

**REPORT OF THE VIRGINIA COOPERATIVE
EXTENSION SERVICE**

**Virginia Land and Energy
Navigator “VaLEN” Initial Report
on the Development of a Map for
Prime Farmland HB894
Workgroup (Chapter 488, 2022)**

**TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA**



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Virginia Land and Energy Navigator

“VaLEN”

Initial Report on the Development of a Map for Prime Farmland

HB894 Workgroup

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HB894 Workgroup - Initial Report

December 1, 2022

Executive Summary

Since 2015 utility-scale solar project development has increased across Virginia, with much more development of renewable solar energy and energy storage anticipated in the coming years. To date, 91% of solar development in Virginia has been in the form of utility-scale solar. The build out of utility-scale solar in Virginia has raised concerns regarding the balancing of renewable energy goals in the context of broader natural resources conservation and economic development interests. The Virginia General Assembly recognized the need for data resources to help inform these land-use planning decisions through HB894.

The charge of HB894 focused on: developing a map of prime farmland, identifying land with conservation easements, and describing certain electrical grid infrastructure information. Together, HB894 Workgroup members collaborated to: understand the complete scope of the planned work activities; consider the pertinent geospatial data sources to incorporate, and; seek end-user feedback to inform the development of an interactive online mapping tool that is both fit for purpose and tailored to the needs of Virginians exploring these applications. These charges of HB894 serve as the basis and format for this document, which is the “initial report” described in the bill. The sections within this report describe the scope of Section 3 HB894, including the participatory process used among the workgroup, the selected geospatial data layers, and the development of the interactive online mapping tool.

Recognizing that utility-scale solar development and land use planning is an issue of significant importance to localities, the Commonwealth of Virginia, and landowners, among others, the workgroup members endeavored to go above and beyond the initial charge by developing an interactive online geospatial tool that provides information that can be used by localities (and others) to help inform decision-making related to solar projects. Note that the goal of this resource is to support and inform decision-making, not prescribe outcomes. With the intent of deploying a peer-reviewed product, reviewed by both HB894 Workgroup members as well as representatives from local government, and within an intuitive user interface. The goal is to have the user interface for the geospatial data repository of Virginia prime farmland and related data layers deployed by the end of December 2022. This resource will be known as the Virginia Land and Energy Navigator (VaLEN).

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This project represents the collective effort and input of Virginia's HB894 Workgroup members

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Acknowledgements

Development of the Virginia Land and Energy Navigator would not have been possible without the time, thought, and energy invested by the workgroup members. These members contributed diverse perspectives and expertise through respectful and collaborative conversations in the spirit of developing a holistic and high-quality resource for Virginia.

In addition to the task force members' contributions, the following individuals generously shared their thoughts regarding gaps in existing resources; ongoing interests and needs for decision-support resources; perspectives on what would be helpful to support local government decision-making processes; and indicated a willingness to serve as beta testers for the end product:

Jonathan Belcher, Executive Director/General Counsel, Virginia Coalfield Economic Development Authority; David Blount, Executive Director, Virginia Association of Planning District Commissions; Michelle Edwards, Environmental Programs Manager, Rappahannock-Rapidan Regional Commission; Eldon James, Chapter Administrator, Virginia Chapter of the American Planning Association; Patrick Mauney, Executive Director, Rappahannock-Rapidan Regional Commission; and Scotty Wampler, Executive Director, Cumberland Plateau Planning District Commission. Workgroup members John Harbin and Joe Lerch also contributed their thoughts during the needs-assessment process in the early stages of the project.

Thank you to Dominion Energy for providing project funding, including support for the development and maintenance of the user interface.

Introduction

In 2015, an 80 MW solar project was approved for development in Accomack County, representing one of Virginia’s first utility-scale solar projects.¹ The US Energy Information Administration (EIA) defines “utility scale” as an electric power plant with at least one megawatt of total generating capacity.² According to EIA data, at the end of the third quarter of 2022, Virginia had an aggregate installed capacity of 2,482 MW in utility-scale solar projects, representing an approximately 25% increase from the previous year.³ The Solar Energy Industry Association (SEIA) has identified Virginia as one of the top ten states nationwide based on the total amount of solar installed through June 2022.⁴ It is estimated that through Q3 2022, approximately 91% of the solar installed in Virginia has been developed as utility-scale solar.⁵

In Virginia, current forms of utility-scale solar project development require land areas for siting the solar photovoltaic arrays. The build out of utility-scale solar in Virginia has raised concerns regarding the balancing of renewable energy goals in the context of broader natural resources conservation and economic development interests. The Virginia General Assembly, recognizing the need for data resources to help inform these land-use planning decisions, passed House Bill 894 (HB894) during the 2022 legislative session.⁶ Appendix A includes the text from HB894, where Section 3 tasked Virginia Cooperative Extension to:

- “...develop a map or repository of prime farmland...”

¹ DEQ, 2015. “Small Renewable Energy Project (Solar) Permit by Rule # 2015-S01/RE0000001.” 2015. Virginia Department of Environmental Quality. Accessed November 18, 2022.

<https://www.deq.virginia.gov/home/showpublisheddocument/51110/637487428937570000>

² EIA, 2022. “U.S. Energy Information Administration - EIA - Independent Statistics and Analysis.” 2022. Electricity generation, capacity, and sales in the United States - U.S. Energy Information Administration (EIA). Accessed November 18, 2022. <https://www.eia.gov/energyexplained/electricity/electricity-in-the-us-generation-capacity-and-sales.php>.

³ EIA, n.d. “Electric Power Monthly - U.S. Energy Information Administration (EIA).” n.d. Accessed November 18, 2022. https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_6_02_b

⁴ SEIA, 2022. “Top 10 Solar States.” 2022. Solar Energy Industry Association: SEIA. 2020. Accessed November 18, 2022. <https://www.seia.org/research-resources/top-10-solar-states-0>

⁵ EIA, n.d. “Electric Power Monthly - U.S. Energy Information Administration (EIA).”

⁶ HB894, 2022. “H894, Chapter 488, Virginia Acts of Assembly - 2022 Session.” 2022. Virginia Legislative Information System. Accessed November 18, 2022. <https://lis.virginia.gov/cgi-bin/legp604.exe?221+ful+CHAP0488+pdf>.

- “...in consultation with relevant and necessary state agencies, including the Department of Agriculture and Consumer Services, the Department of Forestry, the Department of Conservation and Recreation, and the Department of Energy...”
- “...identify land with conservation easements or agricultural potential and land that would be more suitable for development with solar energy collection devices or energy storage devices...”
- “...work with Phase I and Phase II Utilities to identify relevant distribution and transmission grid information to further assist localities in siting determinations regarding solar energy collection devices or energy storage devices...”
- “...submit to the Governor and the General Assembly an initial report on the development of a map or repository for prime farmland, as required by the provisions of this enactment, no later than December 1, 2022...”
- “...include recommendations for the appropriate permanent location for such map or repository, methods by which such map or repository can be made available for public use...” (HB894, 2022)

These charges of HB894 serve as the basis and format for this document, which is the “initial report” described in the bill. The sections within this report describe the scope of Section 3 HB894, the participatory process used among the workgroup, the selected geospatial data layers, and the development of the interactive online mapping tool.

Recognizing that utility-scale solar development and land-use planning is an issue of significant importance to localities, the Commonwealth of Virginia, landowners, and others, the workgroup members endeavored to go above and beyond the initial charge by developing an interactive online geospatial tool that provides information that can be used by localities (and others) to help inform decision-making related to solar projects. Note that the goal of this resource is to support and inform decision-making, not prescribe outcomes. With the intent of deploying a peer reviewed product, reviewed by both HB894 Workgroup members as well as representatives from local government, and within an intuitive user interface with similar functionality to that of the Commonwealth Connection (<https://commonwealth-connection.com>) resource recently released by the Virginia Tech Center for Geospatial Information Technology. With funding secured, the goal is to have this user interface for the geospatial data repository of Virginia prime farmland

and related data layers deployed by the end of December 2022. This resource will be known as the Virginia Land and Energy Navigator (VaLEN). Despite its many advantages, please note that VaLEN is not intended to serve as a “one-stop-shop” siting tool and that proposed solar projects will still need to undergo environmental review as determined by the Virginia Department of Environmental Quality (DEQ).

Process

Given that a significant amount of publicly available GIS data already exists that can be used to support land-use decision-making, project leaders first desired to learn more about needs at the local level. Key informant interviews were conducted with eight members of local government across the state. These individuals included those working in county economic development, land-use planning, and county associations, and ranged from rural to semi-urban localities. Questions posed to interviewees sought input into existing resource gaps, what resources localities currently draw upon when making land-use decisions, and what project outcome(s) would be most useful, among others. Conversations with these stakeholders revealed an interest in providing localities with as much information as possible to support their decision-making processes, with a preference for a user-friendly and intuitive resource for browsing relevant GIS layers. Conversations also indicated that local government GIS capacity varies significantly across the state, and that users will bring different perspectives to how they use the resource and interpret the information.

In addition, project leaders desired to build a diverse workgroup that included agency and industry partners referenced in the legislation as well as GIS experts from state and federal agencies, non-profit organizations, and others with resources and expertise that could be incorporated into the mapping tool. An introductory workgroup meeting was held in-person in Richmond, VA on July 6, 2022 to review the charge, share project aspirations, review existing resources and efforts, and form a subcommittee that would tackle the “heavy lifting”.

Three subcommittee meetings were held virtually on August 3, 18, and September 9. Each meeting consisted of robust technical discussions, including considerable conversation regarding the definition(s) of prime farmland and the appropriate level of detail and specificity for a mapping resource. The August 18 and September 9 subcommittee meetings consisted primarily of technical conversations aimed at further refining the important layers to include in the mapping resource. Workgroup members ultimately determined that a resource offering the capability for localities to overlay a variety of layers such as prime farmland, protected areas, electric transmission lines, brownfields, and so forth, based on their objectives, would allow users the most flexibility and opportunity for exploring siting alternatives and conservation

considerations. The layers and accompanying thought process were presented to the full workgroup at an in-person meeting in Richmond on September 30. Following a thorough discussion, the approach was adopted and the discussion transitioned to the matter of the user interface. An update was provided to the joint House and Senate Agriculture and Natural Resources Committee meeting at Graves Mountain Lodge on October 4.

In total, two full in-person workgroup meetings and three (virtual) subcommittee meetings were conducted through mid-November 2022. To facilitate information sharing and communications outside of organized meetings, a Microsoft Teams site was established to host presentations, resources, meeting agendas, and other materials. Group members also engaged regularly in conversation through e-mail. An additional full workgroup meeting is scheduled for December 5, 2022 to review the draft user interface, after which the final draft of VaLEN will be beta tested by members of the target audience before being released for public use.

Geospatial Data Layers

This section describes the geospatial data layers that were selected through the iterative and participatory discussions among members of the HB894 Workgroup. Workgroup members chose 14 data layers to include in the project. This was subsequently reduced to ten data layers to reduce redundancy and improve the VaLEN user experience. Each of the layers is described in more detail below. Table 1 provides a summary description of each layer for quick reference. In most cases, the descriptions of the existing data layer sources are copied directly from the metadata of the parent data source or from agency descriptions, with accompanying citations. Any modifications, or adaptations, to a specific data layer related to the HB894 Workgroup are also noted. Additional figures describing the summary layer information are included in Appendix B. The data layers listed are to be viewable within the geospatial user interface currently under development. Additionally, many of the geospatial layers listed below can be incorporated with other spatial layers of interest to an end user using geographic information system analysis software.

Primary Geospatial Data Layer

The HB894 Workgroup was specifically tasked with developing a map, or repository, of prime farmland in Virginia. The “Farmland Classification” layer, described below, is provided as the source for this specific information.

Farmland Classification

The HB 894 Workgroup was tasked with developing a map or repository of prime farmland in Virginia as defined in §3.2-205 of the *Code of Virginia*.⁷ This section defines "prime farmland" as:

“...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

⁷ Code of Virginia, 2008. “§ 3.2-205. Characteristics to be considered in evaluating impacts on farm and forest lands.” 2008. Code of Virginia. Accessed November 18, 2022. <https://law.lis.virginia.gov/vacode/3.2-205/>

or committed to urban development or water storage...” (*Code of Virginia* §3.2-205 Part C, 2008).

At the federal level, “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). It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding...”⁸ (*Code of Federal Regulations* 7 CFR §657.5(a)(1), 1978)

Additional details and more documentation describing these definitions is included in Appendix C. Appendix D includes a copy of §3.2-205 from the *Code of Virginia* which describes prime farmland based on Virginia policy. Appendix E includes 7 CFR §657.5(a) from the *Code of Federal Regulations* which describes prime farmland based on federal policy. As described in Appendix E, the federal definition also includes specific qualitative and quantitative criteria to describe the soil properties associated with the prime farmland designation.

Given the similarity in the narrative descriptions of “prime farmland” in the §3.2-205 of the *Code of Virginia* and the *Code of Federal Regulations* 7 CFR §657.5(a) the HB 894 Workgroup members determined that the definitions were comparable. This determination enabled the incorporation of the data-rich, and existing, geospatial datasets developed by the Natural Resources Conservation Service (NRCS) of the United States Department of Agriculture.

Section 7 CFR 601.1(f)(1)(ii) tasks NRCS with conducting:

“Soil surveys that provide the public with local information on the uses and capabilities of their soil resource. Soil surveys are based on scientific analysis and classification of the soils and are used to determine land capabilities and conservation treatment needs. Surveys are conducted cooperatively with other Federal agencies, land grant universities,

⁸ CFR, 1978. “7 CFR §657.5 Identification of important farmlands. (a) Prime farmlands (1) General.” 1978. Code of Federal Regulations. Accessed November 18, 2022. [https://www.ecfr.gov/current/title-7/subtitle-B/chapter-VI/subchapter-F/part-657/subpart-A/section-657.5#p-657.5\(a\)\(1\)](https://www.ecfr.gov/current/title-7/subtitle-B/chapter-VI/subchapter-F/part-657/subpart-A/section-657.5#p-657.5(a)(1))

State agencies, and local units of government...”.⁹ (*Code of Federal Regulations* 7 CFR 601.1(f)(1)(ii), 2000)

This geospatial data layer was derived from the USDA-NRCS-Soil Survey Geographic Database (SSURGO). The data layer derived for the HB894 Workgroup is based on the “all areas prime” polygons from the SSURGO Farmland Classification layer.¹⁰ The NRCS official soil survey database is updated annually.¹¹

Please note that, while soil quality is an important factor in growing agricultural commodities, high value economically important crops are also grown on soils that are not considered prime. Stated another way, soils that do not meet the definition of “prime” but, despite being “non-prime” by definition, may in fact be great for growing a particular crop or provide high-value ecosystem services with a high amount of soils management. Viewing the prime farmland layer in conjunction with other data layers will provide a more complete picture of a locality’s agriculture and forestry resources.

Other Important Geospatial Data Layers to Support Decision-making Efforts

In addition to the task of developing a map of prime farmland in Virginia, the HB894 Workgroup was also charged with identifying: land with conservation easements, land that would be more suitable for development with solar energy or energy storage devices, and relevant distribution and transmission grid information to further assist localities in siting determinations regarding solar energy or energy storage devices. The spatial layers described below are provided to help inform these additional aspects of the process.

⁹ CFR, 2000. “7 CFR §601.1(f)(1)(ii) Functions Assigned.” 2000. Code of Federal Regulations. Accessed November 18, 2022. [https://www.ecfr.gov/current/title-7/subtitle-B/chapter-VI/subchapter-A/part-601/section-601.1#p-601.1\(f\)\(1\)\(ii\)](https://www.ecfr.gov/current/title-7/subtitle-B/chapter-VI/subchapter-A/part-601/section-601.1#p-601.1(f)(1)(ii))

¹⁰ NRCS, 2022a. “SSURGO: Soil Survey Geographic Database Soil Survey.” 2022. Natural Resources Conservation Service, United States Department of Agriculture. Accessed November 10, 2022. <https://sdmdataaccess.sc.egov.usda.gov>.

¹¹ NRCS, 2022b. “Web Soil Survey: Frequently Asked Questions.” 2022. Natural Resources Conservation Service, United States Department of Agriculture. Accessed November 10, 2022. <https://www.nrcs.usda.gov/sites/default/files/2022-09/WSS-Frequently-Asked-Questions.pdf>.

Brownfields

The Virginia Department of Environmental Quality (DEQ) maintains a geospatial layer describing brownfield sites across Virginia. The DEQ describes brownfields as:

“...properties in which redevelopment or reuse is complicated by the presence of hazardous materials, pollution or contaminants. Cleaning up and reinvesting in these properties utilizes existing infrastructure, reduces development of undisturbed open land, facilitates job growth, increases local tax bases and both improves community aesthetics while protecting the environment. DEQ works closely with property owners to turn these contaminated properties back to productive use across Virginia. Using innovative approaches to resolving problems, the agency works to safely clean up, transform and sustainably reuse these underutilized properties.”¹² (Virginia Brownfields Information, n.d.)

Conservation Lands and Easements

The Virginia Department of Conservation and Recreation (DCR) provides statewide GIS coverage of Conservation Lands and Easements in Virginia to serve as a land conservation planning tool. “This dataset contains the boundaries for lands of conservation and recreational interest in Virginia... Historic easements are held by the Virginia Board of Historic Resources and administered by the Virginia department of Historic Resources.”¹³ For the scope of the HB894 Workgroup, guidance was provided by DCR agency members to adapt this DCR Conservation Lands and Easements data layer to include permanently protected areas only. Updates to the Conservation Lands and Easements data are released to the public quarterly.

Cropland Data Layer

The USDA describes the Cropland Data Layer (CDL) as a raster, geo-referenced, crop-specific land cover data layer. “The purpose of the CDL Program is to use satellite imagery to: provide

¹² DEQ, n.d.. “Virginia Brownfields Information.” n.d. Virginia Department of Environmental Quality. Accessed November 10, 2022. <https://www.arcgis.com/apps/dashboards/c64d99e227ff42d895d7d5b7d63bd437>.

¹³ DCR, 2022. “Conservation Lands Database.” 2022. Virginia Department of Conservation and Recreation. Accessed November 10, 2022. <https://www.dcr.virginia.gov/natural-heritage/document/conslands.pdf>.

planted acreage estimates to the Agricultural Statistics Board for the state's major commodities, and produce digital, crop-specific, categorized geo-referenced output products.”¹⁴

The 2021 Virginia CDL contained approximately 60 crop-specific agricultural classes (i.e., barley, pumpkins, strawberries, cotton, etc.). For the purposes of the HB894 Workgroup, the original Virginia CDL was reclassified into one of eight aggregate classes, as either: agricultural crop, grassland (e.g., pasture, hay), forest, shrubland/barren, water, wetland, aquaculture, or developed. The CDL has a resolution of 30 meters and no farmer reported data is derivable from this layer. The metadata describing this layer indicates that:

“The CDL is produced using satellite imagery from the Landsat 8 OLI/TIRS sensor, the ISRO ResourceSat-2 LISS-3, and the ESA SENTINEL-2 sensors collected during the current growing season. Some CDL states used additional satellite imagery and ancillary inputs to supplement and improve the classification. These additional sources can include the United States Geological Survey (USGS) National Elevation Dataset (NED) and the imperviousness data layer from the USGS National Land Cover Database 2019 (NLCD 2019) and the tree canopy data layer from the NLCD 2016.”¹⁵ (Virginia CDL Metadata USDA, 2022b)

The strength and emphasis of the CDL is the agricultural land cover information it provides. The CDL is updated annually.

Development Vulnerability Threat

The Virginia Department of Conservation and Recreation created a Development Vulnerability Model with the purpose:

“...to quantify the risk of conversion from greenspace (natural, rural, or other open space lands) to urbanized or other built-up land uses. The model output is a raster dataset in which the relative vulnerability of lands ranges from 0 (least vulnerable) to 100 (most vulnerable). Vulnerability values are not probabilities, but should be interpreted as a relative measure of development potential.”¹⁶ (Hazler and Bucklin, 2022, i)

¹⁴ USDA, 2022a. “Cropland Data Layer.” 2022. National Agricultural Statistics Service and Agricultural Research Service, United States Department of Agriculture. Accessed November 18, 2022. https://www.nass.usda.gov/Research_and_Science/Cropland/sarsfaqs2.php.

¹⁵ USDA, 2022b. “Virginia Cropland Data Layer, Metadata.” 2022. National Agricultural Statistics Service and Agricultural Research Service, United States Department of Agriculture. Accessed November 18, 2022. https://www.nass.usda.gov/Research_and_Science/Cropland/metadata/metadata_va21.htm.

¹⁶ Hazler, K.R. and D. N. Bucklin. 2022. “Virginia ConservationVision Development Vulnerability Model, 2022 Edition. Natural Heritage Technical Report 22-13.” Virginia Department of Conservation and Recreation, Division

The Development Vulnerability Threat layer was most recently updated in June 2022, and is periodically updated.

Electric Transmission Lines and Substations

This feature class is from the Homeland Infrastructure Foundation Level Database (HIFLD) and represents electric power transmission lines and substations. In the HIFLD database, these layers are described as follows:

Substations:

“...substations are considered facilities and equipment that switch, transform, or regulate electric power at voltages equal to, or greater than, 69 kilovolts. Substations with a maximum operating voltage less than 69 kilovolts may be included, depending on the availability of authoritative sources, but coverage of these features should not be considered complete.”¹⁷ (Electric Substations HIFLD, 2022)

Transmission Lines:

“...the system of structures, wires, insulators and associated hardware that carry electric energy from one point to another in an electric power system. Lines are operated at relatively high voltages varying from 69 kV up to 765 kV, and are capable of transmitting large quantities of electricity over long distances. Underground transmission lines are included where sources were available.”¹⁸ (Electric Transmission Lines HIFLD, 2022)

These data layers were last updated April 2022. Please note that while VaLEN includes publicly available data layers showing electric transmission line and substation information, Virginia Cooperative Extension was unable to obtain distribution line data. Localities are encouraged to contact relevant electric utilities during the comprehensive planning process to access data about the location of distribution lines or future routes for transmission lines.

Forest Conservation Value Model

The Virginia Department of Forestry (DOF) describes the Forest Conservation Value (FCV) model as a tool to:

of Natural Heritage, Richmond, Virginia. Accessed November 18, 2022. <https://www.dcr.virginia.gov/natural-heritage/document/vulmodtechrep2022.pdf>

¹⁷ HIFLD, 2022a. “Electric Substations.” 2022. Homeland Infrastructure Foundation Level Database, HIFLD-GeoPlatform. Accessed November 18, 2022. <https://hifld-geoplatform.opendata.arcgis.com/datasets/geoplatform::electric-substations/about>.

¹⁸ HIFLD, 2022b. “Electric Transmission Lines.” 2022. Homeland Infrastructure Foundation Level Database, HIFLD-GeoPlatform. Accessed November 18, 2022. <https://hifld-geoplatform.opendata.arcgis.com/datasets/geoplatform::electric-power-transmission-lines/about>.

“...strategically identify the highest priority forestland for conservation in Virginia. The intent is to maximize the efficiency of limited resources by focusing conservation efforts on the highest quality, most productive, and most vulnerable forestland statewide.... Model components include: Forested Blocks, Forest Management Potential, Connectivity, Watershed Integrity, Threat of Conversion, Significant Forest Communities and Diminished Tree Species. Six data input layers were created based on these components and were ultimately combined to create the final FCV model. The 2020 FCV model evaluates these criteria to prioritize the highest value forestlands for conservation. The model ranks all forestland in Virginia from 1 (lowest) to 5 (highest) FCV.”¹⁹ (Biasioli et al., 2020)

For the scope of the HB894 Workgroup, guidance was provided by DOF agency members to adapt the 2020 FCV by removing the “Threat of Conversion” (i.e., development vulnerability) component of the layer. The resulting modified layer better represents the overall values and benefits provided by forests and provides better guidance on where to avoid forest conversion, as opposed to where to prioritize forest conservation efforts.

Mine Lands

The Virginia Department of Energy maintains a geospatial layer which describes areas impacted by mining in Virginia. The map is updated quarterly as new sites are added. This data layer includes all commodities and mine types.²⁰

Productivity, Versatility and Resiliency - “Virginia’s Best Land”

In 2020, American Farmland Trust (AFT) released the *Farms Under Threat: The State of the States* report which uses productivity, versatility and resiliency (PVR) data in portions of the analysis. The AFT-PVR analysis:

“...was designed to identify the agricultural lands best suited for intensive cultivation, with a focus on production of human-edible food crops... The PVR consists of a detailed spatial dataset representing soil productivity and capacity, land cover and use, food production for direct human consumption, production limitations, and length of growing season. The PVR model combined these datasets using weights elicited from a group of national agricultural experts. The higher the PVR value, the more productive, versatile, and resilient the land is for long-term cultivation. These values were then used to identify

¹⁹ Biasioli, K., J. Pugh, and M. Santucci.” 2020. “Forest Conservation Value Model, 2020 Edition” Virginia Department of Forestry. Accessed November 18, 2022.

<https://vdof.maps.arcgis.com/sharing/rest/content/items/aadd4fb1719e4d74af381fa3b342a92e/data>

²⁰ VADOE, 2021. “Virginia Mined Land.” 2021. Virginia Department of Energy. Accessed November 18, 2022. <https://vadmme.maps.arcgis.com/home/item.html?id=7e31173f198140deb8442a4041de607f#overview>

two important land classifications: Nationally Significant agricultural land, which is the land best-suited to long-term, intensive crop production within the contiguous United States; and each state’s “best land,” which is approximately the better half of all agricultural land in each state.”²¹ (AFT, 2020)

AFT identified the “best land” in each state by mapping the agricultural lands with PVR values above the state median. In Virginia, land with a PVR value greater than 0.33 received this “best land” classification.²² The AFT “Virginia Best Land” layer, which for Virginia also includes Nationally Significant agricultural lands, was chosen for inclusion with the VaLEN project. Additional guidance was provided by AFT members for using their 30-meter resolution PVR data layer for the scope of the HB894 Workgroup application.²³

Virginia Natural Landscape Assessment Ecological Cores

The Virginia Department of Conservation and Recreation (DCR) provides the Virginia Natural Landscape Assessment (VaNLA). The VaNLA is described as a landscape-scale geospatial analysis for identifying, prioritizing, and linking important lands to form natural land networks throughout Virginia.²⁴ Using land cover data derived from satellite imagery, the VaNLA identified large, unfragmented cores, which are patches of natural land with at least 100 acres of interior cover. Cores provide habitat for a wide range of species, from interior-dependent forest species to habitat generalists, as well as for species that utilize marsh and maritime habitats. The cores layer represents polygons that are symbolized by Ecological Integrity scores, calculated from an Ecological Composite Model. Within the VaNLA, this is described as:

“Maintaining vital natural landscapes is essential for basic ecosystem services such as cleaning our air and filtering our water. Natural lands also harbor thousands of species of animals and plants and contain libraries of genetic information from which we derive new foods, materials, and medicinal compounds. These parts of the landscape also provide us with recreational opportunities and open space resources. But these qualities

²¹ AFT, 2020. “Productivity, Versatility, and Resiliency (PVR) Analysis.” 2020. Farms Under Threat: The State of the States, American Farmland Trust. Accessed November 18, 2022. https://farmlandinfo.org/wp-content/uploads/sites/2/2020/05/AFT_FUT_PVR_Fact_Sheet.pdf

²² CSP, 2020. “Final Technical Report.” 2020. Description of the approach, data, and analytical methods used for the Farms Under Threat: State of the States project, version 2.0. Conservation Sciences Partners, Inc. Accessed November 18, 2022. https://farmlandinfo.org/wp-content/uploads/sites/2/2021/06/AFT_CSP_FUT_Technical_Doc_2020.pdf

²³ Freedgood, J., M. Hunter, J. Dempsey, A. Sorensen. 2020. “Farms Under Threat: The State of the States.” Washington, DC: American Farmland Trust. Accessed November 18, 2022. https://farmlandinfo.org/wp-content/uploads/sites/2/2020/09/AFT_FUT_StateoftheStates_rev.pdf

²⁴ DCR, 2017. “Virginia Natural Landscape Assessment.” 2017. Virginia Department of Conservation and Recreation. Accessed November 18, 2022. <https://www.dcr.virginia.gov/natural-heritage/vaconvsnla#dd>

are represented differently across the cores and habitat fragments that constitute the natural landscape. To assess their unique values, each core and habitat fragment has been assigned an Ecological Integrity score that rates the relative contribution of that area to ecosystem services.”²⁵ (DCR, 2017)

Including ecosystem services, such as: wildlife and plant habitat, biodiversity conservation, open space, recreation, water resources protection, erosion control, sediment retention, protection from storm and flood damage, crop pollination, and carbon sequestration. “In general, larger, more biologically diverse areas are given higher scores. Scores are enhanced if the core or habitat fragment is part of a larger complex of natural lands. Scores also are increased for those cores and habitat fragments that contribute to water quality enhancement.”²⁶ The ecological cores of the VaNLA were updated in 2017 using the 2011 NLCD.²⁷

²⁵ Ibid

²⁶ Ibid

²⁷ Ibid

Table 1: Description of the Selected Geospatial Data Layers

Title	Source	Updates	Data Source
<i>Primary Geospatial Data Layer</i>			
Farmland Classification	USDA NRCS	7/22; Annually	https://www.nrcs.usda.gov/resources/data-and-reports/soil-survey-geographic-database-ssurgo
<i>Other Important Geospatial Data Layers to Support Decision-making Efforts</i>			
Brownfields	VA DEQ	Varies	https://www.arcgis.com/apps/dashboards/c64d99e227ff42d895d7d5b7d63bd437
Conservation Lands and Easements	VA DCR	10/22; Quarterly	https://www.dcr.virginia.gov/natural-heritage/cldownload
Cropland Data Layer	USDA NASS	2/22; Annually	https://croplandcros.scinet.usda.gov/
Development Vulnerability Threat	VA DCR	6/22; Varies	https://www.dcr.virginia.gov/natural-heritage/vaconvisvulnerable

Electric Substations and Electric Transmission Lines	DHS	4/22; Varies	https://hifld-geoplatform.opendata.arcgis.com/datasets/geoplatform::electric-substations/about https://hifld-geoplatform.opendata.arcgis.com/datasets/geoplatform::electric-power-transmission-lines/about
Forest Conservation Value Model	VA DOF	2020; Varies	https://vdof.maps.arcgis.com/sharing/rest/content/items/aadd4fb1719e4d74af381fa3b342a92e/data
Mine Lands	VA DOE	2021; Quarterly	https://vadmme.maps.arcgis.com/home/item.html?id=7e31173f198140deb8442a4041de607f#overview
Productivity, Versatility and Resiliency – “Virginia Best Land”	AFT	2020	https://csp-fut.appspot.com/
Virginia Natural Landscape Assessment Ecological Cores	VA DCR	2017; Varies	https://www.dcr.virginia.gov/natural-heritage/vaconvisvnl

Mapping Tool / User Interface

The Center for Geospatial Information Technology at Virginia Tech (CGIT) is currently developing the user interface that will allow localities to efficiently and intuitively access the GIS layers described in this report to support their decision-making efforts. This tool will be called the “Virginia Land and Energy Navigator”, or “VaLEN”, and will be hosted for public use on the Virginia Cooperative Extension (VCE) public website.

Through the VaLEN interface users will have the ability to:

- Interact with multiple data layers, some queryable, to show opportunities and/or possible restrictions for consideration when siting future energy generation or energy storage facilities.
- Search the map by address, jurisdiction, and other identified boundaries of interest such as tribal boundaries or legislative districts.
- Access descriptive information for each geospatial data layer.
- Access descriptive information regarding the scope of HB 894 and the associated charge of its workgroup.
- Access descriptive information about all involved organizations and sponsors.

The Virginia Land and Energy Navigator is scheduled to be released in late-December 2022 for public use and will have iterative improvements in functionality based on user and workgroup feedback through June 2023. Appendix F provides a screenshot of the current draft format of the VaLEN interface. Technical support at CGIT will ensure that all functionality of the tool is operational through June 30, 2027, at which point the responsibility for future maintenance will be contingent on continuation of funding.

Conclusion

Since 2015 utility-scale solar project development has increased across Virginia, with much more development of renewable solar energy and energy storage anticipated in the coming years. To date, 91% of solar development in Virginia has been in the form of utility-scale solar. The build out of utility-scale solar in Virginia has raised concerns regarding the balancing of renewable energy goals in the context of broader natural resources conservation and economic development interests. The Virginia General Assembly recognized the need for data resources to help inform these land-use planning decisions through HB894. Together, HB894 Workgroup members collaborated to understand the complete scope of the planned work activities, then to: propose, discuss, consider, reflect and revise the pertinent data sources to incorporate; refine the selection of the geospatial data layers, and; seek end-user feedback to inform the development of an interactive online mapping tool that is both fit for purpose and tailored to the needs of Virginians exploring these applications.

In addition to providing a map of prime farmland, the product identifies land with conservation easements, includes electrical grid information, among other informational resources both stipulated in HB894, and also more broadly related to aspects of energy infrastructure siting and environmental conservation considerations across Virginia. Despite its many advantages, please note that VaLEN is not intended to serve as a “one-stop-shop” siting tool and that proposed solar projects will still need to undergo environmental review as determined by the Virginia Department of Environmental Quality (DEQ).

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Appendices

Appendix A: Virginia Acts of Assembly - 2022 Session Chapter 488 H894

Appendix B: Geospatial Data Layers

Appendix C: Prime Farmland Definitions

Appendix D: §3.2-205 of the Code of Virginia Characteristics to be considered in evaluating impacts on farm and forest lands.

Appendix E: Code of Federal Regulations 7 CFR §657.5(a) Identification of important farmlands - Prime farmlands

Appendix F: Snapshot of VaLEN User Interface

Appendix A

Virginia Acts of Assembly - 2022 Session Chapter 488 H894

VIRGINIA ACTS OF ASSEMBLY -- 2022 SESSION

CHAPTER 488

An Act to direct the Department of Energy to study the development of advanced small modular reactors in the Commonwealth and consider minimizing impacts on prime farmland a key priority in completing its Virginia Energy Plan, to direct the Virginia Cooperative Extension to create a map or repository of prime farmland in the Commonwealth, and to direct the State Corporation Commission to develop a program to encourage and expedite infrastructure investments by investor-owned electric utilities in certain industrial sites.

[H 894]

Approved April 11, 2022

Be it enacted by the General Assembly of Virginia:

1. *§ 1. The Department of Energy, in cooperation with the Virginia Nuclear Energy Consortium Authority, shall convene a stakeholder work group to identify strategies and any needed public policies, including statutory or regulatory changes, for promoting the development of advanced small modular reactors in the Commonwealth.*

§ 2. The Department of Energy shall consider the economic development of rural Virginia while minimizing the impact on prime farmland, as defined in § 3.2-205 of the Code of Virginia, a key priority in completing its update to the Virginia Energy Plan scheduled for 2022.

§ 3. The Virginia Cooperative Extension shall work to develop a map or repository of prime farmland and in doing so shall consult with relevant and necessary state agencies, including the Department of Agriculture and Consumer Services, the Department of Forestry, the Department of Conservation and Recreation, and the Department of Energy. Such agencies shall provide assistance, including access to relevant data or information for purposes of developing a map or repository of prime farmland, as defined in § 3.2-205 of the Code of Virginia, to the Virginia Cooperative Extension upon request. The Virginia Cooperative Extension may enter into agreements with private nonprofit groups for the purpose of gathering additional data to identify land with conservation easements or agricultural potential and land that would be more suitable for development with solar energy collection devices or energy storage devices. The Virginia Cooperative Extension may work with Phase I and Phase II Utilities to identify relevant distribution and transmission grid information to further assist localities in siting determinations regarding solar energy collection devices or energy storage devices. Such electric distribution and transmission grid information shall not be subject to the disclosure requirements of the Virginia Freedom of Information Act (§ 2.2-3700 et seq. of the Code of Virginia). The Virginia Cooperative Extension shall submit to the Governor and the General Assembly an initial report on the development of a map or repository for prime farmland, as required by the provisions of this enactment, no later than December 1, 2022. Such report shall include recommendations for the appropriate permanent location for such map or repository, methods by which such map or repository can be made available for public use, and the estimated initial and ongoing costs to be incurred in maintaining such map or repository. The development of the report and recommendations by the Virginia Cooperative Extension shall be funded either privately or through appropriations designated for specified activities required by this enactment.

§ 4. That, in furtherance of economic development in the Commonwealth, the State Corporation Commission (the Commission) shall develop a program to encourage and expedite infrastructure investments by a Phase I Utility or Phase II Utility, as those terms are defined in subdivision A 1 of § 56-585.1 of the Code of Virginia, in industrial sites determined to be relevant and in high demand by the Virginia Economic Development Partnership (VEDP). In developing such program, the Commission may consider best practices in key competitor states, as identified by VEDP. The Commission shall also consider, but is not limited by, the provisions of the existing pilot program established in § 56-585.1:10 of the Code of Virginia. The Commission shall consult with VEDP, local economic development officials, affected utilities, and other stakeholders as it deems appropriate. The Commission shall implement such program no later than December 1, 2022, and shall submit a report by December 15, 2022, to the Governor and the General Assembly of any recommendations identified for legislative changes in furtherance of encouraging and expediting investments in industrial site utility infrastructure. Additionally and separately, VEDP shall review and determine whether barriers currently exist for development of infrastructure and supply chain investments in Southside and Southwest Virginia. VEDP shall also review incentives that the Commonwealth and its localities should utilize or develop to retain economic development and promote new infrastructure and supply chain investments in Southside and Southwest Virginia and in other areas of the Commonwealth. VEDP shall submit a report of its review no later than December 1, 2022, to the Governor and the General Assembly of any findings and recommendations related to promoting infrastructure and supply chain investments within the

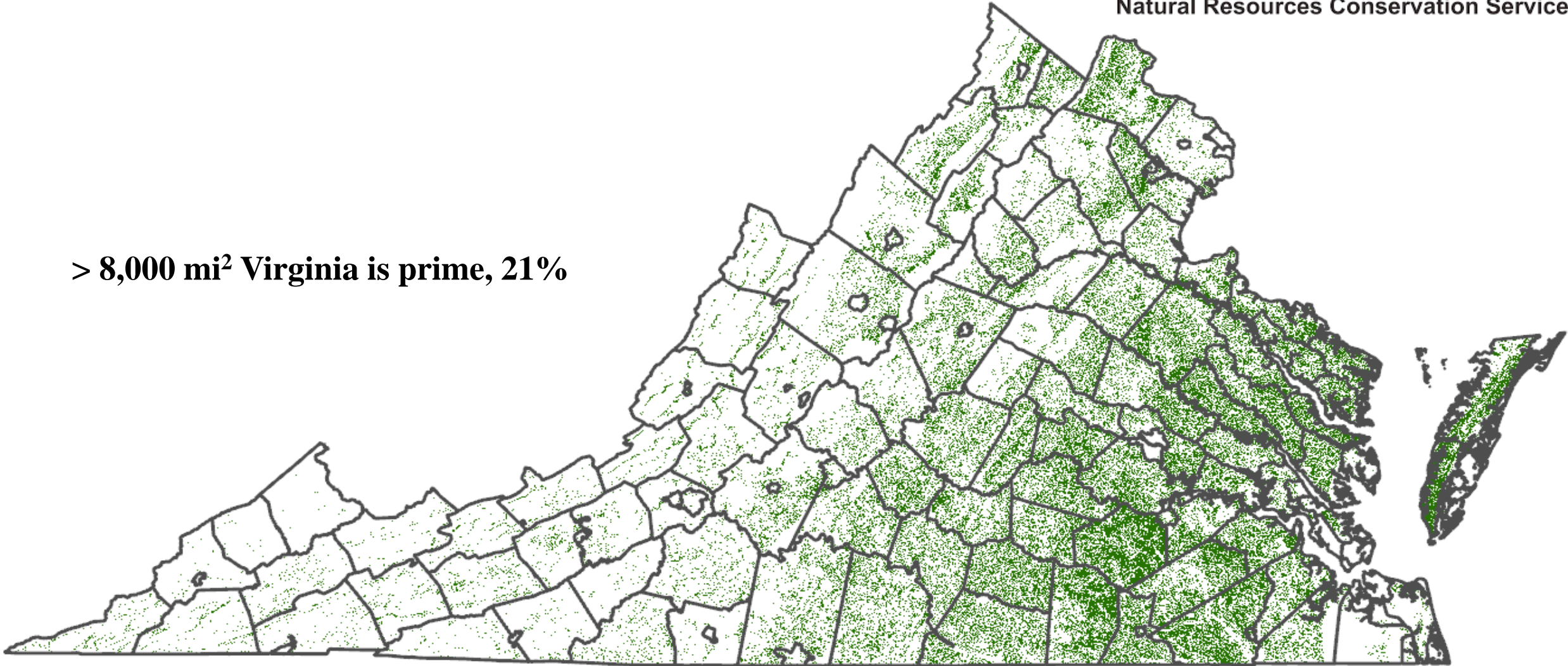
Commonwealth and supporting economic development generally.

Appendix B

Geospatial Data Layers

NRCS farmland classification “All areas prime”

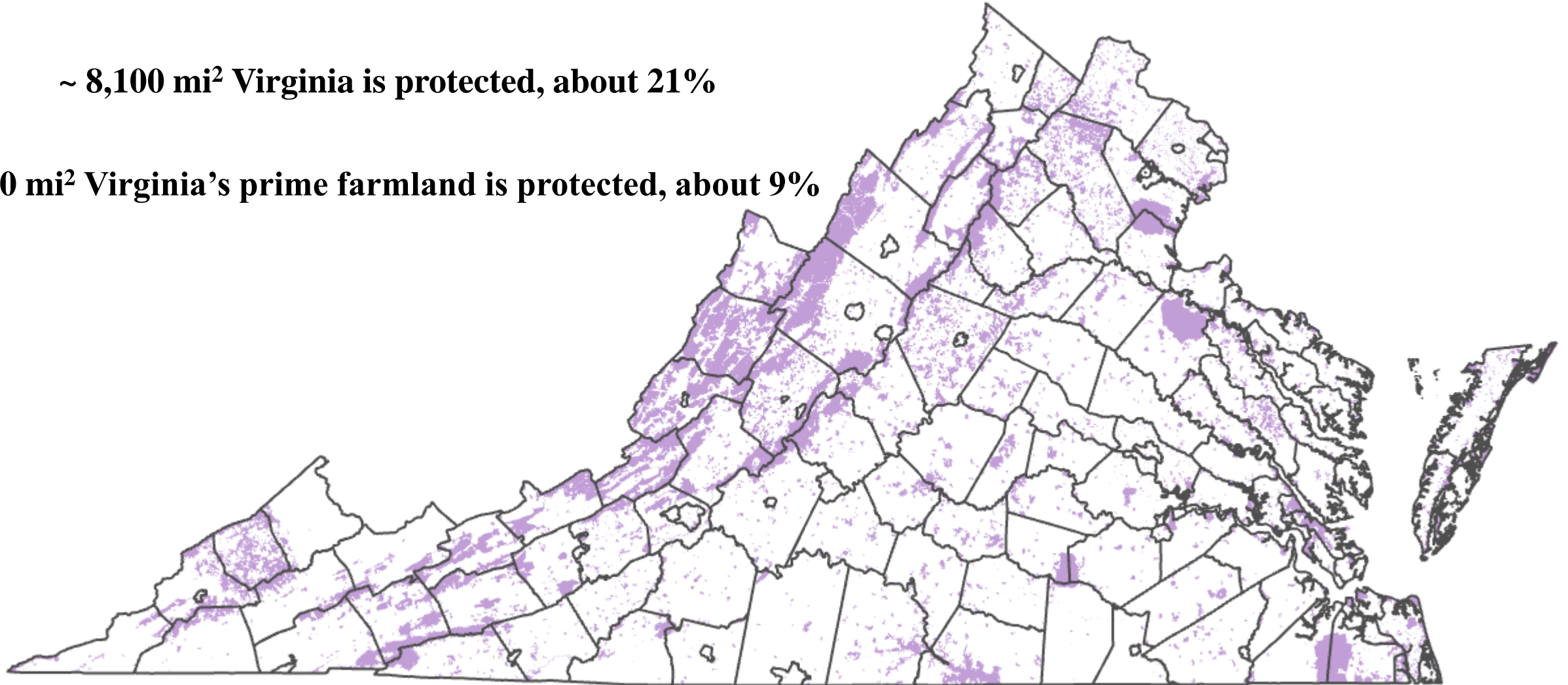
> 8,000 mi² Virginia is prime, 21%



DCR Conservation lands and Easements

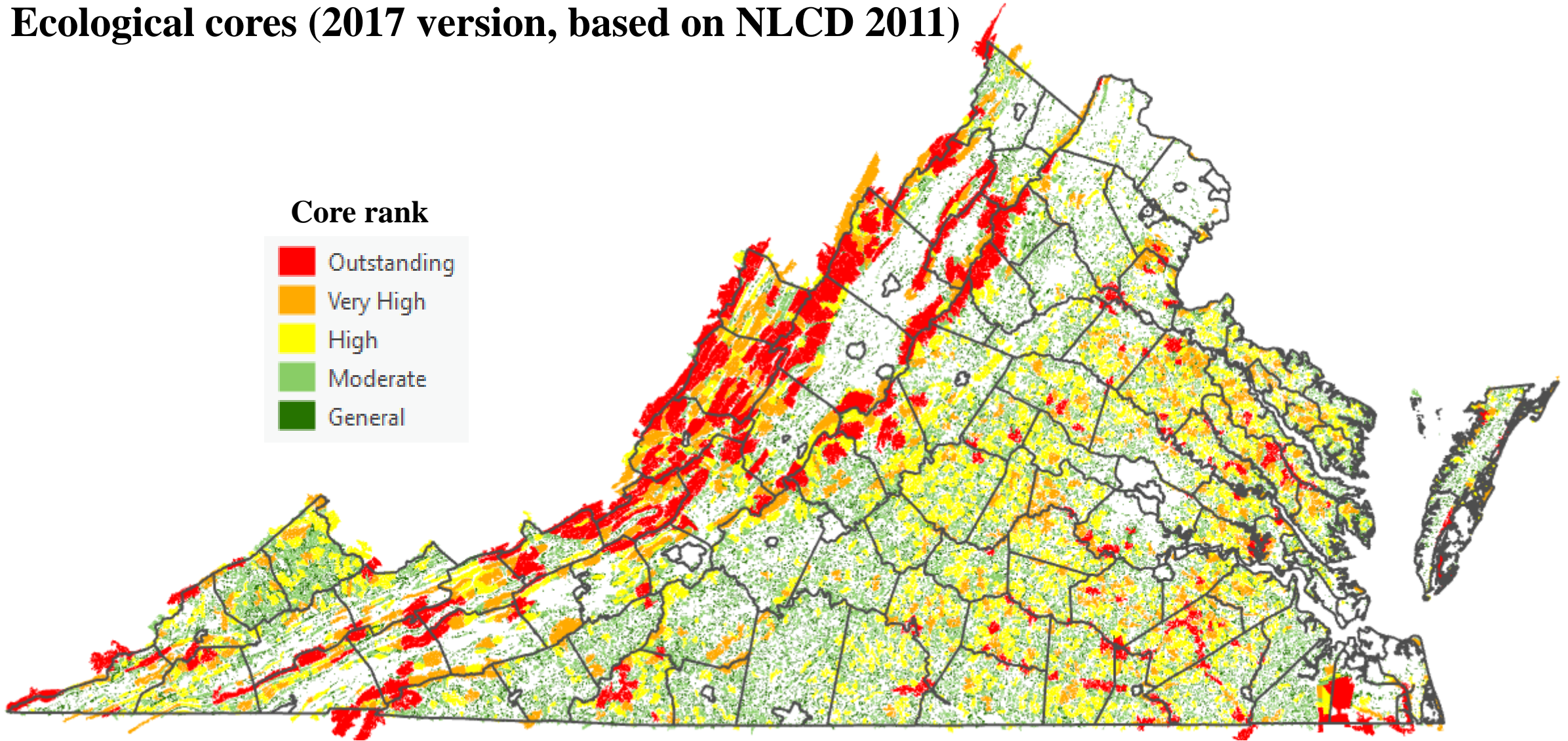
~ 8,100 mi² Virginia is protected, about 21%

730 mi² Virginia's prime farmland is protected, about 9%



DCR Virginia Natural Landscape Assessment

Ecological cores (2017 version, based on NLCD 2011)

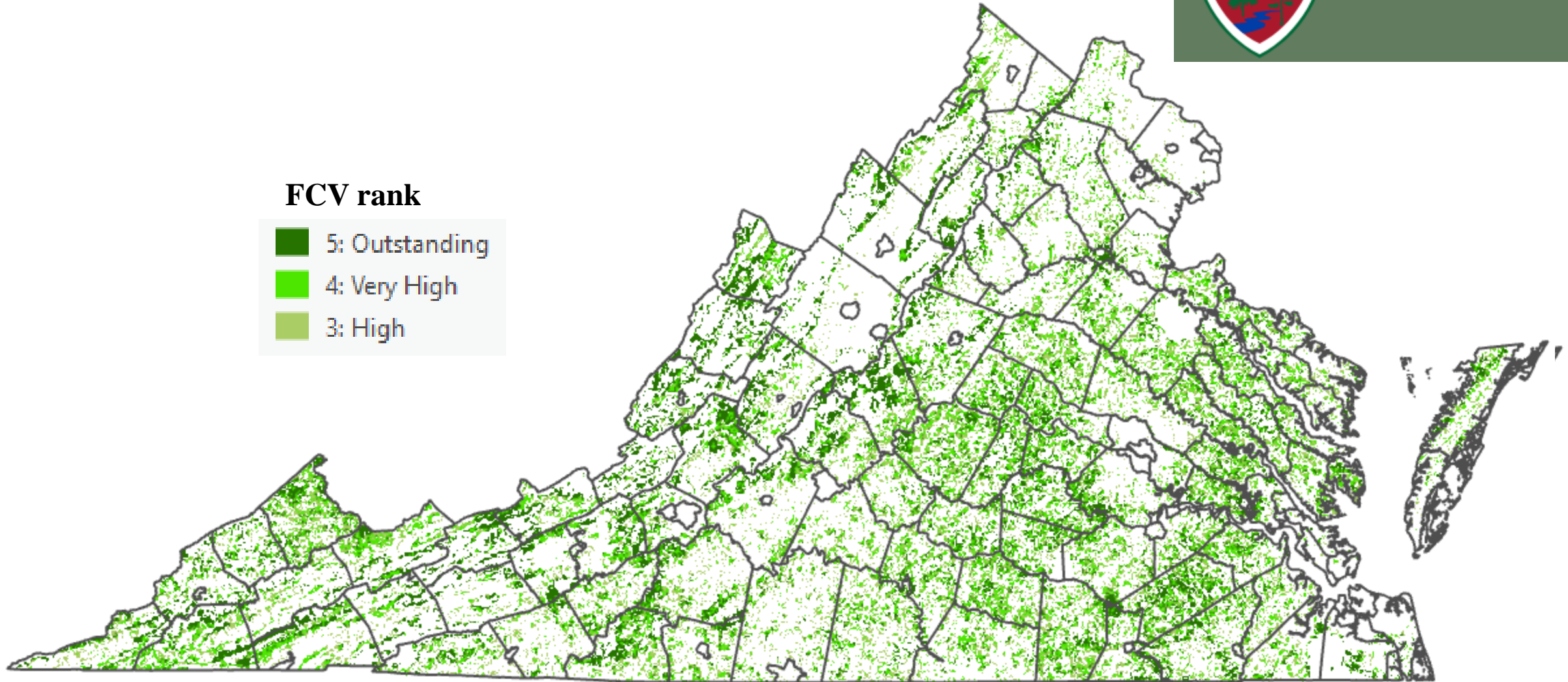


DoF Forest Conservation Value Model (2020)



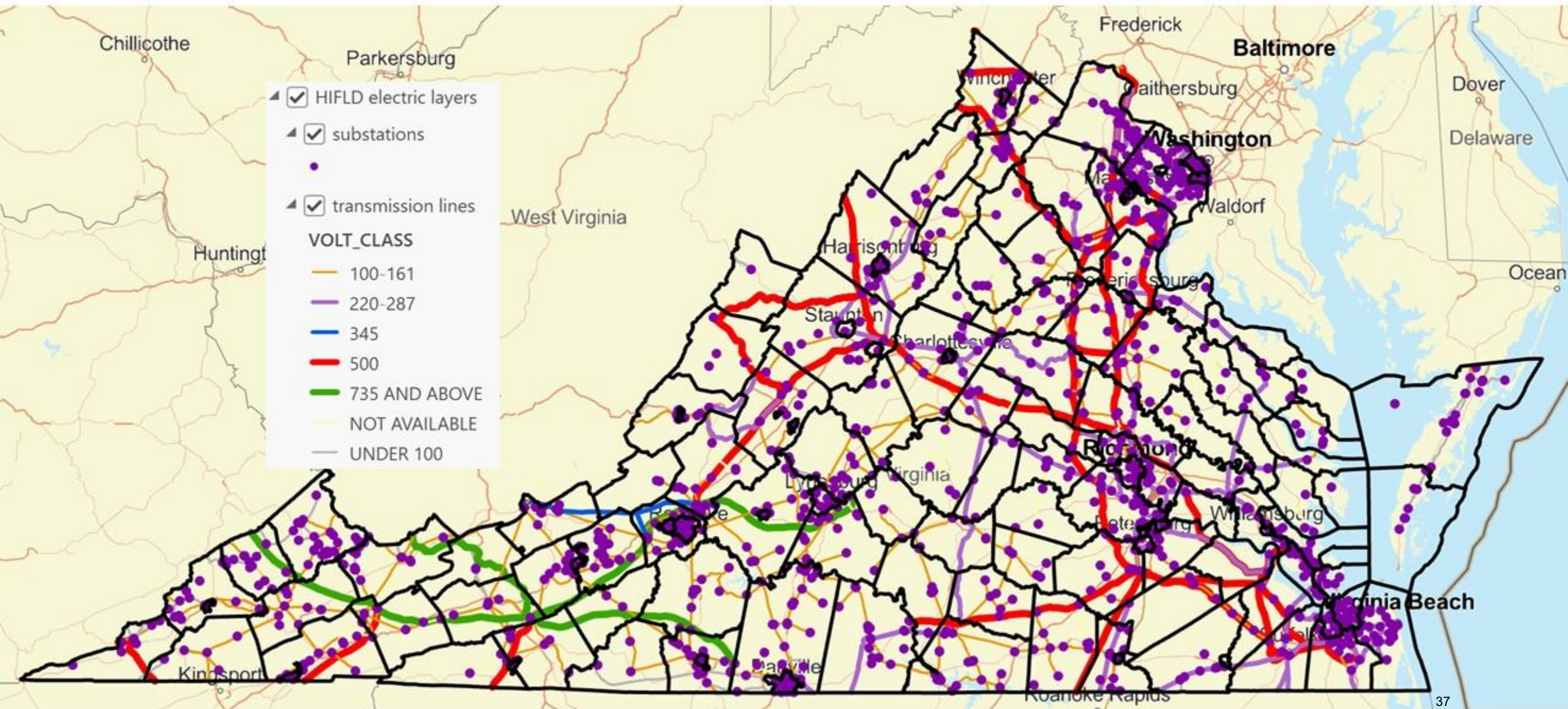
FCV rank

- 5: Outstanding
- 4: Very High
- 3: High



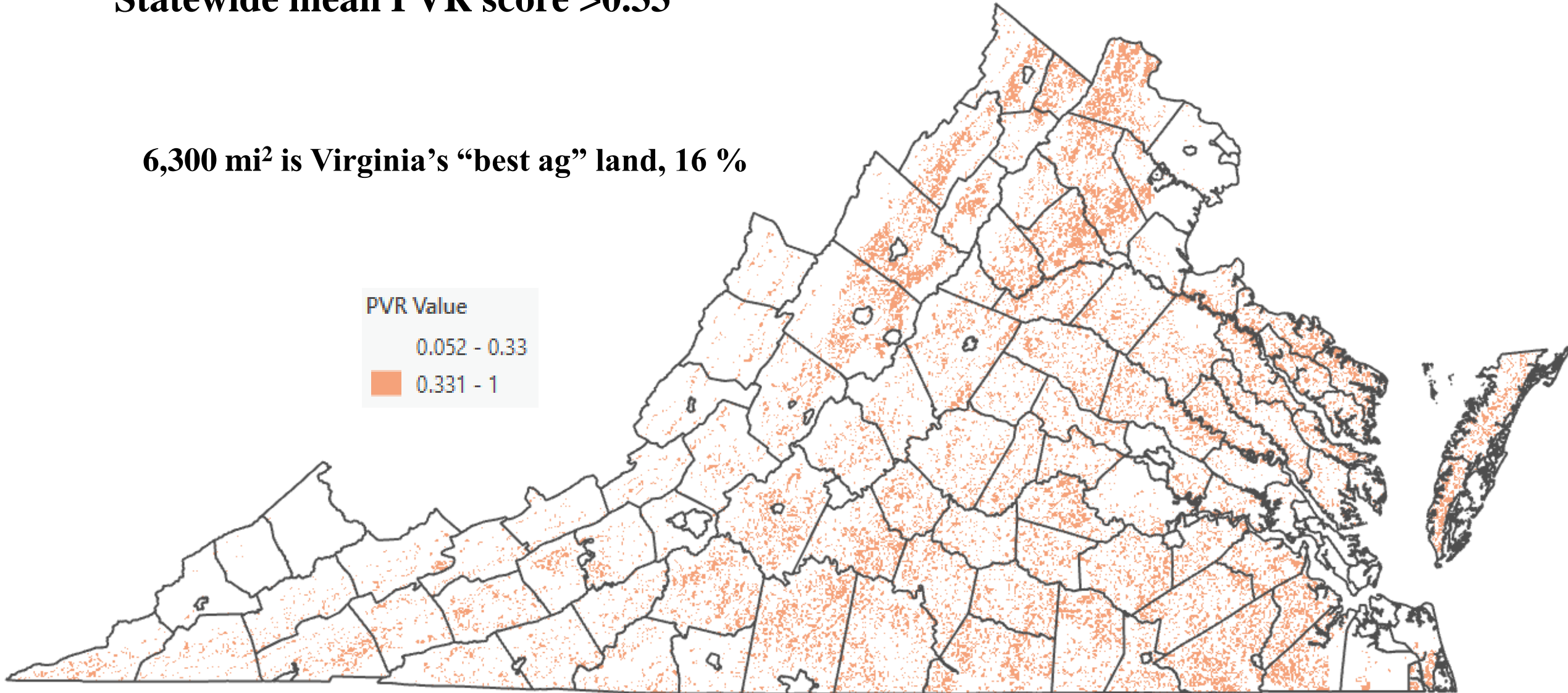
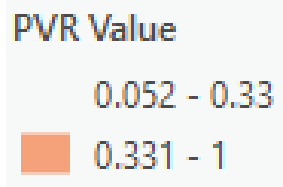
US DHS: Homeland Infrastructure Foundation-level Data (HIFLD)

Electric transmission lines and substations



AFT: VA Best Agricultural lands Statewide mean PVR score >0.33

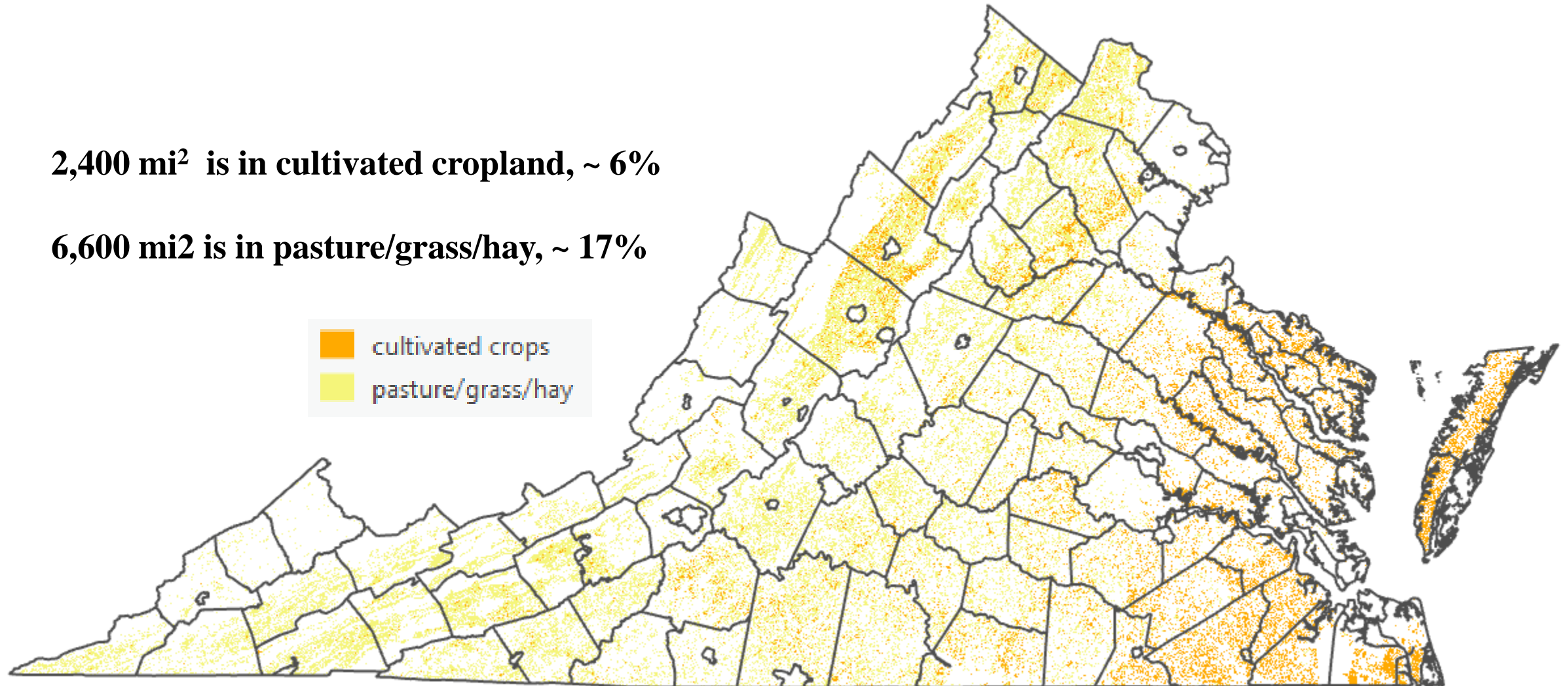
6,300 mi² is Virginia's "best ag" land, 16 %



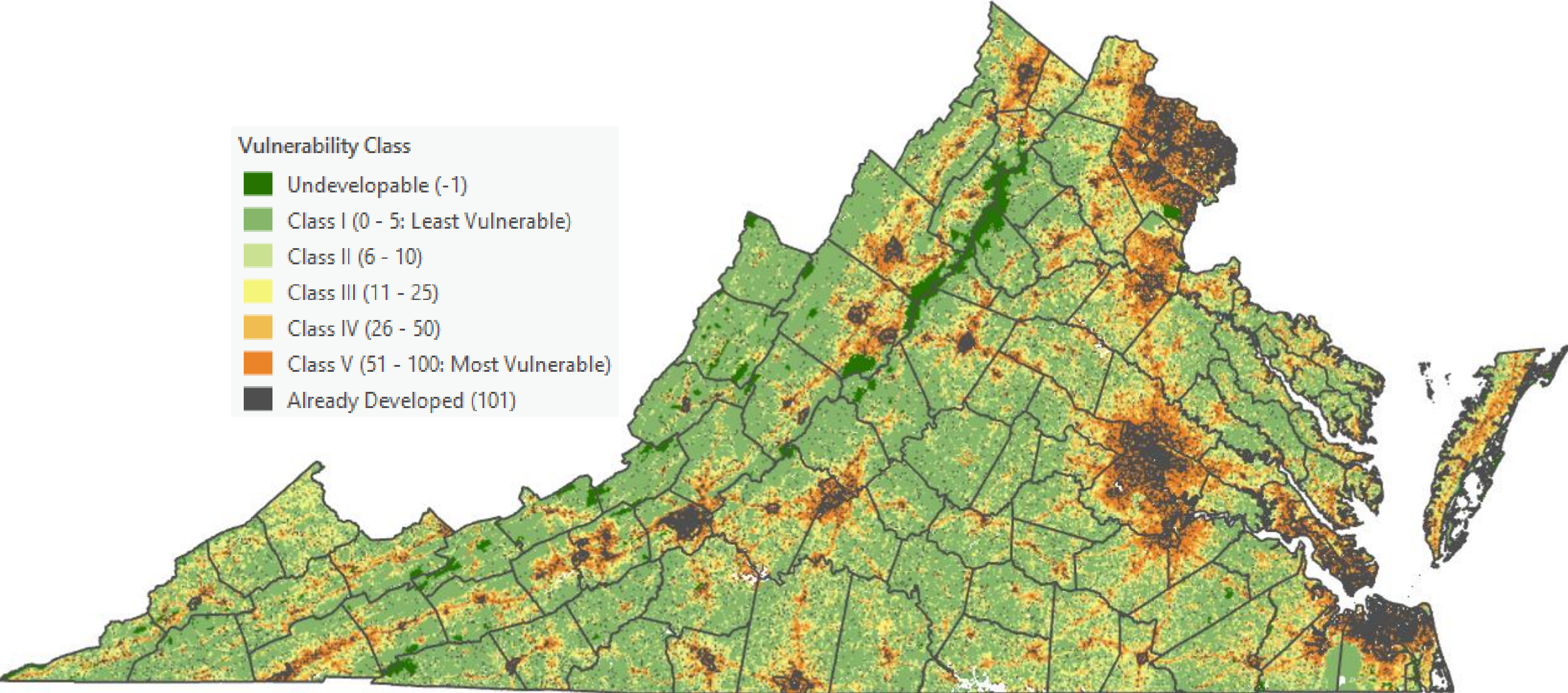
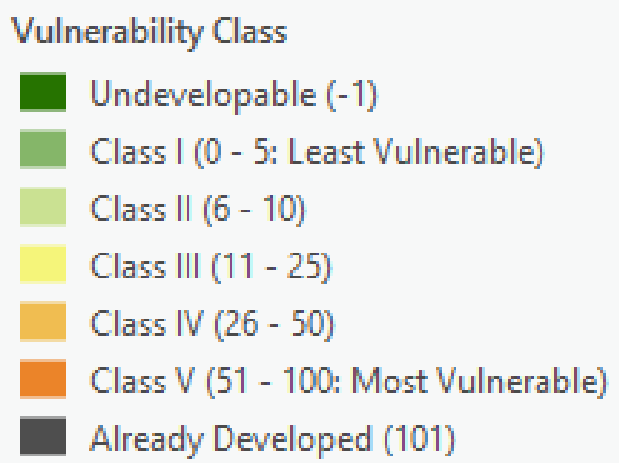
USDA- Cropland Data Layer (2021)

2,400 mi² is in cultivated cropland, ~ 6%

6,600 mi² is in pasture/grass/hay, ~ 17%



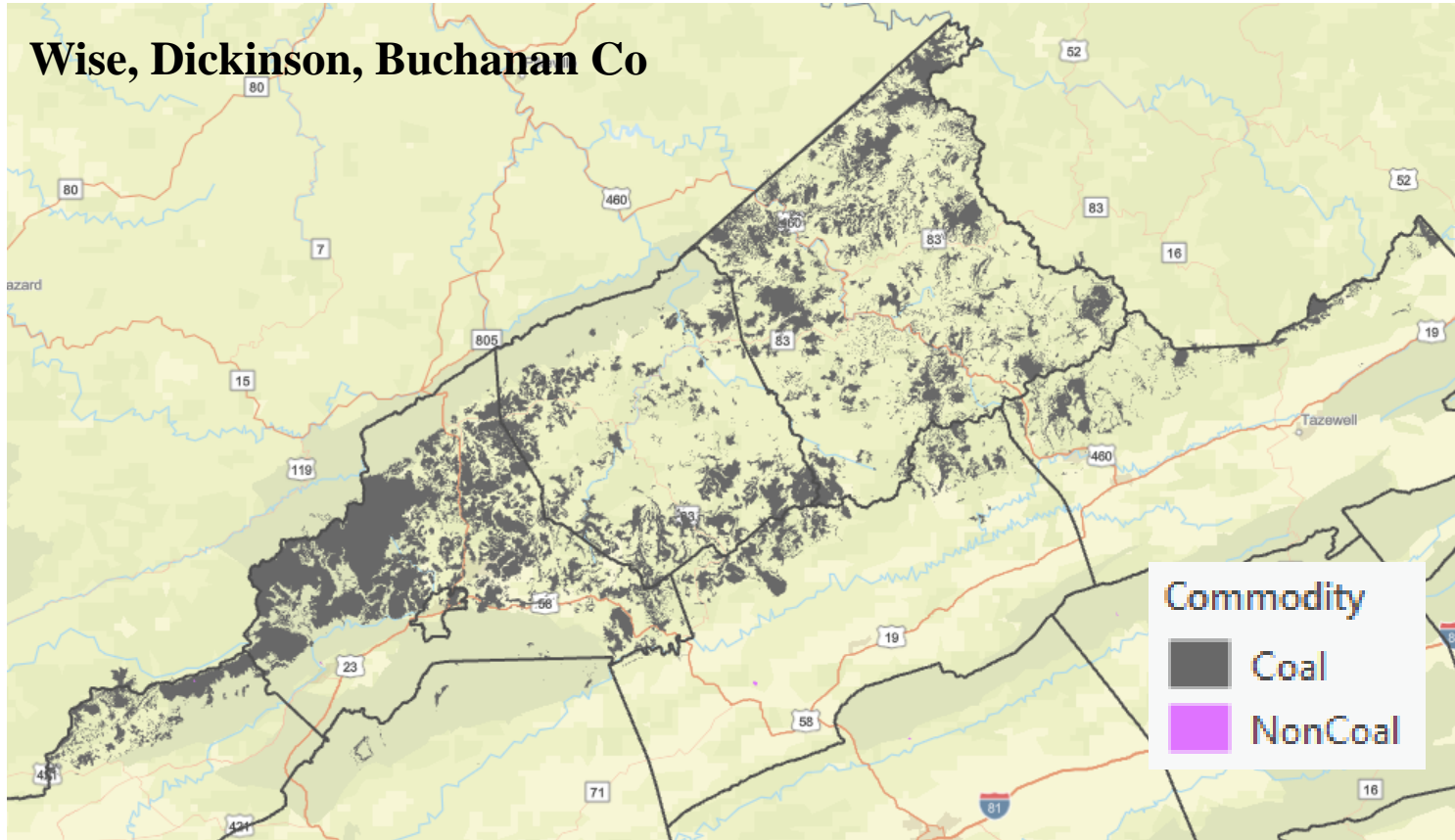
DCR Development Vulnerability Threat



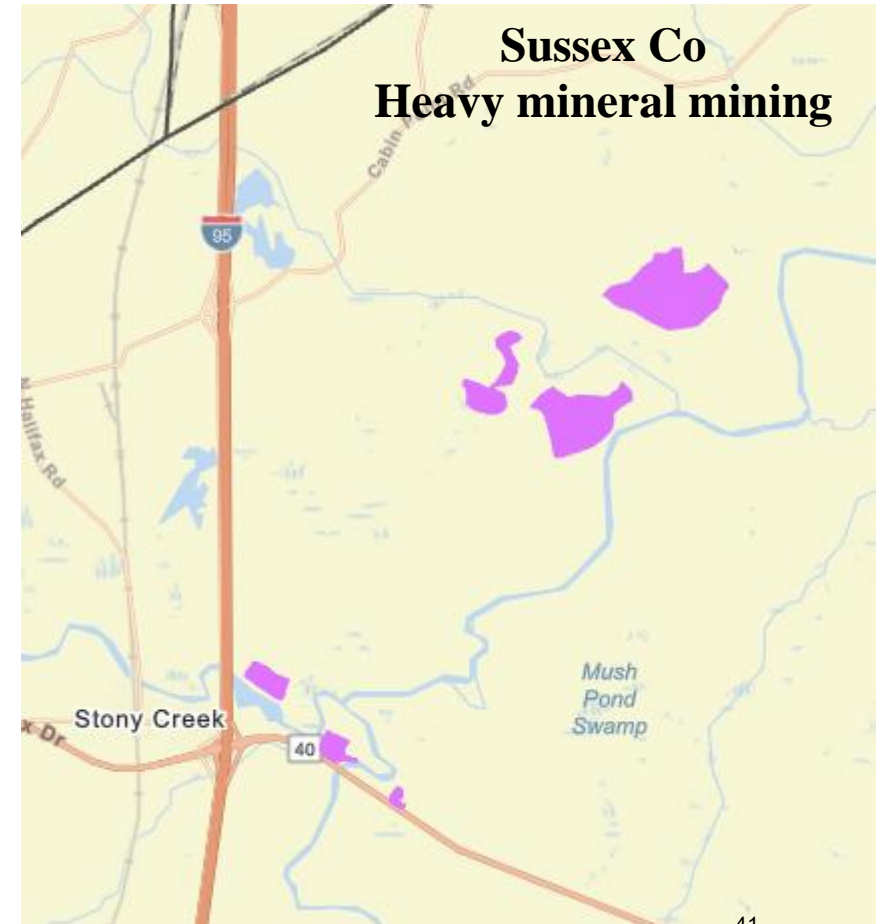
Virginia Energy mine lands



Wise, Dickinson, Buchanan Co



Sussex Co Heavy mineral mining



Appendix C

Prime Farmland Definitions

Prime Farmland Definition from Code of Virginia 3.2-205:

"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.

NRCS's Definition of Prime Farmland

"Prime farmland", as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

Appendix D

§3.2-205 of the Code of Virginia - Characteristics to be considered in evaluating impacts on farm and forest lands

Code of Virginia

Title 3.2. Agriculture, Animal Care, and Food

Subtitle I. General Provisions; Protection and Promotion of Agriculture

Chapter 2. Preservation of Farm and Forest Lands

Article 2. Protection of Farm and Forest Lands

§ 3.2-205. Characteristics to be considered in evaluating impacts on farm and forest lands

A. In preparing environmental impact reports in accordance with § 3.2-204, state agencies shall consider the impact of the major state project on all farm and forest lands that:

1. Have soil classified as capability class I, II, III, or IV;
2. Have an exceptional combination of physical characteristics for the production of food, feed, fiber, forest products, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion;
3. Are valuable for production of specific high-value food and fiber crops, such as fruits, vegetables, and nursery crops and have a special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of such crops when treated and managed according to acceptable farming methods;
4. Are of statewide or local importance for the production of food, feed, fiber, forest products, forage, or oilseed crops;
5. Have been recognized under a state program such as the Clean Water Farm Award or the Century Farm Program;
6. Are part of an agricultural or forestal district or are participating in a use value assessment and taxation program for real estate devoted to agricultural, horticultural, or forest use in accordance with the provisions of Article 4 (§ 58.1-3229 et seq.) of Chapter 32 of Title 58.1; or
7. Make a significant contribution to the local economy or the rural character of the area where the land is located.

B. The governing body of each locality, with the cooperation of the U.S. Department of Agriculture, may designate the important farmlands within its jurisdiction. In designating important farmlands the governing body shall demonstrate that adequate provision has been made for nonagricultural uses within its jurisdiction.

C. As used in this chapter, "farmland" includes all land defined as follows:

"Important farmland," other than prime or unique farmland, is land that is of statewide or local importance for the production of food, feed, fiber, forage, nursery, oilseed, or other agricultural crops, as determined by the appropriate state agency or local government agency, and that the U.S. Department of Agriculture determines should be considered as farmland for the purposes of this chapter;

"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; and

"Unique farmland" is land other than prime farmland that is used for production of specific high-value food and fiber crops, as determined by the U.S. Department of Agriculture. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed according to acceptable farming methods.

1981, c. 635, § 3.1-18.5; 1982, c. 417; 2000, cc. 22, [778](#); 2003, c. [384](#); 2008, c. [860](#).

The chapters of the acts of assembly referenced in the historical citation at the end of this section(s) may not constitute a comprehensive list of such chapters and may exclude chapters whose provisions have expired.

Appendix E

**Code of Federal Regulations 7 CFR §657.5(a) Identification of important farmlands -
Prime farmlands**

§ 657.4 SCS Responsibilities.

(a) *State Conservationist.* Each SCS State Conservationist is to:

(1) Provide leadership for inventories of important farmlands for the State, county, or other subdivision of the State. Each is to work with appropriate agencies of State government and others to establish priorities for making these inventories.

(2) Identify the soil mapping units within the State that qualify as prime. In doing this, State Conservationists, in consultation with the cooperators of the National Cooperative Soil Survey, have the flexibility to make local deviation from the permeability criterion or to be more restrictive for other specific criteria in order to assure the most accurate identification of prime farmlands for a State. Each is to invite representatives of the Governor's office, agencies of the State government, and others to identify farmlands of statewide importance and unique farmlands that are to be inventoried within the framework of this memorandum.

(3) Prepare a statewide list of:

(i) Soil mapping units that meet the criteria for prime farmland;

(ii) Soil mapping units that are farmlands of statewide importance if the criteria used were based on soil information; and

(iii) Specific high-value food and fiber crops that are grown and, when combined with other favorable factors, qualify lands to meet the criteria for unique farmlands. Copies are to be furnished to SCS Field Offices and to SCS Technical Service Centers (TSC's). (See 7 CFR 600.3, 600.6.)

(4) Coordinate soil mapping units that qualify as prime farmlands with adjacent States, including the States responsible for the soil series. Since farmlands of statewide importance and unique farmlands are designated by others at the State level, the soil mapping units and areas identified need not be coordinated among States.

(5) Instruct SCS District Conservationists to arrange local review of lands identified as prime, unique, and additional farmlands of statewide importance by Conservation Districts and representatives of local agencies. This review is to determine if additional farmland should be identified to meet local decisionmaking needs.

(6) Make and publish each important farmland inventory on a base map of national map accuracy at an intermediate scale of 1:50,000 or 1:100,000. State Conservationists who need base maps of other scales are to submit their requests with justification to the Administrator for consideration.

(b) *Technical Service Centers.* Field representatives are to provide requested technical assistance to State Conservationists in inventorying prime

and unique farmlands (see 7 CFR 600.2). This includes reviewing statewide lists of soil mapping units that meet the criteria for prime farmlands and resolving coordination problems that may occur among States for specific soil series or soil mapping units.

(c) *National Office.* The Assistant Administrator for Field Services (see 7 CFR 600.2) is to provide national leadership in preparing guidelines for inventorying prime farmlands and for national statistics and reports of prime farmlands.

§ 657.5 Identification of important farmlands.

(a) *Prime farmlands—(1) General.* Prime farmland is 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). It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding. Examples of soils that qualify as prime farmland are Palouse silt loam, 0 to 7 percent slopes; Brookston silty clay loam, drained; and Tama silty clay loam, 0 to 5 percent slopes.

(2) *Specific criteria.* Prime farmlands meet all the following criteria: Terms used in this section are defined in USDA publications: "Soil Taxonomy, Agriculture Handbook 436"; "Soil Survey Manual, Agriculture Handbook 18"; "Rainfall-erosion Losses From Cropland, Agriculture Handbook 282"; "Wind Erosion Forces in the United States and Their Use in Predicting Soil Loss, Agriculture Handbook 346"; and "Saline and Alkali Soils, Agriculture Handbook 60."

(i) The soils have:

(A) Aquic, udic, ustic, or xeric moisture regimes and sufficient available water capacity within a depth of 40 inches (1 meter), or in the root zone (root zone is the part of the soil that is penetrated or can be penetrated by plant roots) if the root zone is less than 40 inches deep, to produce the

commonly grown cultivated crops (cultivated crops include, but are not limited to, grain, forage, fiber, oilseed, sugar beets, sugarcane, vegetables, tobacco, orchard, vineyard, and bush fruit crops) adapted to the region in 7 or more years out of 10; or

(B) Xeric or ustic moisture regimes in which the available water capacity is limited, but the area has a developed irrigation water supply that is dependable (a dependable water supply is one in which enough water is available for irrigation in 8 out of 10 years for the crops commonly grown) and of adequate quality; or,

(C) Aridic or torric moisture regimes and the area has a developed irrigation water supply that is dependable and of adequate quality; and,

(ii) The soils have a temperature regime that is frigid, mesic, thermic, or hyperthermic (pergelic and cryic regimes are excluded). These are soils that, at a depth of 20 inches (50 cm), have a mean annual temperature higher than 32° F (0° C). In addition, the mean summer temperature at this depth in soils with an O horizon is higher than 47° F (8° C); in soils that have no O horizon, the mean summer temperature is higher than 59° F (15° C); and,

(iii) The soils have a pH between 4.5 and 8.4 in all horizons within a depth of 40 inches (1 meter) or in the root zone if the root zone is less than 40 inches deep; and,

(iv) The soils either have no water table or have a water table that is maintained at a sufficient depth during the cropping season to allow cultivated crops common to the area to be grown; and,

(v) The soils can be managed so that, in all horizons within a depth of 40 inches (1 meter) or in the root zone if the root zone is less than 40 inches deep, during part of each year the conductivity of the saturation extract is less than 4 mmhos/cm and the exchangeable sodium percentage (ESP) is less than 15; and,

(vi) The soils are not flooded frequently during the growing season (less often than once in 2 years); and,

(vii) The product of K (erodibility factor) x percent slope is less than 2.0, and the product of I (soils erodibility) x C (climatic factor) does not exceed 60; and

(viii) The soils have a permeability rate of at least 0.06 inch (0.15 cm) per hour in the upper 20 inches (50 cm) and the mean annual soil temperature at a depth of 20 inches (50 cm) is less than 59° F (15° C); the permeability rate is not a limiting factor if the mean annual soil temperature is 59° F (15° C) or higher; and,

(ix) Less than 10 percent of the surface layer (upper 6 inches) in these soils consists of rock fragments coarser than 3 inches (7.6 cm).

Appendix F

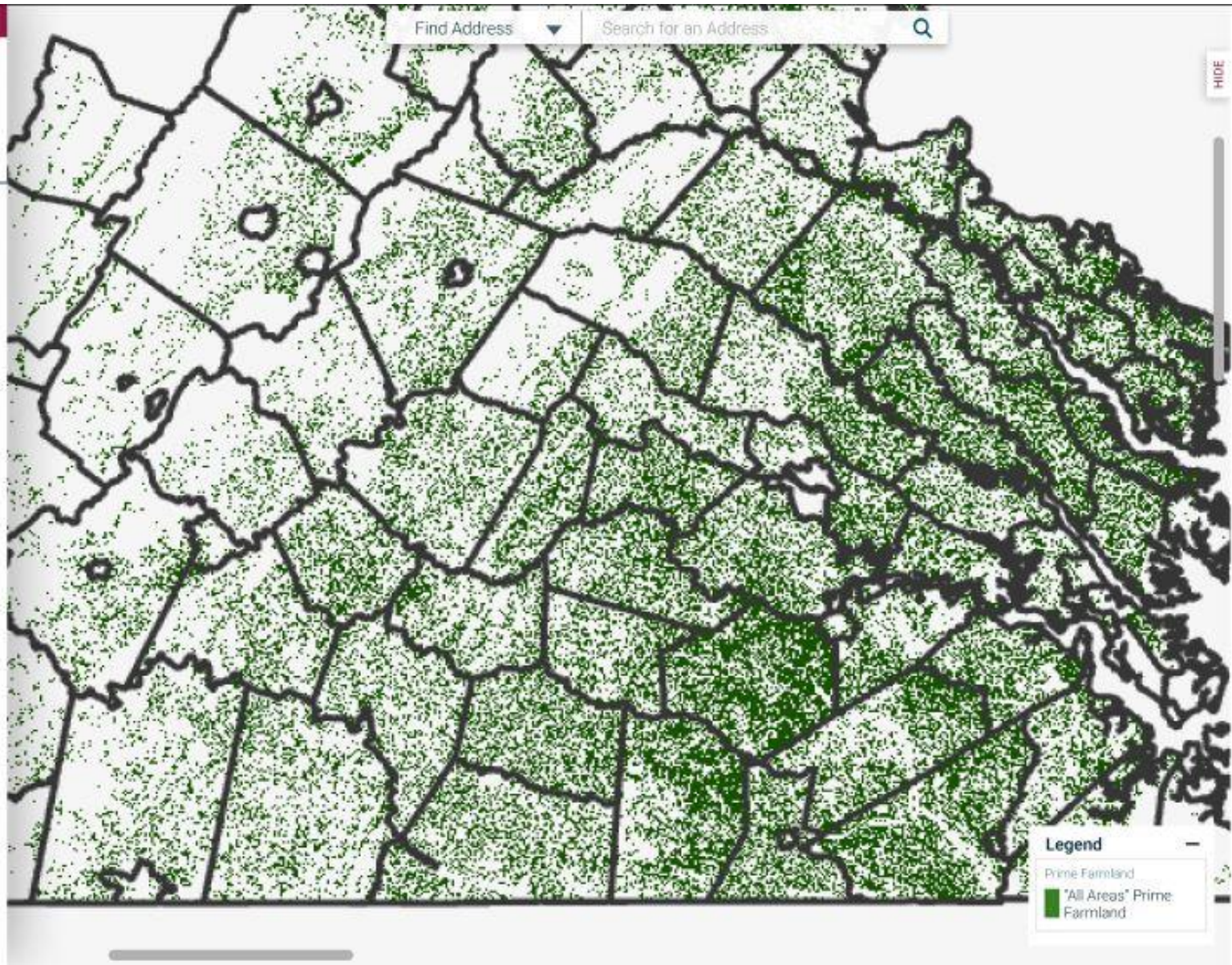
Snapshot of VaLEN User Interface

Layers

- Virginia's Land Cover**
- Prime Farmland
 - National Land Cover
 - Conservation Lands and Easements
 - Ecological Cores

- Resources**
- Electrical lines and substations
 - Virginia Energy Mining

- Calculated Values/Indices**
- DoF Forest Conservation Value
 - Farms Under Threat Productivity Versatility Resiliency (PVR)
 - Development Vulnerability Threat



Prime Farmland

Full Layer Name
NRCS Farmland Classification "All areas prime"

Contributer

 Natural Resources Conservation Service

Layer Notes
8,000 mi² Virginia is prime farmland (21% total)

Definition from Code of Virginia 3.2-205

"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.

Literature

"The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and

Export Map

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