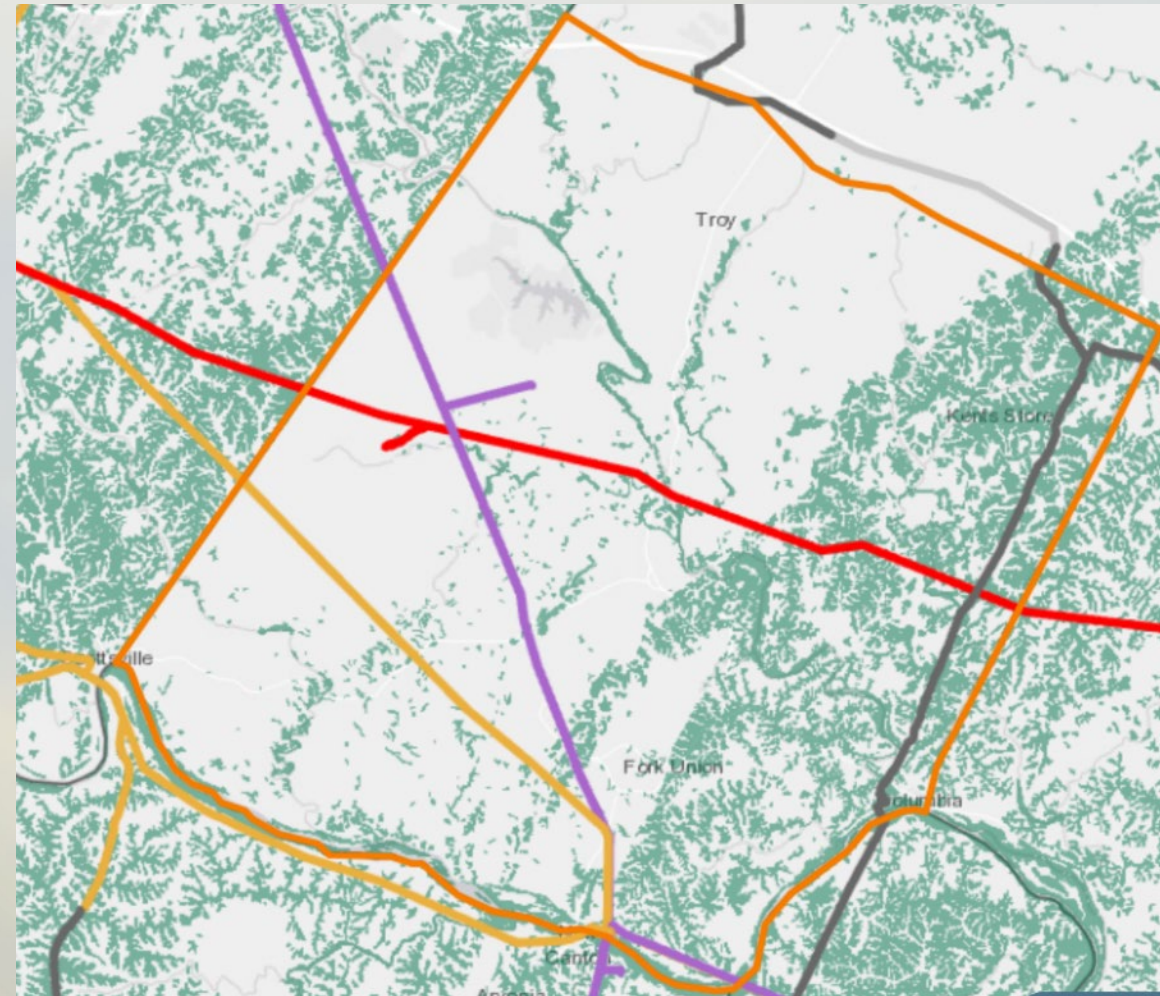
- Fluvanna Co. is home to **289** farms sprawling across **49,499** acres.
- **98%** of farms in Fluvanna Co. are family farms. **534** producers call your county home, and **214** of those consider themselves new and beginning farmers.
- **Staple Crops** in the area are hay (8,387 acres), soybeans (1,898 acres), and corn (1,268 acres).
- **Woodlands** also encompass a great majority of acres in Fluvanna Co.
– **20,054 acres.**

Prime Farmland & Fluvanna Co.

Fluvanna Co. – Prime Farmland



Fluvanna Co. – Prime Farmland & Electric Utility Overlay



Responsible Implementation & Regulations – HB206

HB206 (Webert) | 2022 established mitigation requirements for solar developments as a condition for a permit by rule for a small energy project, if the Department of Environmental Quality determines that there will be significant adverse impact on **wildlife, historic resources, prime agricultural soils, or forestlands.**

Specifically, if there is a disturbance of (i) more than 10 acres of prime agricultural soils, (ii) more than 50 acres of contiguous forest lands or (iii) forest lands enrolled in a forestry preservation program is deemed to be a significant adverse impact on natural resources.

Virginia Farm Bureau participated in the advisory panel that convened to establish these regulations, which have since recently been published to Regulatory Town Hall and will be providing comments.



Food for Thought – Recommendations for Ordinances

Assessing the Impacts:

- ✓ Completion of inspections and impact analysis on existing and future agricultural and forestry industries.
- ✓ Environmental impact assessment – agriculture & forestry, wildlife, parks, cultural, historical.
- ✓ Assessment of traffic impacts during construction and decommissioning.

Involving the Community:

- ✓ How does each project align with your Comprehensive Plan?
- ✓ Involve the neighborhood prior to public hearings with the Planning Commission.
- ✓ Notify adjacent landowners in writing.

Food for Thought – Recommendations for Ordinances

Involving the Community:

- ✓ Involve **all** stakeholders
- ✓ Define community preferred sites – land not well-suited for farming and prioritize siting on these sites. Concentrate solar on rooftops, irrigation ditches, brownfields, marginal lands.
- ✓ Understand tax impacts to landowners with zoning changes.
- ✓ Understand the burden taken on by the landowner to re-zone his land.
- ✓ What other uses would be allowed in the "new" zoning district? How can you continue to preserve agriculture with this zoning change?

Food for Thought – Recommendations for Ordinances

Protecting the Land:

- ✓ Develop appropriate setback standards when the adjacent parcel has an existing residence.
- ✓ Establish a maximum height of ground-mounted panels.
- ✓ Prohibit topsoil removal or grading of the land.
- ✓ Place panels along the contours of the land.

Food for Thought – Recommendations for Ordinances

Decommissioning:

- ✓ All broken or waste solar modules shall be removed from the site within 60 days of being taken out of service.
- ✓ Removal of abandoned solar generating equipment ensured by bond with the county.
- ✓ Create a decommissioning plan and method of providing cost.

Decommissioning Requirements for the Developer Should Include:

- Bond money for decommissioning sites – protect the landowner.
- Removal of all panels, infrastructure, conduit, and roads.
- Reclamation of the site, return land to its original condition.
- Soil and water testing for any solar panel related heavy metals & contaminants; remediation if detected.

Additional Perspectives to Consider

- **American Farmland Trust** – Smart Solar Principles
- **Virginia Association of Counties (VACo)**



Questions?

Katelyn Jordan

(C): 804-241-4042

KATELYN.JORDAN@VAFB.COM

**FARM
BUREAU**
VIRGINIA