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Developing Solar Energy in Rural Virginia: An Analysis of Legal, Environmental, and Policy Issues

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About the Virginia Coastal Policy Center

The Virginia Coastal Policy Center (VCPC) at William & Mary Law School provides science-based legal and policy analysis of ecological issues affecting the state's coastal resources, providing education and advice to a host of Virginia's decision-makers, from government officials and legal scholars to non-profit and business leaders.

VCPC works with scientists, local and state political figures, community leaders, the military, and others to integrate the latest science with legal and policy analysis to solve coastal resource management issues. VCPC activities are inherently interdisciplinary, drawing on scientific, economic, public policy, sociological, and other expertise from within the University and across the country. VCPC grounds its pedagogical goals in the law school's philosophy of the citizen lawyer. VCPC students' highly diverse interactions beyond the borders of the legal community provide the framework for their efforts in solving the complex coastal resource management issues that currently face Virginia and the nation.

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Please contact VCPC Director Elizabeth Andrews (eaandrews@wm.edu) if you have comments, questions, or suggestions.

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I. INTRODUCTION

Over the past decade, there has been a dramatic increase in the development of solar energy nationwide as a means to mitigate the effects of climate change and reduce greenhouse gas emissions from traditional fossil-fuel power plants. At the national level, with an average annual growth rate of 49% since 2010, U.S. solar installations in 2020 generated more than 81,000 megawatts (MW), which is enough energy to power up to 15.7 million homes at peak output.[1] Virginia also has seen a rapid increase in proposed solar developments in response to a renewable energy mandate imposed by the legislature in 2020, and now has 3,790 MW of generation capacity in over 28,000 installations.[2]

Solar energy production contributes to renewable energy generation and emits no greenhouse gases in the actual generation of electricity.[3] It also diversifies the electricity grid and reduces dependence on fossil fuels, thereby enhancing energy grid resilience.[4] Besides environmental benefits, solar projects can also stimulate the local economy by creating some permanent jobs and generating local tax revenue.[5] However, utility-scale solar[6] does pose challenges for local governments, as stakeholders are increasingly concerned about industry practices that are perceived to cause environmental harms and significant changes to many rural communities. Solar facility construction practices have changed over time, but they often involve removal of vegetation, grading of the surface of the ground, and the addition of fill that is then compacted.[7] These practices can increase stormwater runoff and damage ecosystems, among other potential harms.[8] With an estimated nearly 9 million acres of "potentially solar suitable land" in

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[1] SOLAR FOUND., LARGE-SCALE SOLAR DEVELOPMENT: A PLAYBOOK FOR SOUTHWEST VIRGINIA 3 (2020), https://swvasolar.org/swva-solar-playbook-online/.

[2] *Virginia Energy*, SOLAR ENERGY INDUS. ASS'N (last visited Aug. 2, 2022), https://www.seia.org/state-solar-policy/virginia-solar (data current through Q1 2022).

[3] *See, e.g.*, NAT'L RENEWABLE ENERGY LAB'Y, LIFE CYCLE GREENHOUSE GAS EMISSIONS FROM SOLAR PHOTOVOLTAICS (FACT SHEET) (2012), https://www.nrel.gov/docs/fy13osti/56487.pdf ("Total life cycle GHG emissions from solar PV systems are similar to other renewables and nuclear energy, and much lower than coal.").

[4] *See, e.g.*, Solar Energy Tech. Off., Dep't of Energy, "*Solar and Resilience Basics*," OFF. OF ENERGY EFFICIENCY AND RENEWABLE ENERGY, https://www.energy.gov/eere/solar/solar-and-resilience-basics (noting that "[s]olar energy technologies can play an important role in strengthening our energy system's resilience" because it can be distributed rather than centralized, and sunlight-generated electricity can be stored and discharged without the need for fuel deliveries so during a long outage, solar power can continue to be delivered, even at night).

[5] *See* Carol Vaughn, *Amazon Seals Accomack Solar Power Deal*, DELMARVA NOW (June 17, 2015), https://www.delmarvanow.com/story/news/local/virginia/2015/06/17/solar-farm-update/28875521/ (noting that the Amazon Solar Farm US East in Accomack County "will create four full-time electrical technician jobs and another eight or so grounds keeping jobs, in addition to jobs during construction . . . .").

[6] *See generally Utility-Scale Solar Power*, SOLAR ENERGY INDUS. ASS'N (last visited Aug. 4, 2022), https://www.seia.org/initiatives/utility-scale-solar-power (explaining that "Utility-scale" solar usually entails a generation capacity of more than 5 MW and sending electricity to wholesale buyers rather than end-use consumers).

[7] NAT'L RENEWABLE ENERGY LAB'Y, CAN REVEGETATION RETURN PV SITE SOIL TO ITS UNTOUCHED GLORY? RECENT JOURNAL ARTICLE FINDS PANELS PROVIDE BENEFITS TO CO-LOCATED CROPS (Sept. 17, 2020), https://www.nrel.gov/news/program/2020/untouched-glory.html ("To understand whether the revegetation of a PV site can return the soil properties to those of an undisturbed piece of land, the research team compared soil properties at a PV site that had been revegetated with native grasses to those of an undisturbed adjacent site. . . . Researchers observed substantially lower concentrations of total carbon and nitrogen levels in the solar PV soil versus the reference soil, likely caused by the removal of topsoil during the construction of the arrays. The research suggested that 7 years following the construction of the PV site, the nutrient cycling had not yet reestablished nor was the soil able to sequester carbon as could the native soil.").

[8] *Id.*

Virginia,[9] it is important that the legislature clearly defines what state agencies and local governments can do to address these challenges.

This paper focuses on the legal, environmental, land use, and policy issues associated with developing solar energy projects in Virginia, with a particular focus on large-scale installations in rural areas. Part II discusses state laws, regulations, and recent legislative actions that relate to solar development, including the Virginia Stormwater Management Act and Erosion and Sediment Control Law. Part III reviews local strategies for managing solar development, including comprehensive plans, ordinances, siting agreements, and conditional use permits. Part IV addresses the challenges localities may face when balancing land preservation and Virginia's ambitious clean energy goals. Finally, Part V provides recommendations for consideration by Virginia's lawmakers, regulators, and localities as the state continues to expand its solar energy generation capacity.

II. RELEVANT VIRGINIA LAWS, REGULATIONS, AND LEGISLATIVE ACTIONS

A. The Virginia Clean Economy Act

The Virginia General Assembly broke new ground when it passed legislation in 2015 declaring generation facilities with capacity of up to 500 MW using solar energy to be in the public interest, thus limiting review of such projects by the State Corporation Commission (SCC).[10] Subsequently, the 2020 Virginia Clean Economy Act (VCEA) became law and created a framework for renewable energy in the Commonwealth, implementing a mandatory renewable energy portfolio standard program and requiring Virginia's two largest utilities to produce their electricity from 100% renewable sources by 2050.[11] As a result, major private entities such as Amazon, Facebook, and Microsoft have been early investors in solar in Virginia,[12] while some critics have made attempts to legislatively amend or repeal the VCEA, arguing that that it set "unachievable targets" that could expose Virginians to reliability and affordability challenges.[13]

The VCEA moved solar energy goals further than the legislature had in 2015 by finding that 16,000 MW of solar and wind power were in the public interest.[14] Additionally, it requires Virginia's largest energy companies (Dominion Energy and Appalachian Power) to construct or acquire more than 3,100 MW of energy storage capacity.[15]

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[9] *Solar Siting in Virginia*, CONSERVATION GATEWAY, http://conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/virginia/Pages/solar-siting-va.aspx.

[10] 2015 Va. Acts Ch. 6 (suspending regulatory reviews of utility earnings) (codified at VA. CODE ANN. § 56-599).

[11] Virginia Clean Economy Act, 2020 Va. Acts Ch. 1193 (codified at VA. CODE ANN. §§ 10.1-1308, 56-576, 56-585.1, 56-585.1:4, 56-594, 56-596.2, 56-585.1:11, 56-585.5, and 56-585.6).

[12] Megan Schnabel, *Is Virginia at a Solar Crossroads?*, CARDINAL NEWS (Apr. 19, 2022), https://cardinalnews.org/2022/04/19/is-virginia-at-a-solar-crossroads/.

[13] Mason Adams, *Virginia GOP Targets Clean Energy Law, But Options for Rollback Are Limited*, ENERGY NEWS NETWORK (Nov. 9, 2021), https://energynews.us/2021/11/09/virginia-gop-targets-clean-energy-law-but-options-for-rollback-are-limited/.

[14] VA. CODE ANN. § 56-585.1(A)(6) (2021).

[15] *Id.* § 56-585.5(E)(1)-(2).

The VCEA also increased the potential for distributed energy across Virginia by expanding the percentage of a utility's power that may come from net-metered distributed sources from 1% to 6% of the previous year's peak load.[16] "Distributed solar" generally describes solar energy generated near or at the location where it will be used, and in amounts less than a utility-scale installation would provide.[17] Net metering is the practice of measuring electricity flow both to and from the grid: when an energy consumer generates solar power, the utility bills for the consumer's "net" electricity use, which is consumption minus generation sent back to the grid.[18] Raising the cap to 6% allows for more widespread adoption of distributed solar generation, rather than relying upon concentrated, large solar facilities that distribute energy through the transmission grid; but some critics of distributed generation have raised concerns about the expense of retrofitting buildings to accommodate solar arrays, grid infrastructure longevity and reliability,[19] and imposing disproportionate costs on non-generating electricity consumers.[20]

The focus on solar energy in Virginia's legislature during the past several years reflects both the growing industry and increasing public awareness about its potential impacts. The following recent bills either sought to amend the VCEA or were related closely to its provisions.

1. Successful 2022 Legislation

House Bill 774 (2022) was enacted into law and requires that the SCC convene a task force to "analyze the life cycle of renewable energy facilities" and submit a report to the Governor and prescribed House and Senate Committees by May 1, 2023.[21] The scope encompasses the decommissioning of solar facilities, including the potential for recycling or salvaging materials, waste management, and liability for the decommissioning process; the "potential impacts of underground infrastructure" once the facility is decommissioned; and the facilities' impacts on both land and the economy.[22] The report is intended to enable legislators to understand the impacts of solar facilities during operation and any potential issues at the end of their life cycles, such as disposal of materials and site restoration.[23]

House Bill 894 (2022), also enacted into law, requires both that Virginia Cooperative Extension compile a database of prime farmland in the state and that the Virginia Department of Energy "consider 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."[24] Given the differing objectives and approaches of solar developers, land owners, and local governments that

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[16] VA. CODE ANN. § 56-§ 56-594(E)(2020); *see also* Elizabeth McGowan, *Contract Deal Lifts Virginia Utility's Cap on Public Entities' Solar Aspirations*, ENERGY NEWS NETWORK (June 15, 2021), https://energynews.us/2021/06/15/contract-deal-lifts-virginia-utilitys-cap-on-public-entities-solar-aspirations/.
[17] U.S. ENV'T PROT. AGENCY, DISTRIBUTED GENERATION OF ELECTRICITY AND ITS ENVIRONMENTAL IMPACTS (2022), https://www.epa.gov/energy/distributed-generation-electricity-and-its-environmental-impacts.
[18] VA. CODE ANN. § 56-594(B).
[19] NAT'L RENEWABLE ENERGY LAB'Y, GRID-INTEGRATED DISTRIBUTED SOLAR: ADDRESSING CHALLENGES FOR OPERATIONS AND PLANNING (FACT SHEET) (2016), https://www.nrel.gov/docs/fy16osti/63042.pdf.
[20] McGowan, *supra* note 16. *See also* MARK MURO AND DEVASHREE SAHA, BROOKINGS INST., ROOFTOP SOLAR: NET METERING IS A NET BENEFIT (2016), https://www.brookings.edu/research/rooftop-solar-net-metering-is-a-net-benefit/ (discussing net metering).
[21] 2022 Va. Acts Ch. 70.
[22] *Id.*
[23] *Id.*
[24] 2022 Va. Acts Ch. 488.

is discussed below, these provisions of the bill are likely important to Virginia localities that want to preserve high-quality agricultural land for farming and to those who see farmland conversion to solar as a threat to the food supply chain.

Finally, House Bill 206 is a key piece of legislation enacted into law in 2022.[25] This bill, which only relates to small solar projects that qualify for a solar Permit By Rule (PBR),[26] contains three especially noteworthy provisions. First, it requires the Department of Environmental Quality (DEQ) to conduct "[a]n analysis of potential environmental [and other beneficial and adverse] impacts of the small renewable energy project's operations" on air quality, natural and historic resources, and wildlife if a proposed project would disturb more than ten acres of prime agricultural land or fifty acres of contiguous forest lands.[27] Second, the new law requires applicants to submit a mitigation plan[28] if DEQ's analysis "indicates that a significant adverse impact… to wildlife, historic resources, prime agricultural soils, or forest lands"[29] is likely.[30] Finally, the bill requires a thirty-day public comment period prior to the authorization of any project subject to this section.[31] DEQ is currently hosting a series of meetings with stakeholders to develop streamlined review processes and guidance pursuant to this new legislation, with a report due to the General Assembly in December 2022.[32]

2. Unsuccessful 2022 Legislation

The 2022 Session of the General Assembly also saw numerous attempts to scale back the VCEA, often aimed at increasing the oversight capabilities of the SCC. Recent bills aimed at limiting the requirements of the VCEA that did not pass the legislature included House Bills 73,[33] 74,[34] 118,[35] and 839[36].

Outside the context of the VCEA, there have been other legislative proposals that have sought indirectly to maximize the oversight power of the SCC. As an example, House Bill 202 would have granted the SCC more oversight of larger solar projects by reducing the maximum

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[25] 2022 Va. Acts Ch. 688 (to be codified at VA. CODE ANN. § 10.1-1197.6).
[26] *See* definition and discussion of Permits By Rule, *infra* Section II(D).
[27] 2022 Va. Acts Ch. 688 § 1(B)(7)-(8).
[28] *See, e.g.*, *id.* § 1(J)(2).
[29] *Id.* § 1(J) ("For purposes of this section, "prime agricultural soils" means soils recognized as prime farmland by the U.S. Department of Agriculture, and "forest land" has the same meaning as provided in [VA. CODE ANN.] § 10.1-1178, except that any parcel shall be considered forest lands if it was forested at least two years prior to the Department's receipt of a permit application.").
[30] *See id.* § 1(B)(8).
[31] *Id.* § 1(B)(8)-(14).
[32] *See id.* § 2.
[33] H.B. 73, 2022 Gen. Assemb., Reg. Sess. (Va. 2022) (restoring full SCC oversight of renewable energy project approvals and removing aggregate capacity requirements for facilities that generate renewable energy), https://lis.virginia.gov/cgi-bin/legp604.exe?ses=221&typ=bil&val=hb73.
[34] H.B. 74, 2022 Gen. Assemb., Reg. Sess. (Va. 2022) (empowering the SCC to exempt "energy-intensive, trade-exposed" industries), https://lis.virginia.gov/cgi-bin/legp604.exe?ses=221&typ=bil&val=hb74.
[35] H.B. 118, 2022 Gen. Assemb., Reg. Sess. (Va. 2022) (repealing provisions in the VCEA that declare solar energy facilities to be in the public interest, and incentivizing the planning and development of new nuclear generation facilities), https://lis.virginia.gov/cgi-bin/legp604.exe?ses=221&typ=bil&val=hb118.
[36] H.B. 839, 2022 Gen. Assemb., Reg. Sess. (Va. 2022) (giving the SCC authority to reject projects and prohibiting electric utilities from recouping the costs of solar facilities from ratepayers unless they could demonstrate that the cost recoveries were necessary for reliability or the lowest-cost option), https://lis.virginia.gov/cgi-bin/legp604.exe?ses=221&typ=bil&val=hb839.

generation capacity of a solar electricity plant that could be approved via a PBR from 150 to 20 MW.[37] This bill also did not pass.[38]

The flurry of 2022 bills concerning approval of solar projects is instructive because it underscores skepticism about the VCEA's ambitious goals for a full transition to renewable energy sources by 2050. By transferring more oversight power to the SCC, these legislative proposals would generally have made the approval process for solar energy facilities more involved, more individualized, and, ultimately, more costly.

B. Erosion and Sediment Control

Solar installations typically generate a continuous and long-term disturbance of ground during and after construction and thus are presenting localities with new oversight and management challenges. Virginia's erosion and sediment control and stormwater management laws, discussed below, can help localities manage the impacts of solar facilities.

Any land-disturbing activity, including the development of solar installations, must comply with an erosion and sediment control (ESC) regime "to prevent the unreasonable degradation of properties, stream channels, waters, and other natural resources . . . ."[39] Importantly, ESC rules apply during site construction, also known as "land-disturbing activity."[40] Key passages of the Virginia ESC laws include definitions that set precise parameters for both developers and regulators.[41] For instance, under the definition of land-disturbing activity, the law's requirements are triggered when the disturbance affects at least 10,000 square feet or 2,500 square feet within all areas designated subject to the Chesapeake Bay Preservation Act.[42]

To implement these laws, localities establish Virginia Erosion and Sediment Control Programs (VESCPs) "for the effective control of soil erosion, sediment deposition, and nonagricultural runoff associated with a land-disturbing activity" to prevent the unreasonable degradation of agricultural lands, stream channels, and other natural resources.[43] No person shall engage in any land-disturbing activity until they have "submitted to the VESCP authority an erosion and sediment control plan for the land-disturbing activity and the plan has been reviewed

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[37] H.B. 202, 2022 Gen. Assemb., Reg. Sess. (Va. 2022), https://lis.virginia.gov/cgi-bin/legp604.exe?221+sum+HB202.

[38] *Id.*

[39] VA. CODE ANN. § 62.1-44.15:51. *See* §§ 62.1-44.15:25.1, .15:27 (combining the VESC and VSMP under the Virginia Erosion and Stormwater Management Act. Pursuant to an enactment clause, the corresponding law will not become effective until DEQ adopts the necessary implementing regulations, a process that is currently underway); DEP'T OF ENV'T QUALITY, STATE WATER CONTROL BD., CONSOLIDATION OF VIRGINIA EROSION CONTROL AND STORMWATER MANAGEMENT PROGRAMS, VA. REGUL. TOWN HALL (under "Actions Underway"), https://townhall.virginia.gov/L/ViewAction.cfm?actionid=5213.

[40] VA CODE ANN. § 62.1-44.15:51.

[41] *Id.*

[42] *Id.*

[43] *See, e.g., id.*

and approved."[44] DEQ oversees localities' VESCPs and provides them with training and support.[45]

Two recent cases of stormwater runoff from solar sites in Virginia illustrate the challenges associated with successfully implementing ESC plans during the construction phase of solar development. The first case involves a 200-acre solar installation in Essex County, the Coronal Solar Power Center, from which "severe" muddy runoff escaped into a nearby watershed.[46] The DEQ characterized this issue as an "active enforcement case that will result in financial penalties" due to failure to fully implement ESC measures and a lack of monitoring compliance; the most obvious examples of misconduct involved elimination of a retention pond and failure to properly restore groundcover (i.e., failure to achieve permanent site stabilization).[47] Additionally, after the locality approved abbreviated construction schedules, the developers worked year-round to construct the installation, even during winter and spring thaws when storms and runoff were more likely.[48] The developers claimed in part that temporary ESC measures had been compromised due to the oversaturation of the ground caused by atypically heavy rainfall,[49] but regulators nonetheless negotiated a $245,000 fine.[50]

Similarly, at the Belcher Solar Project in Louisa County, stormwater runoff washed away the topsoil on nearby agricultural lands and fouled local waterways.[51] The developer, Dominion Energy, attributed the runoffs to extreme weather conditions but was nonetheless fined over $50,000 by DEQ.[52]

These cases emphasize the need for localities to proactively account for monitoring and enforcement of private developers' compliance with ESC regulations in cooperation with state

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[44] VA CODE ANN. § 62.1-44.15:55 (2020). Additional requirements include that regulators periodically inspect the land-disturbing activity to determine compliance with the plan and deliver an inspection report to the owner or permittee following completion of that inspection; and when deficiencies are found, the regulator must deliver a notice to the owner or permittee specifying "measures needed to comply" and a deadline for coming into compliance or an order that land-disturbing activities be stopped, § 62.1-44.15:58. In addition, the regulator has the ability to bring the violator to court to impose a monetary civil penalty or obtain an injunction, § 62.1-44.15:63.

[45] *Stormwater*, VA. DEP'T OF ENV'T QUALITY, https://www.deq.virginia.gov/water/stormwater ("Approval for [land-disturbing] activity may also require a separate permit for erosion and sediment control. These land disturbance permits are issued by localities as part of their erosion and sediment control programs, which DEQ periodically reviews. The agency offers training for both erosion control and stormwater plan reviewers and land disturbers."). *See also* VA. CODE ANN. § 62.1-44.15:52(e).

[46] Mark Holmberg, *Essex County Solar Farm Sediment Runoff Is 'An Enforcement Case'*, WTVR (Feb. 9, 2018), https://www.wtvr.com/2018/02/09/essex-county-solar-farm-sediment-runoff-is-an-enforcement-case/.

[47] *Id.*; *see also* Consent Decree, *Paylor v. McCarthy Building Cos.*, CL2000091-00 (Va. Cir. 2020), CL2000091-00 (VA. Cir. 2020), https://www.deq.virginia.gov/home/showpublisheddocument/2759/637438474448970000. DEQ filed a suit against the developers, but the parties ultimately settled.

[48] Holmberg, *supra* note 46.

[49] *Id.* (quoting Joint Statement from Coronal Energy and McCarthy Building Companies) ("[O]ver-saturation, cold weather and heavier than normal rainfall is having an impact.").

[50] Consent Decree, *supra* note 47; *see also* Sarah Vogelsong, *Youngkin Administration Sets Stricter Runoff Rules for Solar Farms*, VA. MERCURY (Apr. 18, 2022), https://www.virginiamercury.com/2022/04/18/youngkin-administration-sets-stricter-runoff-rules-for-solar-farms/.

[51] Laura French, *How Virginia Farmers Claim Dominion is Destroying Their Land: 'It's pretty catastrophic'*, WTVR (Oct. 5, 2021), https://www.wtvr.com/news/problem-solvers/problem-solvers-investigations/virginia-farmers-and-dominion-energy.

[52] David Holtzman, *Dominion Apologizes for Solar Runoff*, THE CENTRAL VIRGINIAN (June 11, 2021), https://www.thecentralvirginian.com/news/dominion-apologizes-for-solar-runoff/article_db39d65c-c965-11eb-8f8c-e3ac9691fc3f.html.

oversight bodies, as well as the challenges inherent to doing so.

A secondary erosion and sediment control issue relating to solar installations is when sulfide-bearing materials are excavated from below the ground surface and are exposed to the atmosphere, creating acid forming (acid sulfate) soils. The resulting soil is typically highly acidic and cannot support temporary or permanent vegetative stabilization, resulting in increased erosion and acidic stormwater runoff.[53]

In an effort to expedite the ESC plan review process, a recent amendment to the Erosion and Sediment Control Law allows non-urban localities such as Essex and Louisa counties to request that DEQ review ESC plans for solar projects whose generation capacity exceeds 5 MW.[54] DEQ will review these ESC plans for compliance with the ESC Law and Regulations.[55] However, DEQ will not review ESC Plans for compliance with local ESC requirements that are more stringent than the state's.[56] Upon completion of its review, DEQ will provide a recommendation to the locality regarding compliance.[57] At all times, localities retain the authority to approve or reject ESC plans.[58]

C. Stormwater Management

A companion to the Erosion and Sediment Control Law, the Virginia Stormwater Management Act (VSMA) enables localities to establish programs and ordinances that require management of stormwater runoff to prevent flooding or contamination of local waterways. The VSMA sets minimum standards under the Virginia Stormwater Management Program (VSMP) that can be enhanced to meet local needs.[59] The VSMA primarily applies to the post-construction phase of a solar development project, while ESC requirements mainly apply during construction. The VSMA, however, serves as the state's mechanism to implement the federally-delegated Clean Water Act program for discharges of stormwater from construction activities.

Similar monitoring, reporting, investigation, and inspection requirements under the ESC Law and Regulations apply in this context to ensure compliance with state- and federal-mandated Stormwater Pollution Prevention Plan requirements.[60] Some of localities' challenges under the VSMA are therefore similar to the monitoring and enforcement challenges discussed previously for the VESCPs.[61]

The primary stormwater issue relating to solar installations is increased volumes of stormwater runoff after construction. The VSMP requirements can vary based on the extent to

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[53] Dr. Lee Daniels, *Soil and Landscape Rehabilitation*, https://landrehab.org/home/programs/acid-sulfate-soils-management/.
[54] VA. CODE ANN. § 62.1-44.15:55.1(2020). DEQ has requested additional positions to perform this work, but they have not been funded by the General Assembly.
[55] Letter from Melanie D. Davenport, Dir., Div. of Water Permitting, to Kris Nelson, Louisa Cnty. (Sept. 2021) (on file with the Department of Environmental Quality), https://ewscripps.brightspotcdn.com/fe/4d/7a506a1d435c9811a641366f11c7/vescp-solar-esc-plan-review-louisa-county.pdf.
[56] *Id.*
[57] *Id.*
[58] *Id.*
[59] VA. CODE ANN. § 62.1-44.15:25-27, .15:37.
[60] *See* 9 VA. ADMIN. CODE § 25-870-54 (2013).
[61] *Id.*

which the surfaces at a site are considered impervious, or unable to absorb or reduce runoff.[62] DEQ recently issued a new directive requiring solar installations to consider solar panels as impervious surfaces in an effort to combat situations like those described above in Essex and Louisa counties.[63] As a result, DEQ will consider ground-mounted solar panels as unconnected impervious areas when performing post-development water quantity calculations pursuant to the VSMP regulations.[64]

A secondary stormwater issue relating to solar installations is at the "solar panel drip line," which could be compared to a roof without gutters in that the pitched, flat surface of the panel accelerates and concentrates rain.[65] Runoff is a particular concern if the site is unstable, having been recently cleared or significantly disturbed (e.g., graded or excavated), or if the runoff from the site may pick up hazardous substances that can contaminate nearby groundwater or soils.

D. Permitting Requirements for Renewable Energy Projects in Virginia

In addition to planning for stormwater runoff and other environmental concerns, Virginia also requires permits for any new solar facilities according to size. Virginia has a two-track permitting process for solar projects that have a rated capacity greater than 5 MW. While solar projects between 5 and 150 MW are eligible for DEQ's Small Renewable Energy Projects (Solar) Permit by Rule (PBR), projects greater than 150 MW must undergo review by the SCC.[66]

The PBR process facilitates issuance of permits for small renewable energy projects; those that qualify can be granted permits with limited agency review if they satisfy certain regulatory requirements.[67] These requirements include fourteen separate components compiled by the

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[62] VA. CODE ANN. § 62.1-44.15:27.2(C).

[63] Letter from Michael S. Rolband, Dir., Dep't of Env't Quality, to All Members of the Stormwater Mgmt. Dev./Design Cmty. et al. (Mar. 29, 2022) (on file with the Department of Environmental Quality), https://www.deq.virginia.gov/home/showdocument?id=13985. *See also* VA. DEP'T OF ENV'T QUALITY, Draft Guidance Memo No. 22-2012 - Stormwater Management and Erosion & Sediment Control Design Guide, § 5.500.B (noting that, "unless directly connected to the stormwater conveyance system, the horizontal projected area of all solar panels should be considered unconnected impervious area when performing post-development water quantity and water quality design computations"); Vogelsong, *supra* note 50 ("[W]hile the solar industry worries that the sudden policy shift could dampen efforts to build out renewables, some local officials and environmental groups say it could help better account for how precipitation, which is increasing in both frequency and intensity due to climate change, interacts with solar farms.").

[64] Rolband, *supra* note 63. This change is more protective of water quality and raises the question of who will offset under the Chesapeake Bay restoration effort the pollutant load for existing sites that were approved and developed with the assumption that ground-mounted solar arrays were pervious surfaces.

[65] Todd Greene et al., *Solar and Stormwater*, STORMWATER (Sept. 9, 2020), https://www.stormh2o.com/home/article/21148549/solar-and-stormwater.

[66] *See, e.g.*, VA. CODE ANN. §§ 10.1-1197.5 to 1197.11 (2017) (permit by rule for small energy projects), § 56-585.5 (2021) (electric utility regulation); *see also* AM. BATTLEFIELD TR., SITING SOLAR IN VIRGINIA: PROTECTING VIRGINIA'S HISTORIC LANDSCAPES WHILE MEETING STATE'S CLEAN ENERGY GOALS 12 (2020), https://www.battlefields.org/sites/default/files/atoms/files/ABT-Siting-Solar-in-Virginia-Report-2020.pdf.

[67] 9 VA. ADMIN. CODE § 15-60-30(B)(1) (2021). Very small solar energy projects with a rated capacity below 5 MW are subject to fewer notification and certification requirements than projects greater than 5 MW, 9 VA. ADMIN. CODE § 15-60-30. Specifically, when the project capacity is less than or equal to 500 KW (0.5 MW), or when the project has a disturbance zone of two acres or fewer, the owner or operator is not required to submit any notification or certification to DEQ. For projects whose generation capacity is greater than 500 KW (0.5 MW) and less than or equal to 5 MW, the owner or operator needs to notify DEQ and submit a certification from the governing body of the locality where the project will be located confirming that the project complies with all applicable land use ordinances.

developer and submitted to DEQ, including an environmental impact analysis and mitigation plan if appropriate.[68] As noted, only solar projects with projected generation capacity between 5 and 150 MW are eligible for the PBR process.[69] After receipt of a complete application from a solar developer, DEQ must make a determination within 90 days of whether to issue the permit.[70] If a solar project meets all the PBR requirements, DEQ will issue a permit to allow the developer to proceed with construction and operation.[71]

Solar projects that anticipate generating outputs greater than 150 MW are not eligible for the PBR process and must apply to the SCC for a Certificate of Public Convenience and Necessity (CPCN). Unlike DEQ's PBR review process that issues a permit for all projects that fulfill the statutory and regulatory requirements, the SCC conducts a case-by-case review.[72] This review is a much more rigorous and time-consuming process that involves public notice and comment periods and requires projects to obtain extensive approvals.[73]

III. LOCAL GOVERNMENT TOOLS TO ADDRESS SOLAR DEVELOPMENT

Site selection for solar facilities is typically based on a number of factors which reflect each locality's land use plans and developers' goals. These factors may include land availability, land cost, topography, existing site conditions, community support, and proximity to transmission lines.[74] Localities considering solar development are often confronted with competing land use issues involving a diverse group of stakeholders, so it is essential that local staff have tools with which to resolve inevitable conflicts.

This Part considers the ways in which localities can influence the development of the solar energy industry in their communities. It first outlines the comprehensive planning process and zoning. It then highlights how local solar-specific ordinances can affect developers' ability to build solar installations in different localities across the state. Finally, it discusses siting agreements and conditional use permits, which are two tools localities can use when approving solar developments.

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[68] VA. CODE ANN. § 10.1-1197.6(B) (2017). The fourteen requirements are: (1) notice of intent; (2) certification by the local government that the project complies with all applicable land use ordinances; (3) interconnection studies; (4) final interconnection agreement; (5) certification that the project does not exceed 150 megawatts; (6) air quality impact analysis; (7) natural resources impact analysis; (8) mitigation plan, if significant impacts to wildlife or historic resources are likely; (9) certification of compliance by a professional licensed engineer; (10) operating plan; (11) detailed site plan with project location maps; (12) certification of environmental permits; (13) public meeting; and (14) 30-day public review and comment period.

[69] *Id.* § 10.1-1197.5 (defining "small renewable energy project"); *id.* § 10.1-1197.6 (mandating the development of "permits by rule . . . for the construction and operation of small renewable energy projects.").

[70] 9 VA. ADMIN. CODE § 15-60-30(B) (2021).

[71] *See id.* § 15-60-30(B)(1).

[72] *See generally* VA. CODE ANN. § 56-585.1 (2021) ("[P]lanning and development activities for a new utility-owned and utility-operated generating facility or facilities utilizing energy derived from sunlight or from onshore or offshore wind are in the public interest."). By declaring these projects to be in the public interest, the legislature reduced the SCC's ability to exercise its discretion when reviewing them, in order to fulfill the legislature's policy goals.

[73] *Id.*

[74] Jason Sharp et al., *Lessons Learned: Solar Projects Present Unique Stormwater Management Challenges*, ENV'T SCI. & ENG'G MAG. (Dec. 8, 2017), https://esemag.com/stormwater/lessons-learned-solar-project-present-unique-stormwater-management-challenges/.

A. Comprehensive Planning

Comprehensive planning is one of a locality's most important tools for influencing future growth and development. Under state law, each locality "shall prepare and recommend a comprehensive plan for the physical development of the territory within its jurisdiction," for the purpose of "guiding and accomplishing a coordinated, adjusted and harmonious development of the territory which will, in accordance with present and probable future needs and resources, best promote the health, safety, morals, order, convenience, prosperity and general welfare of the inhabitants."[75] The plan is non-binding in that it can be overruled by the locality's supervisory body, but it generally is intended to serve as a useful tool for the public, locality staff, and developers, and it "shall control the general or approximate location, character and extent of each feature shown on the plan."[76]

Specific to solar, installations are subject to review for conformity with a locality's comprehensive plan, like other types of development, unless they meet certain exceptions specified in state law; namely, they must either be located in a zoning district that allows solar development by right, be a small distributed energy installation that produces electricity to be used on site or meets other small-producer requirements, or have permission from the locality waiving the typical review for substantial accord with the comprehensive plan.[77] The substantial accord review (or "2232 review", as it is often called) for solar facilities may be publicly advertised and approved concurrently with a rezoning, special exception, or other approval process.[78]

The approval process for a solar site in James City County illustrates the non-binding nature of the comprehensive plan. In 2022, Hexagon Energy, LLC's 3 MW Racefield Drive facility was approved for a 26-acre site within what the County classifies as "rural lands" in its comprehensive plan.[79] The Board of Supervisors justified the decision to approve a special-use permit for the facility on a site zoned for agricultural use on the grounds that the solar facility will not be permanent, noting that the lot will not be split into smaller parcels for housing development and that the land can return to agricultural use when the solar facility is decommissioned at the end of its 35-year lease.[80]

County planners raised concerns about the rezoning because solar facilities are not listed among the comprehensive plan's uses for rural lands.[81] The current 2045 comprehensive plan describes rural lands as "areas containing farms, forests and scattered houses, exclusively outside of the [Public Service Area], where a lower level of public service delivery exists or where utilities and urban services do not exist and are not planned for in the future,"[82] and where "[l]and

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[75] VA. CODE ANN. § 15.2-2223(A) (2018).
[76] VA. CODE ANN. § 15.2-2232(A) (2020).
[77] VA. CODE ANN. § 15.2-2232(H)(2020).
[78] *Id.*
[79] Em Holter, *James City County Approves Racefield Drive Solar Farm*, VA. GAZETTE (Mar 11, 2022), https://www.dailypress.com/virginiagazette/va-vg-jcc-racefield-solar-approval-0312-20220311-a6iyy3xol5aupha3zk34yez4rq-story.html.
[80] *Id.*
[81] *Id.*
[82] PLAN. DIV., JAMES CITY CNTY., OUR COUNTY, OUR SHARED FUTURE: COMPREHENSIVE PLAN LU-36 (2021) (emphasis added), https://jamescitycountyva.gov/3683/The-Plan (scroll down to "Chapters and Appendices," and click Chapter 10, "Land Use").

preservation, especially of prime farmland soils, is of utmost importance."[83] It allows, in addition to traditional agricultural and forestry uses, "certain uses which require very low intensity settings relative to the site in which it will be located," but does not mention solar development directly.[84] James City County's case shows that, while the comprehensive plan offers general guidelines for land use, the language is not binding on the governing body.

B. Ordinances

Ordinances, in contrast to comprehensive plans, are enforceable and provide localities with the opportunity to establish clear requirements for constructing and maintaining solar facilities. A number of Virginia counties have adopted or considered adopting ordinances that specifically address solar development. Ordinances offer an opportunity for a locality to define where solar can be sited; set forth what kinds of buffers, height and setback requirements, or mitigation plans will be required; and incorporate plans for the decommissioning process pursuant to state law.[85] Ordinances adopted to address the siting of renewable energy facilities shall be consistent with the Commonwealth Clean Energy Policy, provide reasonable criteria for the protection of the locality that are to be addressed in the siting of such facilities, and include provisions establishing reasonable requirements concerning siting including provisions limiting noise, requiring buffer areas and setbacks, and addressing decommissioning.[86]

For example, in Gloucester County, a local ordinance restricts total land percent per zone that can be devoted to solar facilities, requires a decommissioning plan that must meet specific requirements and be approved at the same time as the site plan, requires soil and groundwater testing, and prescribes impact mitigation measures such as vegetation buffers and setbacks, among other provisions.[87] Gloucester's adoption of this ordinance may have been influenced by another Hexagon Energy project, which submitted an application for a 100 MW project on 900 acres with 375,0000 solar panels that was planned to be among the largest in the state.[88] Similar to James City County, this project was proposed on land zoned RC-1, or "rural countryside", though Gloucester's ordinance explicitly allows some limited solar development in these districts.[89]

Spotsylvania County also has a comparable solar ordinance including a requirement that a

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[83] *Id.* at LU-9.
[84] *Id.* at LU-36.
[85] *See, e.g.*, VA. CODE ANN. § 15.2-2241.2 (2019) ("Bonding provisions for decommissioning of solar energy equipment, facilities, or devices"); § 15.2-2288.7 (2018) ("Local regulation of solar facilities") (setting forth requirements for permitting roof-top or ground-mounted solar facilities in various zoning classifications).
[86] VA. CODE ANN. § 45.2-1708 (2011) ("Role of local governments in achieving objectives of the Commonwealth Clean Energy Policy").
[87] GLOUCESTER COUNTY, VA., CODE OF ORDINANCES app. B, art. 9, § 9-28 (2022), https://library.municode.com/va/gloucester_county/codes/code_of_ordinances?nodeId=APXBZO_ART9SUDIRE_S9-28SOENFA.
[88] Frances Hubbard, *Planners Consider Changes to Gloucester Solar Ordinance*, DAILY PRESS (July 11, 2017), https://www.dailypress.com/news/gloucester/dp-nws-gloucester-county-solar-ordinance-changes-20170707-story.html. *See also* Frances Hubbard, *Proposed Solar Farm in Gloucester Could be Largest in Virginia*, DAILY PRESS (June 12, 2017), https://www.dailypress.com/news/dp-nws-mid-hexagon-energy-solar-farm-20170609-20170612-jtnjlu3h4rhv5c372v6oo6dd5q-story.html.
[89] GLOUCESTER COUNTY, VA., *supra* note 87, § 9-28(1)(d) ("The following maximum percentages of total land area devoted to community- and utility-scale solar facilities have been established . . . . Rural Countryside (RC-1) district – Two (2) percent.").

solar developer submit a plan for decommissioning the site.[90] However, Gloucester County's ordinance requires that the decommissioning plan include "the estimated decommissioning cost in current dollars, not including any salvage value,"[91] while Spotsylvania County's does not specify whether the developer can include salvage value in its cost estimates.[92] When the Utah-based company sPower created the decommissioning plan for its Spotsylvania Solar Energy facility, it included over $25 million in salvage value in its cost estimates.[93] While Gloucester County would have required the company to provide for the full cost of decommissioning, the Spotsylvania Solar Energy plan satisfied the provisions of Spotsylvania's ordinance. However, because sPower relied for its calculations on recycling capacity that does not yet exist, it may have greatly underestimated the eventual cost of decommissioning.[94] Thus, broad language in ordinances can reduce restrictions and encourage development, but also may leave localities exposed to uncertainties and impacts from solar development.

Another locality that has recently amended its ordinances to address solar development is Mecklenburg County, where the Seven Bridges project, intended for a site along 19,000 feet of the Meherrin River, is one of several solar installations located or attempting to locate in the area.[95] The Mecklenburg County Board of Supervisors considered amending the County Solar Ordinance to restrict the activities of utility-scale solar projects to no more than 500 acres in response to public concern about the expansion of solar development.[96] At a January 2021 County Planning Commission meeting, nonprofit group Friends of the Meherrin cited other nearby projects in asking for an amendment to the county zoning ordinances, such as the Dominion Energy-owned Grasshopper Solar site near Chase City, which had repeated and severe stormwater management issues.[97] The group described runoff from Grasshopper Solar turning local waterways "red with mud" after developers cleared the site of vegetation and installed solar panels.[98] The Mecklenburg County Board eventually voted unanimously to approve the solar ordinance amendment, and also

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[90] Spotsylvania County, Va., Ordinance 23-173 to Amend County Code Chapter 23 to Permit Solar Energy Facilities by Special Use Permit in the Agricultural 2 (A-2), Agricultural 3 (A-3), and Rural (Ru) Zoning Districts (Nov. 9, 2017), https://library.municode.com/VA/Spotsylvania_County/ordinances/code_of_ordinances?nodeId=859131.

[91] GLOUCESTER COUNTY, VA., *supra* note 87, § 9-28(1)(e).

[92] Spotsylvania County, Va., *supra* note 90.

[93] sPOWER INITIAL PROJECT DECOMMISSIONING AND SITE RESTORATION PLAN, SPOTSYLVANIA SOLAR ENERGY CENTER, Attach. A2 (2018), https://www.virginiamercury.com/wp-content/uploads/2019/04/Decommissioning_Plan_12172018.pdf (sPower has since merged with AES Corporation). *See* Collister Johnson, *Spotsylvania's Solar Decommissioning Will Be A Nightmare*, CULPEPER STAR-EXPONENT (June 10, 2021), https://starexponent.com/opinion/commentary-spotsylvanias-solar-decommissioning-will-be-a-nightmare/article_9c3ddeac-1ada-5a2c-bcf7-cf2fed55e644.html.

[94] *See generally* Mark Peplow, *Solar Panels Face Recycling Challenge: Researchers and Companies are Preparing for a Looming Tsunami of Photovoltaic Waste*, CHEM. AND ENG'G NEWS (May 22, 2022), https://cen.acs.org/environment/recycling/Solar-panels-face-recycling-challenge-photovoltaic-waste/100/i18; sPOWER, *supra* note 93 (envisioning recovery of nearly $8.2 million by recycling photovoltaic modules that originally cost approximately $11 million, a loss of only around 25% on 30 year-old equipment.).

[95] Jami Snead, *Local Group Fights to Strengthen Solar Industry Ordinances in County*, SOUTH HILL ENTER. (Jan. 13, 2021), https://www.southhillenterprise.com/news/article_67eeffc2-54f5-11eb-8243-537a2e872ff1.html.

[96] Susan Kyte, *Supes Put Off Action on Solar Rule Changes*, SOVANOW.COM (Dec. 15, 2021), https://www.sovanow.com/articles/supes-put-off-action-on-solar-rule-changes/; *Mecklenburg County Tightens Requirements for Solar Projects*, SOVANOW.COM (April 22, 2022), https://www.sovanow.com/articles/mecklenburg-county-tightens-requirements-for-solar-projects/.

[97] Snead, *supra* note 95.

[98] *Id.*

voted to adopt an ordinance pursuant to a new state law permitting local taxation for solar projects of 5 MW or less.[99]

C. Siting Agreements and Conditional Use Permits

Localities also have opportunities to address solar development impacts using other tools, such as siting agreements. Virginia law requires that an applicant for a solar project or an energy storage project must give the host locality written notice of intent to locate there and request a meeting to discuss and negotiate a siting agreement.[100] The law also provides that "Nothing in this article shall affect the authority of the host locality to enforce its ordinances and regulations *to the extent that they are not inconsistent with the terms and conditions of the siting agreement*."[101] Further, if the siting agreement is approved, the solar project is deemed to be substantially in accord with the comprehensive plan.[102]

Siting agreements can be powerful tools for localities to achieve desired results, along with conditional-use or special-use permits and special exceptions. A conditional use permit enables a locality to impose conditions when approving a proposal for development that is not a permitted use under the site's zoning designation. Conditional use permits can provide a "flexible and adaptable" zoning method in light of changing economic or other circumstances.[103] Some localities have approached the issue of managing impacts of large-scale solar with siting agreements and conditional use permits working together, sometimes accompanied by large direct cash incentives.[104] Virginia law grants localities wide latitude in designing conditional use permits, including enforcement powers, which can enable local leadership and staff to balance the

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[99] *Id*. *See also* 2022 Va. Acts Ch. 493 (codified at VA. CODE ANN. § 58.1-2606.1).
[100] VA. CODE ANN. § 15.2-2316.7 (2021).
[101] *Id*. § 15.2-2316.9(B) (2021).
[102] *Id*. § 15.2-2316.9© (2021).
[103] VA. CODE ANN. § 15.2-2296 (1997) ("Frequently, where competing and incompatible uses conflict, traditional zoning methods and procedures are inadequate. In these cases, more flexible and adaptable zoning methods are needed to permit differing land uses and [at] the same time to recognize effects of change. It is the purpose of §§ 15.2-2296 through 15.2-2300 to provide a more flexible and adaptable zoning method to cope with situations found in such zones through conditional zoning, whereby a zoning reclassification may be allowed subject to certain conditions proffered by the zoning applicant for the protection of the community that are not generally applicable to land similarly zoned.").
[104] *See, e.g.*, Susan Kyte, *Randolph Solar Granted Use Permit*, SOVANOW.COM (July 7, 2022), https://www.sovanow.com/articles/randolph-solar-granted-use-permit/ (noting Dominion agreed "to pay Charlotte County $1 million within 45 calendar days after Courthouse Solar begins commercial electrical production" in exchange for county approval of the CUP for Randolph Solar); Em Holter, *$4 Million Deal? King and Queen Considers Solar Company's Incentive Offer*, DAILY PRESS: TIDEWATER REVIEW (Mar 17, 2020), https://www.dailypress.com/tidewater-review/va-tr-kq-solar-farm-incentive-0310-20200317-iddukqrotvbfjkculk7zjx2zse-story.html ("the company returned with an offer the county may not refuse: a $4 million incentive to be paid over three years if the county approves the Walnut Solar facility"); Ashley Hodge, *With No Speakers, Commission Shines Approval on Another Area Solar Project*, GAZETTE-VIRGINIAN (May 20, 2021), http://www.yourgv.com/news/local_news/with-no-speakers-commission-shines-approval-on-another-area-solar-project/article_f165069c-b9a0-11eb-bef0-93c52b5efe3c.html ("beginning the 26th year, the applicant has agreed to provide cash payments to the county. The payment agreement begins with a payment of $9,243.17 and incrementally increases each year until reaching $13,465.56 in year 45."); Randy Arrington, *200 Acres Better Than 20,000… Some Virginia Localities Running to Solar Money*, PAGE VALLEY NEWS (October 29, 2021), https://pagevalleynews.com/200-acres-better-than-20000some-virginia-localities-running-to-solar-money/ (describing a $6 million incentive offered to Page County for approval of the Cape Solar project).

community's needs with a desire for growth and development.[105] Localities also have the authority to grant special exceptions when approving conditional use permits for solar projects, and to include in their zoning ordinances reasonable requirements and provisions for a special exception.[106] A locality may grant a condition that includes "dedication of real property of substantial value" or "substantial cash payments for or construction of substantial public improvements, the need for which is not generated solely by the granting of a conditional use permit, so long as such conditions are reasonably related to the project."[107] Such conditions continue in effect until a subsequent amendment changes the zoning on the property.[108] Thus, siting agreements, conditional use permits and special exceptions can result in welcome revenue for localities, but they also can outlast initial land leases for solar developments, so localities must consider long-term consequences as they negotiate terms.

For example, in Charlotte County, the newly-approved Randolph solar project will cover approximately 6,000 acres with an 800 MW array.[109] The County approved a conditional use permit for the project in exchange for $1.5 million in direct payments prior to construction and another $5.6 million during construction, which is scheduled to start as early as 2025.[110] In the draft siting agreement posted on the County's website, very few conditions were imposed other than acknowledgement of state and federal oversight, while the locality agreed broadly to "take no action intended to frustrate or prevent" any necessary approvals for the life of the project, a period of up to thirty-five years.[111]

In comparison, a solar development project in Henry County initially planned for approximately 1,200 acres received significant pushback from the community because of its size and visual impact on a rural, traditionally agricultural community.[112] After negotiations with the County, the developer agreed to reduce the size of the project to around 400 acres, and also

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[105] *See, e.g.*, VA. CODE ANN. § 15.2-2299 (1997) ("The zoning administrator is vested with all necessary authority on behalf of the governing body of the locality to administer and enforce conditions attached to a rezoning or amendment to a zoning map . . . .").

[106] VA. CODE ANN. § 15.2-2288.8.A ("Special exceptions for solar photovoltaic projects.").

[107] *Id*. at B.

[108] *Id*. at C.

[109] Kyte, *supra* note 104. *See also* Crystal Vandegrift, *Randolph Solar Approved: Tactics in Play Questioned*, FARMVILLE HERALD (July 15, 2022), https://www.farmvilleherald.com/2022/07/randolph-solar-approved-tactics-in-play-questioned/; Letter from Emil Avram, Vice President – Bus. Dev., Va. Elec. and Power Co., to Daniel Witt, Cnty. Adm'r, Charlotte Cnty. and Hon. Gary D. Walker, Chairman, Charlotte Cnty. Bd. of Supervisors, regarding Courthouse Solar Siting Agreement (June 21, 2022) (on file with Charlotte County, Virginia), https://www.charlotteva.com/temporary/Courthouse%20Solar%20Commitment%20Letter%20for%20Randolph%20Solar%206-21-2022.pdf ("If (i) the County approves the conditional use permit for the Randolph Solar Project and approves a siting agreement for that project substantially in the form attached to this letter, (ii) Dominion thereafter acquires the Randolph Solar project from SolUnesco, and (iii) the SCC issues a final order granting Dominion a CPCN to construct the Courthouse Solar Project as a 167 MWAC solar generation facility, Dominion will deliver to the County the Payment in two installments, with the first installment of $500,000.00 being paid within ten (10) business days of a final order from the SCC granting the CPCN for the Courthouse Solar Project (the 'First Half Payment') and the second installment of $500,000.00 being paid on anniversary of the date that First Half Payment is made.").

[110] Kyte, *supra* note 104. *See also* Siting Agreement between Randolph, Va., LLC, and Charlotte Cnty. Bd. of Supervisors (June 22, 2022) (approved July 5, 2022) (on file with Charlotte County, Virginia), https://www.charlotteva.com/temporary/Randolph%20Solar%20Draft%20Siting%20Agreement.pdf.

[111] Siting Agreement between Randolph, Va., LLC, and Charlotte Cnty. Bd. Of Supervisors, *supra* note 109.

[112] Bill D. Wyatt, *Plans Approved for Another Solar Farm in Axton*, DANVILLE REG. & BEE (Jan. 31, 2022), https://godanriver.com/news/state-and-regional/plans-approved-for-another-solar-farm-in-axton/article_b63c363c-8293-11ec-bc40-2b666305d660.html#tracking-source=home-top-story.

committed pursuant to a siting agreement to pay $1 million in three payments prior to completion of the project.[113] The parties estimated that the County would receive annual revenue of $270,000 from a machinery and tools tax for the duration of thirty years, with an additional $180,000 over the lifetime of the facility.[114] In addition to the reduction in the development's size and the payments from the developer, the County also imposed four additional limitations before greenlighting the project: (1) setbacks, (2) conservation easements, (3) areas adjacent to residential neighborhoods not to be developed with panels, and (4) vegetative buffer areas.[115]

These cases demonstrate that localities are responding to local concerns about solar development, and that they possess the ability through comprehensive planning, ordinances, siting agreements, and conditional use permits to impose restrictions or set certain standards for permitting solar energy facilities.

IV. CONSERVATION OF NATURAL AND CULTURAL RESOURCES

Balancing solar development with the preservation of farmland and forest land is one of the most significant challenges for developers, lawmakers, and regulators in Virginia. Based on the Virginia Statewide Land Cover Dataset (VaLCD), approximately 58% of solar facilities in Virginia have disturbed farmland and almost 25% have impacted forested land.[116] This Part analyzes the adverse impacts of solar development on forestland and farmland and discusses the challenge of balancing clean energy and land conservation goals.

A. Competition Between Agricultural and Solar Uses

In Virginia, new utility-scale solar development projects tend to be built on level, recently active croplands with high suitability for agricultural activities, setting the stage for inescapable conflicts between agriculture and solar facilities.[117] The Virginia Agricultural Model from Virginia ConservationVision displays the quality of agricultural land and croplands on which solar facilities have been built.[118] It shows close to 61% of the agricultural land used for solar installations is

[113] *Id.* ("[T]he [378-acre] request for rezoning to accommodate a solar farm operation on Thursday was less than a third of the size of the two requests combined by both companies that had petitioned the Board in November."). *See also* VA. CODE ANN. § 15.2-2316.7 (requiring an applicant for a solar or energy storage project to negotiate a siting agreement with the host locality, which may include terms and conditions including mitigation, financial compensation to the locality, or assistance in the deployment of broadband.).
[114] Wyatt, *supra* note 112.
[115] *Id.*
[116] Aaron R. Berryhill, Utility-Scale Solar in Virginia: An Analysis of Land Use and Development Trends 23 (May 2021) (Master of Urban and Regional Planning Capstone Project, Virginia Commonwealth University) (VCU Scholars Compass), https://scholarscompass.vcu.edu/cgi/viewcontent.cgi?article=1043&context=murp_capstone; *see also* VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION, VIRGINIA CONSERVATIONVISION AGRICULTURAL MODEL (2015), https://www.dcr.virginia.gov/natural-heritage/vaconvisagric.
[117] Berryhill, *supra* note 116, at 28 (noting similar conflicts have existed for decades as building construction expanded outward from historical population centers; but a particular issue in the conflict between solar and agricultural uses is the sheer size of the necessary land acquisitions).
[118] *Id.*

high-suitability cropland.[119] The types of crops most likely to be displaced by utility-scale solar installations are corn, soybeans, cotton, and wheat, which are also among the most-planted crops statewide.[120] Prime agricultural land is essential for food and fiber production, but is inherently limited due to topography and human activity, which only increases competition for these parcels.[121]

Developers are incentivized to site solar installations on agricultural parcels because qualities that make them highly suitable for farming also make them ideal for solar.[122] These conditions include sunlight exposure and mild climate,[123] topography, parcel size, and proximity to existing transportation and grid infrastructure.[124] For example, a parcel's slope is a key consideration for both agricultural and solar uses. According to a report produced by Dominion Energy for the Virginia General Assembly, "usable land [for solar] should not exceed 8% slope, and it should require only minimal grading as well as clearing and grubbing."[125] However, with the increasing development of large-scale solar facilities, there are mounting concerns about the impacts on farmland, forests, and water quality.[126]

In one example of this type of conflict in Virginia, in 2015 Accomack County approved one of the largest solar installations ever planned or installed in Virginia: the Amazon Solar Farm – Eastern Shore built by Community Energy Solar.[127] The project has been online since 2016 and supplies electricity to data centers owned by Amazon Web Services, a subsidiary of Amazon.com, under a long-term power purchase agreement.[128] The solar installation is located in an Agricultural Zoning District on part of a 900-acre site made up of seven former farms that historically produced

[119] Berryhill, *supra* note 116, at 28.
[120] *Id.* at 29.
[121] 7 C.F.R. § 657.5 (2022), https://www.ecfr.gov/current/title-7/subtitle-B/chapter-VI/subchapter-F/part-657/subpart-A/section-657.5; NAT. RES. CONSERVATION SERV. CARIBBEAN AREA, PRIME & OTHER IMPORTANT FARMLANDS DEFINITION, https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/pr/soils/?cid=nrcs141p2_037285. *See also* 2022 Va. Acts Ch. 688(1)(J).
[122] Berryhill, *supra* note 116, at 29.
[123] One issue with siting solar in more northern latitudes is snow coverage during the winter, which reduces output, in addition to other issues such as sun angle.
[124] Berryhill, *supra* note 116, at 29.
[125] DOMINION ENERGY, DOMINION ENERGY'S SOLAR ENERGY REPORT TO THE GOVERNOR, CHAIRMEN OF THE HOUSE AND SENATE COMMITTEES ON COMMERCE AND LABOR, AND STATE CORPORATION COMMISSION 18-19 (2018), https://news.dominionenergy.com/download/2018-dominion-energy-solar-report.pdf ("Solar facilities require approximately 8 - 10 'usable' acres per MW of solar. As such, to produce 20 MW of solar power, one needs 160 to 200 acres of land. And, it can't be just any land. Generally, usable land should not exceed 8% slope, and it should require only minimal grading as well as clearing and grubbing. Further, there needs to be good road and highway access to the site, with minimal additional road building required. Subsurface conditions should have sufficient depth to allow driven post installation. And, as one would anticipate, there should be minimal impacts from shading, ruling out many areas that are near trees, buildings, hills/valleys and the like.").
[126] Construction General Permit data maintained by DEQ indicate that the number of permitted solar projects and the amount of land disturbance have increased significantly since early 2019. Data in the custody of the Virginia Department of Environmental Quality, Water Permitting Division.
[127] Pamela A. D'Angelo, *Solar Surge Brings Optimism, Concern, and Uncertainty to Virginia*, FREDERICKSBURG FREE LANCE-STAR (Apr. 7, 2019), https://fredericksburg.com/news/local/solar-surge-brings-optimism-concern-and-uncertainty-to-virginia/article_05356f05-5ee7-5597-a74a-dcc189f0215a.html.
[128] Vaughn, *supra* note 5.

soybeans, wheat, and corn.[129] A primary reason Community Energy Solar selected this particular agricultural site was that it was predicted to produce up to 80 MW of electricity due to its ideal topography.[130] Accomack County officials later voted in January 2017 to remove utility-scale solar and wind farms from the list of allowed uses in the County's Agricultural Zoning District in order to minimize this type of disturbance of agricultural land, stating they were "trying to protect farmland."[131]

Solar development sometimes is sited on previously forested land rather than agricultural fields. Based on the Forest Conservation Values Model, a tool designed by the Virginia Department of Forestry that identifies high-value conservation forests across Virginia,[132] the forest lands converted to solar installations are most likely to be of average or moderate conservation values, rather than the highest.[133] Still, approximately 58% of utility-scale solar projects are located on former forest land.[134] In rural parts of the Commonwealth, some residents have expressed concerns about the common practice of clear-cutting forests to install solar panels.[135]

For example, the Utah-based developer sPower[136] purchased over 6,000 acres of forested land in Spotsylvania County in anticipation of constructing a solar installation consisting of over 1.8 million solar panels; the land had previously been in use as a silviculture tract by a timber company, which clear-cut the property before transferring ownership to sPower.[137] The solar project, touted as the fifth-largest in the nation, largest east of the Rocky Mountains, and covering ten square miles,[138] drew opposition from some residents in the community when sPower sought

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[129] Linda McNatt, *Large-Scale Solar Farm Finds Home on Eastern Shore Farmland*, LANCASTER FARMING (May 13, 2016; updated Aug. 24, 2021), https://www.lancasterfarming.com/large-scale-solar-farm-finds-home-on-eastern-shore-farmland/article_18b3716d-52d9-5f8e-8c43-0930d963f01b.html.

[130] *Id.*

[131] Clara Vaughn, *Future Solar Farms Could be Slowed by Accomack Regulations*, DELMARVA NOW (Jan. 19, 2017). *See also* ACCOMACK COUNTY, VA., CODE OF ORDINANCES, ch.106, art. III (2022), https://library.municode.com/va/accomack_county/codes/code_of_ordinances?nodeId=CO_CH106ZO_ARTIIIAGDIA.

[132] Forest Conservation Value (FCV) Model, *Forestland Conservation: GIS Data Resources*, VA. DEP'T OF FORESTRY, https://dof.virginia.gov/forest-management-health/forestland-conservation/; *See also* Berryhill, *supra* note 116, at 47.

[133] Berryhill, *supra* note 116, at 27.

[134] *Id.* at 23.

[135] *See, e.g.*, Sarah Vogelsong, *Virginia's Biggest Proposed Solar Project is Also Among its Most Contentious Local Land Use Fights*, VA. MERCURY (Feb. 25, 2019), https://www.virginiamercury.com/2019/02/25/virginias-biggest-proposed-solar-project-is-also-among-the-most-contentious-local-land-use-fights/.

[136] *See supra* Part III(B).

[137] Jacob Fenston, *Welcome To Spotsylvania: The East Coast Battleground For Big Solar*, WAMU (Mar. 18, 2019), https://wamu.org/story/19/03/18/welcome-to-spotsylvania-the-east-coast-battleground-for-big-solar/ ("[T]housands of acres have already been clear-cut in preparation for the project (by the current owner, a timber company, getting ready to sell)."). *See also* Application of Pleinmont Solar, LLC et al., filed with the State Corporation Commission for certificates of public convenience and necessity for a 500 MW solar generating facility in Spotsylvania County, Case No. PUR-2017-00162 2 (Aug. 8, 2018), https://scc.virginia.gov/docketsearch/DOCS/3n2s01!.PDF ("The Site is rural, consisting primarily of cleared forest and timber land."). *See generally* Amelia Tilson, *Spotsylvania Mega Solar Project: Helping or Hurting? Highlighting Issues Within the University of Richmond and sPower's Mega Solar Plant in Spotsylvania County, Virginia*, ARCGIS STORYMAPS (Apr. 26, 2021), https://storymaps.arcgis.com/stories/7fad969f546b49eca10bde751810fd83.

[138] Fenston, *supra* note 137.

rezoning and special-use permits in 2018 and 2019.[139] Residents who lived near the planned solar installation expressed concern that the size of the facility was not compatible with the agricultural and historical nature of Spotsylvania County.[140] Despite these concerns, the County approved the project. As of the time of publication of this paper, at least one part of the site is active, and three others are described by the developer as complete.[141]

B. Competing Demands of Solar Uses and Land Conservation

Environmentally responsible solar development requires balancing clean energy and land conservation goals. Adding new solar utility infrastructure can help Virginia meet the clean energy targets set by the VCEA, but Virginia also prioritizes land preservation and natural resource conservation.[142] Replacing forests and farmland with solar panels also may reduce natural water filtration and increase sediment and nutrient-laden runoff, which could hamper Virginia's efforts to meet its 2025 Chesapeake Bay cleanup goals.[143]

Another example of the kind of balancing necessary to reconcile competing environmental and clean energy goals is the tension between preserving forests and agricultural soils that can sequester carbon and building solar facilities that can reduce carbon emissions. Solar panels can reduce existing carbon emissions if their electricity replaces electricity created by burning fossil fuels, and an 8 MW solar generation facility could offset about nine times more carbon than the trees which the solar facility would replace.[144] Yet that figure does not fully account for other benefits of a forest, such as the carbon sequestered by other forest flora, fauna, and soil ecosystems, the cooling effect of trees, or the protection of nearby waterways.[145]

Some states, such as Maryland, Minnesota and New Jersey, have tried to reconcile conservation and solar development with varying levels of success. In 2020, the Maryland

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[139] Scott Shenk, *Massive Spotsylvania Solar Plant is Online*, FREDERICKSBURG FREE LANCE-STAR (July 29, 2021), https://fredericksburg.com/news/local/massive-spotsylvania-solar-plant-is-online/article_9d7118ea-2de0-5895-b5ce-cefd4e380727.html.

[140] Vogelsong, *supra* note 135.

[141] Shenk, *supra* note 139. *See also* AES Stakeholder Relations, *You're Invited to the Spotsylvania Energy Center Ribbon Cutting!* (June 28, 2022), https://www.aes.com/spotsy-ribbon-cutting; *see also* AES, *Virginia* (2022), https://www.aes.com/virginia (noting the expected operational date for the Spotsylvania Solar Energy Center as Q4 of 2023.).

[142] *See, e.g.*, VA. CODE ANN. § 10.1-1105 (mandating that the State Forester shall "develop and implement forest conservation and management strategies to improve wildlife habitat and corridors"); § 10.1-104.6:1 (establishing the ConserveVirginia program "for the creation, maintenance, operation, and regular updating of a data-driven Geographical Information Systems model to prioritize potential conservation areas across the Commonwealth that would provide quantifiable benefits to the citizens of Virginia.").

[143] Sarah Vogelsong, *One of This Year's Biggest Solar Bills is All About Forests and Farms: Virginia Lawmakers Try to Balance Conservation and Clean Energy Priorities*, VA. MERCURY (Mar. 10, 2022), https://www.virginiamercury.com/2022/03/10/one-of-this-years-biggest-solar-bills-is-all-about-forests-and-farms/.

[144] *See* Frequently Asked Questions, *How Much Carbon Dioxide Is Produced Per Kilowatthour of U.S. Electricity Generation?*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/tools/faqs/faq.php?id=74&t=11; *see also* Naila Moreira, *Down to Earth: A Choice: Forests or Solar Panels?*, DAILY HAMPSHIRE GAZETTE (Oct. 10, 2018), https://www.gazettenet.com/which-to-choose-forests-or-solar-20732082. *See generally* Clare Crosby et al., Carbon Sequestration and its Relationship to Forest Management and Biomass Harvesting in Vermont (2010) (Final project produced by students in Winter 2010 ENVS401 senior seminar, Middlebury College) (on file with Middlebury College Special Collections) (Internet Archive), https://archive.org/details/bd_s7_envs401_carbon_sequestration_2010/mode/2up.

[145] Crosby et al., *supra* note 144.

Department of the Environment denied permits for two large solar projects that would have cleared woodlands, citing harmful water quality impacts.[146] Preserving ecosystems and native flora is a primary concern that Minnesota also has addressed by requiring all utility-scale solar facilities to submit vegetation management plans detailing how a site will be vegetated, maintained, and monitored over time.[147] A complete and approved management plan is required prior to the issuance of a site permit.[148] Minnesota appears to be enjoying some success with its program, which offers the possibility of managing the site using both vegetative cover and livestock: in one industry report, "[the operator's] grazing program doubled each of the last three years, and the company now manages 1,000 four-legged 'technicians'—grazing more than 2,000 acres of pollinator-friendly solar. The cost to [the operator] is less than or equal to the typical lawn-mowing approach."[149] The Minnesota vegetation management plan is similar in concept to the mitigation plan proposed in Virginia's HB 206.[150]

In December 2019, Virginia's DCR and DEQ published a manual modeled on Minnesota's pollinator-friendly vegetation program. The Virginia "Pollinator Smart" manual gives localities and developers the information they need to make vegetation decisions that promote native species preservation and pollinator conservation in addition to reducing vegetation management costs. The Virginia program is currently voluntary, but similar measures could be required.[151]

New Jersey highlights an additional concern in its law: preserving agricultural land for agricultural use. To accomplish that goal, New Jersey prohibits the siting of solar projects on lands designated as "Green Acres, Pinelands Preservation Area, Pinelands Forest Area, Freshwater/Coastal Wetlands, Highlands Preservation Area, Forested Lands, Preserved Farmland, or Prime agricultural soils and soils of statewide importance located within an Agricultural Development Area."[152] Under New Jersey's Solar Act of 2021, out of the state's total land designated under one of the above categories, only up to 2.5% can be allocated to developing solar installations with generating capacities exceeding 5 MW.[153] Furthermore, the law prohibits developing "grid supply solar facilities" on preserved farmland.[154] These restrictions have been coupled with an aggressive push to site solar on previously disturbed lands such as former landfills, simultaneously alleviating both land-use conflicts and community concerns.[155]

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[146] Timothy Wheeler, Maryland denies permits for solar projects that sought to clear forests, BAY JOURNAL (Aug. 30, 2019), https://www.bayjournal.com/news/energy/maryland-denies-permits-for-solar-projects-that-sought-to-clear-forests/article_210db53d-2cc9-5731-85cd-ba4d70aa07e0.html.

[147] DIV. OF ENERGY RES., MINN. DEP'T OF COM., GUIDANCE FOR DEVELOPING A VEGETATION ESTABLISHMENT AND MANAGEMENT PLAN FOR SOLAR FACILITIES (2021), https://apps.commerce.state.mn.us/eera/web/project-file/11702.

[148] *Id.*

[149] Tom Karas, *The Weekend Read: The Ground Beneath*, PV MAGAZINE (Oct. 24, 2020), https://www.pv-magazine.com/2020/10/24/the-weekend-read-the-ground-beneath/.

[150] *See supra* Part II.

[151] D. DEBERRY ET AL., VA. DEP'T OF CONSERVATION AND RECREATION AND VA. DEP'T OF ENV'T QUALITY, VIRGINIA POLLINATOR-SMART SOLAR INDUSTRY: COMPREHENSIVE MANUAL (Nat. Heritage Tech. Rep. 19-21, Version 1.2 2019), https://www.dcr.virginia.gov/natural-heritage/document/solar-site-comprehensive-manual.pdf.

[152] N.J. STAT. ANN. § 48:3-119 (West 2021).

[153] *Id.*

[154] N.J. STAT. ANN. § 48:3-114 (West 2021).

[155] Nichola Groom, *Special Report: U.S. Solar Expansion Stalled by Rural Land-Use Protests*, REUTERS (Apr. 7, 2022), https://www.reuters.com/world/us/us-solar-expansion-stalled-by-rural-land-use-protests-2022-04-07/ ("New Jersey, for instance, became a major market for solar despite the state's dense development, primarily by putting projects on landfills or other disturbed land.").

C. Alternative Approaches: Brownfields Sites and Distributed Solar

To avoid disturbing prime forested and agricultural lands, solar developers and localities should consider siting new solar projects on degraded lands or "brownfields" such as former industrial sites, landfills, or mined areas, provided appropriate environmental controls are in place to mitigate adverse effects. Additionally, distributed solar is another option that could be explored more in Virginia to ease the pressure to develop large solar facilities in rural communities.

Importantly, there is precedent for addressing industrial site and mined land decommissioning. Two federal laws, the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (known as CERCLA, or "Superfund")[156] and the Surface Mining Control and Reclamation Act of 1977 (SMCRA)[157] are likely to be invoked in converting historically disturbed lands to solar facilities. Both may offer tools for use by states and localities, particularly in designing mitigation strategies that incorporate decommissioning, such as bond requirements and succession language to permit continued oversight as business entities and assets change.

1. Brownfields and Previously Mined Sites

The U.S. Environmental Protection Agency (EPA) defines a brownfield as a "property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant."[158] In 2018, the EPA identified over 80,000 brownfields and municipal solid waste landfills across the country that could potentially be used for renewable energy facilities, many of which are in rural areas.[159]

Brownfields can be attractive to renewable energy developers for several reasons. First, existing infrastructure at these sites may help reduce construction costs and shorten development timelines.[160] Second, developers can often acquire or lease degraded lands at a lower cost than undisturbed sites, improving the financial viability of the projects up front.[161] Third, many potentially contaminated or underused sites are found to require little or no remediation before being returned to productive use, while others have more significant challenges.[162] Even if sites are free of contamination, such sites can be visually unappealing, and communities may benefit

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[156] 42 U.S.C. §§ 9601-9675 (2018).
[157] 30 U.S.C. §§ 1201-1328 (2018).
[158] U.S. ENV'T PROT. AGENCY, OVERVIEW OF EPA'S BROWNFIELDS PROGRAM (2022), https://www.epa.gov/brownfields/overview-epas-brownfields-program.
[159] Lucia Woo, *Considerations for Solar Developers When Siting Projects on Landfills and Brownfields*, SOLAR POWER WORLD (Sept. 9, 2020), https://www.solarpowerworldonline.com/2020/09/considerations-for-solar-developers-when-siting-projects-on-landfills/.
[160] U.S. ENV'T PROT. AGENCY, WHAT IS RE-POWERING (2021), https://www.epa.gov/re-powering/what-re-powering#why.
[161] *See generally Brownfields for Sale*, VA. DEP'T OF ENV'T QUALITY, https://sites.vedp.org/deq (accessible through VA. DEP'T OF ENV'T QUALITY, LAND REMEDIATION – BROWNFIELDS, under "Resources," https://www.deq.virginia.gov/land-waste/land-remediation/brownfields).
[162] U.S. ENV'T PROT. AGENCY, *supra* note 158. One consideration in Virginia may be "gob" ("garbage of bituminous") piles consisting of accumulated spoil, the waste rock removed during coal mining which can include toxic materials. The demand for siting solar projects on top of gob piles is not high because the sites would need to be contoured and stabilized, but Senate Bill 120 (2022) directs Virginia Energy to identify the volume and number of such waste coal piles and develop options for their removal, including the use of waste coal for the generation of electricity, 2022 Va. Acts Ch. 711. As these piles are used and removed, the sites may become more suitable for solar projects.

from the site's return to active use for a new purpose.[163] According to the EPA, land revitalization can increase residential property values near brownfield sites by 5% to over 15% when cleanup is completed.[164] Therefore, brownfield redevelopment efforts often gain support from communities that are directly affected by the potentially contaminated lands' adverse environmental impacts or blight.[165]

The Virginia legislature has acted to promote renewable energy development on brownfields, targeting the many former mine sites in Virginia's Southwest region. In January 2021, Delegate Terry Kilgore introduced House Bill 1925 to establish the Virginia Brownfield and Coal Mine Renewable Energy Grant Fund, which awards grants on a competitive basis to renewable energy projects located on brownfields or previously mined lands, subject to the availability of federal funds.[166] In addition to creating the grant program, the legislation required the Virginia Department of Energy to consult with various stakeholders to develop an online handbook for renewable energy development on brownfields and previously mined lands.[167] The draft handbook, completed in July 2022, provides useful information for local and state officials and developers, including permitting and reclamation requirements for renewable energy projects on brownfields, as well as policy recommendations.[168]

In addition, the Virginia Department of Environmental Quality has proposed guidance reclassifying brownfields and reclaimed coal fields as "redevelopment" rather than new development, which would reduce the stormwater management regulations' water quality improvement requirement.[169] DEQ also has developed a Brownfields Dashboard showing potential brownfield redevelopment sites in Virginia.[170]

EPA's RE-Powering America's Land Initiative also encourages renewable energy development on brownfields.[171] The initiative identifies the renewable energy potential of these sites and provides resources for communities and developers interested in repurposing disturbed sites for renewable energy development.[172] As part of this effort, the EPA collaborated with state

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[163] U.S. ENV'T PROT. AGENCY, RE-POWERING AMERICA'S LAND: POTENTIAL ADVANTAGES OF REUSING POTENTIALLY CONTAMINATED LAND FOR RENEWABLE ENERGY (2012), https://www.epa.gov/sites/default/files/2015-04/documents/contaminated_land_resuse_factsheet.pdf.

[164] U.S. ENV'T PROT. AGENCY, BROWNFIELDS PROGRAM ENVIRONMENTAL AND ECONOMIC BENEFITS (2022), https://www.epa.gov/brownfields/brownfields-program-environmental-and-economic-benefits.

[165] U.S. ENV'T PROT. AGENCY, *supra* note 163.

[166] VA. CODE ANN. § 45.2-1725 (instructing Virginia Energy to administer the grant program, which will award $500 per kilowatt for renewable energy projects located on previously coal mined lands, and $100 per kilowatt for projects located on brownfields. The maximum award is $35 million per year, and of this amount, $20 million will be reserved for projects sited on previously coal mined lands. However, if less than $20 million is distributed to projects on previously coal-mined lands in a given year, remaining funds may be reallocated to other brownfield projects.).

[167] VA. CODE ANN. § 45.2-1725(E).

[168] *Id. See also* VA. DEP'T OF ENERGY, DRAFT H.B. 1925 HANDBOOK, https://energy.virginia.gov/public/documents/2022/HB1925%20Handbook%20Draft_050422.pdf.

[169] *See* Draft Guidance Memo No. 22-2012, *supra* note 63, at §§ 4.303, 4.304 (stating that the post-development total phosphorus load should be reduced at least 20% instead of up to 80% for a fully-paved new development site), https://www.deq.virginia.gov/home/showpublisheddocument/15584/637931518610630000.

[170] *See* VA. DEP'T OF ENV'T QUALITY, Virginia Brownfields Information, https://vadeq.maps.arcgis.com/apps/dashboards/c64d99e227ff42d895d7d5b7d63bd437.

[171] U.S. ENV'T PROT. AGENCY, *supra* note 158.

[172] U.S. ENV'T PROT. AGENCY, RE-POWERING SITE PROFILE PAGE, https://ordspub.epa.gov/ords/cimc/f?p=CIMC:REPOWER:::::P6_REFERENCE::26385.

agencies, including in Virginia, to identify potential sites.[173] Additionally, the EPA has a Brownfield Grant Funding Program that provides direct funding for brownfields assessment, cleanup, training, and research.[174] In 2021, EPA announced the selection of several counties in Virginia to receive $1.5 million in grant awards for brownfields assessment and cleanup funding.[175] The funding will support Northampton and Pittsylvania counties, the Southside Planning District Commission (Brunswick, Halifax, and Mecklenburg counties) in conjunction with DEQ, and the City of Staunton to conduct these assessment and cleanup activities.[176]

New Jersey, as described above, is not alone in successfully converting brownfields for solar energy generation.[177] In 2009, solar energy companies Exelon and SunPower Corporation planned a utility-scale urban solar power plant at a former industrial site on Chicago's South Side.[178] The industrial site was described as "environmentally and economically blighted" before being converted to a so-called "brightfield."[179] During the cleanup process, to comply with Illinois standards, the solar project contractors removed, among other contaminated materials, 4,700 tons of soil, three 55-gallon sealed drums containing solid waste, and insulation suspected of containing asbestos.[180] At the time it was constructed, SunPower was the largest urban solar installation in the U.S.[181] Its 32,000 photovoltaic panels provide 10 MW of energy, enough for 1,500 local homes, using advanced GPS tracking systems to tilt the panels and improve efficiency.[182]

In Virginia, The Nature Conservancy (TNC) is working to convert six previously mined sites into solar installations. In 2019, TNC acquired 253,000 acres of forest in far Southwest Virginia and Tennessee, referred to as the Cumberland Forest Project. The land included the former Red Onion mine and other abandoned mining sites scattered across three counties in two states. Solar developers, including Dominion Energy and Sun Tribe, have partnered with TNC and identified these abandoned mine sites as potentially suitable for solar energy because they contain large, flat areas exposed to direct sunlight that are close to transmission lines.[183] The developments are still in the planning stages, but they have substantial backing from utility partners. If the Cumberland Forest Project pilot is successful, siting solar installations on abandoned mined lands

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[173] U.S. ENV'T PROT. AGENCY, RE-POWERING SITE PROFILE PAGE, https://ordspub.epa.gov/ords/cimc/f?p=CIMC:REPOWER:::::P6_REFERENCE::26385.
[174] U.S. ENV'T PROT. AGENCY, TYPES OF EPA BROWNFIELD GRANT FUNDING (2022), https://www.epa.gov/brownfields/types-epa-brownfield-grant-funding.
[175] News Release, U.S. Env't Prot. Agency, EPA Announces the Selection of Four Communities in Virginia to Receive $1.5 Million in Brownfields Assessment and Cleanup Funding (May 12, 2021), https://www.epa.gov/newsreleases/epa-announces-selection-four-communities-virginia-receive-15-million-brownfields.
[176] *Id.*
[177] *See supra* Section IV(B).
[178] News Release, Exelon, Exelon and SunPower to Develop Nation's Largest Urban Solar Power Plant(Apr. 22, 2009), https://www.exeloncorp.com/newsroom/Pages/pr_20090422.aspx.
[179] SUNPOWER, EXELON, SUNPOWER BUILD NEW LANDMARK ON CHICAGO'S SOUTH SIDE WITH 8MWAC PV PLANT, https://us.sunpower.com/sites/default/files/media-library/case-studies/cs-exelon-and-sunpower-build-chicago-south-side-8mwac-solar-pv-plant.pdf.
[180] *Id.*
[181] Jared L. Green, *Cities Use Brownfields to Go Solar*, SMARTCITIESDIVE, https://www.smartcitiesdive.com/ex/sustainablecitiescollective/cities-use-brownfields-go-solar/23753/.
[182] *Id.*
[183] Elizabeth McGowan, *Meet the Virginia Conservationist Trying to Turn Old Coalfields into Solar Farms,* ENERGY NEWS NETWORK (Sept. 29, 2021), https://energynews.us/2021/09/29/meet-the-virginia-conservationist-trying-to-turn-old-coalfields-into-solar-farms/.

could prove to be a model for adaptive reuse of Virginia's former mines and a focal point for developer incentives.

An additional significant development in the potential use of brownfields in Virginia came when the state announced that its agency Virginia Energy (formerly the Department of Mines, Minerals, and Energy) had been awarded over $22 million by the U.S. Department of Energy to reclaim and repurpose abandoned mine lands, which represents a significant influx of resources to an existing state program that usually distributes around $4 million a year to mitigate safety hazards and address environmental issues.[184]

2. Distributed Solar

Rural residents can be concerned about the impacts of solar energy facilities partly because utility-scale projects might disrupt fragile ecosystems and damage arable farmland or historically or culturally important sites on a large scale.[185] One alternative to large installations on rural lands is the use of distributed solar in densely populated areas. Placing the solar installations close to sources of demand and transmission infrastructure offers potential energy cost savings for residents in addition to alleviating pressure on rural lands.[186]

Unlike other markets, such as California and New England, that historically have had more robust incentives for solar, Virginia has taken fewer steps to incentivize distributed energy.[187] Virginia has also seen longstanding debates about how much energy should be net metered.[188] Other issues associated with distributed solar include questions surrounding ownership of solar infrastructure, difficulties in connecting to the transmission grid due to utility pushback[189] and lack of regional capacity, volatility in energy production and consumption related to low capacity for

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[184] Robyn Sidersky, *Va. Receives $22.7M to Reclaim Abandoned Mine Lands: Federal Funding Aims to Attract Projects, Job Opportunities in SWVA*, VA. BUS. (July 6, 2022), https://www.virginiabusiness.com/article/va-receives-22-7m-to-reclaim-abandoned-mine-lands/.

[185] *See, e.g.*, Alex Brown, *Locals Worry Wind and Solar Will Gobble Up Forests and Farms*, PEW TRUSTS (Apr. 30, 2021), https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2021/04/30/locals-worry-wind-and-solar-will-gobble-up-forests-and-farms.

[186] U.S. ENV'T PROT. AGENCY, DISTRIBUTED GENERATION OF ELECTRICITY AND ITS ENVIRONMENTAL IMPACTS (2022), https://www.epa.gov/energy/distributed-generation-electricity-and-its-environmental-impacts.

[187] *See, e.g.*, Sarah Vogelsong, *Long-Sought Changes to Rooftop Solar Laws Offer a New Vision of Virginia's Electric Grid*, VA. MERCURY (Dec. 2, 2020), https://www.virginiamercury.com/2020/12/02/loosening-distributed-solar-laws-long-sought-by-the-industry-requires-a-re-envisioning-of-the-electric-grid/ (stating that "[f]or utilities like Dominion Energy and Appalachian Power Company, which long balked at the idea of widespread distributed solar, the rise of this form of energy will require close examination of the distribution and transmission systems that carry power around the state. . . . The biggest problems for solar advocates were administrative charges the utilities would be allowed to levy on customers, customer definitions that would exclude residents of duplexes from participating in shared solar programs, limits on how many months bill credits could carry over, and wording that would allow utility affiliates to participate in utility-managed programs.").

[188] *See* discussion of net metering, *supra* Section II(A).

[189] *See* Gilbert Michaud, *Community Shared Solar in Virginia: Political and Institutional Barriers and Possibilities*, POL., BUREAUCRACY, AND JUST., Jan. 2016, at 6-7, https://www.researchgate.net/publication/351087634_Community_Shared_Solar_in_Virginia_Political_and_Institutional_Barriers_and_Possibilities (noting that "[investor-owned utilities (IOU)] . . . assert that [net-energy metering (NEM)] under-cuts utility revenues by allowing customers to rid the fixed costs that apply since such customers still have to be connected to the grid. These IOUs also often argue that expanded solar deployment may cause technical problems for the transmission and distribution grids . . . . [IOUs] have been pursuing monthly 'stand-by charges' for solar PV owners using NEM, as a way to help pay for the existing generation infrastructure they need for upkeep.") (internal citations omitted).

energy storage, and low compensation for net metering programs.[190]

In July 2022, the SCC approved a $55.10 minimum bill for a new community solar program, ostensibly to offset the costs of the program being offered free of charge to low-income households[191] but far in excess of the typical minimum for electric customers in Virginia ($6.58).[192] Community or shared solar generally involves "multiple households agreeing jointly to purchase a portion of the electricity generated by a solar array" in situations where individual solar arrays are not feasible, such as on a rooftop.[193] Critics of the new minimum or base charge that all users will have to pay in addition to and regardless of electrical use charges decry the high cost of participation, including several state legislators who firmly assert "we did not pass legislation to create a program that exists in name only,"[194] referring to bills passed in 2020 to create the shared solar initiative.[195] Utilities argue that minimum bills are necessary to cover the costs of users participating in the electrical transmission grid and to avoid burdening non-participating customers, though evidence was not offered to the SCC to support those concerns.[196]

V. RECOMMENDATIONS

There are multiple actions that the General Assembly and localities can take to address the conflict between the escalating demand for solar energy facilities and increasing recognition of the need to address the impacts of utility-scale solar on rural communities. This Part discusses some

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[190] *See* GREER RYAN, CTR. FOR BIOLOGICAL DIVERSITY, THROWING SHADE: 10 SUNNY STATES BLOCKING DISTRIBUTED SOLAR DEVELOPMENT 1, 3 (2018), https://www.biologicaldiversity.org/programs/population_and_sustainability/energy/pdfs/ThrowingShade2018.pdf.

[191] Staff Report, *Regulators Approve $55 Minimum Bill for Dominion Shared Solar. It Would be the Most Expensive in the Country, Critics Say*, VA. MERCURY (July 9, 2022), https://www.virginiamercury.com/blog-va/regulators-approved-a-55-minimum-bill-for-dominions-shared-solar-program-critics-say-its-the-most-expensive-in-the-country/.

[192] Schedule of Virginia Residential Rates Effective for Usage On and After 01-01-22, Va. Elec. and Power Co. (filed Dec. 9, 2021), https://cdn-dominionenergy-prd-001.azureedge.net/-/media/pdfs/virginia/residential-rates/schedule-1.pdf ("Basic Customer Charge $6.58 per billing month").

[193] *Id.*

[194] Letter from Senator Scott A. Surovell, Delegate Richard C. Sullivan, Jr., and Senator Emmett W. Hanger, Va. Gen. Assemb., to Hon. Judith Williams Jagdmann and Hon. Jehmal T. Hudson, Comm'rs, State Corp. Comm'n, regarding VA Docket PUR-2020-00125 (Apr. 6, 2022) (on file with Virginia Mercury), https://www.virginiamercury.com/wp-content/uploads/2022/07/lawmakers_letter.pdf.

[195] H.B. 1634, 2020 Gen. Assemb., Reg. Sess. (Va. 2020) (enacted as 2020 Va. Acts Ch. 1238) (codified at VA. CODE ANN. § 56-594.3 (2021); S.B. 629, 2020 Gen. Assemb., Reg. Sess. (Va. 2020) (enacted as 2020 Va. Acts Ch. 1264) (codified at VA. CODE ANN. § 56-594.3 (2021).

[196] Sarah Vogelsong, *On Shared Solar, Dominion and Solar Groups Clash Over $75 Minimum Bill Proposal*, VA. MERCURY (May 19, 2021), https://www.virginiamercury.com/2021/05/19/on-shared-solar-dominion-and-solar-groups-clash-over-75-minimum-bill-proposal/ ("As with rooftop solar, community solar customers receive bill credits for the energy their solar panels feed back into the grid in an arrangement known as net metering. Those credits reduce the revenues utilities receive, and many claim they also result in customers not paying their fair share of the costs of operating the larger grid.") (emphasis added); *see also* Staff Report, *supra* note 191 ("Dominion had argued that the high minimum bill [for participation in community solar projects] was necessary to avoid burdening customers who choose not to participate, but as opponents and the SCC hearing examiner himself noted, the company failed to produce any evidence that quantified how much of a cost shift would be borne by nonparticipating customers. 'It is correct that the record does not include evidence that specifies exactly what cost shift would occur under Dominion's proposed minimum bill, or any of the other proposed minimum bills,' wrote SCC Hearing Examiner Mathias Roussy, who nevertheless recommended the $55 minimum charge. Dominion had pushed for an even higher minimum bill of $75.10.") (emphasis added).

of those potential actions that lawmakers, regulators, and localities could undertake.

A. Using Pre-Construction Planning and Land Use Controls

Solar projects can bring a variety of environmental and economic benefits to communities in Virginia. However, with the development of large-scale solar facilities, there are increasing concerns about the impacts on farmland, forests, and water quality. To address these concerns, lawmakers and regulators should require an assessment of environmental impacts from utility-scale solar projects and implementation of attendant mitigation plans. They also should empower localities to implement controls tailored to the community's individual needs.

HB 206, enacted into law in 2022, takes steps to establish mitigation standards for renewable energy projects in Virginia. However, the law only applies to small renewable energy projects subject to DEQ's Permit By Rule (PBR) process.[197] It does not affect projects that are greater than 150 MW and need to go through the SCC for approval.[198] To address adverse impacts on agricultural farms and forestlands from larger solar projects, state lawmakers and regulators should authorize the SCC to require developers to design and implement effective mitigation plans beyond current requirements, with meaningful oversight regardless of project size.

Localities should also take advantage of their ability to alleviate environmental impacts by crafting siting agreements and permits that thoroughly address maintenance, decommissioning, and management, in addition to considering cash payments from developers. Some caution is warranted in determining the long-term value of the project to the locality and its residents in light of decommissioning challenges that may continue to evolve with potential improvements in salvage and recycling technology, as well as likely environmental costs to remediate the land once the solar infrastructure is removed.

Furthermore, localities should designate areas on their comprehensive plans suitable for renewable energy projects to reduce adverse environmental impacts, particularly in socially vulnerable communities, and to avoid threatening prime agricultural and forest lands. The agricultural community must be included in discussions both about land uses that may be permitted in areas designated as rural and about potential long-term site impacts from solar facilities. Localities also can insist on mitigation measures such as buffers and conservation areas using tools such as conditional use permits and ordinances to impose conditions on solar facilities and reduce impacts on nearby properties and waterways. Additionally, Virginia Energy, the Department of Agriculture and Consumer Services, and the Department of Forestry can work with the Virginia Association of Counties to develop model ordinance and CUP language which rural localities could rely on to develop their own requirements.

A solar facility developer must, by law, negotiate a siting agreement with the host locality for the development. Siting agreements can be a powerful tool, and localities should use them to achieve terms that protect the community's long-term interests. Because Virginia law states that a siting agreement takes precedence when the agreement and zoning ordinances are in conflict, and because siting agreements and CUPs can outlast a typical solar lease, localities should consider adding language to the agreement that retains some rights to amend the agreement should conditions change in future. Further, localities should consider whether the siting agreement

[197] 2022 Va. Acts Ch. 688, *supra* note 25; VA. CODE ANN. § 45.2-1725, *supra* note 166.
[198] 2022 Va. Acts Ch. 688, *supra* note 25.

addresses long-term costs or uncertainties in, for example, decommissioning. Because localities have the authority to enter into a new siting agreement for each solar development, the agreement allows individual localities with specific priorities some latitude in determining the conditions of the development. Such a locality-by-locality, individualized approach allows Virginia residents to have a stronger say in how their neighborhoods, including farmlands and forestlands, are impacted by solar development. However, particularly in a Dillon Rule[199] state, it is important that the legislature remain prepared to act quickly if localities express uncertainty about their authority to regulate particular solar facility impacts.

B. Requiring Post-Construction Maintenance and Monitoring Plans

Oversight bodies should incentivize developers to design ongoing maintenance plans that restore and protect local ecosystems over the lifetime of the solar installation. An important mitigation strategy can be co-locating solar panels and agriculture, which means integrating vegetated land cover types such as grassland and crop cultivation into solar facilities.[200] This mitigation method can help support pollinator populations, restore habitat, and even diversify the local ecosystem. Additionally, broad-leaf plants located underneath solar panels increase efficiency by cooling the panels: the leaves release water vapor, which research suggests improves panel efficiency by 3% in the summer months and 1% over the course of the year.[201] In short, planting native grasses and wildflowers helps preserve biodiversity, improve soil quality, and increase carbon sequestration, and can positively impact electricity generation through ambient cooling effects.[202]

Since the implementation of the voluntary standard in Minnesota, roughly 50% of new solar projects in the state have been developed as pollinator-friendly.[203] Virginia regulators should consider mandating or incentivizing similar mitigation strategies at the state level to help restore and sustain the local ecosystem. Such a measure could also help address conflicts between landowners or localities that lease land to solar developers for revenue and residents who want to maintain the bucolic nature of their community.

Additionally, robust mitigation plans with a mandatory maintenance provision can help to

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[199] GREG KAMPTNER, ALBEMARLE COUNTY ATTORNEY'S OFFICE, THE ALBEMARLE COUNTY LAND USE LAW HANDBOOK 5-1, (2022), https://www.albemarle.org/home/showpublisheddocument/13198/637854472357870000 ("The Dillon Rule (also referred to as 'Dillon's Rule') provides that a locality's governing body has only those powers expressly granted by the General Assembly, powers necessarily or fairly implied from the express powers, and powers that are essential to the declared objects and purposes of the locality. *Bragg Hill Corporation v. City of Fredericksburg*, 297 Va. 566, 578, 831 S.E.2d 483, 489 (2019). . . . The Dillon Rule is also a rule of strict construction – if there is a reasonable doubt whether the legislative power exists, the doubt must be resolved against the locality's governing body. *Sinclair v. New Cingular Wireless*, 283 Va. 198, 204, 720 S.E.2d 543, 546 (2012). Virginia is one of approximately half the states that follow the Dillon Rule.").

[200] *See, e.g.*, DEBERRY ET AL., *supra* note 151.

[201] Katie Siegner et al., Maximizing Land Use Benefits from Utility-Scale Solar: A Cost-Benefit Analysis of Pollinator-Friendly Solar in Minnesota 6–7 (Dec. 2019) (Project by students in a fall 2018 Energy Economics and Policy Analysis course at Yale University) (on file with the Yale Center for Business and the Environment), https://cbey.yale.edu/sites/default/files/2019-12/MaximizingLandUseBenefitsFromUtility-ScaleSolar_0.pdf; *see also* DEBERRY ET AL., *supra* note 151, at 9.

[202] DEBERRY ET AL., *supra* note 151.

[203] *Id.*

ensure that land is not destroyed by topsoil removal, compaction,[204] and the lack of addition of nutrients to the soil for the term of the lease, and can be converted back to farmland or habitat for native species when the solar arrays are decommissioned. For large-scale solar projects in Virginia, maintenance requirements will be critical to ensure that, even in the absence of extensive programming like pollinator-friendly plantings and cooperative agriculture, basic protections like buffer plantings will survive and continue to provide promised benefits.

C. Incentivizing Solar Development on Brownfields, Previously Disturbed Lands and Lands with Steeper Grade Slopes

Virginia should encourage use of incentives for solar development on brownfields, landfills, abandoned mine lands, and other disturbed sites, including offering expedited permitting if feasible. The Commonwealth should conduct additional research on the use of solar arrays that can be built on steeper grade slopes, which would reduce competition for flat farmland.[205] The state also should seek complementary federal support for these efforts while imposing requirements that disincentivize the conversion of farms and forests of high conservation value.[206] Development of utility-scale solar on brownfields and other marginal lands can relieve pressure on rural, traditionally agricultural communities concerned about a shift in land use and loss of crop-producing lands. Developing solar on brownfields instead of clearing new space creates the double benefit of returning disturbed sites to productive use and keeping new developments from infringing on existing priority conservation areas.[207]

The state should continue to support tools to help developers and localities identify sites such as brownfields and avoid conservation priority areas. In one example, DEQ's "brownfields interactive story map" gives a visual summary of successful brownfield redevelopment projects.[208]

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[204] *See, e.g.*, Muscle Shoals Solar, LLC, Muscle Shoals Solar Project Draft Environmental Assessment 2-8 (2019), https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/environmental-reviews/muscle-shoals-solar-project/muscle_shoals_solar_farm_draft_ea.pdf?sfvrsn=532bef2a_2 (describing grading and removal of topsoil as a common industry practice to produce level sites). *But see* LESLEE CRAWFORD, ET AL., U.S. FOREST SERVICE, GENERAL TECHNICAL REPORT RMRS-421, SOIL SUSTAINABILITY AND HARVEST OPERATIONS: A REVIEW 2 (2021) https://www.fs.fed.us/rm/pubs_series/rmrs/gtr/rmrs_gtr421.pdf (describing how other types of solar site clearing, including timber harvesting, can also cause soil damage and compaction).

[205] Chris Crowell, *How solar trackers overcome undulating terrain – and avoid grading costs*, SOLAR BUILDER (Oct. 27, 2021), https://solarbuildermag.com/solar-trackers/how-solar-trackers-overcome-undulating-terrain-and-avoid-grading-costs/.

[206] *See generally* Sarah Vogelsong, *Panel Says Virginia Should Do More to Promote Solar Development on Brownfields*, VA. MERCURY (May 2, 2022), https://www.virginiamercury.com/2022/05/02/panel-says-virginia-should-incentivize-solar-development-on-brownfields/ ("[D]espite interest in repurposing brownfields as brightfields, Virginia offers no incentives for solar developers to choose those sites in favor of others. A 2021 law, HB1925, sponsored by Del. Terry Kilgore, R-Scott . . . created a program to offer grants for 'renewable energy projects located on brownfields or previously coal mined lands.' But while the proposal got unanimous support from the General Assembly, the program remains unfunded and the law specifies that state monies can't be allocated to it 'unless federal funds are available to cover the entire cost of such allocation.' 'Currently, there are no incentives for solar on brownfields,' said Virginia Department of Energy spokesperson Tarah Kesterson in an email.").

[207] *See generally* Dwayne Yancey, *Some in Southside Feel Overwhelmed by Solar Farms*, VA. CARDINAL (May 4, 2022), https://cardinalnews.org/2022/05/04/some-in-southside-feel-overwhelmed-by-solar-farms/ (discussing takeaways from recent solar energy research in Virginia).

[208] *Virginia Brownfields Success Stories*, VA. DEP'T OF ENV'T QUALITY, https://vadeq.maps.arcgis.com/apps/MapJournal/index.html?appid=ef7fac9ee33d4d0aa580a32ae33b0a8a#

Similar tools to map potential sites could capture important suitability markers, such as slope or proximity to power transmission lines, to make it easy for localities to identify parcels likely to be targeted for solar development and, if desired, use zoning and land use tools that steer development away from potential conflicts between solar and agriculture or land conservation.

D. Incorporating Consideration of Externalities

As a result of an influx of applications from solar installations attempting to connect to "the grid," or the regional transmission system for electrical energy distribution in Virginia, the operator, PJM Interconnection LLC (PJM), instituted a two-year pause on processing requests for connection.[209] This unprecedented measure prompted a review by the Federal Energy Regulatory Commission (FERC) to overhaul review procedures and thereby avoid "creating barriers to the efficient and cost-effective integration of generation resources."[210] Accordingly, policymakers, localities, and developers working to implement the VCEA's renewable energy targets should take into account the logistical limitations in connecting new solar facilities to the regional power grid. Furthermore, state agencies could consider inviting representatives from PJM to stakeholder meetings to identify whether areas of cooperation exist to help reduce the backlog.

E. Addressing Barriers to Distributed Solar

Despite a lack of enthusiasm from Virginia utilities regarding distributed solar,[211] there is impetus for building distributed generation capacity and thereby reducing the pressure to rely upon utility-scale solar in rural communities.[212] State legislators should continue to implement robust opportunities to study the issue because of the potential to benefit Virginia communities by lowering energy costs, particularly for low-income Virginians, and realizing environmental goals. Specifically, Virginia should examine barriers to distributed solar for residential and community development and identify opportunities to reduce obstacles, such as (1) increasing compensation for net metering and improving participation, (2) incentivizing the development and use of energy storage infrastructure, and the use of existing rooftops and parking lots for solar arrays, and (3) addressing legal issues associated with residential solar such as ownership, maintenance, transmission, and connection.

VI. CONCLUSION

Renewable energy development is key to ensuring Virginia's sustainable future. Solar projects diversify the electricity grid, help Virginia meet its clean energy goals as set forth in the VCEA, generate economic benefits for local communities, and can provide potential benefits to the environment. However, utility-scale solar installations can also generate adverse environmental and ecological impacts such as soil erosion, increased stormwater runoff, and

(accessible through VA. DEP'T OF ENV'T QUALITY, LAND REMEDIATION – BROWNFIELDS, under "Success Stories Storymap," https://www.deq.virginia.gov/land-waste/land-remediation/brownfields).

[209] Rachel Novier Marsh, et al., *FERC Proposes Overhaul of Interconnection Procedures*, XII NAT'L L. REV. 174 (June 23, 2022), https://www.natlawreview.com/article/ferc-proposes-overhaul-interconnection-procedures.

[210] *Id.*

[211] *See e.g.*, Michaud, *supra* note 189.

[212] *See e.g.*, VA. CODE ANN.§ 56-594(E), *supra* note 16; Letter from Senator Scott A. Surovell, Delegate Richard C. Sullivan, Jr., and Senator Emmett W. Hanger, Va. Gen. Assemb., to Hon. Judith Williams Jagdmann and Hon. Jehmal T. Hudson, Comm'rs, State Corp. Comm'n, *supra* note 194.

disturbances to or loss of farmlands and forests, as well as economic or social impacts, such as loss of historic or culturally important land and loss of pastoral character in rural areas.

Therefore, responsible solar development requires balancing clean energy goals with environmental, conservation, and preservation goals, as well as showing respect for Virginia's diverse communities that often feel strong connections to local landscapes and industries. To develop solar energy in Virginia while mitigating its adverse impacts, there are many steps that Virginia lawmakers, regulators, and developers can take, such as (1) implementing clear and effective mitigation requirements and other conditions using state law and local land use management tools, (2) supporting the efforts of localities to mitigate negative impacts and mediate community conflict, (3) understanding the broader regional and national challenges associated with rapid renewable energy development, (4) incentivizing alternative siting on previously disturbed lands, and (5) continuing to invest in technological advancements to support the expanding solar industry. By delineating clear roles and authorities for state and local governments to pursue these steps while supporting appropriate incentives for solar developers to avoid priority conservation lands, Virginia can be a leader in establishing a balanced solar industry that provides a renewable energy source with appropriate sensitivity to environmental protection and conservation goals as well as local community priorities.