

**A Report to the
Honorable Glen A. Youngkin, Governor
of the Commonwealth of Virginia
and Chairs of the House Committees on Agriculture, Chesapeake and
Natural Resources and Commerce and Energy and the Senate
Committees on Agriculture, Conservation and Natural Resources, and
Commerce and Labor**

**A Study of Small Renewable Energy Projects:
Impact on Natural Resources
HB 206**

**Prepared by
the Virginia Department of Environmental Quality
with the assistance of the
Institute for Engagement & Negotiation at the University of Virginia
on behalf of the**

HB 206 Solar Regulatory Advisory Panel

December 1, 2022

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Abstract

The Department of Environmental Quality (DEQ) is submitting this report as required by HB 206 to describe the progress made thus far by DEQ and the HB 206 stakeholder’s group in developing regulations under DEQ’s Small Renewable Permit by Rule (PBR) Program to mitigate for the presumed significant adverse impact caused by solar projects that disturb more than 10 acres of prime agricultural soils and 50 acres of contiguous forest land. To date, the workgroup has failed to reach consensus on any major issue. As illustrated in the report, however, the process has resulted in a thorough discussion of the relevant topics and positions of all the stakeholders, laying the foundation for future work. In the absence of further direction from the General Assembly (GA), DEQ shall reconvene the stakeholder group early next year and continue the process of developing and promulgating the regulations asked for by HB 206 by the statute’s December 2024 deadline.

Executive Summary

In the 2022 session, the GA passed House Bill 206 (HB 206), which directed DEQ to promulgate regulations under its PBR Program to mitigate for the presumed significant adverse impact caused by solar projects that disturb more than 10 acres of prime agricultural soils and 50 acres of contiguous forest land. A copy of HB 206 is included in Appendix 1. HB 206 arose from the prospect of conflict between two high priority goals for the Commonwealth and the hope that these conflicts can be resolved in a way that both goals are achievable. One of these goals is the protection of Virginia’s prime agricultural soils and forest lands. These lands are vital because they have the largest economic impact in the Commonwealth and once altered, cannot be restored. The other goal is to support and encourage the growth of alternative energy, particularly solar, which is a vital pathway for achieving the goals of the Virginia Clean Economy Act, increasing Virginia’s energy independence, and creating green jobs. HB 206 also asked DEQ to consider the degree to which localities can require mitigation measures of solar projects more stringent than those required by the PBR program.

HB 206 required DEQ to convene a diverse stakeholder advisory panel to support the development of regulation which would enable both sets of goals to be achieved. The regulations are due by December 2024. Specifically, HB 206 required the advisory panel to consider criteria for determining mechanisms that could be used in a mitigation plan for solar projects defined as having significant adverse impacts and, determining under what circumstances may projects below the thresholds in HB 206 (10 acres of prime soils or 50 acres of forest) have a significant adverse impact. For an excerpt from the full charge of HB 206, see the “RAP Charge” below in the report.

DEQ began assembling a Regulatory Advisory Panel (RAP) in the spring of 2022. DEQ contracted with the Institute for Engagement & Negotiation (IEN) at the University of Virginia to provide facilitation and overall process design and support. DEQ and IEN successfully convened the RAP for five meetings from June through September 2022. The overall RAP consisted of 94

participants across a broad range of interests and 29 Subject Matter Experts from two universities and nine state agencies. Also on the RAP were eight representatives of county and municipal governments. A full list of RAP participants is attached in Appendix 1.

At its first meeting, the RAP agreed to work toward the group's charge: to ***“complete the work that the advisory group is directed to do under HB 206.”*** The RAP was initially divided into five workgroups (WG), then consolidated into four, each of which explored a specific topic. The workgroups sought to develop the range of issues that would need to be discussed and as much as possible work toward consensus recommendations. The workgroups focused on these issues:

- Workgroup 1: Avoidance and Minimization
- Workgroup 2+3: Mitigation + In Lieu Mitigation
- Workgroup 4: Defining significant adverse impacts for projects *under* 10 acres of prime soil or *under* 50 acres of forest
- Workgroup 5: Local Control

The workgroups of the RAP used the first three meetings to develop their proposals. Each workgroup presented its proposals to the full RAP in the fourth meeting. A fifth meeting of the full RAP was held to work toward consensus on those proposals that offered the greatest opportunity for agreement, as well as those of the highest importance.

While there was skepticism among all members about the ability for any consensus to be achieved at this early stage, the process was more successful than anticipated in identifying key issues that stakeholders felt would be important to address in the regulations. Out of 41 proposals developed by the workgroups and considered by the full RAP, four proposals successfully achieved consensus, 14 proposals were not far from consensus, and 23 were not close to consensus. All 41 proposals and their corresponding ideas and concerns are included in the report below. While some of the proposals have significant overlap, each workgroup was attempting to address different key issues and anticipate different types of impacts, so there are important nuances in each proposal that will need to be integrated in the coming year.

In the process of developing these proposals, the RAP identified, cataloged, and began to explore a complex, wide range of issues and concerns. The work ahead in the coming year is to further understand, amend proposals to address remaining concerns, and identify, where possible, to integrate the overlapping proposals.

Several key areas of concern emerged from this work. While most were not resolved, this effort laid the groundwork for greater understanding and discussion in the coming year.

- ***Definitions:*** Many of the 41 proposals focused on the issue of clarifying key definitions, as these will create the boundaries of what aspects of solar development will or will not require mitigation. Because of terms that have already been defined in other regulations, the question frequently discussed was whether to rely on those existing

definitions or whether there is a need to modify for these specific circumstances. While some may wish to use existing definitions, others believe the circumstances warrant further specificity. Also, while some believe the proliferation of definitions is to be avoided, others have said that program administrators would not be burdened as they would only be responsible for the definitions that apply to their program.

- **Education/Best Practices:** The development of a guide for local governments was identified as an important way to support rural localities, which currently don't have staff or resources to research how to best navigate and work with the rapid increase in proposed solar projects, in a way that will enable them to safeguard the interests of their community.
- **Functions & Values:** The RAP agreed that a core issue was to agree on a list of functions and values of prime agricultural soils and forest lands that would need to be inventoried to determine the degree of significant adverse impact a solar project would have and whether mitigation would be needed. This is a complex and contentious issue: because some of the functions and values are addressed and considered in other programs, some members opposed having them considered by this program, while others felt that the discussion was essential regardless of the overlap.
- **Mitigation Issues:** Once the functions and values that require mitigation are determined by a desk review, it must then be determined what kinds of mitigation are possible and effective – whether onsite, offsite, in-lieu, or something else entirely. While these are extremely complex issues that will not be resolved easily, the workgroups identified a number of options for consideration in the coming year. An essential first task is to derive an agreed upon definition of what mitigation means.
- **Permit-by-Rule (PBR) and Notice of Intent (NOI):** Another key concern involves consequences and impacts on local governments of the current PBR process. Local governments want to encourage solar developers to come to the locality as early as possible in the developers' decision-making process and to consult with the locality on whether a proposed project presents potential conflicts with the locality's plans, community goals and sentiments, or environmental justice concerns. Solar developers, in turn, are concerned about issues related to confidentiality and making their plans public too early so as not to tip off competitors or unduly raise real estate values in the targeted area. Resolution of these competing interests will require more discussion.
- **Verification/Analysis:** Functions and values that require mitigation are determined by a desk review. A concern has been raised that data from that review related to the status of the soils and forests must be verified for accuracy. How such verification is to be done, and who should do it, are questions that need to be resolved. Additionally, there is a desire for this regulatory program to be periodically evaluated to determine what is or is not effective and amended to reflect new technologies and methodologies.

In summary, the RAP process was successful in identifying key issues and a range of options for consideration.

Core concerns of solar development proponents are that development affecting prime agricultural and forest lands be treated fairly, and to avoid constraints imposed beyond the development of land for other types of uses. A key concern for solar developers is that the PBR regulatory framework not become so onerous and complex that solar energy is no longer economically feasible in Virginia.

Advocates for the protection of prime agricultural soils and forest lands have other core concerns, primarily that these resources cannot be replaced. Once prime agricultural soil has been impacted through subsoil compaction and loss of structure, they may be restored to similar uses but may never be restored to their pre-disturbance levels of prime productivity. Because Virginia's largest industry covering the largest land area is agriculture and forestry, the loss of prime soils and forest lands is seen as a direct threat to these important economic and natural resources, and must be avoided, minimized when possible, and mitigated when impact cannot be avoided.

Paradoxically, these competing interests all reflect core goals of the Commonwealth. This RAP has created the foundation for continuing discussions around these competing goals. Future discussions to find a path forward that will honor both goals will be worth the challenge.

Background and Context

HB 206 amends Va. Code § 10.1197.6 relating to DEQ's small renewable energy PBR program. The PBR program¹ applies to solar, wind, and electrical storage energy projects with a maximum generation or storage capacity of 150 megawatts. The program does not apply to projects with a storage capacity of less than five megawatts. The PBR program, is an accelerated permitting process by which these projects can obtain authorization through DEQ in lieu of the traditional State Corporation Commission (SCC) process for obtaining a Certificate of Public Convenience and Necessity (CPCN).

Through the PBR process, DEQ coordinates reviews from the Department of Historic Resources, Department of Wildlife Resources, and Department of Conservation and Recreation to ensure potential significant impacts to cultural resources or threatened and endangered species are avoided or mitigated. Some of the requirements for the PBR include conducting surveys for cultural and biological resources, developing mitigation plans if necessary, receiving local government approval, and conducting interconnection studies and obtaining interconnection agreements.

In recent years there has been increasing concern that the existing PBR process does not adequately account for the impacts of increased land use for solar installations. As solar

¹ <https://www.deq.virginia.gov/permits-regulations/permits/renewable-energy>. Accessed October 28, 2022.

development increases, the competition posed by these projects for prime agricultural soils and forests also increases, as well as the overall impact on the environment and the community. HB 206 was passed to further investigate this issue and to develop regulations as necessary.

HB 206 aims to revise the existing PBR process for small solar projects by requiring an assessment of the impact of a proposed project on prime agricultural soils and forest lands. It tasked DEQ with the development of regulations both to:

- 1) Assess the potential for **disturbance** from small solar installations to prime agricultural soils or forest land causing a **significant adverse impact**; defining what constitutes a significant adverse impact, and,
- 2) Determine **reasonable mitigation strategies** for small solar installations. This would include identifying potential mitigation strategies, determining what level of mitigation is required, and how the efficacy of mitigation efforts would be measured.

Under HB 206, a project is defined as having a significant adverse impact, per se, if it disturbs more than 10 acres of prime agricultural soils or 50 acres of contiguous forest lands, or if it would disturb forest lands enrolled in a project for forestry preservation pursuant to subdivision 2 of § 58.1-3233. If these conditions are met, a solar project would be required to create a mitigation plan to address their impact.

“**Prime agricultural soils**” are defined in HB 206 as soils recognized as prime farmland by the U.S. Department of Agriculture. These soils have a superior physical and chemical composition, leading to high production capabilities without extensive interventions (such as pesticides, fertilizer, labor, etc.). Prime agricultural soils include soils currently in use in lumber and livestock production; they do *not* include land already committed to urban development or water storage.

HB 206 defines “**Forest lands**” as having the same meaning as set forth in [§ 10.1-1178](#). “Forest trees” are defined within the law as a stand of potential, immature, or mature commercial timber trees. This *may* also include shade trees of any species around cities, towns, and highways if they pose an infectious disease risk or insect risk as defined within the law to nearby timber trees or stands. For the purposes of HB 206, a parcel of land must also be considered forest land if it was forested at least two years prior to the receipt of a permit application to DEQ.

HB 206 specifically directed that in developing these regulations the following factors be considered:

- (i) mitigation techniques to avoid, minimize, or otherwise mitigate any such impacts;
- (ii) the cost of mitigation relative to the project cost, including the costs of proposed mitigation to rate payers;
- (iii) onsite minimization of impacts;

- (iv) payment of in-lieu fee funds for mitigation;
- (v) the impact on the local agricultural or forestry economy when such soils or lands are displaced;
- (vi) the loss of ecosystem benefits;
- (vii) noncompliance with Virginia's Watershed Implementation Plan III goals on the Chesapeake Bay TMDL,
- (viii) noncompliance with other water quality criteria and standards, and;
- (ix) a process by which an applicant may satisfy its mitigation obligations by agreement with a locality if such mitigation requirements conform to the regulations established by the Department.

HB 206 further directed that the regulations must include reasonable actions to be taken by a PBR applicant to avoid, minimize, or otherwise mitigate any such impacts to prime agricultural soils or forest lands, but in the event that avoidance by the applicant is not reasonable, the applicant shall be afforded the opportunity to minimize or mitigate any significant adverse impacts to prime agricultural soils or forest lands.

Importantly, Enactment Clause 2 of HB 206 mandated that DEQ form a regulatory advisory panel (RAP) to “assist in developing regulations to implement these requirements.” DEQ was tasked with assembling the RAP from a diverse group of representatives from environmental nonprofits, private sector including solar development, trade associations/networks, local government, as well as subject matter experts, in consultation with the Department of Forestry, the State Corporation Commission, the Department of Energy, the Virginia Economic Development Partnership Authority, and other relevant state agencies.

Roles and Responsibilities

In accordance with HB 206, Enactment Clause 2, DEQ assembled a RAP comprised of 94 participants. These included 41 primary members with 24 alternates – representing the interests of agriculture and forestry, environmental organizations, environmental justice, natural and ecological resources, solar development and energy utilities/cooperatives, trade associations representing solar development and energy utilities/cooperatives, and local government, including six counties and two state-wide associations. The full list of participants is provided in Appendix 1. Entities with more than one possible participant were asked to identify a “primary” member tasked with the ongoing assignments of the Solar RAP and consultation with their organization, and one or more “alternate” members who could fill in when the primary member was unable to participate. In addition to the primary and alternate members, 29 Subject Matter Experts (SMEs) representing two universities and nine state agencies were identified to serve as a resource to Solar RAP members; their role was to provide in-depth topical, technical knowledge at meetings, responses to member questions, and feedback on the technical elements of proposals as needed.

Because the Solar RAP operated by consensus, proposals could not be passed by majority vote but instead underwent a process whereby each primary participant's interests must be met such that they are willing to support the proposal. This method of decision-making ensures that uneven representation is not a factor, and that each organization's interests are addressed through a fair process.

The DEQ team was led by the following individuals:

- Michael Dowd, Director of Air and Renewable Energy
- Tamera Thompson, Manager, Office of Air and Renewable Energy Permit Program
- Susan Tripp, Renewable Energy Permit-by-Rule Coordinator
- Amber Foster, Renewable Energy Permit by Rule Coordinator
- Elena Meyer, VCU Doctoral Fellow

The RAP consensus-building process was designed and facilitated by a team from the Institute for Engagement & Negotiation (IEN) at the University of Virginia, led by Tanya Denckla Cobb, Director and Co-Facilitator, Michelle Oliva, Project Consultant and Co-Facilitator, Kelly Altizer, Senior Associate, and Sarah Rizk, Student Research Associate. The IEN team worked in close consultation throughout the process with the DEQ team. See Appendix 1 for a full list of participants and their roles.

DEQ in consultation with the Department of Forestry, the State Corporation Commission, the Department of Energy, the Virginia Economic Development Partnership Authority, and other relevant stakeholders, provided the following charge to the RAP members.

Solar RAP Charge (HB 206, Enactment Clause 2)

The DEQ in consultation with the Department of Forestry, the State Corporation Commission, the Department of Energy, the Virginia Economic Development Partnership Authority, and other relevant stakeholders, provided the following charge to the Solar RAP members, taken from HB206, Enactment Clause 2.

That pursuant to subdivisions B 7 and 8 of § 10.1-1197.6 of the Code of Virginia, as amended by this act, the Department of Environmental Quality (the Department), in consultation with the Department of Forestry, the State Corporation Commission, the Department of Energy, the Virginia Economic Development Partnership Authority, and other relevant stakeholders, shall convene an advisory panel to:

Assist in further developing regulations regarding criteria to determine if a significant adverse impact to prime agricultural soils or forest lands is likely to occur as a result of a proposed solar project that is a small renewable energy project and criteria for an applicant of a solar project to address in a plan to mitigate any significant adverse impacts to soils and lands. In developing regulations regarding plans to mitigate any significant impacts to prime agricultural soils or forest lands, the advisory panel shall

consider, but not be limited to, the following factors in determining appropriate mitigation techniques or criteria to be included in an applicant's mitigation plan:

- (i) the mitigation techniques to avoid, minimize, or otherwise mitigate any such impacts;*
- (ii) the cost of mitigation relative to the project cost, including the costs of proposed mitigation to rate payers;*
- (iii) onsite minimization of impacts;*
- (iv) payment of in-lieu fee funds for mitigation;*
- (v) the impact on the local agricultural or forestry economy when such soils or lands are displaced;*
- (vi) the loss of ecosystem benefits;*
- (vii) noncompliance with Virginia's Watershed Implementation Plan III goals on the Chesapeake Bay TMDL; and*
- (viii) noncompliance with other water quality criteria and standards.*

Such criteria shall include reasonable actions to be taken by the applicant to avoid, minimize, or otherwise mitigate any such impacts to prime agricultural soils or forest lands, but in the event that avoidance by the applicant is not reasonable, the applicant for the solar project that is a small renewable energy project shall be afforded the opportunity to minimize or otherwise mitigate any significant adverse impacts to prime agricultural soils or forest lands.

The advisory panel shall also consider a process by which an applicant may satisfy its mitigation obligations by agreement with a locality if such mitigation requirements conform to the regulations established by the Department pursuant to this enactment and when such mitigation requirements are included in:

- (a) a siting agreement and approved by a local governing body pursuant to subsection B of § 15.2-2316.7 of the Code of Virginia or*
- (b) zoning use conditions approved by the locality pursuant to § 15.2-2288.8 of the Code of Virginia.*

The Department shall adopt such final regulations no later than December 31, 2024. Relevant stakeholders shall include but not be limited to representatives from the Virginia Association of Counties, the Virginia Farm Bureau Federation, the Virginia Agribusiness Council, the Virginia Forestry Association, the Piedmont Environmental Council, The Nature Conservancy, the Virginia Forest Products Association, the Chesapeake Solar and Storage Association, the American Clean Power Association, Advanced Energy Economy, AES Corporation, the Data Center Coalition, solar project engineers, electric utilities, and other stakeholders deemed relevant by the Department, the Department of Forestry, the Department of Energy, the State Corporation Commission, or the Virginia Economic Development Partnership Authority. The advisory panel shall submit a report to the Governor and the Chairmen of the House Committees on Agriculture, Chesapeake and Natural Resources and Commerce and Energy and the

Senate Committees on Agriculture, Conservation and Natural Resources and Commerce and Labor no later than December 1, 2022.

Consensus-Building Process

The Solar RAP members were asked to participate in consensus-building process that would consist of five, day-long public meetings held from June to September 2022. The members were divided by self-selection into workgroups, based on interest and expertise, in which they would work toward the development of consensus-based recommendations. The workgroups were assigned the following topics:

1. **WG-1:** Avoidance and Minimization
2. **WG-2+3:** Mitigation and In-Lieu Mitigation
3. **WG-4:** Defining significant adverse impacts for projects *under* <10 acres of prime soil or <50 acres of forest
4. **WG-5:** Local Control

In the first organizational meeting, primary members expressed the strong desire to combine WG-2 and WG-3, so that they could avoid duplicating effort and lay a common foundation for both mitigation and in-lieu mitigation proposals. This foundation would be to define the functions and values for ecosystem services that would inform whether mitigation or in-lieu mitigation would be required. This and other suggestions throughout the process from RAP members for adapting the process to meet their needs were discussed and adopted by the facilitation team. The RAP members agreed that the configuration and focus of the other three workgroups (WG-1, WG-4, and WG-5) made sense. All members then convened in their workgroups to discuss the assigned topics.

The Issues Matrix below summarizes the HB 206 areas of focus for each workgroup. See Appendix 1: HB 206 RAP Workgroups-Formation and Guidelines for additional information.

FACTORS/ISSUES TO CONSIDER PER HB 206	WG-1 Avoidance & Minimization	WG-2+3 Mitigation & In Lieu Mitigation	WG-4 Define significant adverse impact:	WG-5 Local Control
	Determine appropriate & reasonable mitigation techniques & criteria to be included in mitigation plans for projects with <u>more than 10 acres prime ag soil</u> or <u>more than 50 acres contiguous forest land</u>		For projects disturbing <u>less than 10 acres prime soil</u> or <u>less than 50 acres contiguous forest</u>	
*A project will be deemed to have a significant adverse impact if it would disturb more than 10 acres of prime agricultural soils or 50 acres of contiguous forest lands, or if it would disturb forest lands enrolled in a program for forestry preservation pursuant to subdivision 2 of § 58.1-3233				
Appropriate techniques to avoid & minimize impacts	X			
Appropriate mitigation techniques		X		
Cost of mitigation relative to the project cost, including costs of proposed mitigation to rate payers		X		
Onsite minimization of impacts	X			
Payment of in-lieu fee funds for mitigation		X		
Consider impact on the local agricultural or forestry economy when such soils or lands are displaced			X	X
Consider loss of ecosystem benefits	X	X	X	
Noncompliance w/Virginia's Watershed Implementation Plan III goals on the Chesapeake Bay TMD	[DO NOT VIOLATE]			
Noncompliance w/other water quality criteria and standards	[DO NOT VIOLATE]			
Consider a process by which an applicant may satisfy its mitigation obligations by agreement with a locality if such mitigation requirements (A) conform to the regulations established by the Department pursuant to this enactment and (B) when such mitigation requirements are included in: (a) A siting agreement and approved by a local governing body pursuant to subsection B of § 15.2-2316.7 of the Code of Virginia; or, (b) Zoning use conditions approved by the locality pursuant to § 15.2-2288.8 of the Code of Virginia.				X
Consider Environmental Justice (EJ) impacts	X	X	X	X

Over the course of the first four meetings, each workgroup developed specific proposals for consideration by the full RAP. All workgroups were provided with customized Microsoft SharePoint templates to guide their collaboration while in a group, and to enable their continued collaboration asynchronously without violating Freedom of Information Act (FOIA) or public notice rules. Some workgroups also held additional properly noticed public meetings outside of the full RAP meetings to develop these proposals. Overall, the workgroups submitted 41 proposals for consideration by the entire RAP.

These workgroup proposals were compiled by IEN and shared with the full RAP via a Qualtrics² survey. The goal of the survey was to provide a way for the RAP to continue building understanding about the different interests at stake as well as the potential impacts – including unintended impacts – of different approaches on the dual goals of facilitating solar development and protecting prime agricultural soils and forest lands.

The Qualtrics survey allowed RAP members and their organizations time to read, reflect, and consider their level of support for each separate proposal. Primary members were asked explicitly to consult with their organizations on their responses, so that the survey compilation reflected not individual but organizational responses. In the survey, each primary member or alternate indicated their organization’s level of support for each separate proposal using the consensus scale described below. In addition, for each proposal they were asked to suggest specific language changes that could strengthen the proposal or would increase their organization’s level of support for the proposal. Finally, for each proposal they were provided an opportunity to provide additional points or information about their concerns.

² Qualtrics is a comprehensive survey tool used by the University of Virginia where IEN is located.

The responses from primary members and their organizations were substantive, consisting of more than 150 pages of detailed, technical responses. Prior to the fifth and final meeting of the RAP, IEN collated the Qualtrics survey responses and shared this with all RAP members for review (see Appendix 3: RAP member response from Qualtrics survey compilation).

Below are several tables summarizing the proposals of the workgroups:

Table 1: Complete list of proposals, listed in order by workgroup

Table 2: Complete list of proposals that achieved consensus (4) or close to consensus (14)

- Final consensus (4):
 - One of these achieved consensus through the Qualtrics survey and did not require discussion at Meeting #5.
 - Three of these had not achieved consensus through the Qualtrics survey but during the discussion at Meeting #5 did achieve consensus.
- Close to consensus (14):
 - More than half of these were able to be discussed in Meeting #5, but some were not able to be discussed due to time constraints.

Table 3: Complete list of proposals that did not achieve consensus (23)

Table 4: Complete list of proposals, presented by six high-level issue categories:

- 1) Definitions
- 2) Education/Best Practices
- 3) Functions & Values
- 4) Mitigation Issues
- 5) PBR Process/Notice
- 6) Verification/Analysis

TABLE 1: HB 206 RAP: All Workgroup Proposals (in order by WG)

#	WG #	Proposal #	Proposal Topic	LEVEL OF CONSENSUS			Proposal Category
				GREEN fully support	YELLOW support with reservations: some concerns/ questions	RED cannot support	
Workgroup 1: Avoidance and Minimization							
1	WG-1	1.1	Expanding definition of "disturb"	18	10	4	Definitions
2	WG-1	1.2	Excluding from definition of "disturb"	19	7	6	Definitions
3	WG-1	2	Expanding definition of "avoid"	21	11	0	Definitions
4	WG-1	3	Expanding definition of "minimize"	19	12	1	Definitions
5	WG-1	4	New criteria in mitigation plans	22	8	2	Mitigation Issues
6	WG-1	5	Adding impact analysis (beneficial & adverse) of prime agricultural soils and forest lands on natural resources	20	4	8	Verification/Analysis
7	WG-1	6	Addressing determination of significant adverse impacts to prime agricultural soils and forest lands	22	9	1	Verification/Analysis
8	WG-1	7	Adding to mitigation plan requirements	10	17	5	Definitions
9	WG-1	8	Exception to definition of "disturb"	6	16	10	Definitions
10	WG-1	9	Adding continuous purchasing to "minimize"	6	13	13	Definitions
11	WG-1	10	Analysis of impacts - prime ag soils and forestland	4	19	9	Verification/Analysis
Workgroup 2+3: Mitigation + In Lieu Mitigation							
12	WG-2+3	1	Create a standardized checklist of functions and values	19	12	1	Functions & Values
13	WG-2+3	2	Scoring criteria should be included to easily value prime ag/forest soil	7	23	2	Functions & Values
14	WG-2+3	3	Mitigation value calculated on net difference between current and post construction value	7	16	9	Mitigation Issues
15	WG-2+3	4	Criteria should be objective, simple, and fair	10	15	7	Mitigation Issues
16	WG-2+3	5	Mitigation required locally should be counted in state process	15	11	6	Mitigation Issues
17	WG-2+3	6	Credit should be given if activities will improve F+V	9	16	7	Mitigation Issues
18	WG-2+3	7	Mitigation should be allowed on and off site	20	3	9	Mitigation Issues
19	WG-2+3	8	Mitigation as similar duration to the duration of the impact	3	17	12	Mitigation Issues
20	WG-2+3	9	State mandated mitigation determined case-by-case	7	13	12	Mitigation Issues
21	WG-2+3	10	Payment in lieu	8	20	4	Mitigation Issues
22	WG-2+3	11	State should evaluate program effectiveness	17	14	1	Verification/Analysis
23	WG-2+3	12	Does not cover existing E&S and stormwater	21	6	5	Mitigation Issues
24	WG-2+3	13	Decommissioning as part of mitigation plan	6	14	12	Mitigation Issues
25	WG-2+3	14A	Water	6	10	16	Functions & Values
26	WG-2+3	14B	Nutrients	4	7	21	Functions & Values
27	WG-2+3	14C	Productivity	7	6	19	Functions & Values
28	WG-2+3	14D	Wildfire	7	8	17	Functions & Values
29	WG-2+3	14E	Riparian buffer	9	8	15	Functions & Values
30	WG-2+3	14F	Carbon	7	10	15	Functions & Values
31	WG-2+3	14G	Recreation	4	10	18	Functions & Values
32	WG-2+3	14H	Designated state of federal scenic value	5	9	18	Functions & Values
33	WG-2+3	14I	Rural economy	8	7	17	Functions & Values
Workgroup 4: Significant Impacts Less than 50, Less than 10							
34	WG-4	1	Method for field verification	25	5	0	Verification/Analysis
35	WG-4	2.1	Significant adverse impact definition: C1 cores	6	5	21	Definitions
36	WG-4	2.2	Significant adverse impact definition: C2 cores	6	4	22	Definitions
Workgroup 5: Local Control							
37	WG-5	1	PBR and NOI timeline/steps	27	3	0	PBR Process/Notice
38	WG-5	2	Encouraging earlier NOI submission	16	14	2	PBR Process/Notice
39	WG-5	3	Review results to localities	18	9	5	PBR Process/Notice
40	WG-5	4	PBR template requirements	23	7	2	PBR Process/Notice
41	WG-5	5	Virginia Energy guidebook development	25	5	0	Education/Best Practices

10/14/22

TABLE 2: HB 206 RAP: Proposals with Full Consensus/Close to Consensus

Final consensus (4): One of these achieved consensus through the Qualtrics survey and did not require discussion at Meeting #5. Three of these had not achieved consensus through the Qualtrics survey but during the discussion at Meeting #4 did achieve consensus.

Close to consensus (14): More than half of these were able to be discussed in Meeting #5 and the level of consensus shown represents the final test for consensus at Meeting #5; Those that were not able to be discussed at Meeting #5 due to time constraints show the results from the Qualtrics survey.

	WG #	Proposal #	Proposal Topic	LEVEL OF CONSENSUS			Proposal Category
				GREEN fully support	YELLOW support with reservations some concerns/ questions	RED cannot support	
Proposals with Consensus							
1	WG-1	2	Expanding definition of "avoid"	21	11	0	Definitions
2	WG-4	1	Method for field verification	25	5	0	Verification/Analysis
3	WG-5	1	PBR and NOI timeline/steps	27	3	0	PBR Process/Notice
4	WG-5	5	Virginia Energy guidebook development	25	5	0	Education/Best Practices
Proposals Close to Consensus: Covered in Mtg #5, need more discussion to build agreement							
1	WG-1	1.1	Expanding definition of "disturb"	18	10	4	Definitions
2	WG-1	1.2	Excluding from definition of "disturb"	19	7	6	Definitions
3	WG-1	3	Expanding definition of "minimize"	19	12	1	Definitions
4	WG-1	4	New criteria in mitigation plans	22	8	2	Mitigation Issues
5	WG-1	6	Addressing determination of significant adverse impacts to prime agricultural soils and forest lands	22	9	1	Verification/Analysis
6	WG-1	7	Adding to mitigation plan requirements	10	17	5	Definitions
7	WG-2+3	1	Create a standardized checklist of functions and values	19	12	1	Functions & Values
8	WG-2+3	2	Scoring criteria should be included to easily value prime ag/forest soil	7	23	2	Functions & Values
9	WG-2+3	10	Payment in lieu	8	20	4	Mitigation Issues
10	WG-2+3	11	State should evaluate program effectiveness	17	14	1	Mitigation Issues
11	WG-2+3	12	Does not cover existing E&S and stormwater	21	6	5	Mitigation Issues
12	WG-5	2	Encouraging earlier NOI submission	16	14	2	PBR Process/Notice
13	WG-5	3	Review results provided to localities	18	9	5	PBR Process/Notice
14	WG-5	4	PBR template requirements	23	7	2	PBR Process/Notice

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Table 3: HB 206 RAP: Proposals without Consensus: Have wide differences & need significant discussion to build understanding

None of these proposals were able to be discussed at Meeting #5, and the level of consensus represents the results from the Qualtrics survey.

	WG #	Proposal #	Proposal Topic	LEVEL OF CONSENSUS			Proposal Category
				GREEN fully support	YELLOW support with reservations some concerns/ questions	RED cannot support	
Workgroup 1: Avoidance and Minimization							
1	WG-1	5	Adding impact analysis (beneficial & adverse) of prime agricultural soils and forest lands on natural resources	20	4	8	Verification/Analysis
2	WG-1	8	Exception to definition of "disturb"	6	16	10	Definitions
3	WG-1	9	Adding continuous purchasing to "minimize"	6	13	13	Definitions
4	WG-1	10	Analysis of impacts - prime agricultural soils and forestland	4	19	9	Verification/Analysis
Workgroup 2+3: Mitigation + In Lieu Mitigation							
5	WG-2+3	3	Mitigation value calculated on net difference between current and post construction value	7	16	9	Mitigation Issues
6	WG-2+3	4	Criteria should be objective, simple, and fair	10	15	7	Mitigation Issues
7	WG-2+3	5	Mitigation required locally should be counted in state process	15	11	6	Mitigation Issues
8	WG-2+3	6	Credit should be given if activities will improve F+V	9	16	7	Mitigation Issues
9	WG-2+3	7	Mitigation should be allowed on and off site	20	3	9	Mitigation Issues
10	WG-2+3	8	Mitigation as similar duration to the duration of the impact	3	17	12	Mitigation Issues
11	WG-2+3	9	State mandated mitigation determined case-by-case	7	13	12	Mitigation Issues
12	WG-2+3	13	Decommissioning as part of mitigation plan	6	14	12	Mitigation Issues
13	WG-2+3	14A	Functions & Values: Water	6	10	16	Functions & Values
14	WG-2+3	14B	Functions & Values: Nutrients	4	7	21	Functions & Values
15	WG-2+3	14C	Functions & Values: Productivity	7	6	19	Functions & Values
16	WG-2+3	14D	Functions & Values: Wildlife	7	8	17	Functions & Values
17	WG-2+3	14E	Functions & Values: Riparian buffer	9	8	15	Functions & Values
18	WG-2+3	14F	Functions & Values: Carbon	7	10	15	Functions & Values
19	WG-2+3	14G	Functions & Values: Recreation	4	10	18	Functions & Values
20	WG-2+3	14H	Functions & Values: Designated state of federal scenic value	5	9	18	Functions & Values
21	WG-2+3	14I	Functions & Values: Rural economy	8	7	17	Functions & Values
Workgroup 4: Significant Impacts Less than 50, Less than 10							
22	WG-4	2.1	Significant adverse impact definition: C1 cores	6	5	21	Definitions
23	WG-4	2.2	Significant adverse impact definition: C2 cores	6	4	22	Definitions
Workgroup 5: Local Control							
none in this group							

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Table 4: HB 206 RAP: Types of Proposals: BY HIGH-LEVEL ISSUE AREA CATEGORIES

WG #	Proposal #	Proposal Topic	LEVEL OF CONSENSUS		
			GREEN fully support	YELLOW support with reservations: some concerns/ questions	RED cannot support
Definitions					
WG-1	1.1	Expanding definition of "disturb"	18	10	4
WG-1	1.2	Excluding from definition of "disturb"	19	7	6
WG-1	2	Expanding definition of "avoid"	21	11	0
WG-1	3	Expanding definition of "minimize"	19	12	1
WG-1	7	Adding to mitigation plan requirements	10	17	5
WG-1	8	Exception to definition of "disturb"	6	16	10
WG-1	9	Adding continuous purchasing to "minimize"	6	13	13
WG-4	2.1	Significant adverse impact definition: C1 cores	6	5	21
		Significant adverse impact definition: C2 cores	6	4	22
Education/Best Practices					
WG-5	5	Virginia Energy guidebook development	25	5	0
Functions & Values					
WG-2+3	1	Create a standardized checklist of functions and values	19	12	1
WG-2+3	2	Scoring criteria should be included to easily value prime ag/forest soil	7	23	2
WG-2+3	14A	Water	6	10	16
WG-2+3	14B	Nutrients	4	7	21
WG-2+3	14C	Productivity	7	6	19
WG-2+3	14D	Wildlife	7	8	17
WG-2+3	14E	Riparian buffer	9	8	15
WG-2+3	14F	Carbon	7	10	15
WG-2+3	14G	Recreation	4	10	18
WG-2+3	14H	Designated state of federal scenic value	5	9	18
WG-2+3	14I	Rural economy	8	7	17
Mitigation Issues					
WG-1	4	New criteria in mitigation plans	22	8	2
WG-2+3	3	Mitigation value calculated on net difference between current and post construction value	7	16	9
WG-2+3	4	Criteria should be objective, simple, and fair	10	15	7
WG-2+3	5	Mitigation required locally should be counted in state process	15	11	6
WG-2+3	6	Credit should be given if activities will improve F+V	9	16	7
WG-2+3	7	Mitigation should be allowed on and off site	20	3	9
WG-2+3	8	Mitigation as similar duration to the duration of the impact	3	17	12
WG-2+3	9	State mandated mitigation determined case-by-case	7	13	12
WG-2+3	10	Payment in lieu	8	20	4
WG-2+3	12	Does not cover existing E&S and stormwater	21	6	5
WG-2+3	13	Decommissioning as part of mitigation plan	6	14	12
PBR Process/Notice					
WG-5	1	PBR and NOI timeline/steps	27	3	0
WG-5	2	Encouraging earlier NOI submission	16	14	2
WG-5	3	Review results to localities	18	9	5
WG-5	4	PBR template requirements	23	7	2
Verification/Analysis					
WG-1	5	Adding impact analysis (beneficial & adverse) of prime agricultural soils and forest lands on natural resources	20	4	8
WG-1	6	Addressing determination of significant adverse impacts to prime agricultural soils and forest lands	22	9	1
WG-1	10	Analysis of impacts - prime ag soils and forestland	4	19	9
WG-2+3	11	State should evaluate program effectiveness	17	14	1
WG-4	1	Method for field verification	25	5	0

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It is important to note that, **very early in the process, Solar RAP members agreed that there would not be sufficient time in the five scheduled meetings to resolve the complex issues before them.** They agreed that these proposals would provide a beginning foundation – not an end – for the discussions that would be needed to inform the regulatory process. While members agreed that the dual goals – facilitating Virginia’s alternative solar industry while also protecting its prime agricultural soils and forest lands – are both vital, they also agreed that the “devil is in the details.” Many members expressed that the goal of HB 206 to provide a framework for solar permit-by-rule is daunting, at best. They described how they will need to find a way to protect Virginia’s prime agricultural soils and forest lands while also creating a regulatory framework that does not discourage Virginia’s ability to encourage its alternative solar energy. This will take time. All agreed from the outset that these issues could be explored and laid out during these first meetings but would require far more time and discussion in the coming year to be resolved.

Summary of Recommendations

RAP members dedicated extensive effort to the work, both in and outside of full RAP meetings, during a condensed timeframe and accelerated process intended to interests and concerns of the sectors represented. Members understood that this process could not be completed in the time given but would be a starting point for a discussion that would remain ongoing.

To that end, this record is intended as an educational document only, to reflect where group discussion concluded after five meetings, with the understanding that the stakeholders engaged in this process will need to continue to be engaged in further discussion about the many matters addressed by HB 206.

41 specific proposals across all four workgroup topic areas were developed and considered by the RAP. Of those:

- **4 achieved consensus;**
- **8 were close to consensus;**
- **29 were not close to consensus.**

All proposals and their corresponding ideas and concerns are included below, beginning with those that achieved consensus, followed by those that were close to consensus, and finally those that were not close to consensus. SMEs were asked to provide feedback on the technical elements of the proposals and that input is also included.

Below is a snapshot of each of the proposals, the degree of consensus or lack thereof, as well as a summary of the stakeholder issues and concerns. In Appendix 3 the original stakeholder responses through the Qualtrics survey may be found. Their responses are organized according to the consensus responses, i.e., with those indicating full support (green) grouped together, followed by those indicating some concerns and questions but able to support (yellow), followed by those with too many concerns and questions and unable to support (red).

Proposals Achieving Consensus

Consensus Proposal 1: Avoidance + Minimization (WG 1- Proposal 2)

Expanding definition of “avoid”

Amend 9VAC15-60-[XX] to add the following definition of “avoid:” **

“Avoid” or “avoidance” means, for purposes of acceptable mitigation of “significant adverse impacts” to prime agricultural soils or forest lands, to design or plan for and to implement practices and measures as part of project development that would not cause significant adverse impacts to prime agricultural soils or forest lands, including either of the following practices or measures:

- i. Selecting parcels of land for a project that do not have prime agricultural soils or forest lands; or
- ii. Locating project facilities on parcels that do have prime agricultural soils and forest lands but in a way that does not disturb such prime agricultural soils or forest lands.

** NOTE: This proposal assumes DEQ will define “prime agricultural soils” and “forest land” as they are defined in HB 206.

*Moderately Strong Consensus Achieved
To increase support, the concerns of the “yellows” should be addressed.*

GREEN Fully Support	YELLOW Some concerns and questions but able to support	RED Too many concerns or questions: Cannot Support
21	11	0

Consensus was achieved through the Qualtrics survey, and further discussion by the Committee was not needed. Below is a summary of comments from the Qualtrics survey.

Concerns or clarifications needed to move participants from “can support with reservations” (yellow) to “fully support” (green) this proposal.

Several members indicated that their support for this proposal was contingent upon assurance that it does not change the definition of “significant adverse impact” as it is defined in HB 206.

Another member expressed interest in the definition of “prime agricultural soil” being consistent with the results of the HB 894 workgroup that is currently underway.

One RAP member felt that the definitions offered in this proposal were too specific and suggested that the definitions of “avoid” and “minimize” found in the Bureau of Land Management’s manual on compensatory mitigation should be considered. Within that manual “avoidance” is defined as “avoiding the impact altogether by not taking a certain action or parts

of an action” and “minimize” is defined as “minimizing impacts by limiting the degree or magnitude of the action and its implementation.”³

Two members offered ideas for scenarios in which credit for “avoidance” should be awarded.

- In the first scenario, the member suggested that the 10/50-acre threshold – i.e., the threshold where more than 10 contiguous acres of more of prime agricultural soils or greater than 50 contiguous acres of forest lands are disturbed – should be in consideration. In their view, it may not be possible to avoid all impacts to prime agricultural soils and/or forests, but if the project impacts are below the 10/50 acre thresholds, the project should still get credit for avoidance if avoidance efforts can be demonstrated.
- In the second scenario offered by a member, soil that is identified as “prime agricultural” in a desktop survey but discovered through field verification to be degraded to the point that it would no longer qualify as such, should also mean that prime agricultural land was avoided based on actual site conditions.

Another separate proposal – which did not achieve consensus – pertained to the definition of “disturb.” One member noted a desire to see these definitions tied together, which they recommended could be achieved by substituting “disturb” in the proposal to say:

“Avoid” or “avoidance” means, for purposes of acceptable mitigation of “significant adverse impacts” to prime agricultural soils or forest lands, to design or plan for and to implement practices and measures as part of project development that would not disturb prime agricultural soils or forest lands, including either of the following practices or measures: ...

Another member noted their concern about the ways the definitions of “avoid” and “disturb” were working together in these proposals, specifically that facilities that don’t “disturb” the resource might be granted an exemption from the need for mitigation.

Another member expressed the need for regulatory options for projects to minimize or mitigate impacts because there are relatively few locations suitable for utility-scale solar due to lack of access to transmission capacity. This same member stated that total potential scope of solar development under the Virginia Clean Economy Act represents significantly less than one percent of Virginia’s total landmass if fully developed. That member noted that HB 206 singles out land conversions for solar mitigation of prime agricultural soils and forested lands even though solar has relatively small and less permanent impacts than other major land conversions (housing, roadways, industrial/warehouse use), which they feel is inappropriate.

There were no SME comments on this proposal.

For additional information, please see the stakeholder survey responses in Appendix 3.

³ https://www.blm.gov/sites/blm.gov/files/docs/2021-10/IM2021-046_att1_0.pdf. Accessed October 28, 2022.

Consensus Proposal 2: Significant Adverse Impact (WG4 - Proposal 1)

Method for Field Verification

Request that the workgroup convened to support Virginia Cooperative Extension with developing a map or repository of prime farmland (HB894 § 3 / 2022 Acts of Assembly Ch 488) propose and consider a clearly defined method for an optional field verification of the presence of prime agricultural soils.

The Qualtrics survey did not result in consensus:

22 (fully support) 6 (support with reservations) 4 (cannot support)

SME Comments:

One SME noted that in their view, as currently convened, the HB 894 workgroup does not have the technical expertise for the task of designing a field verification process and such a task is outside the scope of that workgroup. This SME would recommend additional staff at VDACS or other state agencies would be a better fit for designing a field verification process.

Another SME shared that they believe that prime agricultural soils are best confirmed onsite by an appropriate state or national certified or licensed professional soil scientist.

RAP Discussion at the September 28 Meeting

Because only four people could not support the proposal in the Qualtrics survey, the facilitation team identified this proposal as one where further discussion might lead to consensus – which was successfully achieved.

Highlights from the discussion include:

- HB 894 is only charged with looking at prime agricultural soils, not forestry. Four members were concerned that forests were not mentioned in the proposal, which referred only to prime agricultural soils.
- It was shared that the members of the HB 894 workgroup have already recognized that HB 894 needs to also cover forestry.
- While the process for field verification of prime agricultural soils is already completed, an equivalent process identifies the qualified person and process for forestry still needs to be developed.
- There was general agreement that forestry must be included; if agriculture has a qualification for field verification, then so should forestry.
- It was also generally agreed that the process will need to be further discussed and determined regarding how forests would be field verified.

The final proposal adopted by consensus follows:

Request that the workgroup convened to support Virginia Cooperative Extension with developing a map or repository of prime farmland (HB894 § 3 / 2022 Acts of Assembly Ch 488) propose and consider a clearly defined method for an optional field verification of the presence of prime agricultural soils and forests. For prime

agricultural soils, this should be confirmed onsite by an appropriate state or national certified or licensed professional soil scientist.

Very Strong Consensus Achieved

To increase support, the concerns of the “yellows” should be addressed.

GREEN Fully Support 25	YELLOW Some concerns and questions but able to support 5	RED Too many concerns or questions: Cannot Support 0
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For additional information, please see the stakeholder survey responses in Appendix 3.

Consensus Proposal 3: Local Control (WG 5- Proposal 1)

Permit-by-Rule (PBR) and Notice of Intent (NOI) timeline/steps

No later than 90 days prior to filing a PBR application (which triggers the public comment period), applicant shall submit the Notice of Intent to DEQ, with a copy sent to the applicable locality’s Chief Administrative Officer, which will include publicly available copies of 1) the memorandum(s) of land agreement and 2) associated interconnection queue number.

The Qualtrics survey did not result in consensus:

27 (fully support) 4 (support with reservations) 1 (cannot support)

The workgroup discussed the timing of engagement between solar developers and localities. Participants representing localities suggested that solar developers were notifying local officials too late, citing mainly two concerns:

- a) A landowner / developer may wrongly believe the site is appropriately zoned for solar development and begin the process of development, when planning department officials, if engaged earlier, could have informed the parties the site could not be developed in accordance with the existing ordinance or comprehensive plan.
- b) Clearing vegetation in preparation for solar development may foreclose a desire from the county to have vegetative buffers or screening on the project site. The solar industry noted that many of these activities are not necessarily prompted by a particular developer; some landowners proactively reach out to solar developers to explore options for installing solar on their property. Furthermore, the solar industry articulated the importance of private property rights: a conversation between two parties should not have to be reported to a public entity.

Given that the workgroup was focused exclusively on the Permit by Rule (PBR) process – and not on individual county permitting decisions – participants agreed to use the Notice of Intent (NOI) as a mechanism to encourage early communication between counties and the solar

industry and provide state resources to localities. Participants felt that providing the locality with the Pennsylvania-New Jersey-Maryland (PJM) Interconnection Queue number and memorandum of landowner agreements is sufficient information for staff to understand the nature of a potential solar site yet does not contain information that is not otherwise public. The proposal also satisfies a key concern from localities that state resources and expertise should help inform the local zoning process.

SME Comments:

One SME offered the following perspective: “The Cooper Center has done research (“Smoothing the Path to Solar” by Kevin Woram, 2021) on the permitting process/timeline of major solar projects across the state. The data show that the majority of the time, developers submitted the DEQ NOI way after they get local certification, and in most cases more than 90 days before the PBR anyway. I support Workgroup 5's proposals 1-4 because they do increase state/local communication and transparency and will make state resources available earlier in the process; however I am not aware of any evidence that supports the concept that these proposals would result in localities learning about projects earlier, or that it will result in such an incentive that the state agency reports will be made available to localities for their consideration during the review of local applications. Also, remember that this process only applies to those projects that choose the PBR over the SCC process. I suggest that the workgroup consider proposing a locality best practice (for the guidebook that is proposed) that localities request/require the developer submit the DEQ NOI at/before the local application. That way, the locality has the opportunity to coordinate a site visit with state agencies prior to the local public hearing being scheduled.”

RAP Discussion at the September 28 Meeting

Because only one person could not support the proposal in the Qualtrics survey, the facilitation team identified this proposal as one where further discussion might lead to consensus – which was successfully achieved.

A key concern were the words “publicly available,” because the point of the memorandum is not to give away private information.

- It was agreed by consensus to strike the term “publicly available”
- It was agreed by consensus to change the memorandum to say a “list of parcels” and to acknowledge the queue number

The final proposal adopted by consensus follows:

No later than 90 days prior to filing a PBR application (which triggers the public comment period), applicant shall submit the Notice of Intent to DEQ, with a copy sent to the applicable locality’s Chief Administrative Officer, which will include available copies of 1) a list of parcels included in any existing land agreements, and 2) associated PJM interconnection queue number.

Very Strong Consensus Achieved
To increase support, the concerns of the “yellows” should be addressed.

<div style="background-color: #00FF00; display: inline-block; padding: 2px 5px; margin-bottom: 5px;">GREEN</div> Fully Support 27	<div style="background-color: #FFFF00; display: inline-block; padding: 2px 5px; margin-bottom: 5px;">YELLOW</div> Some concerns and questions but able to support 3	<div style="background-color: #FF0000; display: inline-block; padding: 2px 5px; margin-bottom: 5px;">RED</div> Too many concerns or questions: Cannot Support 0
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For additional information, please see the stakeholder survey responses in Appendix 3.

Consensus Proposal 4: Local Control (WG 5- Proposal 5)

Virginia Energy Guidebook Development

Virginia Energy shall develop a guidebook to be distributed to localities relaying best practices related to solar development (from both the developers and localities side). This should include sample, existing siting agreements that have been signed between localities and developers, to shed light on why certain development standards were placed on the project based on its location, local impact, and local input. This guidebook shall also provide a list of applicable permits that a given solar project may be required to obtain.

The Qualtrics survey did not result in consensus:

17 (fully support) 13 (support with reservations) 2 (cannot support)

SME Comments:

One SME was in favor of this proposal with some changes, including that the guidebook be required to be developed with input from stakeholders (with extent and scope of input defined by Virginia Energy). They also suggested requiring "guidance related to siting agreements" in place of "sample, existing siting agreements" for reasons outlined in research completed by UVA.

One SME indicated that Virginia Energy is already planning to design a solar siting guidebook and looks forward to including recommendations and best practices from this workgroup as the resource is designed.

RAP Discussion at the September 28 Meeting (Meeting #5)

Because only two people could not support the proposal, the facilitation team identified this proposal as one where further discussion might lead to consensus – which was successfully achieved.

The highlights from the discussion about this proposal are as follows:

- The purpose of this proposal was clarified to the RAP. This proposal was a recommendation that the RAP wanted to propose to DEQ as a resource guide to decrease friction between solar developers and localities. Its intention is to assist

localities in understanding what solar provides and informing the locality about range of controls and options that are available.

- The RAP discussed that the Virginia Department of Energy is just one of multiple state agencies and development of the guide should be broadened to include other state agencies. It is critical that the guide does not limit perspectives from stakeholder groups.
- Understanding who the local stakeholders are is important for localities in the development process. Additionally, it is also important for localities to understand the role/expertise of state agencies for land use.

The final proposal with amendments was adopted by consensus follows:

Virginia Department of Energy should lead a process that includes other relevant state agencies and key stakeholders to develop an online resource guide for localities relaying best practices related to solar development (from both the developers and localities side).

This would include sample, existing siting agreements that have been signed between localities and developers, to shed light on why certain development standards were placed on the project based on its location, local impact, and local input. This guidebook would also provide a list of applicable permits that a given solar project may be required to obtain.

This proposal is a RAP recommendation, not a proposed regulation.

*Very Strong Consensus Achieved
To increase support, the concerns of the “yellows” should be addressed.*

GREEN Fully Support 25	YELLOW Some concerns and questions but able to support 5	RED Too many concerns or questions: Cannot Support 0
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For additional information, please see the stakeholder survey responses in Appendix 3.

Proposals Close to Achieving Consensus, Needing Further Discussion

Close to Consensus 1: Avoidance + Minimization (WG 1- Proposal 1.1): Expanding Definition of “Disturb”

Amend 9VAC15-60-[XX] to add the following definition of “disturb:”

1. “Disturb” means, for the purposes of determining “significant adverse impacts” to “prime agricultural soils” or “forest lands” any of the following: **
 - a. to install new roads or widen existing roads;
 - b. to install permanent parking lots;
 - c. to create an open trench for installation of project internal cable distributions or for utility lines and connections;
 - d. to place fill material, to excavate, or to move or relocate soils, so as to regrade the land contour over a portion or all of a Site, such as for installation of small solar project-related facilities;
 - e. to excavate for or otherwise install a new stormwater detention or retention basin or to expand the existing surface area of such basin;
 - f. to install permanent impervious surfaces associated with project facilities, such as concrete pads, substation pads, footings for buildings or structures, or gravel areas;
 - g. to install pilings or structural posts for solar array panels;
 - h. to grub stumps and other woody vegetation root mass;
 - i. to compact the soil permanently due to heavy equipment operation or for structural operating plan pursuant to support purposes;
 - j. and to convert forest lands to scrub-shrub, meadow, pasture use or impervious use.

[**Assumes the definitions of “prime agricultural soils” and “forest lands” are consistent with HB 206 definitions of these terms.]

Moderately Strong Support but No Consensus Achieved

To achieve consensus, at a minimum the concerns of the “reds” below should be addressed.

To achieve stronger support, the concerns of the “yellows” should also be addressed.

GREEN	YELLOW	RED
Fully Support	Some concerns and questions but able to support	Too many concerns or questions: unable to support
18	10	4

No consensus was achieved with the Qualtrics survey. Because this was considered by the RAP to be a strategically important proposal, and it was close to consensus with only four people unable to support the proposal, it was selected by the RAP for discussion at its final meeting. However, the RAP was not able to achieve consensus at its final meeting. The following is a summary of comments received from the Qualtrics survey and the final RAP meeting.

Concerns or clarifications needed to move participants from “cannot support” (red) this proposal to “can support with reservations” (yellow) or “fully support” (green) this proposal.

Two members indicated a preference for using the existing definitions of “disturb,” found in Title 62 (State Water Control Law) and in stormwater regulations 9VAC25-870-10. One of these members suggested that a slightly modified definition of what can be found in stormwater regulations would make the most sense:

“disturb’ means a manmade change to the land surface that potentially changes its characteristics including clearing, grading, or excavation, except that the term shall not include those exemptions specified in § 62.1-44.15:34(C)(2) of the Code of Virginia.”

Another member supported the proposal but wanted to add clarification that this list may not be exhaustive and would like the right to be reserved to add other activities as the regulatory discussion proceeds. They also desired guidance from DEQ regarding areas where the development of a new definition of “disturbance” might be in conflict or differ with existing regulations so that group members could consider how those things might interact.

One member requested further consideration of what constitutes interruption of functions and values associated with prime agricultural soils or forest lands that are not already addressed by other regulatory programs so that a definition of disturbance can truly reflect those aspects of solar development that eliminate those functions and values. They noted that it would be helpful to create different definitions of disturbance for prime agricultural soils and forested areas because the functions and values of those spaces are not always the same. They proposed that a balanced definition would recognize that, unlike conventional development, solar development is not only unique in the opportunity to return the land to predevelopment use after decommissioning, but also can be less intensive in impacts to the landscape during construction and operation and that there are many opportunities for the solar facility to operate while maintaining the function of the predeveloped landscape.

Another suggestion was that the new regulations should give developers the opportunity to construct the facility using means and methods that avoid disturbance; this would incentivize those methods of development that maintain ecosystem services within the surrounding environment. Along these lines, this member suggested that the new regulation encourage innovative technologies that are beneficial to the environment overall (e.g., biochar applications) and exclude areas where beneficial technologies are used from the definition of “disturbed area.” Without opportunities to avoid disturbance and employ innovative solutions, mitigation requirements are more likely to result in insurmountable financial burdens.

Another suggestion offered for additional consideration for developers in the context of prime agricultural soils concerns items 1.c and 1.h of this proposal. Technical definitions of prime farmland already acknowledge the need for infrastructure improvements such as ditching, drain tiles, and irrigation. Woody vegetation removal is also an element of conventional farming practices. This member suggested that practices associated with solar development that are substantially consistent with activities conducted as part of conventional farming practices

should be recognized as such. They also felt that further discussion is needed on item 1.j. Even if trees are temporarily removed from a forested area, if the area is not intensively managed (and allowed to develop as meadow, scrub shrub, or other successive environment), many of the functions and values will be maintained. Failing to recognize this reduces incentives for developers to minimize conversion to impervious cover. Their specific suggested edits include: 1. a - strike "or widen existing roads;" 1.c - strike in entirety; 1.h - strike in entirety 1. j - strike "scrub shrub, meadow, pasture use or."

Two members wanted to see a different approach to the definition of "disturb," with one feeling that it was too prescriptive and would require too much to be known about the design of a site too early in the PBR process. In their view, a broad definition of disturbance that allows for greater flexibility in site design would make more sense.

Concerns or clarifications needed to move participants from "can support with reservations" (yellow) to "fully support" (green) this proposal.

Three members requested a specific addition to the items listed:

"Harvesting of forest crops unless the land on which harvesting occurs is reforested artificially or naturally in accordance with the provisions of Chapter 11 (10.1-1100 et seq.)"

Another member raised the same point made by a member who had blocked consensus, that agricultural industry performs many of the items listed as disturbance during typical farming practices but is not subject to regulatory oversight. In their view, disturbance that takes place during typical farming use should not be considered disturbance for solar development.

Two members expressed concern regarding 1.i, which includes a reference to "permanent soil compaction" because in their view even temporary soil compaction is problematic, and they would like the word "permanent" to be removed. Another member felt that the statement in 1.i "or for structural operating plan pursuant to support purposes" doesn't make sense and should be removed. The same member was interested in seeing "widening of existing roads" removed from 1.a because they feel that widening existing roads results in the least amount of environmental impacts and should be encouraged over constructing new roads.

There was additional concern from a member about 1.c because in their view the creation of a trench for installation of cables/utility lines will be backfilled and typically regraded to pre-construction conditions which they believe does not constitute a significant adverse impact; and open trenching in forest lands would be covered under 1(j) for forest conversion to account for the maintenance of the cable/utility corridor. This member would like to see 1.c removed, and 1.d revised "to place fill material or to excavate soil from a portion or all of a Site, such as for installation of small solar project-related facilities".

Additional data points that strengthen the proposal:

Two members raised questions about whether scrub-shrub and meadow should be included, as they indicated any owner of forests can currently do this at any time, without it being considered a disturbance, and this practice is regularly used for deer management. One of these members indicated concern about providing a loophole for clear cutting so long as the stumps/roots are not removed.

There were additional requests from separate members to include any land covered under an Erosion and Sediment Control Permit (ESC), and to delineate between temporary impacts and permanent impacts to ensure construction and operational impacts are appropriately analyzed.

Numerous additional suggestions were made that have already been discussed in the above paragraphs.

SME comments:

SMEs who commented broadly agreed on the need for a clear understanding for all parties regarding the definition of “disturb.” Two SMEs noted that it would be important to clarify whether solar panel arrays would fall into this category of creating a disturbance of the soils, and that it also could be useful to distinguish between permanent or temporary disturbances (e.g., “permanent impervious surfaces”).

RAP Discussion at the September 28 Meeting (Meeting #5)

Other members of the RAP expressed serious concern about these suggested changes to the above proposal. They noted that while these practices may be allowed for certain infrastructure improvements and may be elements in conventional farming, the reason they are called out in this proposal is because these activities are part of what would create the subsoil impacts on prime agricultural soils. One of the aims of HB 206 is to assess the level of protection necessary to preserve a sufficient amount of prime agricultural lands needed for future generations, so activities that will reduce the productivity of the land below its prime levels need to be identified and categorized.

During RAP workgroup discussions, some members pointed to a presentation to the RAP provided by Dr. W. Lee Daniels, Professor of Crop and Soil Environmental Sciences at Virginia Tech, in which he presented research that described impacts of solar installations on subsoil. According to Daniels, research confirmed that while solar development could enable land to be returned to predevelopment uses after decommissioning, productivity of the land would most likely not be able to return to original predevelopment row crop prime productivity levels because of permanent compaction and loss of structure in deeper layers of soils. He summarized this by saying that predevelopment use could be re-established, but the disturbed soils could no longer be categorized as “prime.”⁴

⁴ Productivity of a prime farmland soil is a combined function of its topsoil (A horizon) and subsoil (B horizon) characteristics. See Appendix 2 “03- Lee Daniels, SME (Virginia Tech) Memo - Q&A Solar x Topsoil Issues 220718.pdf.”

Discussion also centered on impact to forest lands. Some members felt that what matters in determining the impact of disturbance to forests is the use of the land, and whether it is being converted from forest land to non-forest land. Another member felt that the process needs to be designed to incentivize developers to minimize adverse impacts and leave room for them to be creative.

Other members raised the idea of referring to existing definitions of “disturbance” in the PBR process. The DEQ clarified that whatever definition is determined by this process will be the only definition used by DEQ for the PBR process, and that there will not be confusion with other definitions.

Close to Consensus 2: Avoidance + Minimization (WG 1- Proposal 1.2)

Exclusions from Definition of “Disturb”

Notwithstanding the foregoing, the following are excluded from the meaning of “disturb:”

- a. To continue the use of a portion of a Site for agricultural or forestry purposes;**
- b. To reserve and plant a portion of the Site with meadow grasses or forest trees pursuant to a forestry management plan pursuant to a binding agreement, restrictive covenant, zoning or use permit condition, approved site plan, approved stormwater management plan, operating plan pursuant to 9VAC15-60-30.A.10, approved project decommissioning plan, or other instrument subject to enforcement by the applicable local government or the Department;**
- c. To operate construction or facilities installation equipment and vehicles of a size and scale no greater than that of agronomic farming equipment or vehicles typically used in the soil and water conservation district [as established pursuant to Section 10.1-500 et seq. of the Code of Virginia] in which the project Site is located or an adjacent district, provided that such operation of equipment and vehicles is subject to conditions and practices set forth in the project operating plan prepared pursuant 9VAC15-60-30.A.10 that:**
- d. Minimize the number of passes across the same soil during active construction or installation activities;**
- e. Would allow the existing soil profile to remain intact; and**
- f. Require temporary and permanent stabilization with vegetated cover consistent with applicable erosion and sediment control regulatory standards;**
- g. To remove trees located on prime agricultural soils at the Site where (i) such removal occurs without grubbing the tree stumps and is incidental to construction of the project, and (ii) such trees are not otherwise considered part of forest lands;**
- h. To conduct directional underground drilling;**
- i. To install temporary silt fencing or other temporary erosion and sediment control measures provided the soil profile remains intact;**
- j. Installation of fencing/fence posts;**

- k. **Maintenance of an existing utility pole or repair of existing utility poles or their replacement in the same hole; and**
- l. **Selective harvesting of trees in forest lands subject to an approved forest management plan or the removal of dead, damaged, or diseased trees and other vegetation located in forest lands.**

No part of the “disturbance zone” of a project shall be considered to be disturbed for purposes of determining significant adverse impacts of a project as defined to prime agricultural soils or forest lands unless one or more of the actions described above in Proposal 1, Part 1 will occur in connection with development of a project.

Note: “Disturbance zone” means the area within the site directly impacted by construction and operation of the solar energy project and within 100 feet of the boundary of the directly impacted area. 9VAC15-60-10

Strong Support and No Consensus Achieved

To achieve consensus, at a minimum the concerns of the “reds” should be addressed;

To achieve stronger support, the concerns of the “yellows” should also be addressed.

GREEN Fully Support	YELLOW Some concerns and questions but able to support	RED Cannot Support
19	7	6

No consensus was achieved with the Qualtrics survey, and this proposal was not able to be further discussed at the RAP’s final meeting. The following is a summary of comments received from the Qualtrics survey.

Concerns or clarifications needed to move participants from “cannot support” (red) this proposal to “can support with reservations” (yellow) or “fully support” (green) this proposal.

Two members expressed interest in utilizing existing definitions instead of drafting an entirely new approach. One referred specifically to the definition in Title 62, and the other was interested in an existing definition which also includes a list of exemptions. This member proposed that “disturb” means:

“a manmade change to the land surface that potentially changes its characteristics including clearing, grading, or excavation, except that the term shall not include those exemptions specified in § 62.1-44.15:34(C)(2) of the Code of Virginia.”

Per the member, these exemptions include:

“Clearing of lands specifically for agricultural purposes and the management, tilling, planting, or harvesting of agricultural, horticultural, or forest crops, livestock feedlot operations, or as additionally set forth by the Board in regulations, including engineering operations as follows: construction of terraces, terrace outlets, check dams, desilting basins, dikes, ponds, ditches, strip cropping, lister furrowing, contour cultivating, contour

furrowing, land drainage, and land irrigation; however, this exception shall not apply to harvesting of forest crops unless the area on which harvesting occurs is reforested artificially or naturally in accordance with the provisions of Chapter 11 (§ 10.1-1100 et seq.) or is converted to bona fide agricultural or improved pasture use as described in subsection B of § 10.1-1163."

There were objections to this proposal from two members based on how they see it interacting with WG1 Proposal 1, Part 1. For one member, the statement in this proposal that the list from WG1 Proposal 1, Part 1 would dictate the determination of disturb (as an exhaustive list) by the agency is problematic for them. They believe that an exhaustive list is not possible to create, as it is not possible to foresee all the possible activities. For another member, they feel that the exclusion section undermines components of the definition of disturb articulated in WG1 Proposal 1, Part 1. In their view, these exclusions, taken collectively, could cumulatively have significant impacts and they would recommend, at a minimum, a threshold above which these activities would be considered disturbances.

Two members had concerns or proposed clarifications related to agriculture. One of these members suggests that agrivoltaics or sheep grazing within project boundaries should mean no disturbance since the site is remaining in agricultural use. Another shared that while item 2.c acknowledges that conducting activities consistent with agricultural practices should not be considered an activity inconsistent with the presence of prime agricultural soils, this item should be clarified to allow any typical agricultural practice (the details of which would be outlined in the application), rather than requiring a demonstration of equivalency with equipment used in a specific SWCD. This exclusion should also be expanded to provide a similar exclusion for activities/equipment associated with forestry practices. In their view, this could be accomplished as a clarification in item 2.i.

One member sought additional consideration for activities that should be exempted from the definition of disturbance. These specific suggested edits include:

- 2.c - Revise to read: to operate construction or facilities installation equipment and vehicles of a size and scale typical of agronomic farming equipment and/or timber harvesting equipment practices.
- 2.d - Strike "without grubbing the tree stumps and" - grubbing of stumps in this scenario as such activity would be consistent with agricultural practice if clearing/maintaining an area for agricultural use.
- 2.h - Revise to read: "Maintenance of an existing utility pole or repair or replacement of existing utility poles." This item acknowledges that maintenance of utility poles is not likely to measurably disturb the overall function of an area containing prime agricultural soils and should be updated to allow for replacement of poles in a location adjacent to an existing hole as is common practice. This is also consistent with item 2g which acknowledges that installation of posts for fencing would not measurably disturb the overall function of an area of prime agricultural soils.
- 2.i - Revise to read: "Selective harvesting of trees in forest lands or the removal of dead, damaged, or diseased trees and other vegetation located in forest lands in a manner

consistent with typical forest management practices.” Flexibility should also be given in 2.i to demonstrate that proposed activities are consistent with conventional forestry practices without requiring operation under an approved forestry management plan.

Concerns or clarifications needed to move participants from “can support with reservations” (yellow) to “fully support” (green) this proposal.

Three members sought to include language within 2.c requiring the use of construction mats on entrances/exits and internal areas of the project where large equipment may be traveling, in order to prevent soil compaction, and one of these members also requested an addition to minimize the number of passes across the same soil during active construction or installation activities.

Other members raised concerns about potential disturbances that they don’t feel are reflected in the current proposal. One person shared that if the site originally was forested, in their view converting to meadow grass is disturbance. This person could support at change within 2.b “to reserve and plant a portion of a previously agriculture site with meadow grasses or forest trees, or to plant a previously forested site with forest trees, pursuant to a forestry management plan . . .” Another feels that fencing within forest lands, even if the trees are maintained, would disturb wildlife corridor connectivity and habitat contiguity and thus fencing should be considered a "disturbance." This person feels it would be more appropriate to use a "disturbance zone" definition that looks at the broader borders of the project, rather than carving out areas where certain activities may not take place, and that the PBR process should inform site design.

Another member was concerned about 2.b and the ways in which it could impact stormwater requirements. In this member’s view, conservation as a stormwater management practice shifts inspection and restoration requirements to the local government and creates a new unfunded mandate.

Additional data points that strengthen the proposal:

One member shared that in their view, including the aforementioned items as a disturbance would be prohibitive for solar development and inhibit our ability to meet clean energy goals. Two others felt that the exclusions encourage the clean energy industry to ensure a solar project provides valuable ecosystem services to the surrounding environment, without excessively burdening projects with excessive mitigation requirements.

Two members noted their appreciation that these definitions acknowledge that agriculture and forestry do disturb and compact land to some degree, and that the solar industry should not be penalized for that equivalent base level of activity. One member noted that 2.e references directional underground drilling, but this is not considered a disturbance as defined in Part 1. This member would like clarification regarding whether underground directional drilling is defined as a disturbance.

One member wanted to emphasize that in their view the proposal 1 framework defining a “disturbance” for prime agricultural soils and forest lands does not work if the concept of a “disturbance zone” is applied. This member strongly agrees that only direct disturbances (as outlined in Proposal 1, Part 1) should be factored into calculations of total disturbed acreage. They would also suggest adding that any activity not specifically listed as a disturbance— that does not remove, permanently compact, or otherwise create erosion problems—is not a disturbance. This member’s rationale is that in their view the WG1 proposal 1, part 2, clarifications to what does not constitute a “disturbance” of prime agricultural soils and forest lands encourage solar developers to make economic decisions to implement construction and operations practices that do not disturb prime agricultural soils and forests. Some of these practices are not business as usual for solar developers, but they present an economic alternative to reasonable minimization and mitigation measures.

SME comments:

SMEs sought several clarifications to this proposal, including whether solar panels are excluded from the “disturb” area; if so, they would like to see that noted. Another noted that approval of forest management plans is uncommon in most instances, and per this member, no agency or locality is identified to approve a forest management plan.

Another SME had a question regarding 2.h and developer/owner control the repair/relocation of utility pole “in the same hole.” They asked, wouldn't there be a utility easement, and then the utility would have the right to move/install new poles within that easement? Would the utility's action of relocating a pole into a new hole trigger any kind of DEQ state review? If not, in their view, perhaps this item should be amended to apply to any utility repair or pole relocation within an established easement. If the proposal refers to utility poles that are not within an easement, and the owner can decide whether to maintain them in the same hole or not, then this language makes sense to this SME.

One SME felt that, while these exceptions to disturb might factually meet the need of “no disturbance to prime agricultural soils and/or forestland,” some of the activities excepted from the definition of “disturb” may result in disturbance and impacts upon wildlife. This SME sought to clarify that avoidance and minimization must be met *prior* to considering mitigation and are not the same.

Another SME wanted to clarify that areas that are being “reserved” are not being “disturbed” in their view, per the definitions in Part 1. Without this clarification, an area that was actually disturbed, but was covered by an approved site plan and/or an approved stormwater plan, would be exempt from being “disturbed.” If that is the intent here, this SME disagrees.

For additional information, please see the stakeholder survey responses in Appendix 3.

Close to Consensus 3: Avoidance + Minimization (WG 1- Proposal 3) Expanding Definition of “Minimize”

Amend 9VAC15-60-[XX] to add the following definition of “minimize:” **

“Minimize” or “minimization” means, for purposes of acceptable mitigation of “significant adverse impacts” to “prime agricultural soils” or “forest lands,” to design or plan for and to implement practices and measures as part of project development that would result in the reduction or lessening of the area or degree of potential significant impacts to prime agricultural soils or forest lands, including the following practices and measures:

Reducing or lessening the area of prime agricultural soils or forest lands disturbed at the Site; reducing or lessening the area or degree of permanent compaction of prime agricultural soils at the Site; reducing or lessening the volume or area of removal or movement of topsoil at the Site; reducing or lessening the placement of fill material or the excavation or regrading of prime agricultural soils at the Site; reduction of impervious surface area and erosion through election and use of ground cover vegetation at the Site, use of single-axis trackers and/or spacing of solar arrays pursuant to the operating plan; conserving areas of forest lands on the Site that are able to be put into productive use upon project decommissioning; replanting a portion of economically viable forest land in a manner that is also economically viable in the future; agrivoltaic practices, once deemed economically viable in Virginia; and reducing or lessening exposure of acid producing materials (APM).

** NOTE: Assumes DEQ will define “prime agricultural soils” and “forest land” as they are defined in HB 206.

Moderately Strong Support and No Consensus Achieved

*To achieve consensus, at a minimum the concerns of the “red” should be addressed;
To achieve stronger support, the concerns of the “yellows” should also be addressed.*

GREEN Fully Support	YELLOW Some concerns and questions but able to support	RED Cannot Support
19	12	1

No consensus was achieved with the Qualtrics survey, and this proposal was not able to be further discussed at the RAP’s final meeting. The following is a summary of comments received from the Qualtrics survey.

Concerns or clarifications needed to move participants from “cannot support” (red) this proposal to “can” (yellow) or “fully support” (green) this proposal.

One member sought a simpler definition, offering:

“Minimize’ or ‘minimization’ means, for purposes of acceptable mitigation of significant adverse impacts to prime agricultural soils or forest lands, to design or plan for and to implement practices and measures as part of project development that would result in a reduction to the degree of impact to the associated resources.”

This person felt that everything else noted in the proposal should be removed from consideration and discussed during regulation development. This member also requested that DEQ begin identification of best management practices for a future conversation with the RAP. This member felt that the proposal sometimes conflated avoidance measures with minimization and included broad terms without providing specific measures (agrivoltaics, etc.) that may be credited.

Concerns or clarifications needed to move participants from “can support with reservations” (yellow) to “fully support” (green) this proposal.

Soil was a concern for several members in the context of this proposal. Three members would like to include a requirement that any topsoil removed must be stockpiled on site for future use after decommissioning. A different member is concerned that the proposal focuses only on permanent soil compaction rather than all forms of soil compaction. And another member recommended providing reference to conserving areas of prime agricultural soil areas or utilizing prime agricultural soils for dual beneficial use such as pollinator plantings. That member felt that the reference to “reducing or lessening the volume or area of removal or movement of topsoil at the Site” alludes to the possibility that if the project retains all topsoil, that may be considered avoidance, because there would be no removal of topsoil. They would like additional clarification for these mitigating measures.

Three members expressed interest in a simplified definition and expressed support for an alternative similar to the one included in the section above: “‘Minimize’ or ‘minimization’ means, for purposes of acceptable mitigation of “significant adverse impacts” to ‘prime agricultural soils’ or ‘forest lands,’ to design or plan for and to implement practices and measures as part of project development that would result in the reduction of the degree of impact.” These members were interested in clarification that the list of minimization measures presented may not be exhaustive, to allow for and incentivize creativity, advances in technology, and other methods for projects to identify opportunities for minimization that would reduce mitigation requirements. Another member was also interested in a reduced definition and was concerned that the proposal was conflating retaining areas in forest cover during the life of the project with reforestation after the project.

Another member indicated support for this proposal if it is made clear that no minimization requirements will extend beyond project decommissioning. Per that member, the vast majority of utility-scale solar projects lease land for development, rather than owning it directly. This member was concerned that the references to “economically viable” and “productive use” in

the proposal reflect the view of some non-solar stakeholders that displaced farming or forestry practices at a solar project site should be compensated for under HB 206. They would like for it to be clear that solar owners and developers that lease land for their projects are not responsible or liable for any minimization activities after a project has been successfully decommissioned.

Three members felt that the reference to economic viability regarding agrivoltaics wasn't appropriate and should be removed. Another member felt that clarification was needed regarding acceptable mitigation practices, specifically that "... replanting a portion of economically viable forest land in a manner that is also economically viable in the future" should apply only to disturbance on lands that had been previously forested.

Additional data points that strengthen the proposal:

Several suggestions for ways to strengthen the proposal included:

- Creating clarity about who will determine and/or when it will be determined that agrivoltaic practices will be deemed economically viable in Virginia.
- Moving the provision regarding loosening or lessening of prime agricultural soils or forest soils to a best practices manual, rather than putting it into an overarching regulation.
- Providing a table that provides enforceable threshold by the acreage.

SME comments

- One SME noted that there may be some overlap between what is classified as being excluded as a disturbance and what counts as a minimization activity. This member requests more clarity between what agriculture/forestry activities are minimization versus those that are not classified as a disturbance. Another member felt that as the proposal is written, soil compaction and associated limitations and effects appear to be only applicable in areas of prime agricultural soil, though this member observes it happens in forested areas as well and would like the proposal to reflect as much.
- Another SME felt that the reference to economic viability regarding agrivoltaics should be removed and that segment should refer only to agrivoltaic practices without contingencies. This member also sought clarification around what recommended best practices would result in "lessening exposure of Acid Producing Materials (APM)" that would merit being considered "minimization." This SME also thought "reduction of impervious surface area" could be confusing since solar panels themselves are impervious. Additionally, this member was interested in learning how it will be determined that something is able to be put into productive use upon decommissioning.

For additional information, please see the stakeholder survey responses in Appendix 3.

Close to Consensus 4: Avoidance + Minimization (Workgroup 1-Proposal 4)

New criteria in mitigation plans

Amend 9VAC15-60-[XX] to reflect the criteria for assessing when a mitigation plan is required to reflect the new criteria related to assessing impacts to prime agricultural soils and forest lands. Language from the existing regulation is reflected below, with the *new proposed language in underlined italics*:

8. In accordance with § 10.1-1197.6 B 8 of the Code of Virginia, furnishes to the department a mitigation plan pursuant to [9VAC15-60-60](#) that details reasonable actions to be taken by the owner or operator to avoid, minimize, or otherwise mitigate such impacts, and to measure the efficacy of those actions; provided, however, that the provisions of this subdivision shall only be required if the department determines, pursuant to [9VAC15-60-50](#), that the information collected pursuant to § 10.1-1197.6 B 7 of the Code of Virginia and [9VAC15-60-40](#) indicates that any of the following are likely:

- (a) significant adverse impacts to wildlife or historic resources, or
- (b) *if a proposed project would disturb*
 - (i) *more than 10 acres of prime agricultural soils,*
 - (ii) *more than 50 acres of contiguous forest lands, or*
 - (iii) *forest lands enrolled in a program for forestry preservation pursuant to subdivision 2 of § 58.1-3233 of the Code of Virginia.*

A project will be deemed to have a significant adverse impact if it would disturb more than 10 acres of prime agricultural soils or more than 50 acres of contiguous forest lands, or if it would disturb forest lands enrolled in a program for forestry preservation pursuant to subdivision 2 of § 58.1-3233. The mitigation plan shall be an addendum to the operating plan of the solar energy project, and the owner or operator shall implement the mitigation plan as deemed complete and adequate by the department. The mitigation plan shall be an enforceable part of the permit by rule;

Very Strong Support and No Consensus Achieved

*To achieve consensus, at a minimum the concerns of the “reds” should be addressed;
To achieve stronger support, the concerns of the “yellows” should also be addressed.*

GREEN Fully Support	YELLOW Some concerns and questions but able to support	RED Too many concerns or questions and unable to Support
22	8	2

No consensus was achieved with the Qualtrics survey, and this proposal was not able to be further discussed at the RAP's final meeting. The following is a summary of comments received from the Qualtrics survey.

Concerns or clarifications needed to move participants from “cannot support” (red) this proposal to “can” (yellow) or “fully support” (green) this proposal.

One member felt that 8.b.ii was a new addition that shouldn't be part of the legislation, and that the proposal should apply only to contiguous prime agricultural soils. In their view, a project should not be considered to have adversely impacted prime agricultural soils if small soil mapping units scattered across a site add up to 10 acres of prime agricultural soils. Additionally, they felt there should be a practical management unit concept applied to the prime agricultural soils so that areas of contiguous prime agriculture that could realistically be managed as a farming unit are what is considered for the purposes of HB 206.

Per this member, scattered bits of prime agricultural soils don't add up to a workable farm outside of the PBR process and shouldn't be treated differently here. They would like to insert “contiguous” to 8.b.i. to read “more than 10 contiguous acres of prime agricultural soils”, and into the last paragraph: “A project will be deemed to have a significant adverse impact if it would disturb more than 10 contiguous acres of prime agricultural soils.”

Concerns or clarifications needed to move participants from “can support with reservations” (yellow) to “fully support” (green) this proposal.

Two members requested clarification of the meaning of “contiguous.” One of these members indicated that in their view, large stands of forest trees that are disconnected other than by a thin line of trees (such as a roadside buffer) should not be considered contiguous. The other of these members indicated that their understanding is that the definition referenced in HB 206 from existing VA code language for “forested land” would refer to larger 2D areas since “forest trees” need to be part of a “stand” to constitute a larger area considered “forest land”. In their view, this concern of multiple connected areas is likely covered by the definition if only “forest trees” can make two “forest land” areas determined to be “contiguous”.

One member requests additional clarification on impact threshold determinations and mitigation measures anticipated. They had questions around how impact acreage thresholds were determined to trigger a mitigation plan requirement and noted that it may be helpful to list mitigation measures under this section.

One member indicated fundamental disagreement with the approach that the underlying legislation HB 206 singles out solar for regulation, when other land conversions are not regulated in this way. Similarly, this member objects to the statutory presumption of significant adverse impacts on prime agricultural soils and forest lands.

Clarification was sought by one member to indicate that solar development lands would no longer be eligible for forestry preservation program cited in this language. Another member questioned whether a lower threshold like 30 acres might be more appropriate in some areas

such as those with limited old growth forest. Another member would like to see the “significant adverse impact” framework updated as proposed by RAP Workgroup 4.

Additional data points that strengthen the proposal:

One member has reservations with the inclusion of timber areas that are timbered regularly and feels strongly that they should not be included as contiguous forest. This member is also concerned that contiguous definition is not clearly defined and might lead to many more forest lands involved than are presently contemplated by using small strands of trees (in a fence line for example) to link up other forested parcels to create 50 acres.

Another member would like for it to be acknowledged that nothing impacts DEQ authority to determine a significant impact at thresholds below the stated values in code. A separate member emphasized that in their view, if it were economic to farm prime agricultural soils that are currently under forest land, someone would already be doing it.

SME comments:

One SME noted that: (b) pertains to lands only enrolled in "land use" taxation programs, "and lands of a population of 5,000 per square mile, for any real estate in any county operating under the urban county executive form of government, or the unincorporated Town of Yorktown chartered in 1691, the governing body may by ordinance prescribe that land devoted to open-space uses consist of a minimum of one quarter of an acre. The minimum acreage requirements for special classifications of real estate shall be determined by adding together the total area of contiguous real estate excluding recorded subdivision lots recorded after July 1, 1983, titled in the same ownership. However, for purposes of adding together such total area of contiguous real estate, any noncontiguous parcel of real property included in an agricultural, forestal, or an agricultural and forestal district of local significance pursuant to subsection B of § 15.2-4405 shall be deemed to be contiguous to any other real property that is located in such district. For purposes of this section, properties separated only by a public right-of-way are considered contiguous;"⁵

For additional information, please see the stakeholder survey responses in Appendix 3.

⁵ <https://law.lis.virginia.gov/vacode/title58.1/chapter32/section58.1-3233/#:~:text=%C2%A7%2058.1%2D3233.-,Determinations%20to%20be%20made%20by%20local%20officers%20before%20assessment%20of,1.>, retrieved Sept. 12, 2022.

Close to Consensus 5: Avoidance + Minimization (WG 1- Proposal 6):
Addressing determination of significant adverse impacts to prime agricultural soils and forest lands

Amend 9VAC15-60-[XX] addressing determination of likely significant adverse impacts to add a new subsections C and D for when the department shall find significant adverse impacts to prime agricultural soils and forest lands. Language from the existing regulation is reflected below, with the *new proposed language in underlined italics*:

- A. The department shall find that significant adverse impacts to wildlife are likely whenever the wildlife analyses prescribed in [9VAC15-60-40 A](#) document that any of the following conditions exists:
 1. State-listed T&E wildlife are found to occur within the disturbance zone, or the disturbance zone is located on or within one-half mile of a known or potential sea turtle nesting beach.
 2. The disturbance zone is located in part or in whole within zones 1, 2, 3, 4, 5, 10, 11, 12, or 14 on the Coastal Avian Protection Zones (CAPZ) map.

B. The department shall find that significant adverse impacts to historic resources are likely whenever the historic resources analyses prescribed by 9VAC15-60-40 B indicate that the proposed project is likely to diminish significantly any aspect of a historic resource's integrity.

C. The department shall find that significant adverse impacts to prime agricultural soils will occur whenever the prime agricultural soils analyses prescribed by 9VAC15-60-40 C indicate that the proposed project would disturb more than 10 acres of prime agricultural soils.

D. The department shall find that significant adverse impacts to forest lands will occur whenever the forest lands analyses prescribed by 9VAC15-60-40 D indicate that the proposed project would disturb either (1) more than 50 acres of contiguous forest lands, or (2) forest lands enrolled in a program for forestry preservation pursuant to subdivision 2 of § 58.1-3233.

Very Strong Support and No Consensus Achieved

*To achieve consensus, at a minimum the concerns of the “red” should be addressed;
 To achieve stronger support, the concerns of the “yellows” should also be addressed.*

GREEN	YELLOW	RED
Fully Support	Some concerns and questions but able to support	Too many concerns or questions: unable to support
22	9	1

No consensus was achieved with the Qualtrics survey, and this proposal was not able to achieve consensus at the RAP's final meeting. The following is a summary of comments received from the Qualtrics survey and the final RAP meeting.

RAP Discussion at the September 28 Meeting (Meeting #5)

Some members expressed concern that scattered pieces of prime agricultural soils impacted by development should not be added together to meet the threshold; in their view, the threshold ideally would not apply to scattered pieces of land but to a more contiguous workable farm unit. Unless the threshold was met as a contiguous unit, adverse impacts would not need to be considered.

Other members felt strongly that the scattered pieces of prime agricultural soils are important to consider, as prime soils cannot be replaced and even if these are smaller non-contiguous pieces of land, they are significant contributors to overall farm productivity. These members were not willing to support an amendment to the original proposed language, and no consensus was achieved with this proposal.

Concerns or clarifications needed to move participants from “cannot support” (red) this proposal to “can” (yellow) or “fully support” (green) this proposal.

One member indicated they would like for 2.C to apply to contiguous prime agricultural soils. In their view, a project should not be considered to have adversely impacted prime agricultural soils if small soil mapping units scattered across a site add up to 10 acres of prime agricultural soils. This member believes there should be a practical management unit concept applied to the prime agricultural soils so that areas of contiguous prime agricultural that could realistically be managed as a farming unit are what is considered for the purposes of HB 206. In their view, scattered bits of prime agricultural soil don't add up to a workable farm outside of the PBR process and shouldn't be treated differently here.

This member would like for the proposed language to read: “The department shall find that significant adverse impacts to prime agricultural soils will occur whenever the prime agricultural soils analyses prescribed by 9VAC15-60-40 C indicate that the proposed project would disturb more than 10 acres of contiguous prime agricultural soils.”

Concerns or clarifications needed to move participants from “can support with reservations” (yellow) to “fully support” (green) this proposal.

Three members recommend language be included that clarifies nothing shall limit DEQ's authority to determine significant adverse impacts for forested land under 50 acres. A separate member noted that they can support this proposal so long as significant adverse impacts can additionally be determined on prime agricultural soils of less than 10 acres, forest lands of less than 50 acres, or forest lands not enrolled in a program for forestry preservation pursuant to subdivision 2 of 58.1-3233. And another member indicated that they believe regulation will have to address impacts from smaller projects as well.

One member had a question regarding C and whether it is meant to factor in results from field delineation. E.g., if desktop maps identify prime agriculture soils but field verification indicated severe deterioration or different classification, will impacts not be considered adverse and requiring mitigation? Regarding field verification, another member wanted to flag that in their view, previous proposals if accepted as drafted would weaken this proposal.

Another member noted that the work of Workgroup 4 could alter the definition of “significant adverse impacts.” This member also requested that the actual administrative code section be designated at the beginning instead of 9VAC15-60-xx.

SME comments:

One SME had questions about how acreage of disturbance would be quantified. Would the site plans be required to delineate undisturbed areas, and any area NOT in the undisturbed area would be considered subject to disturbance (ex: compaction from equipment traffic, removal of tree stumps?) If not, is there a methodology to quantify the area of disturbance for everything that isn't exempt?

Another SME felt that clarification was still needed regarding the process of logging off forested sites with typical brush removal, stump pulling, etc. and whether that would be considered “disturbance.”

Another SME feels that D. pertains only to lands in a land use taxation program. This SME was suggesting this provision:

Determine further that for real estate devoted solely to:

- (i) agricultural or horticultural use consisting of a minimum of five acres, except that for real estate used for agricultural purposes, for purposes of engaging in aquaculture as defined in § 3.2-2600, or for purposes of raising specialty crops as defined by local ordinance, the governing body may by ordinance prescribe that these uses consist of a minimum acreage of less than five acres;
- (ii) forest use consisting of a minimum of 20 acres; and
- (iii) open-space use consisting of a minimum of five acres or such greater minimum acreage as may be prescribed by local ordinance;
 - a. except that for real estate adjacent to a scenic river, a scenic highway, a Virginia Byway or public property in the Virginia Outdoors Plan or for any real estate in any city, county or town having a density of population greater than 5,000 per square mile, for any real estate in any county operating under the urban county executive form of government, or the unincorporated Town of Yorktown chartered in 1691; the governing body may by ordinance prescribe that land devoted to open space uses consist of a minimum of one quarter of an acre.

The minimum acreage requirements for special classifications of real estate shall be determined by adding together the total area of contiguous real estate excluding

recorded subdivision lots recorded after July 1, 1983, titled in the same ownership. However, for purposes of adding together such total area of contiguous real estate, any noncontiguous parcel of real property included in an agricultural, forestal, or an agricultural and forestal district of local significance pursuant to subsection B of § 15.2-4405 shall be deemed to be contiguous to any other real property that is located in such district. For purposes of this section, properties separated only by a public right-of-way are considered contiguous⁶;

The SME supports this language but notes that questions will continue as to whether or not the process of logging off forested sites with typical brush removal, stump pulling, etc. will fall under the definition of "disturbance."

For additional information, please see the stakeholder survey responses in Appendix 3.

Close to Consensus 6: Avoidance + Minimization (WG 1- Proposal 7): Adding to Mitigation Plan Requirements

Amend 9VAC15-60-[XX] addressing mitigation plan requirements to add a new subsection D as follows to address demonstration of avoidance and minimization of significant adverse impacts to prime agricultural soils and forest lands that link back to definitions of "avoid" and "minimize."

- A. If the department determines that significant adverse impacts to wildlife or historic resources or both are likely, then the applicant shall prepare a mitigation plan.**
- B. Mitigation measures for significant adverse impacts to wildlife shall include:**
 - 1. For state-listed T&E wildlife, the applicant shall take all reasonable measures to avoid significant adverse impacts or shall demonstrate in the mitigation plan what significant adverse impacts cannot practicably be avoided and why additional proposed actions are reasonable. These additional proposed actions may include best practices to avoid, minimize, or offset adverse impacts to resources analyzed pursuant to 9VAC15-60-40 A or C.**
 - 2. For proposed projects where the disturbance zone is located on or within one-half mile of a known or potential sea turtle nesting beach, the applicant shall take all reasonable measures to avoid significant adverse impacts or shall demonstrate in the mitigation plan what significant adverse impacts cannot**

⁶ <https://law.lis.virginia.gov/vacode/title58.1/chapter32/section58.1-3233/#:~:text=%C2%A7%2058.1%2D3233.-,Determinations%20to%20be%20made%20by%20local%20officers%20before%20assessment%20of,1> . Accessed October 28, 2022.

practicably be avoided, and why additional proposed mitigation actions are reasonable. Mitigation measures shall include the following:

- a. Avoiding construction within likely sea turtle crawl or nesting habitats during the turtle nesting and hatching season (May 20 through October 31). If avoiding construction during this period is not possible, then conducting daily crawl surveys of the disturbance zone (May 20 through August 31) and one mile beyond the northern and southern reaches of the disturbance zone (hereinafter "sea turtle nest survey zone") between sunrise and 9 a.m. by qualified individuals who have the ability to distinguish accurately between nesting and non-nesting emergences.**
 - b. If construction is scheduled during the nesting season, then including measures to protect nests and hatchlings found within the sea turtle nest survey zone.**
 - c. Minimizing nighttime construction during the nesting season and designing project lighting during the construction and operational phases to minimize impacts on nesting sea turtles and hatchlings.**
- 3. For projects located in part or in whole within zones 1, 2, 3, 4, 5, 10, 11, 12, or 14 on the Coastal Avian Protection Zones (CAPZ) map, contribute \$1,000.00 per megawatt of rated capacity, or partial megawatt thereof, to a fund designated by the department in support of scientific research investigating the impacts of projects in CAPZ on avian resources.**

C. Mitigation measures for significant adverse impacts to historic resources shall include:

- 1. Significant adverse impacts to VLR-eligible or VLR-listed architectural resources shall be minimized, to the extent practicable, through design of the solar energy project or the installation of vegetative or other screening.**
- 2. If significant adverse impacts to VLR-eligible or VLR-listed architectural resources cannot be avoided or minimized such that impacts are no longer significantly adverse, then the applicant shall develop a reasonable and proportionate mitigation plan that offsets the significantly adverse impacts and has a demonstrable public benefit and benefit for the affected or similar resource.**
- 3. If any identified VLR-eligible or VLR-listed archaeological site cannot be avoided or minimized to such a degree as to avoid a significant adverse impact, significant adverse impacts of the project will be mitigated through archaeological data recovery.**

D. Mitigation measures for significant adverse impacts to prime agricultural soils and forest lands shall include:

- 1. Practices and measures to avoid such significant adverse impacts, consistent with the definition of “avoid” set forth in [Insert relevant regulation citation].**
- 2. Practices and measures to minimize significant adverse impacts, consistent with the definition of “minimize” set forth in [Insert relevant regulation citation].**
- 3. Practices and measures to compensate for significant adverse impacts, consistent with [Insert relevant regulation citation].**

Moderate Support and No Consensus Achieved

*To achieve consensus, at a minimum the concerns of the “reds” should be addressed.
To achieve stronger support, the concerns of the “yellows” should also be addressed.*

GREEN Fully Support	YELLOW Some concerns and questions but able to support	RED Cannot Support
10	17	5

No consensus was achieved with the Qualtrics survey, and this proposal was not able to be further discussed at the RAP’s final meeting. The following is a summary of comments received from the Qualtrics survey.

Concerns or clarifications needed to move participants from “cannot support” (red) this proposal to “can” (yellow) or “fully support” (green) this proposal.

Two members indicated that their support was contingent upon knowing the corresponding functions and values which are being proposed by Workgroups 2 and 3. Another member indicated they would need to see additional details before they could fully evaluate their support for this proposal.

One member shared that in their view there is a mitigation hierarchy that requires avoidance, minimization, and offsets to occur in that order. They would like this sequence to be clear. They would also like to see specific practices identified before they can evaluate their support for this proposal.

Another member had a question about the definition of "utility poles." Are these transmission lines? This person would like greater clarity around what is meant by certain surface area limits (e.g., Erosion & Sediment Control permits are required for any disturbance of 10,000 square feet or greater, and 2,500 square feet or greater in Bay Act localities)?

Concerns or clarifications needed to move participants from “can support with reservations” (yellow) to “fully support” (green) this proposal.

Many members responding in this section indicated that they couldn’t support this proposal without additional information and knowledge of the specific items that were being developed

in Workgroup 2+3, as well as an understanding of the final definitions that are cited in the proposal.

One member sought clarity regarding the recipient of mitigation monies, and how that money will be used. In their view, it is unclear whether DEQ will purchase prime farmland, conservations lands, or how that land will be managed, and whether the Department of Forestry will do the same with forested lands? They were also interested in how the amount of compensation be determined.

Another member felt that clarification is needed regarding how to pass through the "avoidance and minimization" phase of review in cases where unavoidable impacts exceed identified thresholds (10 acres prime agricultural soils and 50 acres forest). They felt the impact and compensation metrics in this proposal are unclear, too subjective, and potentially unrealistic to assess and measure.

SME comments:

One member asked for clarification for the information intended for the blank space in D.3.

For additional information, please see the stakeholder survey responses in Appendix 3.

Close to Consensus 7: Mitigation (WG 2- Proposal 1):

Create a standardized checklist of functions and values

a. The state shall make available a standardized checklist of functions and values, as determined by this RAP, and access to standardized data to allow developers to conduct an initial high-level desktop assessment to evaluate the potential of proposed the solar project. The initial assessment would be as follows:

- (i) assessing the presence and current condition of prime agricultural soils and forest land;
- (ii) assessing the level of impacts of solar project on each;
- (iii) calculating the credits for avoidance and minimization efforts of solar developer; and
- (iv) establishing objective methods for determining a value proposition for mitigation with creditable, peer-reviewed methodologies.

Moderately Strong Support and No Consensus Achieved

To achieve consensus, at a minimum the concerns of the "reds" should be addressed.

To achieve stronger support, the concerns of the "yellows" should also be addressed.

GREEN	YELLOW	RED
Fully Support	Some concerns and questions but able to support	Too many concerns or questions: Cannot Support
19	12	1

No consensus was achieved with the Qualtrics survey. Because this was considered by the RAP to be a strategically important proposal, and it was close to consensus, it was selected by the RAP for discussion at its final meeting. The RAP discussion was robust and indicated that members may have been able to achieve consensus with a little more discussion, but there was not sufficient time. As a result, this proposal did not reach consensus. The following is a summary of comments received from the Qualtrics survey and the final RAP meeting.

RAP Discussion at the September 28 Meeting (Meeting #5)

In discussions with the RAP, the Workgroup identified that the purpose of this initial assessment is to understand the current condition of the property, what changes are likely to be caused on the property, and the mitigation cost of that change. They believe the mitigation cost must be part of the assessment for the developer to assess the financial risk.

Other members identified concerns about who is doing the assessment, who is verifying, and the qualifications of the person who is doing the assessment. Ultimately the state should be confirming the results by a person who the state appointed. There were additional questions, including: What is meant by current conditions? And could that mean that you could devalue the quality of the land?

Other members noted why current conditions are important to assess. For example, soil maps can be outdated and current uses could vary from what is indicated on the maps. The RAP has suggested that Lidar is better than aerial maps in terms of assessing the current condition of the soils.

Concerns or clarifications needed to move participants from “cannot support” (red) this proposal to “can” (yellow) or “fully support” (green) this proposal.

One member indicated that in their view the state, not the applicant, should be fully in charge of assessing the presence and condition of the resources. This member would like to see all state agencies involved listed in the steps.

Concerns or clarifications needed to move participants from “can support with reservations” (yellow) to “fully support” (green) this proposal.

A few members indicated general support for this proposal, pending the development of greater detail, including who would be establishing object methods for determining a value proposition, and which state agencies would be included in the work. Another member felt that the term “value proposition” isn’t clear and would like to see it clarified. One member wanted the proposal to be viewed as a nonbinding high-level analysis that does not limit the final calculations and requirements as the project is refined throughout the PBR process.

Another member was concerned about the number of variables that would have to be considered and about the possibility of overcomplicating things. Per this member, the PBR process was designed to provide a streamlined process for siting solar responsibly in Virginia. One member agrees that a simple development checklist is needed but feels that because detailed construction means and methods may not be known in the early stages of

development, identifying areas of disturbance, avoidance, and minimization measures will be challenging. In their view, taking a conservative approach to this evaluation may result in a financial evaluation that prevents further project development.

One member felt that as significant adverse impact is defined by HB 206, there is no need for an assessment of the condition of forest land. This member agrees that solar developers should have a checklist to assess potential costs prior to undertaking project, and would support the proposal with the following changes:

"a. The state shall make available a standardized checklist of functions and values, as determined by this RAP, and access to standardized data to allow developers to conduct an initial high-level desktop assessment to evaluate the potential of the proposed solar project. The initial assessment would be as follows: (i) assessing the ~~presence and current condition~~ *level of impacts of solar project* on prime agricultural soils and forest land; (ii) ~~assessing the level of impacts of solar project on each~~ calculating the credits for avoidance and minimization efforts of solar developer; and (iii) establishing objective methods for determining a value proposition for mitigation with creditable, peer-reviewed methodologies."

Two members indicated support for removing the first item (i) from the proposal and adding "on prime agricultural soils and forest land" to the end of (ii).

Additional data points that strengthen the proposal:

One member requested that site-specific information and potential costs to avoid/minimize/mitigate must be easily understood up front in a checklist form.

SME Comments:

One member had a question regarding whether there would be a variance process, to get credit for innovative things not accounted for in the checklist, or an appeals process? If so, who would be the arbiter?

For additional information, please see the stakeholder survey responses in Appendix 3.

Close to Consensus 8: Mitigation (WG 2- Proposal 2):

Scoring criteria should be included to easily value prime agricultural soils/forest land

In concept scoring criteria should be included in the short checklist so the various functions and values of prime agricultural soils and forest lands can be easily valued, upon objective data.

Weak Support and No Consensus Achieved

To achieve consensus, at a minimum the concerns of the “reds” should be addressed.

To achieve stronger support, the concerns of the “yellows” should also be addressed.

GREEN Fully Support	YELLOW Some concerns and questions but able to support	RED Too many concerns or questions: Cannot Support
7	23	2

No consensus was achieved with the Qualtrics survey. Because this was close to consensus, it was selected for discussion at the RAP final meeting. The RAP discussion was robust and suggested that, until the Functions & Values were settled, this proposal could not be resolved or further tested for consensus. The following is a summary of comments received from the Qualtrics survey and the final RAP meeting.

RAP Discussion at the September 28 Meeting (Meeting #5)

In discussion with the RAP, it was noted that the purpose of the checklist is to provide a finite, objective, applicable resource for valuation of impacted prime agricultural soils and forest lands. The goal is to be able to understand from a desktop survey what the Functions and Values dollar value will be. In this context, scoring criteria for each Function and Value is essential in order for the scoring process to be clearly understood, objective, and accomplished without numerous studies.

There was discussion around whether the term “easy” should be removed or changed. The point is that the valuation process should be clear and not overly complicated, with established methodologies, and that there should be a clear value associated with each criterion. The developer needs to be able to determine in a clear, easy way the dollar value at stake: “something you can calculate without detailed studies.” Related to this, there were also suggestions that it should read as “objectively calculated” or an “objective evaluation process.”

Another member requested that the functions and values be scored/evaluated using established methodologies. Because the methodologies don’t yet exist, who would be trusted to establish this methodology? Are there models in other states for how to determine a cost from an objective evaluation process? Concern was expressed about whether the state should decide the Functions and Values for the PBR process; it should not reinvent the wheel. This process could be similar to the state’s land use assessment using USDA data for crops or the process for compensation using a third-party system for wetlands. State agencies such as DOF, DWR, VDACS, and DCR would need to weigh in on the different elements of the calculations, like habitat and biological resources. For some elements, such as wetlands, there are already established benchmarks for market-based pricing. There was general agreement that more will need to be worked out in the regulatory process.

Concerns or clarifications needed to move participants from “cannot support” (red) this proposal to “can” (yellow) or “fully support” (green) this proposal.

One member noted that while they understand industry's desire to have the mitigation process be short and simple, the actual function of mitigation is to avoid, minimize, or offset a loss of some function and value. In their view, they support a process that is simple or perceived by industry as fair but does not reasonably do that. This person noted that if by “scoring criteria” we mean valuing some functions and values over others, then they feel a more detailed discussion is warranted, but valuation of functions and values here appears to refer to the cost of mitigation. In their view it may not be possible for the state to provide reliable pricing for all mitigation actions, and prices may vary based on the land values in the geography within which the project is being developed.

Another member noted they would like to see functions and values of contiguous prime agricultural soils and forest lands clearly defined for rapid scoring. In their view, credits should also be clearly defined for the positive environmental benefits that can result from solar projects and the additional management and engineering controls that are used to mitigate impacts.

Concerns or clarifications needed to move participants from “can support with reservations” (yellow) to “fully support” (green) this proposal.

Many members expressed the need for greater clarification of functions and values, scoring criteria, and definitions within the proposal. One member felt that it is unclear how a positive net difference for mitigation value would be utilized, and that mitigation should be required where there is a negative net difference, and each project should be evaluated independently.

Two members supported replacing “valued” with “calculated.” One member was concerned that limiting scoring to “objective data” could limit use of empirical evidence (obtained by a site visit, for example) that reflects on-the-ground realities. They do not want scoring data to be used as anything other than an initial screening tool (i.e., not prohibitive of solar development based on the resulting score alone). One member wanted to emphasize that any initial assessment is just a planning tool and not to be used as an exclusionary zoning tool.

One member indicated that a good resource on this topic would be the New York State Energy Research and Development Authority (NYSERDA) agricultural technical working group’s January 2022 preparation of a scoring criteria.⁷

Additional data points that strengthen the proposal:

One member emphasized that regardless of how objective the scoring criteria may be, they believe there should be a challenge and/or check process to confirm applicant submittals of the value of prime agricultural or forest lands.

⁷ Agricultural Technical Working Group, January 14, 2022 presentation. Accessed October 28, 2022. <https://static1.squarespace.com/static/60a2bb02f009ad6b9f6a15f9/t/61e5b380ff063f1e1498ad51/1642443651498>

SME comments:

One member had questions about how a project should be treated if the objective data and criteria change during the review process. Their concern is projects getting held up if new data or criteria are pending or be expected to change the design after the checklist submittal (e.g., avoid what happened when DEQ did not initially give a grace period and projects that were mid-review were asked to re-engineer.)

Another member would like the calculation to take into consideration functions and values of the forestland and loss of prime agricultural lands. Another voiced support for functions and values needing to be defined.

For additional information, please see the stakeholder survey responses in Appendix 3.

**Close to Consensus 9: Mitigation (WG 2- Proposal 10):
Payment-in-Lieu**

In addition to mitigation practices, payment-in-lieu should be permitted.

*Weak Support and No Consensus Achieved
To achieve consensus, at a minimum the concerns of the “reds” should be addressed.
To achieve stronger support, the concerns of the “yellows” should also be addressed.*

GREEN Fully Support	YELLOW Some concerns and questions but able to support	RED Too many concerns or questions: Cannot Support
8	20	4

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Concerns or clarifications needed to move participants from “cannot support” (red) this proposal to “can” (yellow) or “fully support” (green) this proposal.

One member shared that they believe payment-in-lieu should only be permitted if it is handled completely by a state-agency like DCR, and those funds should be applied to the highest value conservation lands first. In their view, the state should not outsource the management and processing of funds for payment-in-lieu by third parties such as non-governmental organizations. Another member raised the question of who will benefit from payments in lieu of mitigation measures. A third member expressed agreement with the concept, but only after all onsite measures are exhausted. In their view, impacted communities deserve to have mitigation in proximity to where the impact occurred where practicable.

Concerns or clarifications needed to move participants from “can support with reservations” (yellow) to “fully support” (green) this proposal.

Four members expressed that payment-in-lieu is required by HB 206, so they weren’t sure it needed to be considered as a separate proposal. A few members agreed with concept of using payment-in-lieu within a hierarchy of mitigation preferences with on-site mitigation and off-site mitigation and avoidance being considered first.

Several members expressed a request for greater clarification before they could indicate their support for this proposal. Some of the questions included:

1. How would a total mitigation package of on-site, off-site, and pay-in-lieu would be handled?
2. Would there be a difference in scoring and value proposition?
3. Who makes the decision to accept payment-in-lieu of mitigation?
4. Would this apply to both agricultural prime soils and forest land conservation? If so, could all mitigation for a project come from payment-in-lieu? How would these values vary?
5. Can developers escape all mitigation requirements through payment-in-lieu?
6. Will a mitigation preference hierarchy be developed and where do in-lieu fee programs fit into that hierarchy?

One member felt they could support the proposal if it was made clear that payment-in-lieu should be reasonable and consistent. Another member expressed a preference for flexibility to use multiple methods of mitigation in combination, or in isolation.

Additional data points that strengthen the proposal:

One member expressed the view that payment-in-lieu of mitigation for prime soils or forested land ensures developers have greater flexibility to navigate the myriad of other siting constraints that restrict clean energy deployment. They noted that siting of solar facilities relies on several factors largely outside of a developer’s control, including availability of transmission infrastructure, site topography, landowner interest, and ecological factors as potentially constraining factors, which is why the options created by payment-in-lieu might be preferable.

SME comments:

One member asked if this approach would apply in all cases. Another indicated in their view that this approach applies if there is an appropriate in-lieu fee program in place that is directed to meet the mitigation needs of this program. Another member expressed a preference for this approach as opposed to direct local on/offsite efforts.

For additional information, please see the stakeholder survey responses in Appendix 3.

Close to Consensus 10: Mitigation (WG 2- Proposal 11):

State should evaluate program effectiveness

After a reasonable period of time, and no later than five years, the state should evaluate the program’s effectiveness of mitigation practices and update the program to reflect lessons learned.

Moderate Support and No Consensus Achieved

To achieve consensus, at a minimum the concerns of the “reds” should be addressed.

To achieve stronger support, the concerns of the “yellows” should also be addressed.

GREEN	YELLOW	RED
Fully Support	Some concerns and questions but able to support	Too many concerns or questions: Cannot Support
17	14	1

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Concerns or clarifications needed to move participants from “cannot support” (red) this proposal to “can support with reservations” (yellow) or “fully support” (green) this proposal.

One member expressed that the industry needs consistency and the ability to plan for projects in the future. If the state determines that changes are necessary, then this member feels they should pursue such changes through the legislative process.

Concerns or clarifications needed to move participants from “can support with reservations” (yellow) to “fully support” (green) this proposal.

Several members indicated they could support the approach indicated in the proposal if it is not retroactive and/or would not result in additional requirements for existing projects. Other members expressed a desire for greater clarification about how this process would function. What are the standards against which the program is evaluated? Would it trigger the ability to amend ongoing practices, and if so, do these amendments have any impact on the values determined in previous iterations of mitigation valuation practices?

Two members indicated that in their view it’s important to assess the efficacy of mitigation actions and to learn from what works and what does not. One member felt that five years was too long and that two or three years would be more appropriate based on the speed at which projects are being completed.

Additional data points that strengthen the proposal:

One member suggested a possible adjustment could include changing "after a reasonable amount of time" to "after a reasonable number of solar projects have been developed" -- given that the efficacy of these mitigation protocols will not be understood until projects have fully gone through the process or are well on their way.

SME comments

Separate SMEs raised the need for greater elaboration or definition of terms within the proposal of “reasonable period of time” and “mitigation practices.” Another suggested that this could be evaluating the site too soon and might not produce the intended results. That person also supported better defining “reasonable period of time.”

For additional information, please see the stakeholder survey responses in Appendix 3.

Close to Consensus 11: Mitigation (WG2- Proposal 12):

Does not cover existing E&S and stormwater

Through its existing E&S and stormwater programs DEQ regulates active and post-construction stormwater quality and quantity. Therefore, this RAP will focus only on issues that are not covered by these existing programs or regulations.

Very Strong Support and No Consensus Achieved

To achieve consensus, at a minimum the concerns of the “reds” should be addressed.

To achieve stronger support, the concerns of the “yellows” should also be addressed.

GREEN Fully Support	YELLOW Some concerns and questions but able to support	RED Too many concerns or questions: Cannot Support
21	6	5

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Concerns or clarifications needed to move participants from “cannot support” (red) this proposal to “can support with reservations” (yellow) or “fully support” (green) this proposal.

Two members felt that stormwater impacts should be addressed within the work of the RAP. Another member felt that existing programs do not adequately address all functions and values associated with water quality and quantity and that the existing regulations are out of date and have not yet been updated to current standards. One member expressed that in their view if land disturbing activities are defined more narrowly than in Title 62 then they should not count.

Concerns or clarifications needed to move participants from “can support with reservations” (yellow) to “fully support” (green) this proposal.

Three members expressed the desire to add to the proposal that the RAP “reserves the right to pull in any storm water measures for credit after they implemented.” Another member emphasized the need to make sure the different programs work together, and everyone understands the process.

Additional data points that strengthen the proposal:

Three members expressed that throughout the RAP, the solar industry raised several concerns about “scope creep,” as other stakeholders routinely brought up issues not covered by the legislative directive of the RAP, covered by existing regulations/regulatory programs, or currently being addressed in other regulatory forums. In their view it is important to clarify that guidance related to stormwater management and erosion and sediment control is currently being drafted by the DEQ – with the solar industry in mind – thus they feel it would be redundant to cover this issue in the RAP.

SME Comments:

One member felt that the proposal should consider overall impact of downstream water quantity and quality for project duration, such as aquatic habitat, drinking water supply, etc., outside of the site.

For additional information, please see the stakeholder survey responses in Appendix 3.

Close to Consensus 12: Local Government (WG 5- Proposal 2):

Encouraging earlier NOI submission

Establish a mechanism to encourage submission of an NOI earlier in the process and to unlock resources from state agencies to assist localities and applicants.

Upon receipt of the NOI and request by the locality, DEQ and its PBR sister agencies (DCR, DHR, DWG, VDOF, and VDACES) shall provide consultation of site characteristics relevant to an agencies purview to aid the locality in its review of solar projects. Such consultation may include a review of state resource databases, a site visit, and a list of the applicable permits a solar project may be subject to prior to start of construction.

Moderate Support and No Consensus Achieved

To achieve consensus, at a minimum the concerns of the “reds” should be addressed.

To achieve stronger support, the concerns of the “yellows” should also be addressed.

GREEN Fully Support	YELLOW Some concerns and questions but able to support	RED Too many concerns or questions: Cannot Support
16	14	2

No consensus was achieved with the Qualtrics survey. Because this was considered by the RAP to be a strategically important proposal, and it was close to consensus, it was selected by the RAP for discussion at its final meeting. The RAP discussion was robust and indicated that members may have been able to achieve consensus with a little more discussion, but there was

not sufficient time. As a result, this proposal did not reach consensus. The following is a summary of comments received from the Qualtrics survey and the final RAP meeting.

RAP Discussion at the September 28 Meeting (Meeting #5)

The purpose of the proposal is to get some sort of contact established between the developer and the locality early on, so that a relationship is established, and a workable approach can be identified early on in the process. It is also pertinent that this early contact would remain confidential. This proposal will also help the developers understand ahead of time if there are issues about the site that would render it inappropriate for solar development.

There are two primary concerns from localities that are being heard.

1. The locality does not hear about the project fast enough;
2. The locality does not have the resources to assess the proposed projects.

So, the NOI is being used as a mechanism to address these concerns without creating additional burden on the developers.

Some members highlighted the need to consider FOIA impacts, and that the burden on the ability to create a potential project could take away opportunities. Others felt that there has to be a happy medium where the NOI is moved up earlier in the process but not too early. Localities do not want to get in the way of potential development.

Other concerns raised by members include:

- There is a mandate on the solar developer to give notice to locality before the land use file application (but that is just for siting agreement).
- For developers, there is concern that the PBR process timeline is done in a sequence of events for a reason (cost control, etc.). Changing that might have consequences.
- For localities, there is concern that they are forced to make a decision before having all the information. That can lead to making an uninformed decision that is irreversible.

Some members expressed that it would be helpful for developers if counties have a page on their website dedicated to their "solar wish list" and requirements, as well as contact information, which would help to facilitate the conversation.

Concerns or clarifications needed to move participants from “cannot support” (red) this proposal to “can support with reservations” (yellow) or “fully support” (green) this proposal.

One member shared their view that the agencies listed are all part of the review of the project through the PBR process and other regulatory programs as applicable. Additional workload may cause additional delay in existing processes, and additional involvement from these agencies on the local level may result in redundant requirements/reviews. Another member echoed the concern regarding redundancy at the local level and expressed concern about how the inclusion of the state in a local process could affect review and approval timelines.

Concerns or clarifications needed to move participants from “can support with reservations” (yellow) to “fully support” (green) this proposal.

Several members expressed concern that this could slow the approval process and could be too time consuming and complex to implement. A few members were concerned that this could result in more upfront costs for a developer for a project that is then cancelled. One member felt that localities may use these reviews to point to unanswered questions and effectively halt solar deployment.

Another member noted, “Today, a solar developer applies to the locality for land use approval BEFORE that solar developer applies for PBR approval. What would happen if every local government requested each state agency to do a detailed review of various aspects of a solar project before that locality even considers the land use case? No other developer of any kind of real property is subjected to a requirement like that to completely engineer their whole project before the local government even makes a land use decision.”

One member felt that the state should provide a full list of minimization techniques (BMPs) to better assist localities with the development of conditions for their permitting purposes. Another noted that in their view, much of this is public information that localities should be able to get for themselves or from the developer.

One member suggested alternative language for the proposal:

- “Sharing of subject matter expertise and resources by the state to local governments would be welcomed.”

SME comments:

- One member recommended that applicants request pre-application meetings. Another shared their view that NRCS soil scientists should be involved at some point in the process.

For additional information, please see the stakeholder survey responses in Appendix 3.

Close to Consensus 13: Local Government (WG 5- Proposal 3):

Review results provided to localities

NOI is required prior to request for analysis with any state agency. Any subsequent review results for a solar energy project completed by a state agency shall be provided to the Chief Administrative Officer of the locality(ies) in which the project is located.

Moderate Support and No Consensus Achieved

To achieve consensus, at a minimum the concerns of the “reds” should be addressed.

To achieve stronger support, the concerns of the “yellows” should also be addressed.

GREEN Fully Support	YELLOW Some concerns and questions but able to support	RED Too many concerns or questions: Cannot Support
18	9	5

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Concerns or clarifications needed to move participants from “cannot support” (red) this proposal to “can” (yellow) or “fully support” (green) this proposal.

One member shared that in their view, existing agency review/coordination requirements are conducted under other regulatory programs and tying those existing processes to the PBR process has the potential to create inefficiencies. Another member emphasized concerns expressed above regarding the impact on review and approval timelines, and potential for redundancies in the process.

One member felt that this proposal infringes on the competitive landscape of solar and lacks any definition of "analysis," which will be problematic with so many state agencies involved. In their view, the 90-day notice proposal is a much clearer bar to set.

Another member offered that solar developers should be able to approach state agencies for preliminary consultation before filing a NOI, and another felt that this proposal should be optional only when specifically requested by the county.

Concerns or clarifications needed to move participants from “can support with reservations” (yellow) to “fully support” (green) this proposal.

One member shared the concern that localities must make decisions on projects before all the information is gathered, and that they should have another opportunity to be consulted in the process once things are farther along.

Another member had a question about whether the use of the word "any" is too restrictive on agency/locality/developer consultations, and how this would be put into practice in conjunction with Workgroup 5, Proposal 2.

Two members felt like the requirements of the proposal were unnecessary. Another was supportive of the proposal if it means that the locality must receive a NOI before they can request state agency report.

SME comments:

One member noted that NOI are publicly available on the DEQ Renewable energy GIS mapper. Another member recommended that applicants request pre-application meetings.

For additional information, please see the stakeholder survey responses in Appendix 3.

Close to Consensus Proposal 14: Local Government (WG 5- Proposal 4):

PBR Template Requirements

The PBR template for the local governing body certification form shall require submission of the Siting Agreement or Conditional Use Permit (CUP) conditions, as applicable.

Strong Support and No Consensus Achieved

To achieve consensus, at a minimum the concerns of the “reds” should be addressed.

To achieve stronger support, the concerns of the “yellows” should also be addressed.

GREEN Fully Support	YELLOW Some concerns and questions but able to support	RED Too many concerns or questions: Cannot Support
23	7	2

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Concerns or clarifications needed to move participants from “cannot support” (red) this proposal to “can” (yellow) or “fully support” (green) this proposal.

One member noted that the siting agreement or Conditional Use Permit (CUP) conditions may not be complete at the time a PBR application is filed. Another member felt that submittal of full siting agreements and CUP conditions is redundant as those are already available to the locality and may be burdensome administratively depending on the size of the documents. In addition, this member expressed that in their view the full contents of these document don’t warrant review as part of the PBR process and that only those aspects of the documents being used to satisfy requirements under the PBR approval process should be provided. This member provided the following alternative language:

- “The PBR template for the local governing body certification form shall require submission of any Siting Agreement or Conditional Use Permit (CUP) conditions, that are being proposed to satisfy mitigation requirements for impacts to prime agricultural soils or forest lands.”

Concerns or clarifications needed to move participants from “can support with reservations” (yellow) to “fully support” (green) this proposal.

One member sought to clarify that they support the ability of localities to have siting agreements and CUP conditions. Another felt that it seems like DEQ would need this to verify what actions already committed to can be counted toward mitigation. Two members noted the need to reconcile this proposal with that of Workgroups 2+3, Proposal 5.

Several members offered changes, additions, and/or suggestions for alternative language, including:

- Adding language that requires submission of any other relevant documents at the local level that contain provisions or conditions that would be considered under the mitigation calculation.
- Adding any agreed upon list of conditions OR PROFFERS (some are rezonings) addressing conditions or measures that may be considered for the purposes of mitigation calculation.
- “The PBR template for the local governing body certification form shall require submission of the Conditional Use Permit (CUP) conditions and Siting Agreement, as applicable.” The reasoning is that localities must know that the project is going to be proposed earlier and this proposal doesn’t go far enough.
- County notification must happen sooner, perhaps as soon as leases are being negotiated.
- Mitigation should be done according to this regulation and in accordance with what is contained in HB 206 and no credits shall be allowed for mitigation through local siting agreements or the Conditional Use Permit.

SME comments:

One member commented that solar PBR is based upon MW, not acres. Another noted that this language overlaps with that from Workgroups 2 + 3 and needs to be harmonized.

For additional information, please see the stakeholder survey responses in Appendix 3.

Proposals Not Close to Achieving Consensus, Needing Significant Additional Discussion

Not Close to Consensus 1: Avoidance + Minimization (WG 1-Proposal 5)

Mitigation required locally should be counted in state process

Amend 9VAC15-60-[XX] addressing analysis of the beneficial and adverse impacts on natural resources to reflect addition of new subsections C and D addressing evaluation of impacts to prime agricultural soils and forest lands. Language from the existing regulation is reflected below, with the *new proposed language in underlined italics*:

A. Analyses of wildlife. To fulfill the requirements of § 10.1-1197.6 B 7 of the Code of Virginia, the applicant shall conduct preconstruction wildlife analyses. The analyses of wildlife shall include the following:

- 1. Desktop surveys and maps.** The applicant shall obtain a wildlife report and map generated from DGIF's Virginia Fish and Wildlife Information Service web-based application (9VAC15-60-120 C 3) or from a data and mapping system including the most recent data available from DWR's subscriber-based Wildlife Environmental Review Map Service of the following: (i) known wildlife species and habitat features on the site or within two miles of the boundary of the site and (ii) known or potential sea turtle nesting beaches located within one-half mile of the disturbance zone.
- 2. Desktop map for avian resources in Coastal Avian Protection Zones (CAPZ).** The applicant shall consult the "Coastal Avian Protection Zones" map generated on the department's Coastal GEMS geospatial data system (9VAC15-60-120 C 1) and determine whether the proposed solar energy project site will be located in part or in whole within one or more CAPZ.

B. Analyses of historic resources. To fulfill the requirements of § 10.1-1197.6 B 7 of the Code of Virginia, the applicant shall also conduct a pre-construction historic resources analysis. The analysis shall be conducted by a qualified professional meeting the professional qualification standards of the Secretary of the Interior's Standards for Archeology and Historic Preservation (9VAC15-60-120 B 2) in the appropriate discipline. The analysis shall include each of the following:

- 1. Compilation of known historic resources.** The applicant shall gather information on known historic resources within the disturbance zone and within one-half mile of the disturbance zone boundary and present this information on the context map referenced in 9VAC15-60-70 B, or as an overlay to this context map, as well as in tabular format.
- 2. Architectural survey.** The applicant shall conduct a field survey of all

architectural resources, including cultural landscapes, 50 years of age or older within the disturbance zone and within one-half mile of the disturbance zone boundary and evaluate the eligibility of any identified resource for listing in the VLR.

3. Archaeological survey. The applicant shall conduct an archaeological field survey of the disturbance zone and evaluate the eligibility of any identified archaeological site for listing in the VLR. As an alternative to performing this archaeological survey, the applicant may make a demonstration to the department that the project will utilize non-penetrating footings technology and that any necessary grading of the site prior to construction does not have the potential to adversely impact any archaeological resource.

C. Analyses of prime agricultural soils. To fulfill the requirements of § 10.1-1197.6 B 7 of the Code of Virginia, the applicant shall conduct pre-construction analyses of the presence of prime agricultural soils at the proposed project Site. The analyses of prime agricultural soils shall include the following:

1. Desktop surveys and maps. The applicant shall (a) obtain a prime agricultural soils report and map for the project Site generated from either (a) the current map identifying prime agricultural soils as published by Virginia Cooperative Extension or (b) the current Web Soil Survey and associated NRCS Prime farmland soil state list for Virginia (which list is maintained by the NRCS State Soil Scientist); (b) determine based on such reports and maps any location(s) of prime agricultural soils on the project Site; and (c) overlay such locations on a project Site drawing showing the perimeters of the proposed disturbance zone for the project and the proposed directly impacted area within the proposed disturbance zone.

2. Field confirmation. The applicant may at its option also perform field verification of (a) the presence of prime agricultural soils within the proposed disturbance zone at the project Site, as indicated in the desktop surveys and maps, which field verification must be performed by a Virginia-licensed professional soil scientist; and (b) the degree of soil compaction within the proposed disturbance area of the project Site to determine the existing level of compaction and of root-limiting levels or conditions, which verification must be performed by a Virginia-licensed professional soil scientist or by a Virginia-licensed geologist or geo-technician.

D. [A new subsection D would be inserted here, but further information/research is needed for, and consensus has not been reached as to, the new subsection D language; see "WG1: Avoidance and Mitigation: Proposal 10" below for details.]

E. Analyses of other natural resources. To fulfill the requirements of § 10.1-1197.6 B 7

of the Code of Virginia, the applicant shall also conduct a pre-construction desktop survey of natural heritage resources within the disturbance zone.

F. Summary report. The applicant shall provide to the department a report presenting the findings of the studies and analyses conducted pursuant to subsections A, B, C, D and E of this section, along with all data and supporting documents. The applicant shall assess and describe the expected beneficial and adverse impacts, if any, of the proposed project on wildlife and historic resources identified by these studies and analyses.

Strong Support but No Consensus Achieved

*To achieve consensus, at a minimum the concerns of the “reds” should be addressed;
To achieve stronger support, the concerns of the “yellows” should also be addressed.*

GREEN	YELLOW	RED
Fully Support	Some concerns and questions but able to support	Too many concerns or questions: unable to support
20	4	8

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- Due to the long lead time inherent in the PBR process, detailed construction means and methods may not be known at the time of PBR application submittal and an applicant may be forced to make conservative assumptions about where prime agricultural soils and forested lands on site will be impacted (disturbed).
- Consider removing C.2.b. regarding soil compaction – does this have bearing on whether qualification as prime agricultural soil?
- Possible conflict with language from the statute identifying U.S. Department of Agriculture as the arbiter of prime agricultural soils.
- There is a need to expand the pool of qualified professionals able to perform soil evaluations. Possibilities include adding “Certified Professional Soil Scientists accredited by the Soil Science Society of America” to C.2., including soil scientists from neighboring states, and/or those from the national Professional Soil Scientists (ARCPACS) registry to be allowed to conduct this work.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 2: Avoidance + Minimization (WG 1-Proposal 8)

Exception to definition of "disturb"

Provide a potential exception to definition of "disturb:" New utility poles with an aggregate area less than a certain surface area limit.

Note: This proposal was considered by WG 1 and did not achieve consensus within the Workgroup. However, it was submitted to the RAP for their consideration to assist with further development of these ideas.

Weak Support but No Consensus Achieved

*To achieve consensus, at a minimum the concerns of the "reds" should be addressed;
To achieve stronger support, the concerns of the "yellows" should also be addressed.*

GREEN	YELLOW	RED
Fully Support	Some concerns and questions but able to support	Too many concerns or questions: Cannot Support
6	16	10

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- "These holes are several feet deep, and as was noted during one of WG 1's meetings, there could be 10 of these (or more) on a site. Those are an integral part of the solar facility and should no way be exempted from the definition of 'disturb.' It does not stand to reason that 'install[ing] pilings or structural posts for solar array panels' counts as a disturbance but creating a much larger hole for utility poles does not."
- Some members expressed support for simpler definitions that don't include numerous exemptions.
- This approach does not require generation resources to mitigate in instances where load is exempt.
- Generally new power lines within a project fence line will be buried. If overhead lines are used, the installation of new utility poles (in and of itself) is unlikely to create any meaningful disturbance to prime agricultural soils or forested lands.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 3: Avoidance + Minimization (WG 1-Proposal 9)

Adding continuous purchasing to "minimize"

Addition of the following to the definition of "minimize:"

Continuous purchasing from local agricultural or forest products industries for the operation and maintenance of the project and upkeep of the vegetation at the Site.

Note: This proposal was considered by WG 1 and did not achieve consensus within the Workgroup. However, it was submitted to the RAP for their consideration to assist with further development of these ideas.

Weak Support but No Consensus Achieved

To achieve consensus, at a minimum the concerns of the "reds" should be addressed;

To achieve stronger support, the concerns of the "yellows" should also be addressed.

GREEN Fully Support	YELLOW Some concerns and questions but able to support	RED Too many concerns or questions: Cannot Support
6	13	13

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- If this only mitigates a portion of value of one resource it should be included as a temporary offset and not permanent.
- Workgroups 2+3 were working on economic impact and this might be better approached through that lens.
- Are any other sectors required to continue purchasing?
- As proposed, there is a possibility this would drive the industry to pursue an alternative permitting approach through the CPCN process.
- More specific definitions are needed and concepts elaborated, such as thresholds for purchasing, how it would be quantified to be considered an offset, what qualifies as a continuous purchase, and what is local.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 4: Avoidance + Minimization (WG 1-Proposal 10)

Analysis of impacts - prime agricultural soils and forestland

Amend 9VAC15-60-[XX] addressing analysis of the beneficial and adverse impacts on natural resources to reflect addition of new subsections C (see Avoidance and Mitigation: Proposal 5) and D (see below) addressing evaluation of impacts to prime agricultural soils and forest lands:

D. Analysis of forest lands.

1. Desktop surveys and maps. The applicant shall obtain a forest lands report and map for the project Site generated from [INSERT APPROPRIATE REFERENCE SOURCES], (ii) determine based on such reports and maps any location(s) of forest lands on the project Site, and (iii) overlay such locations on a project Site drawing showing the perimeters of the proposed disturbance zone for the project and the proposed directly impacted area within the proposed disturbance zone.

2. Field confirmation. The applicant may also perform field verification of the presence of forest lands within the proposed disturbance zone at the Site, as indicated in the desktop surveys and maps” which verification must be performed by [INSERT APPROPRIATE QUALIFIED PROFESSIONALS].

Note: This proposal was considered by WG 1 and did not achieve consensus within the Workgroup. However, it was submitted to the RAP for their consideration to assist with further development of these ideas.

Weak Support but No Consensus Achieved

To achieve consensus, at a minimum the concerns of the “reds” should be addressed;

To achieve stronger support, the concerns of the “yellows” should also be addressed.

GREEN	YELLOW	RED
Fully Support	Some concerns and questions but able to support	Too many concerns or questions: Cannot Support
4	19	9

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- Requests to involve the Virginia Department of Forestry rather than other sources or professionals (and a question about whether DOF has adequate field staff to fulfill the requirements of the proposal).

- This proposal appears to be addressing the presence of forest land, not the impacts to the functions and values of forest land the project would have.
- Solar developers should be able to use desktop surveys to assess whether the state mandated mitigation will render a solar project unviable. Per these members, this necessitates sufficient data (available online) to make these due diligence determinations early in the development process.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 5: Mitigation (WG 2 - Proposal 3)

Mitigation value calculated on net difference between current and post construction value

Mitigation value should be calculated based on the net difference between current value and post construction value.

1. Current value
2. Post construction value
3. Note: the net difference could actually be positive or negative depending on circumstances

Weak Support but No Consensus Achieved

To achieve consensus, at a minimum the concerns of the “reds” should be addressed;

To achieve stronger support, the concerns of the “yellows” should also be addressed.

GREEN	YELLOW	RED
Fully Support	Some concerns and questions but able to support	Too many concerns or questions: Cannot Support
7	16	9

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- HB 206’s second enactment clause details what factors should be considered.
- Decommissioning activities should be considered: 1. Current value, 2. Post construction value, and 3. Post-decommissioning value.
- How would post-construction value be measured, who makes that measurement, and based on site qualities or would include other elements, such as off-site benefits of the project to a county, to the utility, etc.?
- Several benefits of solar (fewer fertilizer and pesticide applications; deep-rooted permanent ground cover; pollinator habitat, etc.) would contribute to a positive value of a project.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 6: Mitigation (WG 2 - Proposal 4)

Criteria should be objective, simple, and fair

The state-mandated mitigation criteria should be objective, simple, fair, and have a reasonably short checklist so a solar developer can quickly determine in preliminary due diligence upfront whether these state-mandated cost burdens will kill the solar project, or not.

Weak Support but No Consensus Achieved

*To achieve consensus, at a minimum the concerns of the “reds” should be addressed;
To achieve stronger support, the concerns of the “yellows” should also be addressed.*

GREEN Fully Support	YELLOW Some concerns and questions but able to support	RED Too many concerns or questions: Cannot Support
10	15	7

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- The proposal should be modified to reflect more neutral language.
- Simplicity and brevity are paramount for reducing potential regulatory burden.
- This proposal should reference the specific impacts on prime agricultural soils and forest lands on the site, not just other requirements that a locality may impose or agreements they have come to with a developer.
- Mitigation criteria should include credits for the positive environmental benefits that can result from solar projects and the additional management and engineering controls that are used to mitigate impacts.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 7: Mitigation (WG 2 - Proposal 5)

Mitigation required locally should be counted in state process

Mitigation required by the local zoning conditions and siting agreements that meets the state standards should be counted in the state-mandated mitigation process.

Strong Support but No Consensus Achieved

*To achieve consensus, at a minimum the concerns of the “reds” should be addressed;
To achieve stronger support, the concerns of the “yellows” should also be addressed.*

GREEN Fully Support	YELLOW Some concerns and questions but able to support	RED Too many concerns or questions: Cannot Support
15	11	6

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- Virginia is a Dillon Rule state. Therefore this regulation must preempt local zoning conditions and siting agreements with respect to significant adverse impacts on prime farmland and forest land as defined in HB 206.
- Mitigation should apply only to site improvements that address farm and forest loss.
- Clarification is needed regarding who is doing the valuation and assessment, what criteria would be used, and what the appeals/dispute resolution process would be.
- Cannot determine support until state standards for mitigation are developed.
- There is a need to avoid duplicative burdens.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 8: Mitigation (WG 2 - Proposal 6)

Credit should be given if activities will improve Functions & Values

Assuming that pre-development functions and values are fully assessed and valued, where post-construction activities will improve those functions and values, credit should be given. Similarly, where post-construction activities fail to fully mitigate, that should be reflected in the credit calculation.

Weak Support and No Consensus Achieved

To achieve consensus, at a minimum the concerns of the “reds” should be addressed;

To achieve stronger support, the concerns of the “yellows” should also be addressed.

GREEN	YELLOW	RED
Fully Support	Some concerns and questions but able to support	Too many concerns or questions: Cannot Support
9	16	7

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- This proposal should not allow excess improvements in one function or value to be credited toward impacts of a different function or value, e.g., carbon offsets.
- Values should be based on functions as defined in enactment clause 2 of HB 206
- Solar benefits have not been fully articulated and/or understood in this process. Benefits should be recognized first, like Best Management Practices (BMPs) where none now exist, reductions in pesticide and herbicide use, nutrient runoff, tillage, and water

use compared to conventional agriculture. By considering impacts and benefits alike the regulations will capture the net effects of a solar project on the land, as well as encourage developers to adopt beneficial practices as part of a vegetation management plan.

- Clarity is needed around pre-construction and post-construction functions and values, scoring criteria, impacts and compensation, the definition of credits, who will receive the credits and by what means, and what happens if a project fails to mitigate “fully”.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 9: Mitigation (WG 2 - Proposal 7)

Mitigation should be allowed on and off site

Mitigation by the solar developer shall be allowed on-site and/or off-site.

Strong Support and No Consensus Achieved

To achieve consensus, at a minimum the concerns of the “reds” should be addressed;

To achieve stronger support, the concerns of the “yellows” should also be addressed.

GREEN	YELLOW	RED
Fully Support	Some concerns and questions but able to support	Too many concerns or questions: Cannot Support
20	3	9

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- Limits could be placed on where the mitigation can occur to maintain ecosystem function in each area (e.g., within XX distance of the site, within watershed, within VA etc.)
- Is on or off-site mitigation is preferable? And how will each be valued?
- Off-site mitigation should be limited to in lieu fees (covered in another section).
- Knowing when, where, and how offsite mitigation would be acceptable has many significant ramifications and touches on environmental justice concerns expressed during the RAP.
- Constraints related to the siting of solar facilities make it difficult to impossible for all mitigation to occur onsite. These could include: facilities that are largely constrained by the availability of transmission infrastructure (a project must be located near a high voltage transmission line, and this line must have sufficient injection capacity to enable the solar project to be financially viable), site topography, landowner interest, and ecological factors – such as the presence of endangered species, wetlands, or other sensitive habitat. Offsite mitigation for prime soils or forested land ensures developers

have greater flexibility to navigate the myriad of other siting constraints that restrict clean energy deployment.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 10: Mitigation (WG 2 - Proposal 8)

Mitigation as similar duration to the duration of the impact

Mitigation onsite and/or offsite should be of similar duration to the duration of the impact.

Note: The workgroup reached no consensus on duration of the project or in perpetuity.

Weak Support but No Consensus Achieved

To achieve consensus, at a minimum the concerns of the “reds” should be addressed;

To achieve stronger support, the concerns of the “yellows” should also be addressed.

GREEN Fully Support	YELLOW Some concerns and questions but able to support	RED Too many concerns or questions: Cannot Support
3	17	12

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- Many important pieces of this proposal merit further discussion.
- Support for mitigation in perpetuity in instances where impact is perpetual.
- “Duration of impact” needs greater elaboration and definition. Mitigation should coincide with the life of the project. All projects are required to have a decommissioning plan to return them to the current land use, and at that point mitigation is no longer pertinent. Some allowance should be made for the differentiation between construction impacts, which would be greater but of short duration, and impacts during operation, which are much less. Mitigation in perpetuity would be a nonstarter for the industry and would deter developers from using the PBR process.
- It is important to focus on the intent of the legislation, prime agricultural soils and forested lands, and whether the property can be returned to previous use of agricultural or forested lands when the project is completed.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 11: Mitigation (WG 2 - Proposal 9)

State-mandated mitigation shall be determined on a case-by-case basis.

Weak Support but No Consensus Achieved

To achieve consensus, at a minimum the concerns of the “reds” should be addressed;

To achieve stronger support, the concerns of the “yellows” should also be addressed.

GREEN Fully Support	YELLOW Some concerns and questions but able to support	RED Too many concerns or questions: Cannot Support
7	13	12

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- The proposal is too vague and in contrast with other proposals requiring specificity, checklists, and the ability to predict cost.
- The *process* for calculating required mitigation should be consistent across all projects. However, the amount of mitigation required will be different for each project.
- To the extent mitigation is determined on a project-by-project basis, there should be guidelines as suggested in WG 2+3’s Proposal 4.
- As proposed, this would strain state resources and delay development.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 12: Mitigation (WG 2 - Proposal 13)

Decommissioning as part of a mitigated plan

Practices undertaken as part of decommissioning may be included and considered part of the “mitigation plan” and, if included, should be valued and added into the determination of credits.

Weak Support but No Consensus Achieved

To achieve consensus, at a minimum the concerns of the “reds” should be addressed;

To achieve stronger support, the concerns of the “yellows” should also be addressed.

GREEN Fully Support	YELLOW Some concerns and questions but able to support	RED Too many concerns or questions: Cannot Support
6	14	12

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- Mitigation at the end of the project is not equal to upfront mitigation because there is no way to count it appropriately.
- Mitigation occurring at any stage of the project should be counted in the mitigation plan.
- This question is being considered by an SCC Decommissioning study, the results of which would inform this discussion.
- Decommissioning practices are separate and distinct from development impacts and the need to avoid, minimize, and mitigate them.
- There is a disconnect between parties on the level to which a specific site could be restored.
- Decommissioning activities won't take place for 30 years, and many things could change in the interim. For example, if the developer were to go bankrupt, who is required to ensure that those decommissioning activities take place?

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 13: Mitigation (WG 2 - Proposal 14A)

Functions & Values: Water

The Functions & Values to be assessed should include groundwater infiltration/ discharge and water quality protection

Wide Differences and No Consensus Achieved

To achieve consensus, at a minimum the concerns of the "reds" should be addressed;

To achieve stronger support, the concerns of the "yellows" should also be addressed.

GREEN	YELLOW	RED
Fully Support	Some concerns and questions but able to support	Too many concerns or questions: Cannot Support
6	10	16

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- Groundwater infiltration/discharge and Water Quality Protection are functions and values that are already being addressed as part of the erosion and sediment control and stormwater management programs. There's no need to address them under HB206 and the PBR process.

- There’s concern that the functions and values computations will be way too complex and make it nearly impossible to create a “desktop” or field assessment to determine how much state-mandated mitigation will be required on any given solar project.
- There are concerns that while functions and values of water are addressed under multiple programs, it has not been done effectively yet.
- Concerns have been stated without any statement as to the benefits of this value. The concerns should not be included in the report without further explanation of the benefits.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 14: Mitigation (WG 2 - Proposal 14B)

Functions & Values: Nutrients

Functions and Values to be assessed include nutrients (both wet (and dry?)) and nutrient removal/ transformation.

Wide Differences and No Consensus Achieved

To achieve consensus, at a minimum the concerns of the “reds” should be addressed;

To achieve stronger support, the concerns of the “yellows” should also be addressed.

GREEN Fully Support	YELLOW Some concerns and questions but able to support	RED Too many concerns or questions: Cannot Support
4	7	21

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- Too broad, many additional details are needed.
- Difficult to quantify, but important for Bay TMDL goals.
- Many of the nutrient concerns are already addressed by the erosion and sediment control and stormwater management programs. In this proposal, nutrients are undefined and it is uncertain how a project developer would get a realistic determination of what the nutrient impacts would be. This could be a very costly and time-consuming process.
- I do not support the use of a cost functions and value metric as a way to drive up costs on solar developers and over complicate the process. Let’s not lose sight of the purpose of the PBR process, which is to provide a streamlined process for siting solar responsibly in Virginia. A process this costly and complicated will limit solar energy development, energy independence, and affect electric rate payers across the Commonwealth.
- All farms do not use same level of nutrients just as some forests may be better equipped than others at their removal.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 15: Mitigation (WG 2 - Proposal 14C)

Functions & Values: Productivity

Functions and Values to be assessed include the ability to produce food, fiber, etc. for humans or other living organisms.

Wide Differences and No Consensus Achieved

*To achieve consensus, at a minimum the concerns of the “reds” should be addressed;
To achieve stronger support, the concerns of the “yellows” should also be addressed.*

GREEN	YELLOW	RED
Fully Support	Some concerns and questions but able to support	Too many concerns or questions: Cannot Support
7	6	19

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- Should be able to consider loss of productivity due to soil removal, uplifted or compacted soils, or water table impacts due to subsoil ripping, water diversion structures sediment ponds/dam removals on a site. All of which could have a negative impact on soil productivity, but not necessarily food production.
- Energy, especially carbon-free energy, is equally important to society as food, fiber, etc. In fact, some farm and forest land is used to produce energy (corn ethanol and timber products). The free market will determine the most productive use of land in a given area. Furthermore, HB206 singles out solar and doesn't apply this burden to other sources of land conversion.
- Disagree with the "concerns" because it is projected that in 2050 there will be a global food shortage which should be considered. These concerns present a very one-sided picture.
- Food production in and of itself causes disturbance by the nature of its means of production, thus it does not seem reasonable to include it as a means of mitigation and presents it in conflict with other provisions in this proposal.
- Solar is not responsible for food production, but the decision to make lasting impacts to what may be Virginia's most productive lands should be taken into consideration.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 16: Mitigation (WG 2 - Proposal 14D)

Functions & Values: Wildlife

Functions and Values to be assessed include habitat connectivity

Wide Differences and No Consensus Achieved

*To achieve consensus, at a minimum the concerns of the “reds” should be addressed;
To achieve stronger support, the concerns of the “yellows” should also be addressed.*

GREEN Fully Support	YELLOW Some concerns and questions but able to support	RED Too many concerns or questions: Cannot Support
7	8	17

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

1. Wildlife habitat is already evaluated by the PBR program and it is unclear how HB206 or this proposal would change anything.
2. While HB 206 did not charge us with impacts on wildlife, solar projects without question have an impact on wildlife and their habitat and movement patterns.
3. Habitat is absolutely a function of forests that should be offset, and the existing language is very restrictive. In particular, we support mitigation for impacts to high conservation value forest habitats such as C1 and C2 cores. There is language in the draft regulation that was published, but not adopted, in 2020 that speaks to this.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 17: Mitigation (WG 2 - Proposal 14E)

Functions & Values: Riparian Buffer

Functions and Values to be assessed for riparian buffers include habitat and water quality protection – although retention and establishment of buffers is also a practice the group considered important.

Wide Differences and No Consensus Achieved

*To achieve consensus, at a minimum the concerns of the “reds” should be addressed;
To achieve stronger support, the concerns of the “yellows” should also be addressed.*

GREEN Fully Support	YELLOW Some concerns and questions but able to support	RED Too many concerns or questions: Cannot Support
9	8	15

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- Riparian forest buffers serve as traffic corridors, roosting and nesting sites as well as temperature control for water. Suggest using "Virginia's Forestry Best Management Practices for Water Quality" Technical guide 2011 for guidance and clarification of what constitutes a riparian buffer and its value and function.
- Already considered in wetland delineation and permitting process.
- Feel this is unnecessary to the permit process at this stage of the development. These considerations are better handled at the final design and review stage with actual water quality and quantity metrics based on actual science that are evaluated.
- Numerous regulations that solar is already party to cover water quality impacts.
- Riparian buffering should be counted towards water quality and not an offset to mitigation for prime farm soil and forestland. There is general agreement on what constitutes a riparian buffer, and the trend is to increase the buffer to 75 to 100 feet.
- Should absolutely be included as a value. With respect to expressed concerns, DCR and DEQ have standards on what constitutes a riparian buffer. Riparian buffers are a mitigation tool for water quality.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 18: Mitigation (WG 2 - Proposal 14F)

Functions & Values: Carbon

Functions and Values to be assessed include Carbon already stored in soils and vegetation, and annual increment of new sequestration.

Wide Differences and No Consensus Achieved

To achieve consensus, at a minimum the concerns of the "reds" should be addressed;

To achieve stronger support, the concerns of the "yellows" should also be addressed.

GREEN	YELLOW	RED
Fully Support	Some concerns and questions but able to support	Too many concerns or questions: Cannot Support
7	10	15

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- The emissions displacement from solar generation compared to fossil fuels far outweighs the carbon storage lost due to vegetation removal for solar construction

- Greenhouse gas emissions reductions from renewable energy are comparatively easy to calculate and account for (by taking the average carbon intensity of electricity generation on a power grid and calculating the avoided emissions impact of replacing that generic electricity generation mix with carbon-free renewable sources). Greenhouse gas accounting for soil and forests is much more difficult to monitor and track, as greenhouse gases that are captured by forests and soils can be reversed.
- Concern is for the finite amount of acreage - we will need forests to meet the net zero requirements. Solar panels will not store carbon or sequester carbon from the atmosphere.
- The carbon function and value needs to account for avoided emissions as a benefit of solar energy production.
- Our main concern is that forests and farmland sequester carbon, where solar panels do not. We want to ensure we don't lose sight of the role of these landscapes in meeting our net zero carbon goals. This could be included as a function and value, but we also want to ensure that just using carbon values does not mean that other values loss must not be mitigated for.
- This regulation is about the conversion of a finite land resource from one use to another. While solar is undoubtedly important in carbon AVOIDANCE, reducing reliance on fossil fuels for energy generation, solar panels do not capture carbon or store carbon. Once a forest resource is removed, sequestration of carbon is not possible for the duration of the project until decommissioning.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 19: Mitigation (WG 2 - Proposal 14G)

Functions & Values: Recreation

Functions and Values to be assessed include Hunting, Hiking, and Wildlife Viewing (although likely there is a very small amount of this on private land)

Wide Differences and No Consensus Achieved

*To achieve consensus, at a minimum the concerns of the “reds” should be addressed;
To achieve stronger support, the concerns of the “yellows” should also be addressed.*

GREEN	YELLOW	RED
Fully Support	Some concerns and questions but able to support	Too many concerns or questions: Cannot Support
4	10	18

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- How much hunting is happening in prime agricultural lands? Or on forested land that is being farmed for timber? Would be more likely to support hunting / recreation / wildlife viewing as a function and value for forested lands, but not for agricultural lands.
- The vast majority of solar projects are developed on private land that is not open to the public for recreational purposes. Individual landowners have authority over their decisions on how to use the land or whether to lease or sell it to others. The solar industry is not responsible for private landowner decisions.
- Hunting and hiking on private property is a use that the property owner chose to give up for the benefits of the income from selling or leasing the property. The PBR should have no input on this issue.
- The recreation function/value (Hunting, Hiking / Wildlife Viewing) needs to be limited to the public as a user. Trying to account for public access to privately-owned land is inappropriate in this context.
- We agree with the value, but camping must be added to the list. With respect to the concern expressed, DWR absolutely has a value associated with hunting not just on local economies (surrounding retailers, restaurants, etc.), but for the Department itself in terms of fees for hunting and fishing.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 20: Mitigation (WG 2 - Proposal 14H)

Functions & Values: Designated state or federal scenic value

Functions and Values to be assessed include only already designated (i.e., not eligible for designation) scenic resources (e.g. scenic rivers, byways, national recreation areas)

Wide Differences and No Consensus Achieved

To achieve consensus, at a minimum the concerns of the “reds” should be addressed;

To achieve stronger support, the concerns of the “yellows” should also be addressed.

GREEN	YELLOW	RED
Fully Support	Some concerns and questions but able to support	Too many concerns or questions: Cannot Support
5	9	18

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- Visual impacts are completely subjective and should not be subject to mitigation. This is a question for local planning and zoning.
- Don't designated state and federal scenic resources already have protections? If we're talking about "designated state or federal scenic value," why is local scenic value relevant?
- Federal, state, and local jurisdictions cannot designate private land as a scenic resource, limiting the landowner's ability to develop it or sell it. That encroaches on private property rights. Again, the value of looking at a field of soybeans vs. field of solar panels is subjective.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 21: Mitigation (WG 2 - Proposal 14I)

Functions & Values: Rural Economy

Functions and Values to be assessed include the value chain created by the production, sale, and processing of what the land generates and the quality of the soils, and inequities created by economic transition.

Wide Differences and No Consensus Achieved

To achieve consensus, at a minimum the concerns of the "reds" should be addressed;

To achieve stronger support, the concerns of the "yellows" should also be addressed.

GREEN	YELLOW	RED
Fully Support	Some concerns and questions but able to support	Too many concerns or questions: Cannot Support
8	7	17

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- While rural economy is a very important value, it will be extremely difficult to assess. We suggest that the complexities of impact to local economy might best be addressed at the local level rather than as part of the PBR.
- The locality already has the power to make a determination on the relative value of a given solar project vis a vis other potential economic uses.
- This should be linked to the local agricultural or forestry economy, not the broader term of rural economy. In other words, donation to local fire department of a rural locality doesn't necessarily support the agricultural or forest economy.
- In a free market economy, landowners respond to market signals to determine how to maximize revenue from their land. If a landowner leases their land (in this context, prime agricultural soil or forest land) to be developed for solar, it means that they

weighed the value of the solar lease revenue to be greater than the revenue they would glean from farming or forestry. No other industry, to our knowledge, has to compensate for the economic activity it displaces on private land.

- Enactment clause 2 of HB206 requires mitigation for: "(v) the impact on the local agricultural or forestry economy when such soils or lands are displaced." For forestry, there are both short and long term concerns. In the short term, the harvesting of trees for solar development at its current pace is creating a glut of wood available for purchase in existing markets, depressing the price for wood fiber. Long term, there is concern about the availability of fiber from working forest lands and prospective economic and employment impacts in local, rural communities.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 22: Mitigation (WG 4 - Proposal 2.1)

Significant adverse impact definition: C1 Cores

Context/Rationale

With respect to identifying significant adverse impacts from projects disturbing less than 10 acres of prime agricultural soils or 50 acres of contiguous forestland, Workgroup 4 identified a number of goals, including:

- (i) a clear threshold that solar developers can consider during the planning process to incentivize limiting impacts to prime soils and forested land;**
- (ii) consideration of the current ecological value and ecosystem services of the land to be disturbed, particularly if that land has been identified as having high ecological value;**
- (iii) use of existing tools and consultation opportunities within the PBR process;**
and
- (iv) the ability to field verify or ground truth any maps or tools used.**

Based on these goals, Workgroup 4 singled out two state models that identify priority lands for conservation: the Natural Landscape Assessment (VaNLA) conducted by the Virginia Natural Heritage Program (VNHP) and the Forest Conservation Value (FCV) model.

VaNLA “is a landscape-scale geospatial analysis for identifying, prioritizing, and linking natural lands in Virginia.” Patches of natural land, or ecological cores, are mapped and prioritized based on the core’s ecological integrity score. “In general, larger, more biologically diverse areas are given higher scores. Scores are enhanced if the core or habitat fragment is part of a larger complex of natural lands. Scores also are increased for those cores and habitat fragments that contribute to water quality enhancement.” Scores are further “classified into

five categories of ecological integrity: C1 - Outstanding; C2 - Very High; C3 - High; C4 - Moderate; and C5 - General.”

FCV “is a tool designed by the Virginia Department of Forestry (VDOF) to strategically identify the highest priority forestland for conservation in Virginia. The intent is to maximize the efficiency of limited resources by focusing conservation efforts on the highest quality, most productive, and most vulnerable forestland statewide.” The model considers 6 components (forested blocks; forest management potential; connectivity; watershed integrity; threat of conversion; and significant forest communities and diminished tree species) to rank forestland from 1 (lowest) to 5 (highest) in forest conservation value.

Workgroup 4 proposes to further define “significant adverse impacts” by presuming that projects disturbing less than 10 acres of prime agricultural soils and less than 50 acres of contiguous forest lands will, nevertheless, have a significant adverse impact if the project disturbs land identified as high value by the VaNLA or FCV models. The proposal allows for this presumption to be overcome if further analysis by VNHP or VDOF verifies that the land has since undergone permanent land conversion. Existing VNHP and VDOF analyses can be used for this verification: core impact analysis for ecological cores and environmental impact review for forest conservation values.

Both the VaNLA and FCV models can be viewed within the Natural Heritage Data Explorer. Current maps of C-1 and C-2 cores have also been provided to the workgroup by VNHP. Based on comments received from the full ad hoc workgroup, Workgroup 4 proposes that the latest-in-time version of both models be used to ensure that the most up-to-date information regarding the ecological value of the land in question is employed, rather than referring to a specific, static iteration of either model.

Option 1 limits the “significant adverse impact” definition to disturbance of land in level 5 “outstanding” forest lands or C-1 “outstanding” ecological cores. This option has consensus within Workgroup 4. Option 2 expands the definition to include disturbance of land in level 5 forests, C-1 “outstanding” cores or C-2 “very high” cores. While this option has not reached consensus at this time, Workgroup 4 was encouraged by our subject matter expert to consider the use of C-1 and C-2 cores for a number of reasons, including:

- 1) the very high ecological value of C-2 cores which often contain habitats of rare species and are often associated with C-1 cores in complexes;**
- 2) almost 60% of C-1 cores are already conserved and cannot be developed, and there are very few C-1 cores east of the Blue Ridge Mountains;**
- 3) C-1 and C-2 cores, when added together, represent less than 3% of all ecological cores in Virginia; and**
- 4) the use of C-1 and C-2 cores together would be consistent with how the Department of Conservation and Recreation reviews development projects**

using an impact analysis with a standardized and documented methodology and an estimate of mitigation acres.

Based on the recommendation received, Workgroup 4 chose to present both options for the full ad hoc workgroup’s consideration and reflection.

Wide Differences and No Consensus Achieved

*To achieve consensus, at a minimum the concerns of the “reds” should be addressed;
To achieve stronger support, the concerns of the “yellows” should also be addressed.*

GREEN	YELLOW	RED
Fully Support	Some concerns and questions but able to support	Too many concerns or questions: Cannot Support
6	5	21

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

- The FCV and VaNLA models need to be more consistently described. These are both geospatial layers used for modeling priority lands. As currently written the explanation of both models is not clear and consistent. The description needs to be clearer in explaining that the recommendations intend on relying on geospatial layers to assess the impacts to project sites.
- This needs to be harmonized with WG 1 definitions of significant disturbance and avoidance, etc. The evaluation of prime farmland status needs to be done by NRCS and/or appropriately qualified soil scientists and not VNHP etc.
- Unsure why there is a need to define impact less than the 10/50 threshold, when that is what the HB206 language specifies.
- Proposal 2, Option 1 is not within the authority of HB 206.
- We object to the concept of requiring additional evaluation of projects where disturbance of prime agricultural soils and forested lands remain below the regulatory thresholds. However, it is also important to note that the DCR and DOF models were not developed as tools for implementation of regulatory programs. These models were designed as a guide for agencies or land conservation groups to use in working with interested landowners and/or localities to protect high priority areas under formal conservation agreements. If lands proposed as part of a project have been protected via conservation measures based on ecological merit and uniqueness by any governmental or non-governmental entities, those lands will likely have protections and require additional coordination outside of the PBR process. Tools used to determine the location and impacts to prime agricultural soils and forested areas under this regulation should be developed based on appropriate criteria specific to that purpose.

For additional information, please see the stakeholder survey responses in Appendix 3.

Not Close to Consensus 23: Mitigation (WG 4 - Proposal 2.2)

Significant adverse impact definition: C2 Cores

Context/Rationale

With respect to identifying significant adverse impacts from projects disturbing less than 10 acres of prime agricultural soils or 50 acres of contiguous forestland, Workgroup 4 identified a number of goals, including:

- (i) a clear threshold that solar developers can consider during the planning process to incentivize limiting impacts to prime soils and forested land;
- (ii) consideration of the current ecological value and ecosystem services of the land to be disturbed, particularly if that land has been identified as having high ecological value;
- (iii) use of existing tools and consultation opportunities within the PBR process; and
- (iv) the ability to field verify or ground truth any maps or tools used.

Based on these goals, Workgroup 4 singled out two state models that identify priority lands for conservation: the Natural Landscape Assessment (VaNLA) conducted by the Virginia Natural Heritage Program (VNHP) and the Forest Conservation Value (FCV) model.

VaNLA “is a landscape-scale geospatial analysis for identifying, prioritizing, and linking natural lands in Virginia.” Patches of natural land, or ecological cores, are mapped and prioritized based on the core’s ecological integrity score. “In general, larger, more biologically diverse areas are given higher scores. Scores are enhanced if the core or habitat fragment is part of a larger complex of natural lands. Scores also are increased for those cores and habitat fragments that contribute to water quality enhancement.” Scores are further “classified into five categories of ecological integrity: C1 - Outstanding; C2 - Very High; C3 - High; C4 - Moderate; and C5 - General.”

FCV “is a tool designed by the Virginia Department of Forestry (VDOF) to strategically identify the highest priority forestland for conservation in Virginia. The intent is to maximize the efficiency of limited resources by focusing conservation efforts on the highest quality, most productive, and most vulnerable forestland statewide.” The model considers 6 components (forested blocks; forest management potential; connectivity; watershed integrity; threat of conversion; and significant forest communities and diminished tree species) to rank forestland from 1 (lowest) to 5 (highest) in forest conservation value.

Workgroup 4 proposes to further define “significant adverse impacts” by presuming that projects disturbing less than 10 acres of prime agricultural soils and less than 50 acres of contiguous forest lands will, nevertheless, have a significant adverse impact if the project disturbs land identified as high value by the VaNLA or FCV models. The proposal allows for this presumption to be overcome if further analysis by VNHP or VDOF verifies that the land

has since undergone permanent land conversion. Existing VNHP and VDOF analyses can be used for this verification: core impact analysis for ecological cores and environmental impact review for forest conservation values.

Both the VaNLA and FCV models can be viewed within the Natural Heritage Data Explorer. Current maps of C-1 and C-2 cores have also been provided to the workgroup by VNHP. Based on comments received from the full ad hoc workgroup, Workgroup 4 proposes that the latest-in-time version of both models be used to ensure that the most up-to-date information regarding the ecological value of the land in question is employed, rather than referring to a specific, static iteration of either model.

Option 2: If the proposed project disturbs less than 10 acres of prime agricultural soils and less than 50 acres of contiguous forest lands, the project will be presumed to have a significant adverse impact if the disturbance includes land identified by the Virginia Natural Heritage Program as within a C-1 “outstanding” or C-2 “very high” ecological core or by the Virginia Department of Forestry as “outstanding” within the Forest Conservation Values model. This presumption can be overcome, for ecological cores, by a core impact analysis conducted by VNHP, OR, for forest conservation values, by an environmental impact review conducted by the Department of Forestry, to verify permanent conversion of the land. Reference should be made to the most current Natural Landscape Assessment and Forest Conservation Value Model, not a specific iteration of the assessment or model. *(For Option 1, see prior proposal)*

Wide Differences and No Consensus Achieved

To achieve consensus, at a minimum the concerns of the “reds” should be addressed; To achieve stronger support, the concerns of the “yellows” should also be addressed.

GREEN	YELLOW	RED
Fully Support	Some concerns and questions but able to support	Too many concerns or questions: Cannot Support
6	4	22

No consensus was achieved through the Qualtrics survey. Because this proposal was not able to be discussed by the RAP, no additional test for consensus was conducted.

Select highlights from the Qualtrics survey are as follows:

SME comments:

- At what point in the permitting process will a project be grandfathered when/if data/maps are updated mid-review?
- First, I would request that my agency, DCR, be identified in the report instead of the “Virginia Natural Heritage Program,” which is a division of DCR. 1. My comments as SME, which were requested by the workgroup and provided to them via email on August 16, 2022, and which were subsequently distributed to the entire RAP, were

slightly misrepresented in the summary provided in support of Proposal 2, Option 2. For Reason #2 listed above, my original comment stated “few” not “very few.” I am fine with the workgroup choosing to use “very few,” as the categorization is subjective, but I just wanted to make clear that those were not my exact words. That said, it also depends on whether we are considering few in terms of area or number, which probably should be made clear by the workgroup. For Reason #3 listed above, my original comment stated: “C1 and C2 cores together would represent less than 3.5% (873) of all the cores and habitat fragments in Virginia (25,289). The workgroup possibly didn’t copy the number correctly or it rounded the number down (note: before rounding, my original estimate was 3.452%).

- C2 cores should not be included. There should be a lower limit of 1 acre such that impacts less than 1 acre are not assessed. Impacts should not be automatically considered permanent, and the review should consider how the site will be developed and the land restoration components of the deaccessioning plan.
- HB206 does not presume that disturbing less than 50 acres of forested land in a C-2 core (or even a C-1 core) would result in significantly adverse ecological impacts. Absent statutory authority, we believe a blanket presumption represents regulatory overreach—especially because this legislation singles out solar and does not apply to any other form of land conversion. Even so, we are willing to support the approach in Option 1.
- With respect to the Forest Conservation Value Model, we believe that "Outstanding," "Very High," and "High" value lands should be included as significant adverse impacts for less than 50 acres/not enrolled in forest conservation program as defined in HB206.
- Based on the very high importance of both C-1 and C-2 cores, the high percentage of C-1 cores permanently protected already, the location of C-2 cores in areas where significant solar development is anticipated and the need to understand the impact to the cores from that development, and the fact that DCR's Natural Heritage Program already has the ability and regularly considered both C-1 and C-2 cores in similar analyses, I think it makes sense to include both sets of cores.

For additional information, please see the stakeholder survey responses in Appendix 3.

Appendix 1: RAP Charge and Members

Resources in this appendix include:

- I. House Bill 206, Approved April 11, 2022 ([for online link click here.](#))
- II. Full Listing of House Bill 206 RAP Members
 - a. Organized by member type
 - b. Organized alphabetically
- III. Sector/Interest Areas of RAP Primary Members
- IV. House Bill 206 RAP Workgroups: Formation & Guidelines
 - a. Full listing of workgroup members
 - b. Workgroup Issues Matrix
 - c. Consensus: A Tool for Building Understanding
 - d. Participation Guidelines: Primary, Alternate, and SME Members

VIRGINIA ACTS OF ASSEMBLY -- 2022 SESSION

CHAPTER 688

An Act to amend and reenact § 10.1-1197.6 of the Code of Virginia, relating to small renewable energy projects; impact on natural resources.

[H 206]

Approved April 11, 2022

Be it enacted by the General Assembly of Virginia:

1. That § 10.1-1197.6 of the Code of Virginia is amended and reenacted as follows:

§ 10.1-1197.6. Permit by rule for small renewable energy projects.

A. Notwithstanding the provisions of § 10.1-1186.2:1, the Department shall develop, by regulations to be effective as soon as practicable, but not later than July 1, 2012, a permit by rule or permits by rule if it is determined by the Department that one or more such permits by rule are necessary for the construction and operation of small renewable energy projects, including such conditions and standards necessary to protect the Commonwealth's natural resources. If the Department determines that more than a single permit by rule is necessary, the Department initially shall develop the permit by rule for wind energy, which shall be effective as soon as practicable, but not later than January 1, 2011. Subsequent permits by rule regulations shall be effective as soon as practicable.

B. The conditions for issuance of the permit by rule for small renewable energy projects shall include:

1. A notice of intent provided by the applicant, to be published in the Virginia Register, that a person intends to submit the necessary documentation for a permit by rule for a small renewable energy project;

2. A certification by the governing body of the locality or localities wherein the small renewable energy project will be located that the project complies with all applicable land use ordinances;

3. Copies of all interconnection studies undertaken by the regional transmission organization or transmission owner, or both, on behalf of the small renewable energy project;

4. A copy of the final interconnection agreement between the small renewable energy project and the regional transmission organization or transmission owner indicating that the connection of the small renewable energy project will not cause a reliability problem for the system. If the final agreement is not available, the most recent interconnection study shall be sufficient for the purposes of this section. When a final interconnection agreement is complete, it shall be provided to the Department. The Department shall forward a copy of the agreement or study to the State Corporation Commission;

5. A certification signed by a professional engineer licensed in Virginia that the maximum generation capacity of the small renewable energy project by (i) an electrical generation facility that generates electricity only from sunlight or wind as designed does not exceed 150 megawatts; (ii) an electrical generation facility that generates electricity only from falling water, wave motion, tides, or geothermal power as designed does not exceed 100 megawatts; or (iii) an electrical generation facility that generates electricity only from biomass, energy from waste, or municipal solid waste as designed does not exceed 20 megawatts;

6. An analysis of potential environmental impacts of the small renewable energy project's operations on attainment of national ambient air quality standards;

7. Where relevant, an analysis of the beneficial and adverse impacts of the proposed project on natural resources. For wildlife, that analysis shall be based on information on the presence, activity, and migratory behavior of wildlife to be collected at the site for a period of time dictated by the site conditions and biology of the wildlife being studied, not exceeding 12 months. *For prime agricultural soils and forest land, that analysis shall be required if a proposed project would disturb more than 10 acres of prime agricultural soils or 50 acres of contiguous forest lands, or if it would disturb forest lands enrolled in a program for forestry preservation pursuant to subdivision 2 of § 58.1-3233;*

8. If the Department determines that the information collected pursuant to subdivision ~~B~~ 7 indicates that significant adverse impacts to wildlife ~~or~~, historic resources, *prime agricultural soils, or forest lands* are likely, the submission of a mitigation plan, *if a draft plan was not provided by the applicant as part of the initial application, with a 45-day public comment period* detailing reasonable actions to be taken by the owner or operator to avoid, minimize, or otherwise mitigate such impacts, and to measure the efficacy of those actions. *A project will be deemed to have a significant adverse impact if it would disturb more than 10 acres of prime agricultural soils or 50 acres of contiguous forest lands, or if it would disturb forest lands enrolled in a program for forestry preservation pursuant to subdivision 2 of § 58.1-3233;*

9. A certification signed by a professional engineer licensed in Virginia that the small renewable energy project is designed in accordance with all of the standards that are established in the regulations

applicable to the permit by rule;

10. An operating plan describing how any standards established in the regulations applicable to the permit by rule will be achieved;

11. A detailed site plan with project location maps that show the location of all components of the small renewable energy project, including any towers. Changes to the site plan that occur after the applicant has submitted an application shall be allowed by the Department without restarting the application process, if the changes were the result of optimizing technical, environmental, and cost considerations, do not materially alter the environmental effects caused by the facility, or do not alter any other environmental permits that the Commonwealth requires the applicant to obtain;

12. A certification signed by the applicant that the small renewable energy project has applied for or obtained all necessary environmental permits;

13. A requirement that the applicant hold a public meeting. The public meeting shall be held in the locality or, if the project is located in more than one locality in a place proximate to the location of the proposed project. Following the public meeting, the applicant shall prepare a report summarizing the issues raised at the meeting, including any written comments received. The report shall be provided to the Department; and

14. A 30-day public review and comment period prior to authorization of the project.

C. The Department's regulations shall establish a schedule of fees, to be payable by the owner or operator of the small renewable energy project regulated under this article, which fees shall be assessed for the purpose of funding the costs of administering and enforcing the provisions of this article associated with such operations including, but not limited to, the inspection and monitoring of such projects to ensure compliance with this article.

D. The owner or operator of a small renewable energy project regulated under this article shall be assessed a permit fee in accordance with the criteria set forth in the Department's regulations. Such fees shall include an additional amount to cover the Department's costs of inspecting such projects.

E. The fees collected pursuant to this article shall be used only for the purposes specified in this article and for funding purposes authorized by this article to abate impairments or impacts on the Commonwealth's natural resources directly caused by small renewable energy projects.

F. There is hereby established a special, nonreverting fund in the state treasury to be known as the Small Renewable Energy Project Fee Fund, hereafter referred to as the Fund. Notwithstanding the provisions of § 2.2-1802, all moneys collected pursuant to this § 10.1-1197.6 shall be paid into the state treasury to the credit of the Fund. Any moneys remaining in the Fund shall not revert to the general fund but shall remain in the Fund. Interest earned on such moneys shall remain in the Fund and be credited to it. The Fund shall be exempt from statewide indirect costs charged and collected by the Department of Accounts.

G. After the effective date of regulations adopted pursuant to this section, no person shall erect, construct, materially modify or operate a small renewable energy project except in accordance with this article or Title 56 if the small renewable energy project was approved pursuant to Title 56.

H. Any small renewable energy project shall be eligible for permit by rule under this section if the project is proposed, developed, constructed, or purchased by a person that is not a utility regulated pursuant to Title 56.

I. Any small renewable energy project commencing operations after July 1, 2017, shall be eligible for permits by rule under this section and is exempt from State Corporation Commission environmental review or permitting in accordance with subsection B of § 10.1-1197.8 or other applicable law if the project is proposed, developed, constructed, or purchased by:

1. A public utility if the project's costs are not recovered from Virginia jurisdictional customers under base rates, a fuel factor charge under § 56-249.6, or a rate adjustment clause under subdivision A 6 of § 56-585.1; or

2. A utility aggregation cooperative formed under Article 2 (§ 56-231.38 et seq.) of Chapter 9.1 of Title 56.

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 § 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.

2. That pursuant to subdivisions B 7 and 8 of § 10.1-1197.6 of the Code of Virginia, as amended by this act, the Department of Environmental Quality (the Department), in consultation with the Department of Forestry, the State Corporation Commission, the Department of Energy, the Virginia Economic Development Partnership Authority, and other relevant stakeholders, shall convene an advisory panel to assist in further developing regulations regarding criteria to determine if a significant adverse impact to prime agricultural soils or forest lands is likely to occur as a result of a proposed solar project that is a small renewable energy project and criteria for an applicant of a solar project to address in a plan to mitigate any significant adverse impacts to soils and lands. In developing regulations regarding plans to mitigate any significant impacts to prime agricultural soils or forest lands, the advisory panel shall consider, but not be limited to, the

following factors in determining appropriate mitigation techniques or criteria to be included in an applicant's mitigation plan: (i) the mitigation techniques to avoid, minimize, or otherwise mitigate any such impacts; (ii) the cost of mitigation relative to the project cost, including the costs of proposed mitigation to rate payers; (iii) onsite minimization of impacts; (iv) payment of in-lieu fee funds for mitigation; (v) the impact on the local agricultural or forestry economy when such soils or lands are displaced; (vi) the loss of ecosystem benefits; (vii) noncompliance with Virginia's Watershed Implementation Plan III goals on the Chesapeake Bay TMDL; and (viii) noncompliance with other water quality criteria and standards. Such criteria shall include reasonable actions to be taken by the applicant to avoid, minimize, or otherwise mitigate any such impacts to prime agricultural soils or forest lands, but in the event that avoidance by the applicant is not reasonable, the applicant for the solar project that is a small renewable energy project shall be afforded the opportunity to minimize or otherwise mitigate any significant adverse impacts to prime agricultural soils or forest lands. The advisory panel shall also consider a process by which an applicant may satisfy its mitigation obligations by agreement with a locality if such mitigation requirements conform to the regulations established by the Department pursuant to this enactment and when such mitigation requirements are included in (a) a siting agreement and approved by a local governing body pursuant to subsection B of § 15.2-2316.7 of the Code of Virginia or (b) zoning use conditions approved by the locality pursuant to § 15.2-2288.8 of the Code of Virginia. The Department shall adopt such final regulations no later than December 31, 2024. Relevant stakeholders shall include but not be limited to representatives from the Virginia Association of Counties, the Virginia Farm Bureau Federation, the Virginia Agribusiness Council, the Virginia Forestry Association, the Piedmont Environmental Council, The Nature Conservancy, the Virginia Forest Products Association, the Chesapeake Solar and Storage Association, the American Clean Power Association, Advanced Energy Economy, AES Corporation, the Data Center Coalition, solar project engineers, electric utilities, and other stakeholders deemed relevant by the Department, the Department of Forestry, the Department of Energy, the State Corporation Commission, or the Virginia Economic Development Partnership Authority. The advisory panel shall submit a report to the Governor and the Chairmen of the House Committees on Agriculture, Chesapeake and Natural Resources and Commerce and Energy and the Senate Committees on Agriculture, Conservation and Natural Resources and Commerce and Labor no later than December 1, 2022.

3. That the provisions of the first enactment of this act shall become effective immediately upon the adoption of regulations pursuant to the second enactment of this act.

4. That any small renewable energy project for which an initial interconnection request application has been received and accepted by the regional transmission organization or electric utility by December 31, 2024, shall not be subject to the provisions of this act.

Stakeholder Org Type	RAP Member Type	Stakeholder Organization Pink-Shaded=>1 participant from org	FIRST Name	LAST Name	Contact Title	Contact Email
0-Planning Team	0-Planning Team	Virginia Dept of Environmental Quality	Michael	Dowd	Air & Renewable Energy Division Director	Michael.Dowd@deg.virginia.gov
0-Planning Team	0-Planning Team	Virginia Dept of Environmental Quality	Amber	Foster	Renewable Energy Permit by Rule Coordinator	Amber.Foster@deg.virginia.gov
0-Planning Team	0-Planning Team	Virginia Dept of Environmental Quality	Tamera	Thompson	Air & Renewable Energy Program Manager	Tamera.Thompson@deg.virginia.gov
0-Planning Team	0-Planning Team	Virginia Dept of Environmental Quality	Susan	Tripp	Renewable Energy Permit by Rule Coordinator	Susan.Tripp@deg.virginia.gov
0-Planning Team	0-Planning Team	Commonwealth of Virginia Engineering & Science (COVES) Policy Fellowship	Elena	Meyer	Fellow	mevere3@vcu.edu
0-Planning Team	0-Planning Team	UVA Institute for Engagement & Negotiation	Kelly	Altizer	Senior Associate	kaltizer@virginia.edu
0-Planning Team	0-Planning Team	UVA Institute for Engagement & Negotiation	Tanya	Denckla Cobb	Director/RAP Co-Facilitator	td6n@virginia.edu
0-Planning Team	0-Planning Team	UVA Institute for Engagement & Negotiation	Michelle	Oliva	Associate Consultant/RAP Co-Facilitator	mlo5n@virginia.edu
0-Planning Team	0-Planning Team	UVA Institute for Engagement & Negotiation	Sarah	Rizk	Student Research Associate	vzx6nv@virginia.edu
1-Environmental Nonprofit	1-Primary	Appalachian Voices	Emily	Piontek	Virginia Field Coordinator	emily@appvoices.org
1-Environmental Nonprofit	2-Alternate	Appalachian Voices	Jessica	Sims		jessica@appvoices.org
1-Environmental Nonprofit	1-Primary	Chesapeake Action Climate Network	Victoria	Higgins	Virginia Director	vhiggins@chesapeakeclimate.org
1-Environmental Nonprofit	1-Primary	Chesapeake Bay Foundation	Peggy	Sanner	Virginia Executive Director	psanner@cbf.org
1-Environmental Nonprofit	2-Alternate	Chesapeake Bay Foundation	Patrick	Fanning	CBF Staff Attorney	pfanning@cbf.org
1-Environmental Nonprofit	1-Primary	Southern Environmental Law Center	Josephus	Allmond	Associate Attorney	jallmond@selcva.org
1-Environmental Nonprofit	2-Alternate	Southern Environmental Law Center	Emily	Francis	Senior Policy and Outreach Manager,	efrancis@selcva.org
1-Environmental Nonprofit	1-Primary	The James River Association	Anna	Killius	Director of Policy and Government Affairs	akillius@thejamesriver.org
1-Environmental Nonprofit	1-Primary	The Nature Conservancy	Judy	Dunscumb	Senior Conservation Scientist	jdunscumb@tnc.org
1-Environmental Nonprofit	2-Alternate	The Nature Conservancy	Nikki	Rovner	Associate State Director for External Affairs	nrovner@tnc.org
1-Environmental Nonprofit	1-Primary	The Piedmont Environmental Council	Dan	Holmes	Principal, Weathered Rock Consulting LLC	weatheredrockconsulting@gmail.com
1-Environmental Nonprofit	2-Alternate	The Piedmont Environmental Council	Julie	Bolthouse	Director of Land Use	jbolthouse@pecva.org

Stakeholder Org Type	RAP Member Type	Stakeholder Organization Pink-Shaded=>1 participant from org	FIRST Name	LAST Name	Contact Title	Contact Email
2-Private Sector	1-Primary	AES Clean Energy	Ben	Saunders	Director, Development	ben.saunders@aes.com
2-Private Sector	2-Alternate	AES Clean Energy	Walter	Crenshaw	Director, Commercial Execution	walter.crenshaw@aes.com
2-Private Sector	1-Primary	American Electric Power (parent company of Appalachian Power)	Jon	Amores	Government Affairs Manager	jonamores@aep.com
2-Private Sector	1-Primary	Commonwealth Energy Partners (CEP Solar)	Tyson	Utt	Co-Founder & Manager	tyson.utt@cepsolar.com
2-Private Sector	1-Primary	Dominion Energy	Jason	Ericson	Director, Environmental Services	jason.p.ericson@dominionenergy.com
2-Private Sector	2-Alternate	Dominion Energy	Amelia	Boschen		amelia.h.boschen@dominionenergy.com
2-Private Sector	2-Alternate	Dominion Energy	Todd	Flowers	Manager Business Development	todd.flowers@dominionenergy.com
2-Private Sector	1-Primary	EDF Renewables	Chris	Gordon	Senior Manager, Project Development	chris.gordon@edf-re.com
2-Private Sector	2-Alternate	EDF Renewables	Jeff	Machiran	Senior Project Development Manager	Jeff.Machiran@edf-re.com
2-Private Sector	1-Primary	Energix Renewables	Dominika	Sink	Director of Project Acquisition and Development	Dominika.Sink@energixrenewables.com
2-Private Sector	2-Alternate	Energix Renewables	Kelsey	Forren	Senior Analyst, Project Development	kelsey.forren@energixrenewables.com
2-Private Sector	1-Primary	Hewitt Solutions PLLC (Engineering)	Cutter	Sydnor	Director, Solar Division	cutter@hewittsol.com
2-Private Sector	1-Primary	Kimley-Horn (Engineering)	Kenny	Jesensky	Professional Wetland Scientist	kenny.jesensky@kimley-horn.com
2-Private Sector	2-Alternate	Kimley-Horn (Engineering)	Katie	Crum	Senior Project Manager	Katie.Crum@kimley-horn.com
2-Private Sector	1-Primary	Old Dominion Electric Cooperative	Stephanie	Kane	Director of Government Relations & External Affairs	skane@odec.com
2-Private Sector	1-Primary	Stantec Consulting Services Inc.	Jim	Orrell	Senior Landscape Architect	jim.orrell@stantec.com
2-Private Sector	1-Primary	Strata Clean Energy	Kevin	Seaford	Permitting Manager	kseaford@stratacleanenergy.com
2-Private Sector	1-Primary	Timmons Group (Engineering)	Chris	Dodson	Principal, Director of Field Operations	chris.dodson@timmons.com
2-Private Sector	2-Alternate	Timmons Group (Engineering)	Dan	Jamison		dan.jamison@timmons.com
2-Private Sector	2-Alternate	Timmons Group (Engineering)	Rick	Thomas		rick.thomas@timmons.com
2-Private Sector	2-Alternate	Timmons Group (Engineering)	Lauren	Wheeler	GIS Specialist	lauren.wheeler@timmons.com
2-Private Sector	1-Primary	Troutman Pepper Hamilton Sanders LLP (Law Firm)	Andrea	Wortzel	Partner	andrea.wortzel@troutman.com
2-Private Sector	2-Alternate	Troutman Pepper Hamilton Sanders LLP (Law Firm)	Andrew	Flavin	Associate	andy.flavin@troutman.com
2-Private Sector	1-Primary	Williams Mullen (Law Firm)	Speaker	Pollard	Partner	hpollard@williamsmullen.com
2-Private Sector	2-Alternate	Williams Mullen (Law Firm)	Christopher	McDonald	Director of Government Relations	cmcdonald@williamsmullen.com

Stakeholder Org Type	RAP Member Type	Stakeholder Organization Pink-Shaded=>1 participant from org	FIRST Name	LAST Name	Contact Title	Contact Email
3-Trade Association/Network	1-Primary	Advanced Energy Economy	Jeff	Hammond	Director of Project Development, Apex Clean Energy	jeff.hammond@apexcleanenergy.com
3-Trade Association/Network	2-Alternate	Advanced Energy Economy	Chris	Hawk		chris.hawk@apexcleanenergy.com
3-Trade Association/Network	1-Primary	American Clean Power Association	David	Murray	Director, Solar Policy	dmurray@cleanpower.org
3-Trade Association/Network	2-Alternate	American Clean Power Association	Hilary	Clark	Social License Director, Siting and Permitting	hclark@cleanpower.org
3-Trade Association/Network	1-Primary	Chesapeake Solar and Storage Association	Chip	Dicks III	Legislative Counsel	chip@chipdicks.com
3-Trade Association/Network	1-Primary	Coalition for Community Solar Access	Charlie	Coggeshall	Director, Policy & Regulatory Affairs	charlie@communitysolaraccess.org
3-Trade Association/Network	1-Primary	Data Center Coalition (represented by Amazon Web Services)	Craig	Sundstrom	Senior Manager, Energy & Environment Public Policy	csunds@amazon.com
3-Trade Association/Network	2-Alternate	Data Center Coalition (represented by Amazon Web Services)	Rob	Corradi		rcorradi@amazon.com
3-Trade Association/Network	1-Primary	Mid-Atlantic Renewable Energy Coalition	Evan	Vaughan	Deputy Director	evaughan@marec.us
3-Trade Association/Network	1-Primary	Solar Energy Industries Association	Will	Giese	Southeast Regional Director	wgiese@seia.org
3-Trade Association/Network	2-Alternate	Solar Energy Industries Association	Ben	Norris	Director of Regulatory Affairs	bnorris@seia.org
3-Trade Association/Network	1-Primary	Virginia Agribusiness Council	Heidi	Hertz		HHertz@cozen.com
3-Trade Association/Network	2-Alternate	Virginia Agribusiness Council	Brad	Copenhaver		brad@meadowviewstrategies.com
3-Trade Association/Network	1-Primary	Virginia Farm Bureau Federation	Martha	Moore	Senior Vice President	martha.moore@vafb.com
3-Trade Association/Network	2-Alternate	Virginia Farm Bureau Federation	Zach	Jacobs	Legislative Specialist	zach.jacobs@vafb.com
3-Trade Association/Network	1-Primary	Virginia Forest Products Association	Susan	Seward	Director of Government Affairs	SewardConsultingInc@gmail.com
3-Trade Association/Network	1-Primary	Virginia Forestry Association	Corey	Connors	Executive Director	cconnors@vaforestry.org
3-Trade Association/Network	2-Alternate	Virginia Forestry Association	Robert	Crockett	Executive Director	rcrockett@advantusstrategies.com
3-Trade Association/Network	1-Primary	(VMDAEC)	Sam	Brumberg	General Counsel	sbrumberg@vmdaec.com
3-Trade Association/Network	2-Alternate	(VMDAEC)	Jacob	Newton		jnewton@vmdaec.com

Stakeholder Org Type	RAP Member Type	Stakeholder Organization Pink-Shaded=>1 participant from org	FIRST Name	LAST Name	Contact Title	Contact Email
4-Local Government	1-Primary	Caroline County	Jeff	Sili	Board of Supervisors, Bowling Green District	jsili@co.caroline.va.us
4-Local Government	1-Primary	City of Chesapeake	David	Westcott Jr	Legislative Affairs Liaison	dwestcott@cityofchesapeake.net
4-Local Government	1-Primary	City of Danville	Rick	Drazenovich	Director of Public Works, City of Danville	drazeri@danvilleva.gov
4-Local Government	1-Primary	Frederick County	Joe	Wilder	Director of Public Works, Frederick County	jwilder@fcva.us
4-Local Government	1-Primary	Hampton Roads Planning District Commission	John	Harbin	Senior Regional Planner	jharbin@hrpdvca.gov
4-Local Government	1-Primary	King George County	Cathy	Binder	King George Board of Supervisors	shiloh@co.kinggeorge.state.va.us
4-Local Government	1-Primary	Virginia Association of Counties	Joe	Jerch	Director of Local Government Policy	ilerch@vaco.org
4-Local Government	1-Primary	Virginia Municipal League	Mitchell	Smiley	Policy Manager for Transportation & Natural Resources	msmiley@vml.org
5-SME: University	SME1-University	Retired Ecologist	Kevin	Howe	Retired Ecologist	juniper@erols.com
5-SME: University	SME1-University	University of Virginia	Jonah	Fogel	Program Manager, Environmental Resilience Institute (ERI)	ifogel@virginia.edu
5-SME: University	SME1-University	University of Virginia	Elizabeth	Marshall	Senior Project Coordinator, Virginia Solar Initiative, Weldon Cooper Center for Public Service	emm2t@virginia.edu
5-SME: University	SME1-University	Virginia Tech	Lee	Daniels	Professor	wDaniels@vt.edu
5-SME: University	SME1-University	Virginia Tech	John	Ignosh	Extension Specialist	jignosh@vt.edu
6-SME: State Agency	SME2-State Agency	Virginia Dept of Agriculture and Consumer Services	Charles	Green	Deputy Commissioner	charles.green@vdacs.virginia.gov
6-SME: State Agency	SME2-State Agency	Virginia Dept of Agriculture and Consumer Services	Joe	Guthrie	Commissioner	joseph.guthrie@vdacs.virginia.gov
6-SME: State Agency	SME2-State Agency	Virginia Dept of Agriculture and Consumer Services	Kevin	Schmidt	Director, Office of Policy, Planning and Research	kevin.schmidt@vdacs.virginia.gov
6-SME: State Agency	SME2-State Agency	Virginia Dept of Conservation & Recreation	James	Martin	Director, Division of Soil & Water Conservation	james.e.martin@dcr.virginia.gov
6-SME: State Agency	SME2-State Agency	Virginia Dept of Conservation & Recreation	Joe	Weber	Chief of Biodiversity Info & Conservation Tools, Division of Natural Heritage	joe.weber@dcr.virginia.gov
6-SME: State Agency	SME2-State Agency	Virginia Dept of Energy	Aaron	Berryhill	Solar Program Manager	aaron.berryhill@energy.virginia.gov
6-SME: State Agency	SME2-State Agency	Virginia Dept of Energy	Carrie	Hearne	Associate Director, Renewable Energy and Energy Efficiency	carrie.hearne@energy.virginia.gov
6-SME: State Agency	SME2-State Agency	Virginia Dept of Energy	Michael	Skiffington	Director of Policy and Planning	mike.skiffington@energy.virginia.gov
6-SME: State Agency	SME2-State Agency	Virginia Dept of Environmental Quality	Meade	Anderson	Volunteer Remediation Program (VDP) & Brownfields Program Manager	j.meade.anderson@deg.virginia.gov
6-SME: State Agency	SME2-State Agency	Virginia Dept of Environmental Quality	Melanie	Davenport	Director, Water Permitting Division	Melanie.Davenport@deg.virginia.gov
6-SME: State Agency	SME2-State Agency	Virginia Dept of Environmental Quality	Chris	Egghart	Cultural Resources Specialist	Christopher.Egghart@deg.virginia.gov
6-SME: State Agency	SME2-State Agency	Virginia Dept of Environmental Quality	Drew	Hammond	Water Permit Office Director	Andrew.Hammond@deg.virginia.gov
6-SME: State Agency	SME2-State Agency	Virginia Dept of Environmental Quality	Michael	Rolband	Director	michael.rolband@deg.virginia.gov
6-SME: State Agency	SME2-State Agency	Virginia Dept of Forestry	Terry	Lasher	Assistant State Forester	terry.lasher@dof.virginia.gov
6-SME: State Agency	SME2-State Agency	Virginia Dept of Historic Resources	Jenny	Belville-Marrion	Project Review Archeologist	jennifer.belville-marrion@dhr.virginia.gov
6-SME: State Agency	SME2-State Agency	Virginia Dept of Wildlife Resources	Amy	Martin	Manager, Wildlife Info & Environmental Services	amy.martin@dwr.virginia.gov
6-SME: State Agency	SME2-State Agency	Virginia Economic Development Partnership	Michael	Dreiling	VP, Real Estate Solutions	mdreiling@vedp.org
6-SME: State Agency	SME2-State Agency	Virginia Economic Development Partnership	Kevin	Farrelly	Manager, Economic Competitiveness	kfarrelly@vedp.org
6-SME: State Agency	SME2-State Agency	Virginia State Corporation Commission	Michael	Cizenski	Deputy Director, Division of Public Utility Regulation	mike.cizenski@scc.virginia.gov
6-SME: State Agency	SME2-State Agency	Virginia State Corporation Commission	Neil	Joshipura	Principal Utilities Engineering Manager, Division of Public Utility Regulation	neil.joshipura@scc.virginia.gov

FIRST Name	LAST Name	Contact Title	Stakeholder Organization Pink-Shaded=>1 participant from org	Contact Email	Stakeholder Org Type	RAP Member Type
Josephus	Allmond	Associate Attorney	Southern Environmental Law Center	jallmond@selcva.org	1-Environmental Nonprofit	1-Primary
Jon	Amores	Government Affairs Manager	American Electric Power (parent company of Appalachian Power)	jonamores@aep.com	2-Private Sector	1-Primary
Meade	Anderson	Volunteer Remediation Program (VDP) & Brownfields Program Manager	Virginia Dept of Environmental Quality	j.meade.anderson@deq.virginia.gov	6-SME: State Agency	SME2-State Agency
Jenny	Belville-Marrion	Project Review Archeologist	Virginia Dept of Historic Resources	jennifer.belville-marrion@thr.virginia.gov	6-SME: State Agency	SME2-State Agency
Aaron	Berryhill	Solar Program Manager	Virginia Dept of Energy	aaron.berryhill@energy.virginia.gov	6-SME: State Agency	SME2-State Agency
Cathy	Binder	King George Board of Supervisors	King George County	shiloh@co.kinggeorge.state.va.us	4-Local Government	1-Primary
Julie	Bolthouse	Director of Land Use	The Piedmont Environmental Council	ibolthouse@pecva.org	1-Environmental Nonprofit	2-Alternate
Amelia	Boschen		Dominion Energy	amelia.h.boschen@dominionenergy.com	2-Private Sector	2-Alternate
Sam	Brumberg	General Counsel	Virginia, Maryland & Delaware Association of Electric Cooperatives (VMDAEC)	sbrumberg@vmdaec.com	3-Trade Association/Network	1-Primary
Michael	Cizenski	Deputy Director, Division of Public Utility Regulation	Virginia State Corporation Commission	mike.cizenski@scc.virginia.gov	6-SME: State Agency	SME2-State Agency
Hilary	Clark	Social License Director, Siting and Permitting	American Clean Power Association	hclark@cleanpower.org	3-Trade Association/Network	2-Alternate
Charlie	Coggeshall	Director, Policy & Regulatory Affairs	Coalition for Community Solar Access	charlie@communitysolaraccess.org	3-Trade Association/Network	1-Primary
Corey	Connors	Executive Director	Virginia Forestry Association	cconnors@vaforestry.org	3-Trade Association/Network	1-Primary
Brad	Copenhaver		Virginia Agribusiness Council	brad@meadowviewstrategies.com	3-Trade Association/Network	2-Alternate
Rob	Corradi		Data Center Coalition (represented by Amazon Web Services)	rcorradi@amazon.com	3-Trade Association/Network	2-Alternate
Walter	Crenshaw	Director, Commercial Execution	AES Clean Energy	walter.crenshaw@aes.com	2-Private Sector	2-Alternate
Robert	Crockett	Executive Director	Virginia Forestry Association	rcrockett@advantusstrategies.com	3-Trade Association/Network	2-Alternate
Katie	Crum	Senior Project Manager	Kimley-Horn (Engineering)	Katie.Crum@kimley-horn.com	2-Private Sector	2-Alternate
Lee	Daniels	Professor	Virginia Tech	wdaniels@vt.edu	5-SME: University	SME1-University
Melanie	Davenport	Director, Water Permitting Division	Virginia Dept of Environmental Quality	Melanie.Davenport@deq.virginia.gov	6-SME: State Agency	SME2-State Agency
Chip	Dicks III	Legislative Counsel	Chesapeake Solar and Storage Association	chip@chipdicks.com	3-Trade Association/Network	1-Primary
Chris	Dodson	Principal, Director of Field Operations	Timmons Group (Engineering)	chris.dodson@timmons.com	2-Private Sector	1-Primary
Rick	Drazenovich	Director of Public Works, City of Danville	City of Danville	drazeri@danvilleva.gov	4-Local Government	1-Primary
Michael	Dreiling	VP, Real Estate Solutions	Virginia Economic Development Partnership	mdreiling@vedp.org	6-SME: State Agency	SME2-State Agency
Judy	Dunscumb	Senior Conservation Scientist	The Nature Conservancy	jdunscumb@tnc.org	1-Environmental Nonprofit	1-Primary
Chris	Egghart	Cultural Resources Specialist	Virginia Dept of Environmental Quality	Christopher.Egghart@deq.virginia.gov	6-SME: State Agency	SME2-State Agency
Jason	Ericson	Director, Environmental Services	Dominion Energy	jason.p.ericson@dominionenergy.com	2-Private Sector	1-Primary
Patrick	Fanning	CBF Staff Attorney	Chesapeake Bay Foundation	pfanning@cbf.org	1-Environmental Nonprofit	2-Alternate
Kevin	Farrelly	Manager, Economic Competitiveness	Virginia Economic Development Partnership	kfarrelly@vedp.org	6-SME: State Agency	SME2-State Agency
Andrew	Flavin	Associate	Troutman Pepper Hamilton Sanders LLP (Law Firm)	andy.flavin@troutman.com	2-Private Sector	2-Alternate
Todd	Flowers	Manager Business Development	Dominion Energy	todd.flowers@dominionenergy.com	2-Private Sector	2-Alternate
Jonah	Fogel	Program Manager, Environmental Resilience Institute (ERI)	University of Virginia	ifogel@virginia.edu	5-SME: University	SME1-University
Kelsey	Forren	Senior Analyst, Project Development	Energix Renewables	kelsey.forren@energixrenewables.com	2-Private Sector	2-Alternate

FIRST Name	LAST Name	Contact Title	Stakeholder Organization Pink-Shaded=>1 participant from org	Contact Email	Stakeholder Org Type	RAP Member Type
Emily	Francis	Senior Policy and Outreach Manager,	Southern Environmental Law Center	efrancis@selcva.org	1-Environmental Nonprofit	2-Alternate
Will	Giese	Southeast Regional Director	Solar Energy Industries Association	wgiese@seia.org	3-Trade Association/Network	1-Primary
Chris	Gordon	Senior Manager, Project Development	EDF Renewables	chris.gordon@edf-re.com	2-Private Sector	1-Primary
Charles	Green	Deputy Commissioner	Virginia Dept of Agriculture and Consumer Services	charles.green@vdacs.virginia.gov	6-SME: State Agency	SME2-State Agency
Joe	Guthrie	Commissioner	Virginia Dept of Agriculture and Consumer Services	joseph.guthrie@vdacs.virginia.gov	6-SME: State Agency	SME2-State Agency
Drew	Hammond	Water Permit Office Director	Virginia Dept of Environmental Quality	Andrew.Hammond@deg.virginia.gov	6-SME: State Agency	SME2-State Agency
Jeff	Hammond	Director of Project Development, Apex Clean Energy	Advanced Energy Economy	jeff.hammond@apexcleanenergy.com	3-Trade Association/Network	1-Primary
John	Harbin	Senior Regional Planner	Hampton Roads Planning District Commission	jharbin@hrpdcvva.gov	4-Local Government	1-Primary
Chris	Hawk		Advanced Energy Economy	chris.hawk@apexcleanenergy.com	3-Trade Association/Network	2-Alternate
Carrie	Hearne	Associate Director, Renewable Energy and Energy Efficiency	Virginia Dept of Energy	carrie.hearne@energy.virginia.gov	6-SME: State Agency	SME2-State Agency
Heidi	Hertz		Virginia Agribusiness Council	HHertz@cozen.com	3-Trade Association/Network	1-Primary
Victoria	Higgins	Virginia Director	Chesapeake Action Climate Network	vhiggins@chesapeakeclimate.org	1-Environmental Nonprofit	1-Primary
Dan	Holmes	Principal, Weathered Rock Consulting LLC	The Piedmont Environmental Council	weatheredrockconsulting@gmail.com	1-Environmental Nonprofit	1-Primary
Kevin	Howe	Retired Ecologist	Retired Ecologist	juniper@erols.com	5-SME: University	SME1-University
John	Ignosh	Extension Specialist	Virginia Tech	jignosh@vt.edu	5-SME: University	SME1-University
Zach	Jacobs	Legislative Specialist	Virginia Farm Bureau Federation	zach.jacobs@vafb.com	3-Trade Association/Network	2-Alternate
Dan	Jamison		Timmons Group (Engineering)	dan.jamison@timmons.com	2-Private Sector	2-Alternate
Kenny	Jesensky	Professional Wetland Scientist	Kimley-Horn (Engineering)	kenny.jesensky@kimley-horn.com	2-Private Sector	1-Primary
Neil	Joshipura	Division of Public Utility Regulation	Virginia State Corporation Commission	neil.joshipura@scc.virginia.gov	6-SME: State Agency	SME2-State Agency
Stephanie	Kane	Affairs	Old Dominion Electric Cooperative	skane@odec.com	2-Private Sector	1-Primary
Anna	Killius	Director of Policy and Government Affairs	The James River Association	akillius@thejamesriver.org	1-Environmental Nonprofit	1-Primary
Terry	Lasher	Assistant State Forester	Virginia Dept of Forestry	terry.lasher@dof.virginia.gov	6-SME: State Agency	SME2-State Agency
Joe	Lerch	Director of Local Government Policy	Virginia Association of Counties	jlerch@vaco.org	4-Local Government	1-Primary
Jeff	Machiran	Senior Project Development Manager	EDF Renewables	Jeff.Machiran@edf-re.com	2-Private Sector	2-Alternate
Elizabeth	Marshall	Senior Project Coordinator, Virginia Solar Initiative, Weldon Cooper Center for Public Service	University of Virginia	emm2t@virginia.edu	5-SME: University	SME1-University
Amy	Martin	Manager, Wildlife Info & Environmental Services	Virginia Dept of Wildlife Resources	amy.martin@dwr.virginia.gov	6-SME: State Agency	SME2-State Agency
James	Martin	Director, Division of Soil & Water Conservation	Virginia Dept of Conservation & Recreation	james.e.martin@dcr.virginia.gov	6-SME: State Agency	SME2-State Agency
Christopher	McDonald	Director of Government Relations	Williams Mullen (Law Firm)	cmcdonald@williamsmullen.com	2-Private Sector	2-Alternate
Martha	Moore	Senior Vice President	Virginia Farm Bureau Federation	martha.moore@vafb.com	3-Trade Association/Network	1-Primary
David	Murray	Director, Solar Policy	American Clean Power Association	dmurray@cleanpower.org	3-Trade Association/Network	1-Primary
Jacob	Newton		Virginia, Maryland & Delaware Association of Electric Cooperatives (VMDAEC)	jnewton@vmdaec.com	3-Trade Association/Network	2-Alternate
Ben	Norris	Director of Regulatory Affairs	Solar Energy Industries Association	bnorris@seia.org	3-Trade Association/Network	2-Alternate
Jim	Orrell	Senior Landscape Architect	Stantec Consulting Services Inc.	jim.orrell@stantec.com	2-Private Sector	1-Primary
Emily	Piontek	Virginia Field Coordinator	Appalachian Voices	emily@appvoices.org	1-Environmental Nonprofit	1-Primary

FIRST Name	LAST Name	Contact Title	Stakeholder Organization Pink-Shaded=>1 participant from org	Contact Email	Stakeholder Org Type	RAP Member Type
Speaker	Pollard	Partner	Williams Mullen (Law Firm)	hpollard@williamsmullen.com	2-Private Sector	1-Primary
Michael	Rolband	Director	Virginia Dept of Environmental Quality	michael.rolband@deq.virginia.gov	6-SME: State Agency	SME2-State Agency
Nikki	Rovner	Associate State Director for External Affairs	The Nature Conservancy	nrovner@tnc.org	1-Environmental Nonprofit	2-Alternate
Peggy	Sanner	Virginia Executive Director	Chesapeake Bay Foundation	psanner@cbf.org	1-Environmental Nonprofit	1-Primary
Ben	Saunders	Director, Development	AES Clean Energy	ben.saunders@aes.com	2-Private Sector	1-Primary
Kevin	Schmidt	Director, Office of Policy, Planning and Research	Virginia Dept of Agriculture and Consumer Services	kevin.schmidt@vdacs.virginia.gov	6-SME: State Agency	SME2-State Agency
Kevin	Seaford	Permitting Manager	Strata Clean Energy	kseaford@stratacleanenergy.com	2-Private Sector	1-Primary
Susan	Seward	Director of Government Affairs	Virginia Forest Products Association	SewardConsultingInc@gmail.com	3-Trade Association/Network	1-Primary
Jeff	Sili	Board of Supervisors, Bowling Green District	Caroline County	jsili@co.caroline.va.us	4-Local Government	1-Primary
Jessica	Sims		Appalachian Voices	jessica@appvoices.org	1-Environmental Nonprofit	2-Alternate
Dominika	Sink	Director of Project Acquisition and Development	Ennergix Renewables	Dominika.Sink@energixrenewables.com	2-Private Sector	1-Primary
Michael	Skiffington	Director of Policy and Planning	Virginia Dept of Energy	mike.skiffington@energy.virginia.gov	6-SME: State Agency	SME2-State Agency
Mitchell	Smiley	Policy Manager for Transportation & Natural Resources	Virginia Municipal League	m-smiley@vml.org	4-Local Government	1-Primary
Craig	Sundstrom	Senior Manager, Energy & Environment Public Policy	Data Center Coalition (represented by Amazon Web Services)	csunds@amazon.com	3-Trade Association/Network	1-Primary
Cutter	Syndor	Director, Solar Division	Hewitt Solutions PLLC (Engineering)	cutter@hewittsol.com	2-Private Sector	1-Primary
Rick	Thomas		Timmons Group (Engineering)	rick.thomas@timmons.com	2-Private Sector	2-Alternate
Tyson	Utt	Co-Founder & Manager	Commonwealth Energy Partners (CEP Solar)	tyson.utt@cepsolar.com	2-Private Sector	1-Primary
Evan	Vaughan	Deputy Director	Mid-Atlantic Renewable Energy Coalition	evaughan@marec.us	3-Trade Association/Network	1-Primary
Joe	Weber	Chief of Biodiversity Info & Conservation Tools, Division of Natural Heritage	Virginia Dept of Conservation & Recreation	joe.weber@dcr.virginia.gov	6-SME: State Agency	SME2-State Agency
David	Westcott Jr	Legislative Affairs Liaison	City of Chesapeake	dwestcott@cityofchesapeake.net	4-Local Government	1-Primary
Lauren	Wheeler	GIS Specialist	Timmons Group (Engineering)	lauren.wheeler@timmons.com	2-Private Sector	2-Alternate
Joe	Wilder	Director of Public Works, Frederick County	Frederick County	jwilder@fcva.us	4-Local Government	1-Primary
Andrea	Wortzel	Partner	Troutman Pepper Hamilton Sanders LLP (Law Firm)	andrea.wortzel@troutman.com	2-Private Sector	1-Primary
DEQ/IEN PLANNING TEAM						
Michael	Dowd	Air & Renewable Energy Division Director	Virginia Dept of Environmental Quality	Michael.Dowd@deq.virginia.gov	0-Planning Team	0-Planning Team
Amber	Foster	Renewable Energy Permit by Rule Coordinator	Virginia Dept of Environmental Quality	Amber.Foster@deq.virginia.gov	0-Planning Team	0-Planning Team
Tamera	Thompson	Air & Renewable Energy Program Manager	Virginia Dept of Environmental Quality	Tamera.Thompson@deq.virginia.gov	0-Planning Team	0-Planning Team
Susan	Tripp	Renewable Energy Permit by Rule Coordinator	Virginia Dept of Environmental Quality	Susan.Tripp@deq.virginia.gov	0-Planning Team	0-Planning Team
Elena	Meyer	Fellow	Commonwealth of Virginia Engineering & Science (COVES) Policy Fellowship	meyere3@vcu.edu	0-Planning Team	0-Planning Team
Kelly	Altizer	Senior Associate	UVA Institute for Engagement & Negotiation	kaltizer@virginia.edu	0-Planning Team	0-Planning Team
Tanya	Denckla Cobb	Director/RAP Co-Facilitator	UVA Institute for Engagement & Negotiation	td6n@virginia.edu	0-Planning Team	0-Planning Team
Michelle	Oliva	Associate Consultant/RAP Co-Facilitator	UVA Institute for Engagement & Negotiation	mlo5n@virginia.edu	0-Planning Team	0-Planning Team
Sarah	Rizk	Student Research Associate	UVA Institute for Engagement & Negotiation	vzx6nv@virginia.edu	0-Planning Team	0-Planning Team

HB 206 Primary Member Breakdown: By Org Type & Interest Area/s

Stakeholder Org Type	#	Main Interest Area
Environmental Nonprofit	7	5 Natural & Ecological Resources, 2 Environmental Justice
Private Sector	14	11 Solar Development, 3 Energy Utility/Cooperative
Trade Association/Network	12	6 Solar Development, 2 Energy Utility/Cooperative, 2 Agriculture, 2 Forestry
Local Government	8	6 Counties and 2 State-wide Associations
Primary Members	41	*as reported by the members

Main Interest Area of Primary Members

Solar Development	17
Energy Utility/Cooperative	5
Agriculture	2
Forestry	2
Environmental Justice	2
Natural & Ecological Resources	5
Local Government	8
Primary Members	41

Additional Interest Area/s of Primary Members (1 or multiple)

Solar Development	10
Energy Utility/Cooperative	5
Agriculture	7
Forestry	7
Environmental Justice	5
Natural & Ecological Resources	9
Local Government	3
Clean Energy	19
Economic Development	10
Historic Resources	6
Wildlife Resources	10
Other: Water Quality, Stormwater, Erosion, Sediment Control, Scenic Resources, Soil Science, Natural Resource Mitigation	

HB206 RAP Workgroup 1: Avoidance & Minimization

as of August 22, 2022

Stakeholder Organization	FIRST Name	LAST Name
Southern Environmental Law Center	Josephus	Allmond
Williams Mullen (Law Firm)	Speaker	Pollard
Dominion Energy	Jason	Ericson
Virginia Farm Bureau Federation	Martha	Moore
Mid-Atlantic Renewable Energy Coalition	Evan	Vaughan
Troutman Pepper Hamilton Sanders LLP (Law Firm)	Andrea	Wortzel
Virginia Economic Development Partnership	Kevin	Farrelly
Virginia Dept of Wildlife Resources	Amy	Martin
Dominion Energy	Amelia	Boschen
Troutman Pepper Hamilton Sanders LLP (Law Firm)	Andrew	Flavin
Dominion Energy	Todd	Flowers
Southern Environmental Law Center	Emily	Francis
Virginia Farm Bureau Federation	Zach	Jacobs
Williams Mullen (Law Firm)	Christoper	McDonald

1-Primary
SME
2-Alternate

	WG Notes
1-Primary	WG-1 Co-Lead
1-Primary	WG-1 Co-Lead
1-Primary	
1-Primary	
1-Primary	
1-Primary	
SME2-State Agency	
SME2-State Agency	
2-Alternate	Alternate for Jason Ericson
2-Alternate	Alternate for Andrea Wortzel
2-Alternate	Alternate for Jason Ericson
2-Alternate	Alternate for Josephus Allmond
2-Alternate	Alternate for Martha Moore
2-Alternate	Alternate for Speaker Pollard

HB206 RAP Workgroup 2+3: Mitigation/In Lieu Mitigation

as of August 22, 2022

NOTE: Workgroups 2 & 3 have been combined per RAP request at Mtg #1; TBD if to remain combined or separate at later stages in the process

Stakeholder Organization	FIRST Name	LAST Name
Chesapeake Solar and Storage Association	Chip	Dicks III
The Nature Conservancy	Judy	Dunscumb
American Electric Power (parent company of Appalachian Power)	Jon	Amores
Virginia Forestry Association	Corey	Connors
Timmons Group (Engineering)	Chris	Dodson
Advanced Energy Economy	Jeff	Hammond
Chesapeake Action Climate Network	Victoria	Higgins
The Piedmont Environmental Council	Dan	Holmes
Kimley-Horn (Engineering)	Kenny	Jesensky
Chesapeake Bay Foundation	Peggy	Sanner
AES Clean Energy	Ben	Saunders
Strata Clean Energy	Kevin	Seaford
Virginia Agribusiness Council	Heidi	Hertz
Virginia Economic Development Partnership	Michael	Dreiling
Virginia Economic Development Partnership	Kevin	Farrelly
University of Virginia	Jonah	Fogel
Retired Ecologist	Kevin	Howe
Virginia Dept of Forestry	Terry	Lasher
Virginia Dept of Conservation & Recreation	Joe	Weber
The Piedmont Environmental Council	Julie	Bolthouse
Virginia Agribusiness Council	Brad	Copenhaver
AES Clean Energy	Walter	Crenshaw
Virginia Forestry Association	Robert	Crockett
Kimley-Horn (Engineering)	Katie	Crum
Chesapeake Bay Foundation	Patrick	Fanning
Advanced Energy Economy	Chris	Hawk
Timmons Group (Engineering)	Dan	Jamison
The Nature Conservancy	Nikki	Rovner
Timmons Group (Engineering)	Rick	Thomas
Timmons Group (Engineering)	Lauren	Wheeler

WG Notes	
1-Primary	WG-2/3 Co-Lead
1-Primary	WG-2/3 Co-Lead
1-Primary	
1-Primary	
1-Primary	
1-Primary	
1-Primary	
1-Primary	
1-Primary	
1-Primary	
1-Primary	
1-Primary	
SME2-State Agency	
SME2-State Agency	Alternate for Michael Dreiling; Also on WG-1 as SME
SME1-University	
SME1-University	
SME2-State Agency	
SME2-State Agency	
2-Alternate	Alternate for Dan Holmes
2-Alternate	Alternate for Heidi Hertz
2-Alternate	Alternate for Ben Saunders
2-Alternate	Alternate for Corey Connors
2-Alternate	Alternate for Kenny Jesensky
2-Alternate	Alternate for Peggy Sanner
2-Alternate	Alternate for Jeff Hammond
2-Alternate	Alternate for Chris Dodson
2-Alternate	Alternate for Judy Dunscumb
2-Alternate	Alternate for Chris Dodson
2-Alternate	Alternate for Chris Dodson

1-Primary
SME
2-Alternate

HB206 RAP Workgroup 4: Significant adverse impact <10 acres ag soil/50 acres forest

as of August 22, 2022

Stakeholder Organization	FIRST Name	LAST Name
EDF Renewables	Chris	Gordon
The James River Association	Anna	Killius
Virginia, Maryland & Delaware Association of Electric Cooperatives (VMDAEC)	Sam	Brumberg
Stantec Consulting Services Inc.	Jim	Orrell
EDF Renewables	Jeff	Machiran
Virginia, Maryland & Delaware Association of Electric Cooperatives (VMDAEC)	Jacob	Newton

1-Primary
SME
2-Alternate

	WG Notes
1-Primary	WG-4 Co-Lead
1-Primary	WG-4 Co-Lead
1-Primary	
1-Primary	
2-Alternate	Alternate for Chris Gordon
2-Alternate	Alternate for Sam Brumberg

HB206 RAP Workgroup 5: Local Control

as of August 22, 2022

Stakeholder Organization	FIRST Name	LAST Name
Virginia Association of Counties	Joe	Lerch
Commonwealth Energy Partners (CEP Solar)	Tyson	Utt
King George County	Cathy	Binder
City of Danville	Rick	Drazenovich
Solar Energy Industries Association	Will	Giese
Hampton Roads Planning District Commission	John	Harbin
Old Dominion Electric Cooperative	Stephanie	Kane
American Clean Power Association	David	Murray
Appalachian Voices	Emily	Piontek
Virginia Forest Products Association	Susan	Seward
Caroline County	Jeff	Sili
Energix Renewables	Dominika	Sink
Virginia Municipal League	Mitchell	Smiley
Data Center Coalition (represented by Amazon Web Services)	Craig	Sundstrom
Hewitt Solutions PLLC (Engineering)	Cutter	Sydnor
City of Chesapeake	David	Westcott Jr
Frederick County	Joe	Wilder
Virginia Dept of Energy	Aaron	Berryhill
University of Virginia	Elizabeth	Marshall
American Clean Power Association	Hilary	Clark
Data Center Coalition (represented by Amazon Web Services)	Rob	Corradi
Energix Renewables	Kelsey	Forren
Solar Energy Industries Association	Ben	Norris
Appalachian Voices	Jessica	Sims

1-Primary
SME
2-Alternate

	WG Notes
1-Primary	WG-5 Co-Lead
1-Primary	WG-5 Co-Lead
1-Primary	
1-Primary	
1-Primary	
1-Primary	
1-Primary	
1-Primary	
1-Primary	
1-Primary	
1-Primary	
1-Primary	
1-Primary	
1-Primary	
1-Primary	
1-Primary	
1-Primary	
SME2-State Agency	
SME1-University	
2-Alternate	Alternate for David Murray
2-Alternate	Alternate for Craig Sundstrom
2-Alternate	Alternate for Dominika Sink
2-Alternate	Alternate for Will Giese
2-Alternate	Alternate for Emily Piontek

HB 206 RAP Workgroups: Formation & Guidelines

In order to address the questions posed to the HB 206 Regulatory Advisory Panel (RAP), the stakeholders were divided (self-selected) into workgroups based on the requirements of HB 206. From Jun-Sep 2022 (during and in between 5 full RAP meetings), each WG developed draft proposals for review/input/discussion by the full RAP at the in-person RAP meetings and via a Qualtrics survey

List of Workgroups (WG)

WG-1 Avoidance & Minimization

WG-2+3 Mitigation & In Lieu Mitigation

WG-4 Define significant adverse impact for projects disturbing **less than 10 acres of prime agricultural soils** or **less than 50 acres of contiguous forest**

WG-5 Local Control

NOTES:

- WGs 1-3: Determine appropriate & reasonable mitigation techniques & criteria to be included in mitigation plans for projects with **more than 10 acres of prime agricultural soils** or **more than 50 acres of contiguous forest land**
- WG-2 Mitigation & WG-3 In Lieu Mitigation were combined per RAP request at Mtg #1

HB 206 RAP Workgroup Issues Matrix




An advisory panel shall be convened “to assist in further developing regulations regarding criteria to determine if a significant adverse impact* to prime agricultural soils or forest lands is likely to occur as a result of a proposed solar project that is a small renewable energy project and criteria for an applicant of a solar project to address in a plan to mitigate any significant adverse impacts to soils and lands. In developing regulations regarding plans to mitigate any significant impacts to prime agricultural soils or forest lands, the advisory panel shall consider, but not be limited to, the following factors in determining appropriate mitigation techniques or criteria to be included in an applicant's mitigation plan...”

<p>FACTORS/ISSUES TO CONSIDER PER HB 206</p> <p>*A project will be deemed to have a significant adverse impact if it would disturb more than 10 acres of prime agricultural soils or 50 acres of contiguous forest lands, or if it would disturb forest lands enrolled in a program for forestry preservation pursuant to subdivision 2 of § 58.1-3233</p>	<p>WG-1 Avoidance & Minimization</p>	<p>WG-2+3 Mitigation & In Lieu Mitigation</p>	<p>WG-4 Define significant adverse impact: For projects disturbing <u>less than 10 acres prime soil</u> or <u>less than 50 acres contiguous forest</u></p>	<p>WG-5 Local Control</p>
	<p>Determine appropriate & reasonable mitigation techniques & criteria to be included in mitigation plans for projects with <u>more than 10 acres prime ag soil</u> or <u>more than 50 acres contiguous forest land</u></p>			
Appropriate techniques to avoid & minimize impacts	X			
Appropriate mitigation techniques		X		
Cost of mitigation relative to the project cost, including costs of proposed mitigation to rate payers		X		
Onsite minimization of impacts	X			
Payment of in-lieu fee funds for mitigation		X		
Consider impact on the local agricultural or forestry economy when such soils or lands are displaced			X	X
Consider loss of ecosystem benefits	X	X	X	
Noncompliance w/Virginia's Watershed Implementation Plan III goals on the Chesapeake Bay TMD	[DO NOT VIOLATE]			
Noncompliance w/other water quality criteria and standards	[DO NOT VIOLATE]			
Consider a process by which an applicant may satisfy its mitigation obligations by agreement with a locality if such mitigation requirements (A) conform to the <u>regulations</u> established by the Department pursuant to this enactment and (B) when such mitigation requirements are included in: (a) A siting agreement and approved by a local governing body pursuant to subsection B of § 15.2-2316.7 of the Code of Virginia: or, (b) Zoning use conditions approved by the locality pursuant to § 15.2-2288.8 of the Code of Virginia.				X
Consider Environmental Justice (EJ) impacts	X	X	X	X

Consensus: A Tool for Building Understanding

- A well-defined, tested set of *strategies* and *tools* for shaping, building, and (in some cases) ratifying collaborative agreements and decisions.
- When using consensus to make decisions, the group does not “vote,” which implies a binary response of support/don’t support.
- **By contrast, consensus surfaces *gradients of agreement* and gives participants the opportunity to *strengthen common ground*.**

CONSENSUS: A TOOL FOR BUILDING UNDERSTANDING
Examples Scales for “Gradients of Agreement”

	<p>3 – Fully Support “I support the proposal and its implementation”</p>
	<p>2 – Will Support with Reservations “I have questions and concerns but can live with and support implementation”</p>
	<p>1 – Stop “I have too many questions and concerns, cannot live with it, and we need more discussion”</p>

Reaching consensus means:

- Everyone can live with the final agreements without compromising issues of fundamental importance.
- Individual portions of the agreement may be less than ideal for some members, but the overall package is worthy of support.
- Participants will work to support the full agreement and not just the parts they like best.

All group members are empowered, and anyone may call for a quick straw poll or test for consensus at any time on a point of discussion to see where people may stand, and to see if we may have agreement.

HB 206 Regulatory Advisory Panel (RAP) Participation Guidelines (Updated July 15, 2022)

Primary, Alternate & Subject Matter Expert (SME) Roles in RAP Meetings and in Workgroups

Primary & Alternate Members

1. 1 Primary per organization participates in the RAP and represents the organization's position (consulting with any Alternates and within their organization for input when needed).
2. Alternate may attend in-person meetings, observing only if the Primary is present; or be designated by the Primary to attend meetings/participate in the Primary's absence.
3. Primary participates in only one workgroup – including attending any in-person meetings and contributing to their Workgroup Proposals Worksheet (SharePoint document).
4. Alternates are assigned to the same workgroup as the Primary to observe (and attend/participate in Primary's absence).
5. At specific points throughout the virtual process and at in-person RAP meetings, the full RAP will have opportunities to review all workgroup proposals, and primary members will be able to provide input.
6. During the online workgroup proposal development process: Primary consults across their organization for input and submits consolidated proposal language/comments for consideration into their workgroup's draft document.
7. At later stages in the process, when it is time for full RAP review (in-person or virtual), e.g., to consensus check proposals, Primary discusses/consults internally within their organization/with any Alternates as needed and puts forth 1 organizational response.

Subject Matter Experts (SMEs)

1. SMEs are University and State Agency representatives.
2. SMEs may serve on one workgroup, and/or also be available for consultation across workgroups on request.
3. SMEs observe full RAP meetings; Facilitators will provide opportunities for SMEs to contribute/provide input.
4. SMEs provide input into the Workgroup Proposals Worksheet (SharePoint document) as requested by workgroup co-leads.

Other Guidance

Seating protocols for Full RAP meetings:

- Primary RAP members at tables (main circle/U)
- SMEs, Alternates and public in rows of chairs

Alternates/Public: Anyone may observe full RAP meetings and/or any in-person workgroup meetings, and may choose to sit in small group discussions to listen, but not to participate

Email any questions/clarifications to hb206rap-support@virginia.edu.

Appendix 2: RAP Resources

Resources in this appendix include:

- I. Resource List (Catalog)
- II. Core Resources
 - a. HB 206 Issues Briefing
 - b. Issues Overview Presentations from RAP Meeting #1
- III. Additional Resources

HB206 RAP Resource List as of Oct 2022

Technical resources, reports, data, SME responses to questions, etc. submitted for HB206 RAP reference

CORE RESOURCES

File Number/Name	01-CORE RESOURCE-HB 206 Issues Briefing
Type	PDF
Title of resource	HB 206 Issues Briefing
Link if available	
Submitted by	Elena Meyer, Commonwealth of Virginia Engineering & Science (COVES) Policy Fellow for DEQ HB 206 RAP Project
Originally shared with	All RAP
Additional info, if any	Briefing document for RAP members about HB 206
Interest	All

File Number/Name	02-CORE RESOURCE-RAP Mtg 1-Issues Overview Presentations 220628
Type	PDF
Title of resource	RAP Mtg 1-Issues Overview Presentations 220628
Link if available	
Submitted by	SMEs: Susan Tripp, Michael Skiffington, Terry Lasher, Keven Schmidt
Originally shared with	All RAP
Additional info, if any	
Interest	All

ADDITIONAL RESOURCES (Shared by SME Members)

File Number/Name	03-Lee Daniels, SME (Virginia Tech) Memo-Q&A Solar x Topsoil Issues 220718
Type	PDF
Title of resource	RESOURCE-From Lee Daniels, Virginia Tech SME-Memo Q&A Solar x Topsoil Issues 220718
Link if available	
Submitted by	Lee Daniels, SME
Originally shared with	All
Additional info, if any	Responses to questions raised by HB 206 members: several soil quality issues related to development of existing agricultural lands into solar facilities
Interest	All

File Number/Name	04-Lee Daniels, SME (Virginia Tech) Presentation-Large-Scale Solar Soil Considerations RAP Mtg 220802
Type	PDF
Title of resource	Large-Scale Solar Site Development & Legacy Issues - Soil Productivity Considerations
Link if available	
Submitted by	Lee Daniels, SME
Originally shared with	All
Additional info, if any	Presentation at RAP Mtg on August 2, 2022
Interest	All

File Number/Name	05-Lee Daniels, SME (Virginia Tech) Report-Development of Effective Rehabilitation Protocols 2018
Type	Link/PDF
Title of resource	Development of effective rehabilitation protocols for mineral sands mining in Virginia, USA (WL Daniels, Z Orndorff, C Stilson, C Zimmerman and A Haywood)
Link if available	https://www.researchgate.net/publication/338631684_Development_of_effective_rehabilitation_protocols_for_mineral_sands_mining_in_Virginia_USA
Submitted by	Lee Daniels, SME
Originally shared with	WG-1, 2+3
Additional info, if any	Scientific paper assessing the post-mining productivity of mined lands following topsoil replacement
Interest	All, soil considerations

File Number/Name 06-Lee Daniels, SME (Virginia Tech) Presentation-Large-Scale Solar Soil Considerations March 2022
Type PDF
Title of resource Large-Scale Solar Site Development & Legacy Issues - Soil Considerations
Link if available
Submitted by Lee Daniels, SME
Originally shared with WG-1, WG-2+3
Additional info, if any
Interest All

File Number/Name 07-Utility-Scale Solar in Virginia-Analysis Land Use and Development Trends
Type Link/PDF
Title of resource Utility-Scale Solar in Virginia-Analysis Land Use and Development Trends
Link if available https://scholarscompass.vcu.edu/cgi/viewcontent.cgi?article=1043&context=murp_capstone
Submitted by Aaron Berryhill, SME
Originally shared with All
Additional info, if any Report prepared for Virginia Department of Mines, Minerals, and Energy by Aaron Berryhill which directly discusses the impact of utility-scale solar
Interest All

File Number/Name 08-Virginia Solar Survey 2022
Type Link/PDF
Title of resource Virginia Solar Survey, April 2022, Results and Initial Findings
Link if available <https://energytransition.coopercenter.org/virginia-solar-survey>
Submitted by Aaron Berryhill, SME
Originally shared with All
Additional info, if any Collaboration between VaDOE and UVA discussing solar development; the Virginia Solar Survey was designed to give ?point in time? insights into what localities are experiencing and relevant policy questions
Interest WG-5, all

File Number/Name	09-Justice 40, Climate EJ Tool and USDA Resources
Type	Link/PDF
Title of resource	1) Biden Administration Justice 40 Initiative; 2) Climate and Economic Justice Screening Tool linked from the Justice 40; and 3) USDA Climate-Smart Agriculture and Forestry Strategy
Link if available	https://www.whitehouse.gov/environmentaljustice/justice40/
Link if available	https://screeningtool.geoplatform.gov/en/#7.67/36.546/-78.033
Link if available	https://www.usda.gov/sites/default/files/documents/climate-smart-ag-forestry-strategy-90-day-progress-report.pdf
Submitted by	Jonah Fogel, SME
Originally shared with	WG-1 and WG-2+3
Additional info, if any Interest	1) Justice 40's goal is to set 40 percent of the overall benefits of certain Federal investments to flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution; 2) Climate and Economic Justice Screening Tool is an interactive map in beta which shows communities that are considered disadvantaged; and 3) USDA report on interactions between agriculture and climate All, environmental justice (EJ)

File Number/Name	10-Joe Weber, SME (DCR) Presentation-Data to Consider for HB894
Type	PDF
Title of resource	Joe Weber, SME (DCR) Presentation-Data to Consider for HB894
Link if available	
Submitted by	Joe Weber, SME
Originally shared with	WG-2+3
Additional info, if any Interest	Discusses VA conservation goals, natural heritage, ecological cores and resilience corridors WG-1, WG-2+3, all

File Number/Name 11-Joe Weber, SME (DCR) Memo-Q&A Maps-Data Prime Farmland-Forest-Eco Core
Type Link/PDF
Title of resource Joe Weber, SME (DCR) Memo-Q&A Maps-Data Prime Farmland-Forest-Eco Core
Link if available <https://vanhde.org/content/map>
Submitted by Joe Weber, SME
Originally shared with WG-4
Additional info, if any Information on ecological forest cores, and recommendations from Joe Weber about utilization of C1 and C1 cores,
Interest and figures showing C1-C5 cores
WG-4, all

File Number/Name 12-Virginia Dept of Forestry-Forest Conservation Value Model-Final Report
Type PDF
Title of resource Forest Conservation Value Model 2020 Edition
Link if available
Submitted by Terry Lasher
Originally shared with WG-4
Additional info, if any Model identifies the highest priority forestland for conservation in Virginia
Interest All

File Number/Name 13-Developing Solar Energy in Virginia (DEQ)
Type Link/PDF
Title of resource Developing Solar Energy in Rural Virginia: An Analysis of Legal, Environmental, and Policy Issues
Link if available <https://www.deq.virginia.gov/permits-regulations/permits/renewable-energy/renewable-energy-resources>
Submitted by Department of Environmental Quality
Originally shared with All
Additional info, if any Report on solar production in rural Virginia by William & Mary Law School
Interest All

File Number/Name 14-Potential Utility Scale Solar Facilities-Charlotte County (PEC)
Type PDF
Title of resource Potential Utility Scale Solar Facilities Charlotte County
Link if available
Submitted by
Originally shared with IEN Facilitation Team
Additional info, if any
Interest All

File Number/Name 15-ConserveVirginia Map-Charlotte County
Type PDF
Title of resource Conserve Virginia
Link if available
Submitted by
Originally shared with IEN Facilitation Team
Additional info, if any
Interest All

File Number/Name 16-NYTimes Better Places for Solar than these Forests
Type Link/PDF
Title of resource Are There Better Places to Put Large Solar Farms than these Forests?
Link if available <https://www.nytimes.com/2022/09/21/opinion/environment/solar-panels-virginia-climate-change.html>
Submitted by
Originally shared with IEN Facilitation Team
Additional info, if any
Interest All

ADDITIONAL RESOURCES (Shared by RAP Members)

File Number/Name 17-Highway Supplement Apr 2015
Type Link/PDF
Title of resource The Highway Methodology Workbook Supplement

Link if available <https://www.nae.usace.army.mil/Portals/74/docs/regulatory/Forms/HighwaySupplement6Apr2015.pdf>
Submitted by Chip Dicks, RAP Member
Originally shared with WG-2+3
Additional info, if any Framework used to find areas of mitigation in discussion with WG 2 and 3 about ecosystem functions and values.
Interest Originally designed for the Corps New England District Regulatory Program
WG-2+3, all, wetland and mitigation

File Number/Name 18-Email summarizing resources shared (Kevin Seaford)
Type PDF
Title of resource Email summarizing resources shared

Link if available
Submitted by Kevin Seaford, RAP Member
Originally shared with WG-2+3
Additional info, if any See below for each individual resource
Interest WG-2+3, all, mitigation

File Number/Name 19-Forest Conservation Worksheet MD DNR
Type Link/PDF
Title of resource Maryland Forest Conservation Act Worksheet
Link if available <https://dnr.maryland.gov/forests/Documents/forestconservationworksheet.pdf>
Submitted by Kevin Seaford, RAP Member
Originally shared with WG-2+3

Additional info, if any Simple, 1-page worksheet to assess forest restoration requirements based on land use, proposed clearing, etc.
Interest WG-2+3, all, mitigation, forest

File Number/Name 20-NCSU Balancing Ag-Solar
Type Link/PDF
Title of resource Balancing Agricultural Productivity with Ground-Based Solar Photovoltaic (PV) Development
Link if available <https://anson.ces.ncsu.edu/wp-content/uploads/2017/08/Balancing-Ag-and-Solar.pdf?fwd=no>
Submitted by Kevin Seaford, RAP Member
Originally shared with WG-2+3
Additional info, if any Report from the North Carolina Clean Energy Technology Center about trade-offs between agriculture and solar development in NC
Interest All, mitigation, agriculture

File Number/Name 21-NREL Life Cycle Greenhouse Gas Emissions from Solar
Type Link/PDF
Title of resource Life Cycle Greenhouse Gas Emissions from Solar Photovoltaics
Link if available <https://www.nrel.gov/analysis/life-cycle-assessment.html>
Submitted by Kevin Seaford, RAP Member
Originally shared with WG-2+3
Additional info, if any Report/web page from National Renewable Energy Laboratory about lifecycle emissions from solar projects. Page includes links to studies, published results, etc.
Interest WG-2+3, all

File Number/Name 22-Email summarizing resources shared (Emily Piontek)
Type PDF
Title of resource Email summarizing resources shared
Link if available
Submitted by Emily Piontek, RAP Member
Originally shared with WG-5
Additional info, if any See below for each individual resource
Interest WG-5, all

File Number/Name 23-505 ILCS 147 15 Agricultural Impact Mitigation Agreement
Type PDF
Title of resource 505 ILCS 147 15 Agricultural Impact Mitigation Agreement
Link if available
Submitted by Emily Piontek, RAP Member
Originally shared with WG-5
Additional info, if any Language from Illinois legislature about mitigating impacts of wind and solar projects through an agricultural
Interest mitigation agreement
WG-5, all, agriculture

File Number/Name 24-CBA Resource Guide
Type Link/PDF
Title of resource Guide to Advancing Opportunities for Community Benefits through Energy Project Development (EP)
Link if available <https://www.energy.gov/sites/default/files/2017/09/f36/CBA%20Resource%20Guide.pdf>
Submitted by Emily Piontek, RAP Member
Originally shared with WG-5
Additional info, if any Discusses Community Benefit Agreements (CBAs) and a community-driven process
Interest WG-5, all

File Number/Name 25-Maryland Solar Facility Siting Case Study Frederick County
Type Link/PDF
Title of resource Maryland Solar Facility Siting Case Study Frederick County
Link if available <https://planning.maryland.gov/Pages/OurWork/envr-planning/solar-siting/solar-siting-case-fred.aspx>
Submitted by Emily Piontek, RAP Member
Originally shared with WG-5
Additional info, if any Case study of siting agreement, discusses specifics of the zoning ordinance and best practices as identified by
Interest Frederick County
WG-5, all

File Number/Name 26-NY State Dept of Ag-Guidelines for Solar Energy Projects-Ag Mitigation
Type Link/PDF
Title of resource NY State Dept of Ag-Guidelines for Solar Energy Projects-Construction Mitigation for Ag Land
Link if available https://agriculture.ny.gov/system/files/documents/2019/10/solar_energy_guidelines.pdf
Submitted by Emily Piontek, RAP Member
Originally shared with WG-5
Additional info, if any Provides guidelines for mitigating construction impacts on agricultural land
Interest All

EXCEL SPREADSHEETS - ON FILE WITH DEQ

File Number/Name 27-Ag Economic Receipts Spreadsheet (EXCEL)
Type **Excel Spreadsheet - ON FILE WITH DEQ**
Title of resource Ag Economic Receipts Spreadsheet
Link if available
Submitted by Elizabeth Marshall, SME
Originally shared with WG-1
Additional info, if any 1969-2020 Agriculture Economic Receipts providing dollar amounts for income/expenses
Interest All, agriculture

File Number/Name 28-US Army Corps Stream Assessment Forms May 2008 (EXCEL)
Type **Excel Spreadsheet - ON FILE WITH DEQ**
Title of resource US Army Corps Stream Assessment Forms May 2008
Link if available
Submitted by Chip Dicks, RAP Member
Originally shared with WG-2+3
Additional info, if any Worksheet for assessing stream quality and condition, and describing proposed impact of a project
Interest WG-2+3, all, wetland, mitigation



Compiled June 2022

Stakeholder Issues Briefing:

HB 206, Small renewable energy projects; impact on natural resources, report.

For the attention of the Regulatory Advisory Panel (RAP) convened by the Department of Environmental Quality (DEQ), June 28th, 2022.

Facilitation for the RAP is provided by the University of Virginia's Institute for Engagement & Negotiation (IEN):

Tanya Denckla Cobb, Facilitator

Michelle Montserrat Oliva, Co-Facilitator

Summary

HB 206 (“[Small renewable energy projects; impact on natural resources, report.](#)”) relates to small renewable energy projects and their impact on Virginia’s natural resources.

Under the law, a small renewable energy project is defined as producing \leq 150 megawatts of power. Under the existing permit-by-rule process, these projects can obtain accelerated permitting through DEQ as opposed to going through the State Corporation Commission (SCC) Certificate of Public Convenience and Necessity (CPCN) process. HB 206 will add to this process by requiring significantly disruptive solar projects to create a mitigation plan to address their impact on prime agricultural soils and forested lands. HB 206 also mandates the formation of a stakeholder group to inform and make recommendations about how appropriate mitigations will be determined, and how a significant adverse impact to these environments will be defined. Key considerations for this issue include meeting goals within the Virginia Clean Economy Act, and the 2025 Chesapeake Bay goals, as well as understanding and responding to the needs of different communities within the Commonwealth.

Contents

- **Pgs. 3-4** - Background, including
- **Pg. 5** - Conflicting goals and challenges
- **Pgs. 6-10** - Index/Glossary of terms, references

Key Questions Aims for the Regulatory Advisory Panel (RAP)

Under HB 206, the Department of Environmental Quality was tasked with convening an advisory panel of interested stakeholders to assist in developing regulations. The goal of this group is to address two key points from HB 206, as follows:

- 1) Development of regulations to assess the potential for **disturbance** from small solar installations to prime agricultural soils or forest land causing a **significant adverse impact**; defining what constitutes a significant adverse impact.
- 2) Development of regulations to determine **reasonable mitigation strategies** for small solar installations. This would include identifying potential mitigation strategies, determining what level of mitigation is required, and how the efficacy of mitigation efforts would be measured.

Background

Small Renewables; Permit-By-Rule Process (PBR)

DEQ manages permitting for the construction and operation of small renewable energy projects. Under Virginia law, small renewable energy projects (solar, wind, and electrical storage) are defined as projects with a maximum generation capacity of 150 megawatts. These projects utilize the PBR process, which is an accelerated permitting process by which these small renewable energy projects can obtain permits through DEQ in lieu of the traditional permitting processes through the State Corporation Commission. However, some concern has arisen recently that the existing PBR process does not adequately account for the impact of increasing land use for solar installations¹. As solar development increases, the competition posed by these projects for valuable land such as prime agricultural soils and forests also increases, as well as the overall impact on the environment and the community. HB 206 was passed to further investigate this issue and to develop regulations as necessary.

HB 206 Legislative Background

HB 206 aims to improve the existing PBR for small solar projects by requiring an assessment of the impact of a proposed project on prime agricultural soil and forest lands. Within the law, a project would be defined as having a significant adverse impact if it disturbs more than 10 acres of prime agricultural soil or 50 acres of contiguous forest lands, or if it would disturb forest lands enrolled in a project for forestry preservation pursuant to subdivision 2 of [§ 58.1-3233](#). A project below this acreage threshold *may* also be deemed to have a significant adverse impact, dependent upon site-specific variables.

Scope of Work; Limitations and Definitions

Within Virginia law, “prime agricultural soils” exist within prime farmland as is defined in [§ 3.2-205](#). These soils have a superior physical and chemical composition, leading to high production capabilities without extensive interventions (such as pesticides, fertilizer, labor, etc)². Prime agricultural soils include soils currently in use in lumber and livestock production; they do *not* include land already committed to urban development or water storage.

Forest lands are defined in [§ 10.1-1178](#), which characterizes “forest lands” as land on which forest trees are found. “Forest trees” are defined within the law as a stand of potential, immature, or mature commercial timber trees. This *may* also include shade trees of any species around cities, towns, and highways if they pose an infectious disease risk or insect risk as defined within the law to nearby timber trees or stands. For the purposes of HB 206, a parcel of land must also be considered forest land if it was forested at least two years prior to the receipt of a permit application to DEQ.

Importance and Impacts

Prime agricultural soils

Prime agricultural soils are soils that are recognized as prime farmland by the U.S. Department of Agriculture. They are ideal for the production of agricultural products such as food crops, animal feed, forage, fiber, oilseed, and nursery plants². Additionally, these soils typically require less fertilizer, fuel, pesticides, and labor than sub-prime soils. In addition to the production of food and other agricultural products, the farmlands these soils support have economic and social benefits to communities. The tradition of farming can be culturally important, as can the landscape provided by cropland, and may be utilized for agrotourism purposes. Alternative development of these soils for clean energy installations has the potential to impact these services.

Forest lands

Forest lands are an important part of Virginia's land use. Virginia was over 60% forested as of the 2016 Forest Inventory and Analysis (FIA) published by the Department of Forestry, ranking 11th nationally³. However, increasing pressure on forested lands may be leading to or lead to future deforestation. Forest lands provide a wide range of ecological services and economic products. The maintenance of forested land is also important for carbon cycling and climate regulation, as forests act as a carbon "sink"⁴.

Conflicting Goals and Challenges

Clean energy and emissions goals

In 2020, the Virginia Clean Economy Act (VCEA, [HB 1526](#)) began requiring power companies Dominion Energy Virginia and American Electric Power to begin transitioning to clean energy on a set timetable, replacing existing voluntary clean energy programs. VCEA requires that Dominion Energy transition to 100% renewable energy sources by 2045, and American Electric power transition to 100% renewable energy sources by 2050. Currently, less than 10% of Virginia's power comes from renewable energy sources⁵. In order to meet the goals set forth in the VCEA, the Commonwealth's clean energy capacity must be increased.

Preserving Virginia's natural resources and culture

The natural resources provided by prime agricultural soils and forest lands are important. Prime agricultural soils provide vital products to Virginians, which are a key part of the statewide economy. Agricultural activities are the largest private industry in the Commonwealth, provide over 300,000 jobs, and constitute around 9.5% of Virginia's gross domestic product (GDP)⁶. Beyond the purely economic benefits, Virginia's forests and farmlands are also facing

increasing pressure to provide critical services such as productive jobs, and a healthy environment (including clean air, water, and buffers against climate change)⁶.

Regulatory Advisory Panel (RAP) In-Person Meeting Schedule

The Regulatory Advisory Panel will meet on five occasions throughout the summer and early fall, on the following dates:

Meeting 1 - **Tuesday, June 28th**: Information Sharing & Work Group Formations - Richmond

Meeting 2 - **Tuesday, August 2nd**: Issues - Richmond

Meeting 3 - **Friday, August 19th**: Building consensus (Day 1) - Charlottesville

Meeting 4 - **Tuesday, August 23rd**: Building consensus (Day 2) - Richmond

Meeting 5- **Wednesday, September 28th**: Wrap Up - Charlottesville

Meeting Locations:

Meetings 1, 2 & 4: Workforce Development and Conference Center, -J. Sargeant Reynolds Community College Campus, 1651 E Parham Rd, Suite 108, Richmond, VA 23228

Meetings 3 & 5: Hillsdale Conference Center, 550 Hillsdale Drive
Charlottesville, VA 22901

Implementation Timeline for HB 206 Legislative Study

October 31st, 2022: University of Virginia's Institute for Engagement & Negotiation (IEN) Report deadline – transmission of the legislative study report.

December 1st, 2022: Submission of the report resulting from work by the advisory panel to the Governor and various committees as specified in HB 206.

December 31st, 2024: Prior to this date, any small renewable energy project for which an interconnection request application has been received and *accepted* by the RTO or electric utility shall not be subjected to new regulations under HB 206.

Glossary of Terms and Potentially Relevant Issues

Carbon sequestration

Carbon sequestration is the process of capturing and storing atmospheric carbon. This carbon capture occurs as a natural part of the carbon cycle, and many natural environments such as forest lands and the ocean act as carbon “sinks” that store carbon. Carbon sequestration can also be performed artificially. A variety of emergent technologies have carbon sequestration as their goal.

Chesapeake Bay cleanup goals [8](#)

In 2010, the EPA established the Total Maximum Daily Load (TMDL) regulations for the Chesapeake Bay, which limit the amount of nitrogen, phosphorus, and sediment that can enter the Bay to meet water quality standards. In order to meet these standards, each state in the Chesapeake Bay watershed has established its own Watershed Implementation Plan (WIP). Currently, Virginia is in Phase III of its Watershed Implementation Plan. Together, these limits on pollutants entering the Bay and the corresponding reduction plans form the Chesapeake Clean Water Blueprint. Completing these goals by 2025 would allow for the removal of the Bay from the EPA’s “dirty water” list.

Climate goals and initiatives in Virginia [9](#)

Various climate agreements and goals aim to reduce emissions of greenhouse gasses. The anthropogenic emissions of greenhouse gasses are the main driver of climate change. The Virginia Clean Economy Act mandates that the Commonwealth transition to 100% carbon-free electric energy generation by 2050. Virginia is also a member of the Regional Greenhouse Gas Initiative (RGGI, pronounced “reggie”). RGGI is a cooperative, market-based cap-and-invest program between 11 states (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, and Virginia).[10](#)

Ecosystem services [11](#)

Ecosystem services can be defined as any positive benefit that wildlife or ecosystems provide to people. These include 1) provisioning services (providing food, fresh water, fuel, fiber, and other goods), 2) regulating services (such as climate regulation, water regulation, as well as regulating diseases and pollutants), 3) supporting services (soil formation, nutrient cycling), and 4) cultural services (education, aesthetic, cultural, and recreational, as well as tourism services). Human use of these services can place pressure on these natural systems and may lead to degradation. Over time, this can damage the services on which we rely.

Endangered species

Endangered species are species that are considered at risk of extinction. A species can be endangered at either the federal or the state level.

Environmental disturbance

Environmental disturbances can be either natural or man-made. Anthropogenic disturbances include impacts from development, runoff, pollution, mining, or even tourism. The severity of these impacts may differ between ecosystems and species, depending on their resilience and tolerance to human activities. Examples of natural disturbance include things like wildfires, extreme weather, weather cycles, and drought. For example, many ecosystems in fire-prone areas such as scrublands and prairies experience routine disturbance. However, even natural disturbances may be changing and becoming more severe due to human impacts on the environment.

Greenhouse gas emission

Greenhouse gasses are released from a broad range of human activities. These gasses include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and fluorinated gases (HFCs and SF₆).

Historic and cultural resources¹²

Virginia boasts considerable history and culture. These historic and cultural resources include architectural, archaeological, and cultural resources. Examples of these resources include the Jamestown colony and battlefields from the Revolutionary and Civil wars. Some historic resources in Virginia also relate to past racial injustices and preserve the history of minorities in the Commonwealth.

Runoff and solar installations¹³

Recent changes in Virginia guidance have set stricter rules for how runoff from solar installations is dealt with. Prior to March 2022, the only portion of a solar installation that was considered an impervious surface was the bases of the panels, and not the solar panels themselves. However, new classifications now view solar panels as impervious surfaces. As approximately 56% of the Commonwealth is part of the Chesapeake Bay watershed, runoff is a serious concern, especially as extreme rainfall events become more common. However, solar developers contend that this may place a damper on development. There is also controversy about if the classification adequately reflects the environmental context of solar panels, which often reside above permeable vegetation.

Rural localities¹⁴

Rurality is challenging to define and is a multi-faceted concept that may have different definitions for individuals and organizations. According to the 2017 American Housing Survey,

88% of the state's land area contained individuals self-identifying as rural. However, this large land area only comprises 26% of the state's total population.

Soil conservation¹⁵

Soil conservation is a combination of practices used to maintain healthy soils. This includes erosion management, avoiding nutrient depletion from over-farming, and managing soil pollutants. Some examples of practices that promote healthy soils include crop rotation, the inclusion of windbreaks and buffer strips, and proper runoff management.

Wetland mitigation banking¹⁶

Wetland mitigation banking is the practice of pursuing wetland restoration, the creation of wetland habitat, or the enhancement of existing wetlands. This is typically conducted to offset unavoidable adverse impacts from new development or land use (such as agriculture). A wetland banking project would typically be located at an alternative location in a similar ecosystem near the affected wetland.

References and Resources

1. One of this year's biggest solar bills is all about forests and farms. Sarah Vogelsong (2022). The Virginia Mercury. <https://www.virginiamercury.com/2022/03/10/one-of-this-years-biggest-solar-bills-is-all-about-forests-and-farms/>
2. Prime Farmland. USDA Natural Resources Conservation Service, Virginia (Accessed 2022). https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/va/soils/surveys/?cid=nrcs142p2_018864
3. Forest Inventory and Analysis. Virginia Department of Forestry (2016). <https://dof.virginia.gov/forest-markets-sustainability/forest-inventory/>
4. Forests as carbon sinks—benefits and consequences. David Whitehead (2011). Tree Physiology, Volume 31, Issue 9. <https://academic.oup.com/treephys/article/31/9/893/1676008>
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8. The History of Chesapeake Bay Cleanup Efforts. The Chesapeake Bay Foundation. 2022. <https://www.cbf.org/how-we-save-the-bay/chesapeake-clean-water-blueprint/the-history-of-bay-cleanup-efforts.html>
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11. USDA Forest Service. More About Ecosystem Services. (2016). https://www.fs.fed.us/ecosystemservices/About_ES/
12. Protecting Historic and Cultural Resources. Virginia Conservation Network. (2020) <https://vcnva.org/wp-content/uploads/2020/09/PROTECTING-HISTORIC-AND-CULTURAL-RESOURCES.pdf>
13. Youngkin administration sets stricter runoff rules for solar farms. The Virginia Mercury. (2022). <https://www.virginiamercury.com/2022/04/18/youngkin-administration-sets-stricter-runoff-rules-for-solar-farms/>
14. Defining Rurality in Virginia. Virginia Department of Health. (2022). https://www.vdh.virginia.gov/content/uploads/sites/76/2022/01/Virginia-Rural-Health-Plan_2-Defining-Rurality.pdf

15. Soil Conservation Guide: Importance and Practices. Maryville University. (2022).
<https://online.maryville.edu/blog/soil-conservation/>
16. Conservation Compliance and Wetland Mitigation Banking. USDA Natural Resource Conservation Service. (2022).
<https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/farmland/?cid=nrseprd362686#:~:text=Wetland%20mitigation%20banking%20is%20the,used%20for%20impacts%20from%20agriculture.>





Small Renewable Energy Projects (Solar) Permit by Rule

June 28, 2022

Susan M. Tripp
Renewable Energy Permitting
Office of Air Permit Programs
March 28, 2022

Permit By Rule (PBR) History

- 2009: Legislation mandated the DEQ adopt regulations for a permit by rule for renewable energy projects
- 2010: Small Renewable Energy Projects (Wind) Permit by Rule
9VAC15-40
- 2012: Small Renewable Energy Projects (Solar) Permit by Rule
9VAC15-60
- 2013: Small Renewable Energy Projects (Combustion) Permit by Rule
9VAC15-70
- 2022: Small Renewable Energy Projects (Energy Storage) Permit by Rule
9VAC15-100

15 Components of the Solar PBR

1. Notice of Intent (NOI)
2. Local Government Approval
3. Interconnection Studies
4. Final Interconnection Agreement
5. Engineer Certification (max. generation)
6. Air Quality Analysis (pollutants avoided)
7. Cultural, Wildlife and Natural Heritage Resource Assessments
8. Mitigation Plan (if required)
9. Project Design Certification
10. Operating Plan
11. Site Map/ Context Map
12. Certification-applied for or obtained all necessary environmental permits
13. Utility Certification
14. 30-day Public Comment Period with Public Meeting
15. Permit Fee

Completeness Determination

- DEQ will make a determination within 90 days if the application is complete after consultation with:
 - Department of Historic Resources
 - Department of Wildlife Resources aka Game and Inland Fisheries
 - Department of Conservation and Recreation

Solar PBR Program Status: 6/28/2022

Permitted Projects (greater than 5 MW and disturbance zone greater than 10 acres)

• PBRs Issued:	69
• Megawatts (MW)	3,436
• Permitted Acreage	40,899
• Projects Operational	25
• MW in operation	1,138
• Projects Under Construction	10

Potential Projects

• Notices of Intent (NOI)	60
• Projected MW	2,720
• Projected NOI Acreage	30,694
• Potential Total Acreage (NOI + permitted)	71,593

Section 130 Projects (5 MW or 10 acreage or less)

- Section 130 Permits
 - 47 Projects
 - 160 MW
 - 2,063 Acres

Project Acreage by City/County (Top 20)

	County/City	Number of Apps and Permits	Megawatts	Total Acres
1				
2	Halifax County	7	444.0	4948.0
3	Pittsylvania County	7	253.2	3482.0
4	Prince George County	2	169.7	3247.0
5	Louisa County	9	269.5	3013.0
6	Frederick County	3	205.0	2468.0
7	Greensville County	3	189.0	2461.0
8	Campbell County	3	155.0	1962.0
9	Gloucester County	3	171.0	1947.0
10	Charlotte County	4	171.6	1882.0
11	Chesapeake City	3	220.0	1651.0
12	Surry County	1	150.0	1650.0
13	Richmond County	3	132.5	1640.0
14	Sussex County	2	70.0	1548.0
15	Southampton County	1	100.0	1200.0
16	Mecklenburg County	3	168.0	1053.0
17	Accomack County	3	88.4	1052.0
18	Wythe County	2	95.0	1012.0
19	Culpeper County	1	100.0	1000.0
20	Henry County	3	91.0	905.0

THE VIRGINIA CLEAN ECONOMY ACT

HB206 RAP Meeting #1 - June 28, 2022

Michael A. Skiffington

Director of Policy and Planning

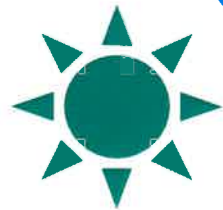
Virginia Department of Energy

State Energy Goals: Executive Order 43 (2019)



30% by 2030

Produce 30 percent of Virginia's electricity from renewable energy sources by 2030



100% by 2050

Produce 100 percent of Virginia's electricity from carbon-free sources by 2050



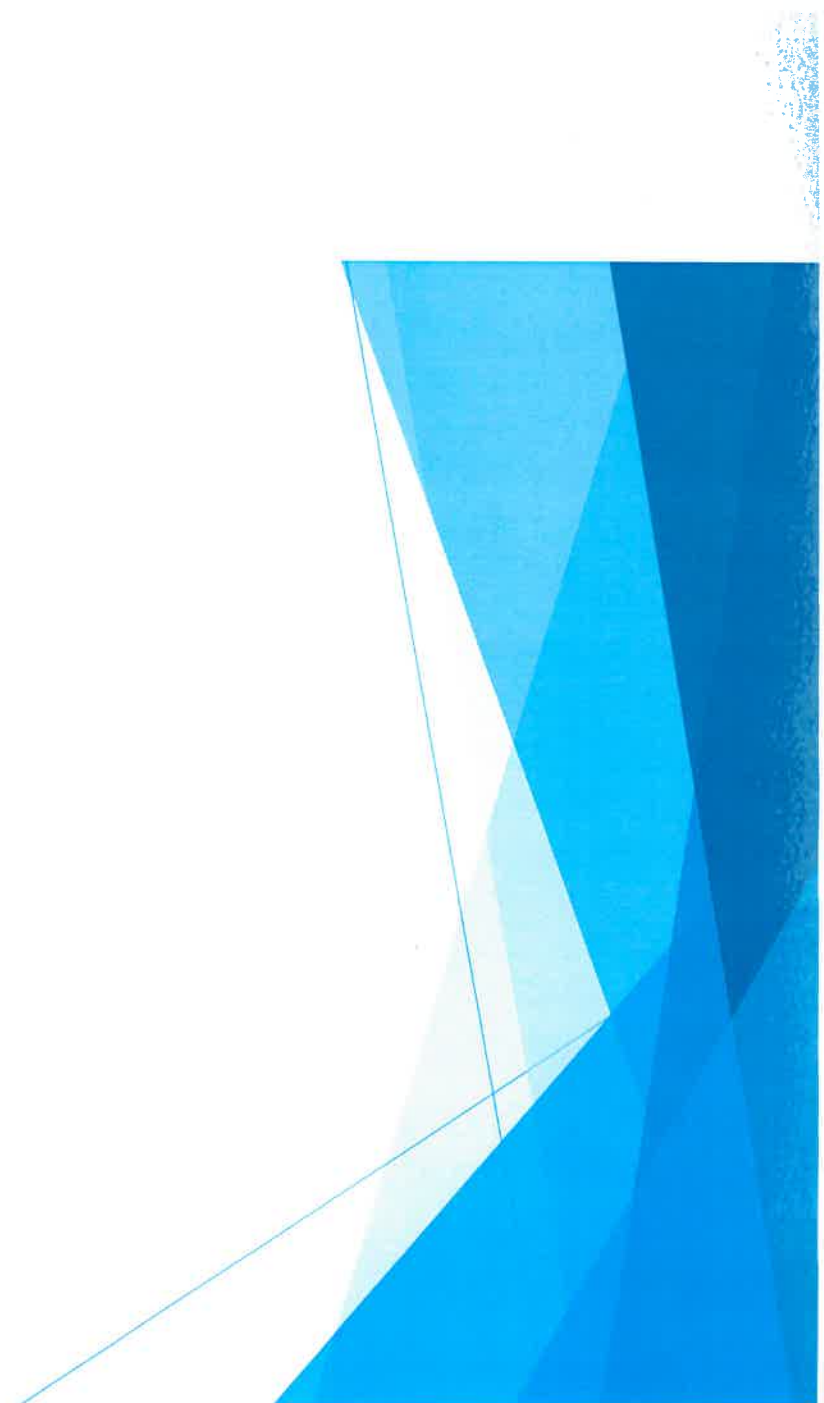
Energy Equity

Achieve energy goals in a just manner that advance social, energy, and environmental equity



THE 2020 GENERAL ASSEMBLY SESSION

- ▶ Massive changes to energy policy
 - ▶ Revenue share for local solar projects
 - ▶ Siting agreements
 - ▶ Virginia Clean Economy Act





Okay, let's go baa-ack to 2020.....

SITING AGREEMENTS

- **Authorized by HB1675 (Hodges)**
- **Allows localities to negotiate siting agreements (> 5 MW) with solar developers, including:**
 - mitigation of any impacts of the solar project
 - financial compensation to the host locality to address capital needs set out in the capital improvement plan, current fiscal budget, fiscal fund balance policy adopted by the host locality; or
 - assistance by the applicant in the deployment of broadband
- **Extended to cover energy storage projects in 2021.**

REVENUE SHARE

- **Authorized by HB1131/SB762 (Jones/Barker)**
- **Allows localities to establish by ordinance a revenue share of up to \$1,400 per megawatt for projects > 5 MW**
 - In lieu of machinery and tools tax
 - Can provide localities with more reliable revenue stream
 - Virginia Energy and U.Va created [a tool](#) to help localities decide which path is right for them.
- **Extended to cover energy storage projects in 2021.**
- **Max amount increases 10% in 2026 and every five years thereafter.**

THE VIRGINIA CLEAN ECONOMY ACT

- **Establishes a mandatory renewable portfolio standard (RPS):**
 - Dominion Energy: 40% by 2030; 100% by 2045
 - Appalachian Power: 30% by 2030; 100% by 2050
- **Establishes a mandatory energy efficiency resource standard (EERS):**
 - Dominion Energy: 5% by 2025
 - Appalachian Power: 2% by 2025
- **Deems 16,100 MW of solar and onshore wind, 5,200 MW of offshore wind, and 2,700 MW of energy storage in the public interest.**

THE VIRGINIA CLEAN ECONOMY ACT

- Directs **Appalachian Power** to petition the SCC for necessary approvals to construct, acquire, or enter into agreements to purchase the energy, capacity, and environmental attributes of 600 MW of generating capacity from solar or onshore wind by December 2030.
- Directs **Dominion** to petition the SCC for necessary approvals to construct, acquire, or enter into agreements to purchase the energy, capacity, and environmental attributes of 16,100 MW of generating capacity from solar or onshore wind by December 2035.
 - At least 200MW must be on previously developed project sites (brownfields).
- 35% of such capacity shall be from facilities owned by third parties.

THE VIRGINIA CLEAN ECONOMY ACT

- ▶ Requires the SCC to consider the social cost of carbon in any application to construct a new generating facility.
- ▶ Requires the SCC to ensure development of new energy resources or facilities does not have a disproportionate adverse impact on historically economically disadvantaged communities.
- ▶ Raises net metering caps from one to three MW for individual projects.
- ▶ Raises the collective cap from one to six percent of the previous year's adjusted demand forecast.

THE VIRGINIA CLEAN ECONOMY ACT

- ▶ Establishes a deficiency payments fund to be administered by Virginia Energy if utilities do not comply with RPS
 - ▶ 50% of revenue directed to job training programs in historically economically disadvantaged communities (HEDC)
 - ▶ 16% directed to EE measures for public facilities
 - ▶ 30% directed to renewable energy programs located in HEDC
 - ▶ 4% for admin costs
- ▶ Establishes a Percentage of Income Payment program for low income customers.
- ▶ Declares that it is the policy of the Commonwealth that the SCC, Virginia Energy, EJ Council in the development of energy and job training programs, shall consider whether and how those programs benefit local workers, HEDC, and individuals in the coalfields.

THE VIRGINIA CLEAN ECONOMY ACT

- ▶ Directed SNHR and SOCT to report by January 1, 2022, any recommendations on how to achieve 100 percent carbon-free electric energy generation by 2045 at least cost for ratepayers.
- ▶ Such report shall include a recommendation on whether the GA should permanently repeal the ability to obtain a certificate of public convenience and necessity for any electric generating unit that emits carbon.
- ▶ The report recommended that the GA not repeal the ability to obtain a CPCN at this time.
- ▶ By January 1, 2023, Virginia Energy must issue initial triennial report as to whether the VCEA imposes a disproportionate burden on HEDC.

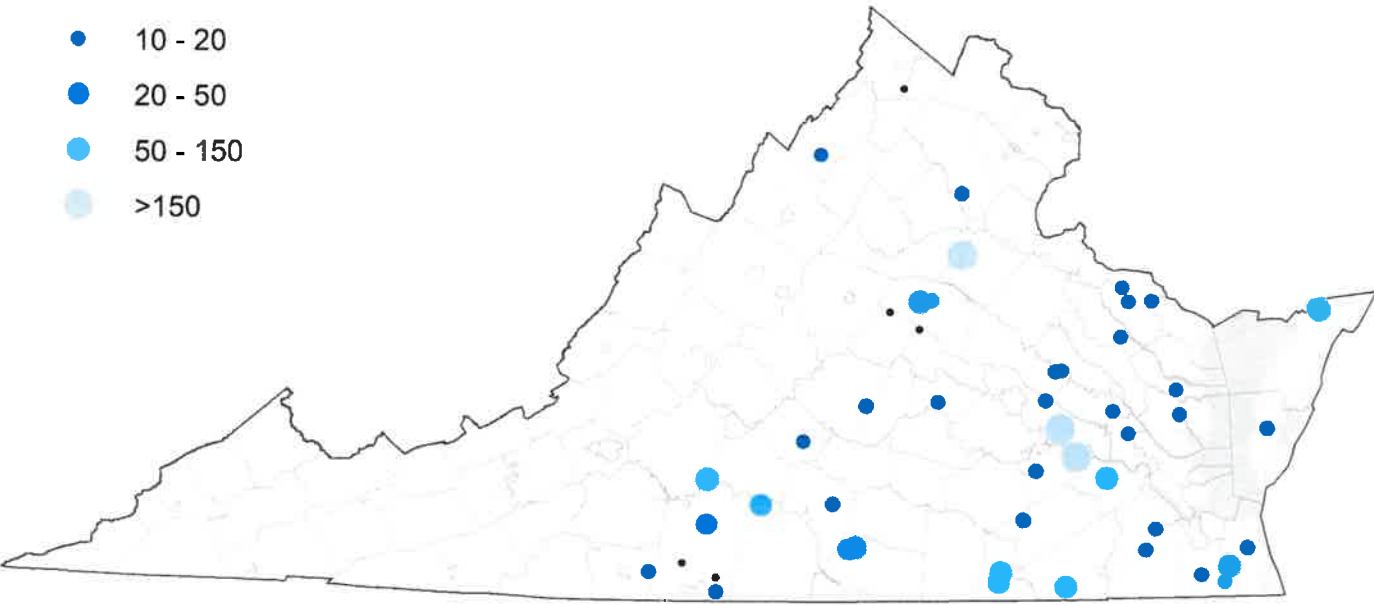
THE VIRGINIA CLEAN ECONOMY ACT SOLAR PROJECTS BY THE NUMBERS

- ▶ **For large-scale solar (5 MW or greater) as of May 2022:**
- ▶ *52 active solar facilities that have been successfully constructed and producing electricity*
- ▶ *Total installed MW nameplate capacity = 2,667 megawatts*
- ▶ *11 of 52 have been permitted by SCC*
- ▶ *41 of 52 have been permitted by DEQ*
- ▶ *36 of 52 received interconnection approval from PJM*

Active Virginia Solar Facilities (52)*

Nameplate Capacity (MW)

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



* Active Facilities as of May 1, 2022

Data Compiled by Virginia Energy
Sources: PJM, EIA, DEQ, SCC



Annual Net Generation from Solar

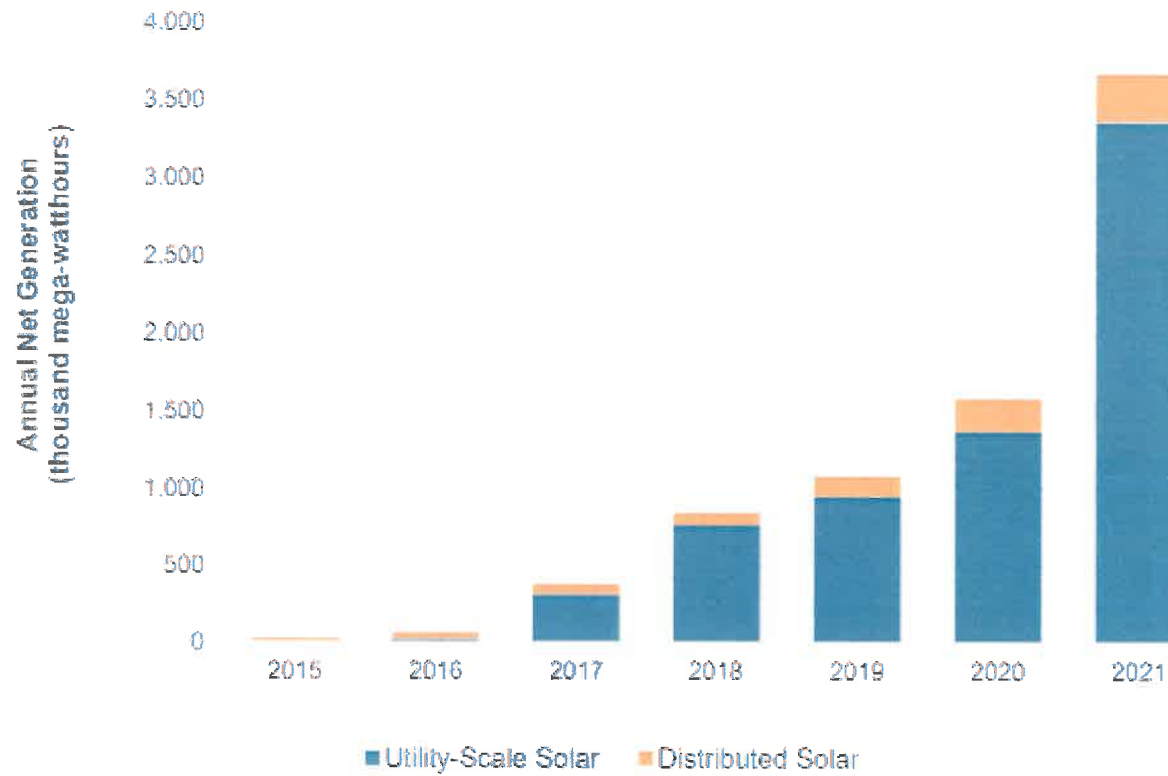
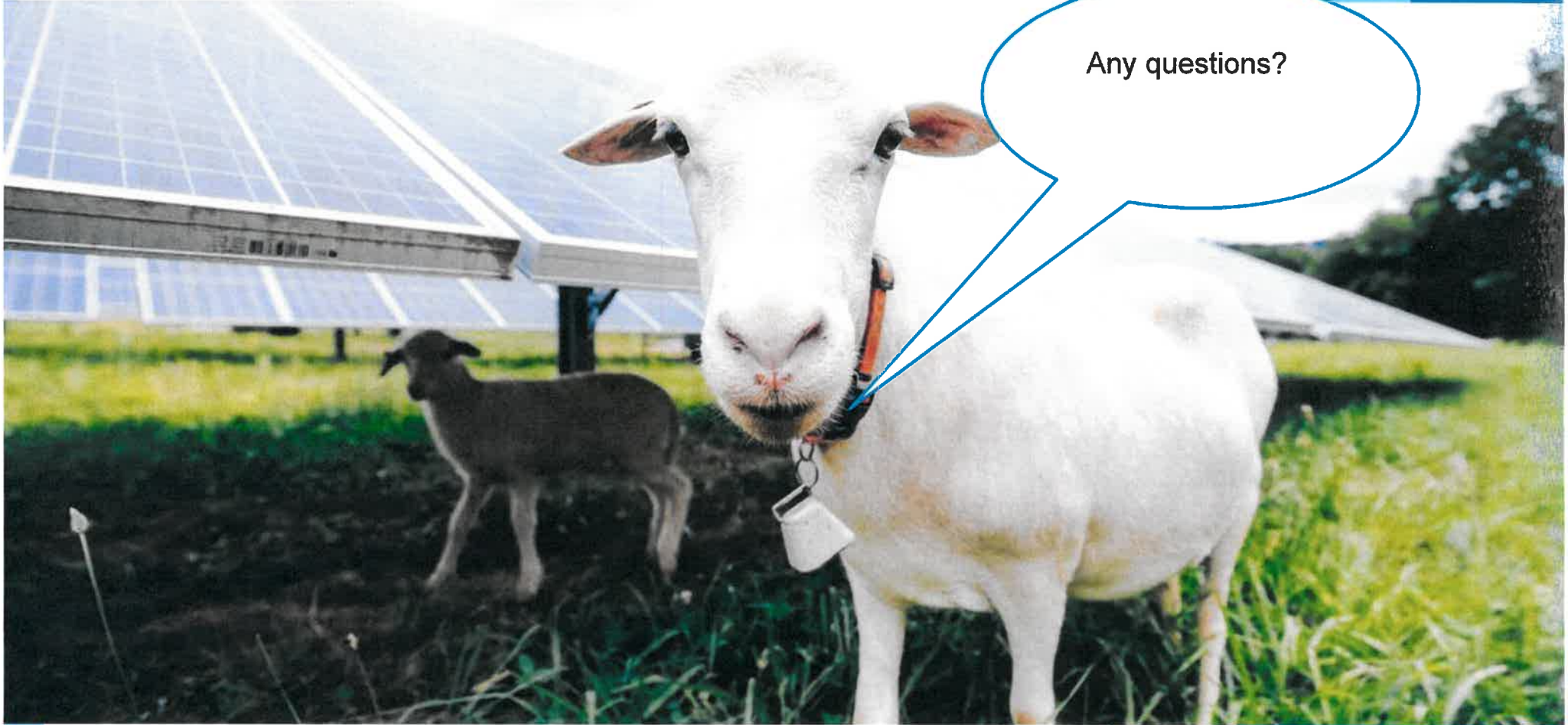


Figure 4. Annual Net Generation from Solar in Virginia
Source: U.S. EIA



Any questions?

ADDITIONAL RESOURCES

- ▶ [Virginia Solar Survey](#)
- ▶ [Decarbonization Modeling Report](#)
- ▶ [Virginia SolTax Model](#)
- ▶ [SolSmart Program](#)



Virginia Department of Forestry Solar Locating and Impact

HB206 Meeting
June 28, 2022



The Source for My Information

Utility-Scale Solar in Virginia An Analysis of Land Use And Development Trends

**Utility-Scale Solar in Virginia: An Analysis of Land Use and
Development Trends**

**A Capstone Professional Plan
Prepared By:**

Aaron Berryhill
Master of Urban and Regional Planning
L. Douglas Wilder School of Government & Public Affairs
Virginia Commonwealth University



Prepared For:

Virginia Department of Mines, Minerals, and Energy





Our Opinion

- Renewable energy is a good thing
- This is a rapidly changing environment
- Balance is good, right place, right use
- Deforestation is bad. Impacts can be exponential.
- We must begin to evaluate impacts equally, what is the real cost?



How Many Solar Projects Are There?

- In 2015, No Utility Scale Solar projects (5MW min)
 - ◆ 3,000 distributed solar installations
- In 2021, there were 51 active, Utility Scale Solar Facilities (in 35 localities).
 - ◆ 26,000 distributed solar installations
- 61% of the large scale solar facilities have been placed in southside or central Virginia.



Why Has Solar Grown?

- What is the driving force? – 2020’s Virginia’s Clean Economy Act. (HB1526, SB851) – technology & decreasing costs, land \$
 - ◆ Sunlight or onshore wind
 - ◆ VCEA mandates 16,100 Megawatts from solar, onshore wind
 - ◆ Net Zero Carbon by 2050 (Dominion “Carbon Free” by 2045, AEP 2050)
 - ◆ Starting in 2025, at least 75 percent of all of the sources that energy suppliers count toward their renewable goal have to be associated with facilities in Virginia.
 - ◆ forces the retirement of all natural gas plants by 2045/2050 all coal fired plants 2024
 - ◆ imposes penalties on energy producers that fail to meet guidelines and requires part of the proceeds of such penalties to fund job training and renewable energy programs in historically disadvantaged communities.
 - ◆ Virginia’s largest energy companies to construct or acquire more than 3,100 MW of energy storage capacity



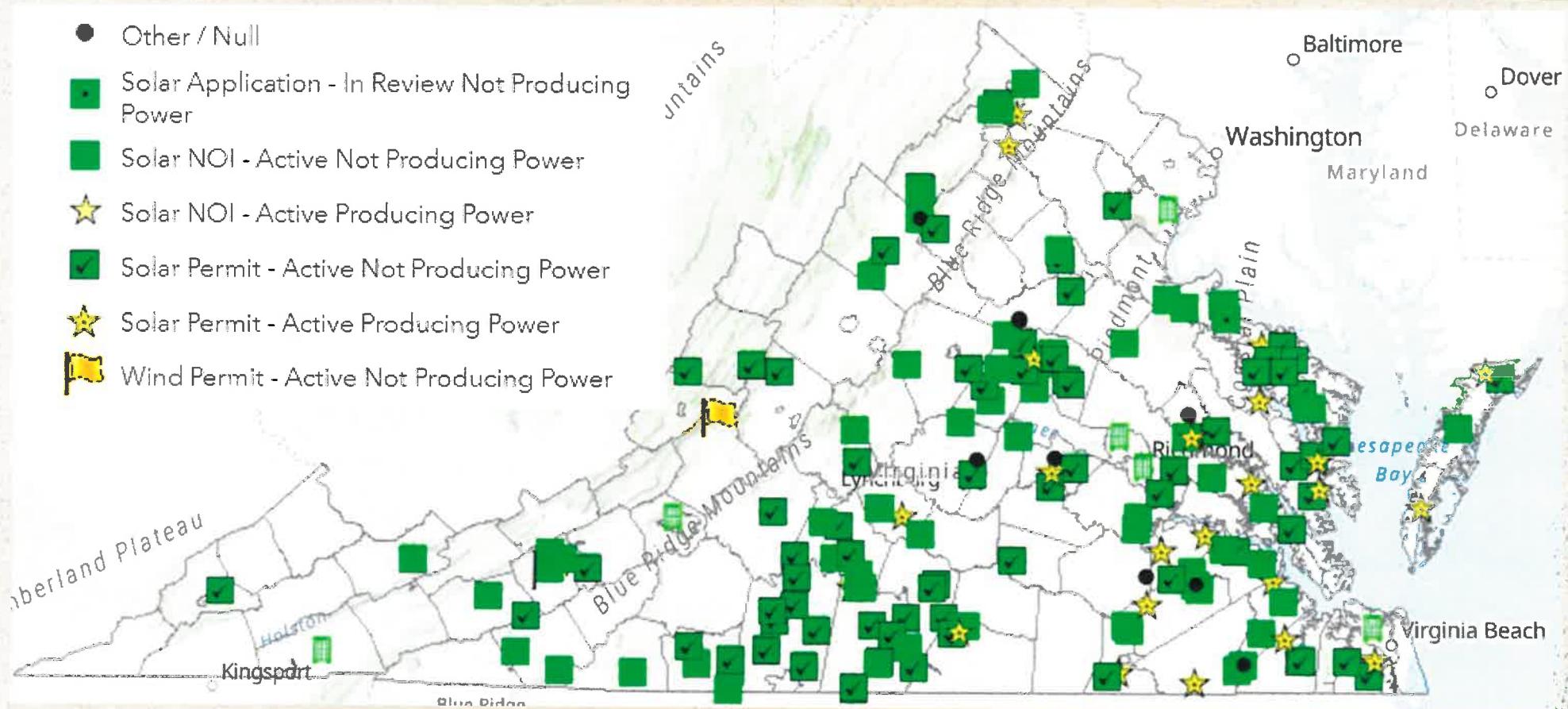
Key Facts and Figures

- In 2010 solar production was 10,000 megawatts. In 2020 the U.S. was approaching 100,000 megawatts of installed solar capacity.
- 1 Megawatt hour = 200 homes (on average)
- Virginia ranks 4th in the nation in solar generating capacity (behind NC #3, California and Texas)
- In 2020 only 5.6% of net electricity generation in Virginia came from non-hydroelectric renewable sources like wind and solar. Largest renewable sector biomass.
- Currently, 17.7% of the Nations electricity is from renewable sources.
- s-Power Pleinmont Solar Facility (Spotsylvania Solar Energy Center) in Spotsylvania County is largest in VA. Expected capacity is 500 MW, 1.8 million panels, and 6,350 acres, the project is the fifth largest in the United States and the largest solar project east of the Rockies.



Where Are These Being Located?

- Other / Null
- Solar Application - In Review Not Producing Power
- Solar NOI - Active Not Producing Power
- ★ Solar NOI - Active Producing Power
- Solar Permit - Active Not Producing Power
- ★ Solar Permit - Active Producing Power
- 🚩 Wind Permit - Active Not Producing Power

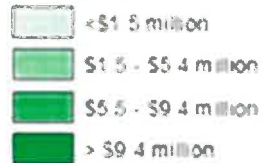




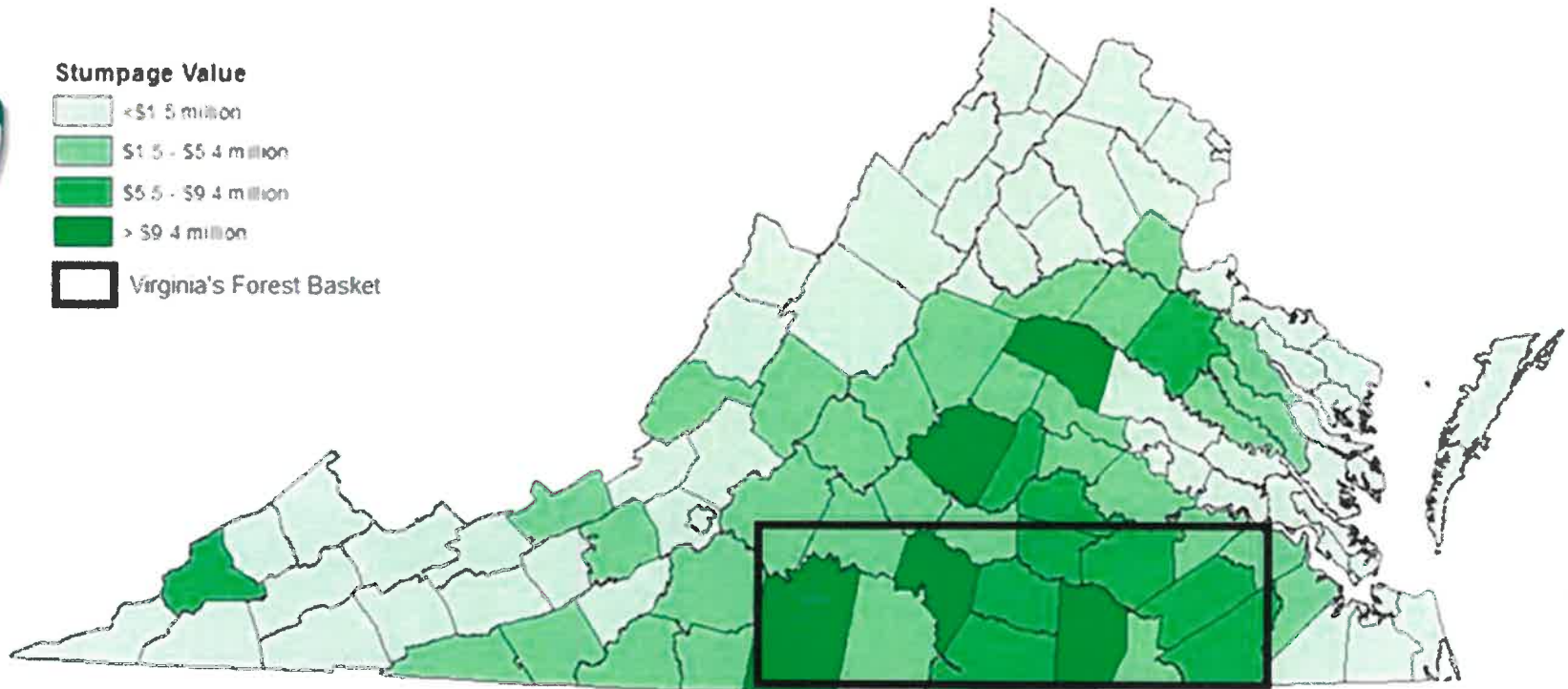
Virginia's Wood Basket



Stumpage Value



 Virginia's Forest Basket





Geography and Population

Table 2. *Solar Facilities in Virginia Regions*

Region	Total Facilities
Central	10
West Central	1
Southside	11
Hampton Roads	7
Eastern	6
Southwest	0
Northern	3
Valley	0

Table 3. *Solar Facilities by Population Size of Locality*

Locality Population Size	Total Facilities
Greater than 100,000	5
75,000 to 100,000	1
50,000 to 75,000	4
30,000 to 50,000	7
15,000 to 30,000	11
Less than 15,000	10



Potential Level of Impact

- 16,100 MW (VCEA)
 - ◆ 9 acres per MW
 - ◆ $9 \text{ acres} * 16,100 \text{ MW} = 144,900 \text{ acres}$.
- 2021 – 38 active solar projects (13,842ac)
 - ◆ 62.9% of acreage used was forested land cover.
 - ◆ 31.9% Cropland and pasture.
 - ◆ 5.2% wetland, barren, herbaceous etc.



Land Cover Impacts

Land Cover Classification	Total Acres	Total Percent	Facility Average
<i>Forest</i>	8,035.1	58.1%	38.0%
<i>Cropland</i>	3,443.8	24.9%	45.9%
<i>Pasture</i>	966.2	7.0%	5.7%
<i>Harvested/Disturbed</i>	471.2	3.4%	3.0%
<i>NWI/Other</i>	327.6	2.4%	0.7%
<i>Shrub/Scrub</i>	231.5	1.7%	0.6%
<i>Tree</i>	194.6	1.4%	2.6%
<i>Turf/Grass</i>	134.0	1.0%	3.1%
<i>Impervious</i>	30.9	0.2%	0.5%
<i>Open Water</i>	6.7	0.0%	0.1%
<i>Barren</i>	0.0	0.0%	0.0%



How Big Are VA's Facilities?

Generating Capacity	Number of Active Facilities	Share of Total Acreage	Share of Total Capacity
<i>5-20 MW</i>	29	25.1%	31.3%
<i>20-50 MW</i>	0	0.0%	0.0%
<i>50-75 MW</i>	1	2.4%	3.3%
<i>75-100 MW</i>	6	34.6%	35.8%
<i>>100 MW</i>	2	37.9%	29.5%



Forests at a Glance

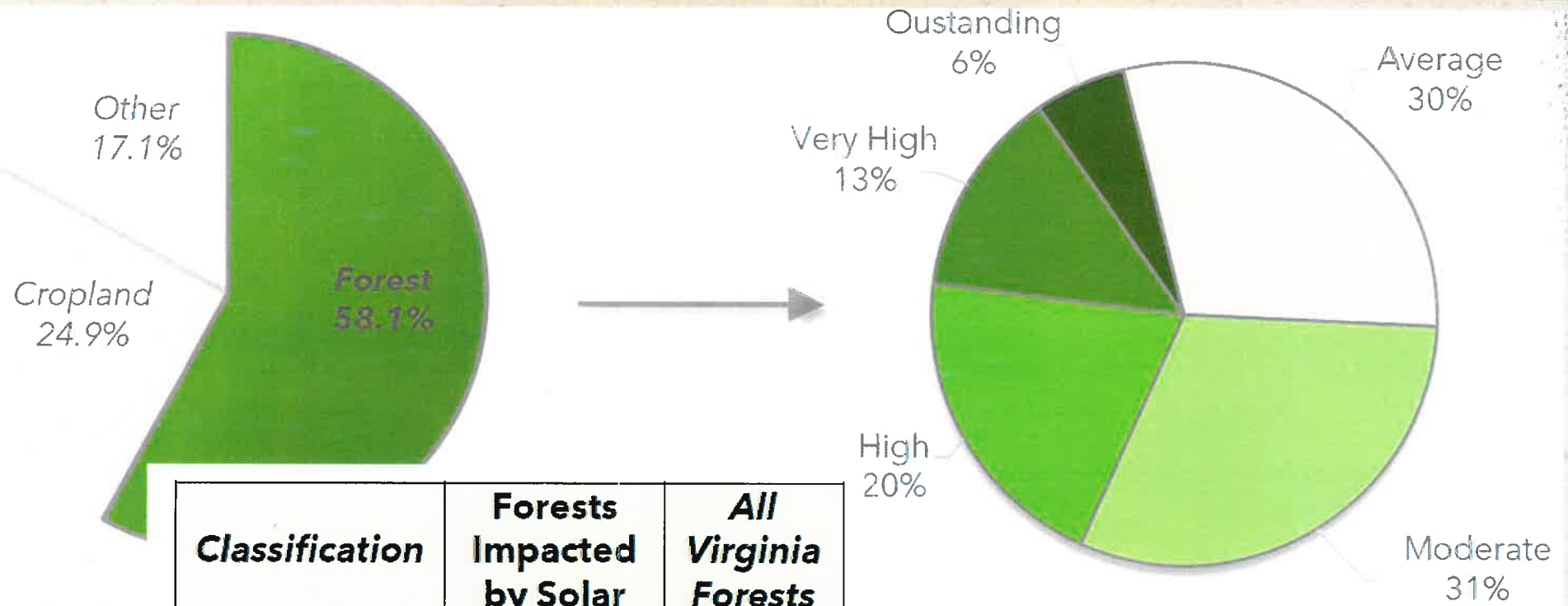
Virginia Forest Cover *62% Forest*



2011 National Land Cover Dataset (NLCD)



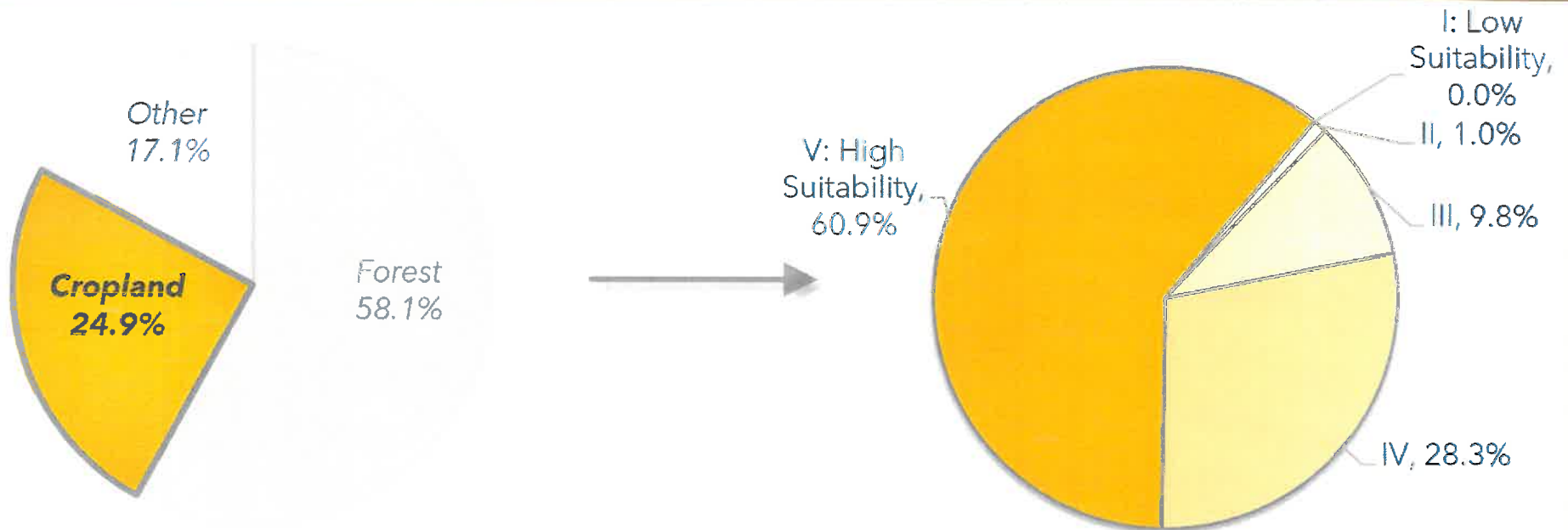
Are All Forests Equal?



Classification	Forests Impacted by Solar	All Virginia Forests
Average	29.6%	19.5%
Moderate	31.0%	20.5%
High	20.3%	20.7%
Very High	13.3%	19.4%
Outstanding	5.9%	19.8%



Agriculture Impacts

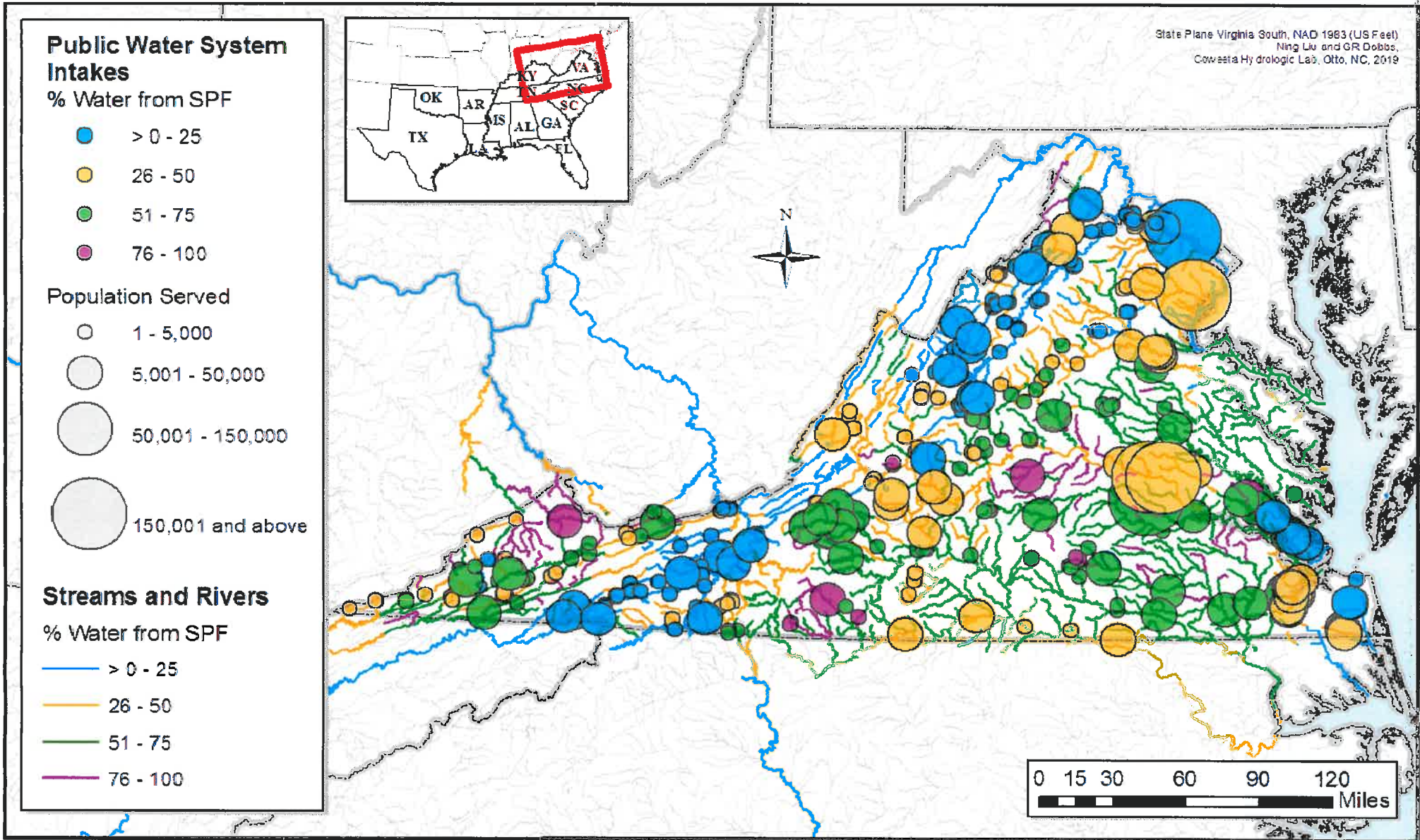


Classification	Croplands Impacted by Solar	All Virginia Croplands
Class I: Low Suitability	0.0%	1.5%
Class II	1.0%	11.3%
Class III	9.8%	11.8%
Class IV	28.3%	39.3%
Class V: High Suitability	60.9%	36.1%

Soil Quality Score	Croplands Used for Solar
Low: 0-20	0.7%
20-40	3.4%
40-60	18.2%
60-80	20.6%
High: 80-100	57.0%

State of Virginia

Streams and Intrastate Public Water System Intakes Receiving Water from Virginia State and Private Forests





Questions?

Terry Lasher
Assistant State Forester
terry.lasher@dof.virginia.gov
434-220-9095

VDACS BACKGROUND

- ✘ Established in 1877

- ✘ Administers 60 laws and 66 regulations

- ✘ 539 FTEs; numerous seasonal workers

- ✘ Commissioner's Office and four divisions
 - + Consumer Protection
 - + Animal and Food Industry Services
 - + Marketing
 - + Commodity Services



AGENCY MISSION

- ✘ Promote the economic growth and development of Virginia agriculture, provide consumer protection, and encourage environmental stewardship



*VIRGINIA DEPARTMENT
OF AGRICULTURE AND
CONSUMER SERVICES*

STRATEGIC GOALS

- ✘ **Goal #1:** Enhance opportunities for the growth, profitability, diversity, and continued viability of the Virginia agriculture industry
- ✘ **Goal #2:** Enhance public health by ensuring the food supply is safe and wholesome
- ✘ **Goal #3:** Provide agricultural and consumer protection services that support economic growth, meet consumer needs, and encourage environmental stewardship
- ✘ **Goal #4:** Enhance agency services and productivity through new technology, e-government applications, work processes and procedures, and training
- ✘ **Goal #5:** Provide services that prevent , mitigate, and facilitate recovery from agricultural infestations, animal disease events, foodborne illness outbreaks, and other natural and manmade disasters



VDACS PERSPECTIVE ON SOLAR FARMS

- Understands the potential for positive impacts
 - Provide additional rental income opportunities for farm owners
 - Provide alternative to selling the land for non-farming uses
- Understands the potential for negative impacts
 - Limit the land available for most farming activities (may still be available for grazing)
 - Increase the cost for farmers trying to rent or buy land
- Ultimately, VDACS's role in DEQ's Regulatory Advisory Panel is to provide technical assistance in support of VDACS's mission and strategic goals





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

W. Lee Daniels
T.B. Hutcheson Jr. Professor
School of Plant & Environmental Sciences
185 Ag Quad Lane, 0404
Virginia Tech, Blacksburg, VA 24061
wdaniels@vt.edu; www.landrehab.org

Memorandum

Date: July 18, 2022

To: Martha Moore, Virginia Farm Bureau; HB 206 Working Group 1 Member

From: W. Lee Daniels, T.B. Hutcheson Jr. Professor

C: John Ignosh, Virginia Tech Extension, Harrisonburg

Attach: Daniels et al. 2018 Prime Farmland Reclamation Article

I have prepared this memo in response to your email of July 14 where you posed a number of questions regarding several soil quality issues related to development of existing agricultural lands into solar facilities. To my knowledge, there have been no published field studies in Virginia or the surrounding region to date that specifically address actual site impacts of solar development projects. However, I have been actively working on rehabilitation and remediation of lands disturbed by mining, road building, and construction for over 40 years at Virginia Tech. One example of a directly related study on rehabilitation of prime farmlands disturbed by mineral sands mining is attached here that includes 14 years of fully replicated and statistically analyzed field scale results. More details on the range of our related research work efforts and publications can be found at <https://landrehab.org/>.

Each of your original questions appears below in ***bold font/italics*** followed by my answers based on my regional experience with soil reconstruction and rehabilitation following disturbance. I assume that your Working Group (#1) is relying on the NRCS definition of “prime farmland” for these queries. It is also important to point out that solar development sites undergo a wide range of “disturbance” based on their topography and other site-specific conditions which can be as low as ~10% or include the majority of the site where topsoil is removed and/or extensive grading is required to level panel arrays and other infrastructure.

I have made an effort here to keep my answers to your queries direct and succinct, but I have also included multiple related points for some of them. John Ignosh (copied here) also interacted with me for this reply. I will be happy to provide much more detailed answers and appropriate publications, references and and/or links if you need any more documentation related to my answers below.

Question 1: *When developing the solar utility facility, there are vegetative ground cover under the panels and in buffers and in areas designated as part of the stormwater requirements. Is there a type of vegetative cover that helps preserve the prime agricultural soils characteristics?*

- The primary objective here must be to maintain a complete vegetative cover to control erosion over time. This will almost always involve perennial herbaceous species and there is a wide array of options for this. Secondary important issues include inclusion of pollinator plants where appropriate, etc.
- The chosen vegetative cover will need to be compatible with regular maintenance/mowing needs around the panel arrays and other infrastructure. In areas (buffers) that don't require frequent mowing, more alternatives including woody shrubs could also be viable on some sites.
- Assuming the site is maintained in solar production for 20 to 30 years, the choice of vegetation per se will have little impact on long term soil quality vs. the issues raised below. However, this assumes that the cover can readily root throughout at least the topsoil (A horizon) zone.

Question 2: What is the impact that microclimates have on prime ag soil chemistry?

- While there will certainly be a difference in both soil temperature and moisture content under established panels vs. areas between rows or in buffers, the long term impacts relative to return of the site to agricultural production will be minimal relative to the other issues discussed below.
- Shaded areas under panels will be cooler over time which would aid in the maintenance of soil organic matter, assuming they remain well vegetated. However, they may also be drier, which would tend to counteract the temperature effects.
- This comparison will also be complicated by the differences in overall vegetation growth and rooting between the areas beneath panels vs. in buffers etc. If the areas under panels do not support the same level of overall vegetation cover and production as open areas, that will also influence soil properties over the decades of active management.
- Regardless, the overall effects of soil disturbance (cut/fill) and site fertilization and liming practices will have a dominating influence on soil chemical properties over time rather than local microclimate. In particular, where subsoil (B horizon clays) are in the final reconstructed surface, soil pH and essential nutrients (particularly P) will be very low and will need appropriate fertilization/liming both initially and over time.

Question 3: What happens to the prime ag soil characteristics if you stockpile the topsoil and reapply?

- First of all, it is important to point out that the productivity of a prime farmland soil is a combined function of its topsoil (A horizon) *and* subsoil (B horizon) characteristics. In combination, they must meet the overall rooting depth and water holding requirements of the intended cropping system.
- When topsoil is removed from a disturbed site and stockpiled, it typically loses much of its active microbial biomass over a time period of months to years. Associated with this, we usually see a slow decline in organic matter content and usually the pH drops as well.
- Whenever possible, topsoil stockpiles should be no higher than 3-4 to feet with sideslopes of 2:1 or shallower and maintained in deep-rooted vegetation. It is also important to keep the base of the stockpile well-drained (e.g. unsaturated).

Question 4: Does soil retain its prime ag soil characteristics if it is compacted and then decompacted?

- Soil compaction is by far and away the most common soil limitation found on all disturbed sites. This includes mined lands, road corridors, construction sites, home development sites, etc.
- The extent to which the soil at a given solar site becomes excessively compacted will be highly variable and could range widely across the site. Some areas like external buffers may experience very little soil compaction that needs remediation. Others will be highly, or completely, disturbed and need variable remediation efforts as described below.
- Soil compaction is best evaluated via measuring soil bulk density (g/cm^3) which directly limits plant rooting and water movement/drainage when found at values $> \sim 1.80$ for sandy soils and $> \sim 1.45$ for clayey soils. However, rooting and water movement are also affected positively by the retention or redevelopment of soil structure (aggregates) in both the topsoil and subsoil layers.
- Most construction activities that involve cut/fill, site grading and removal and redistribution of topsoil will lead to soil compaction to some extent that should be evaluated and then remediated if/when bulk density exceeds critical values.
- If the topsoil layer is compacted above critical thresholds, revegetation efforts will generally fail or you will observe initial success with plant establishment that then “burns out” once rainfall becomes limited.
- High surface soil bulk density also limits infiltration rates and therefore increases local runoff rates. This should be accounted for in stormwater modeling efforts.
- Remediation (decompaction) of high bulk density soils needs to be implemented down to the projected desired rooting depth for the intended cropping or vegetation management system. For example, deep rooted crops like corn require 30” or more of available rooting depth to achieve prime farmland levels of productivity. Hayland/pasture systems require less rooting depth, but still need to exploit the upper subsoil layers.
- Overly compacted subsoils and topsoil layers (horizons) need to be remediated via appropriate tillage practices and this often requires two different tillage events.
- While some limited “loosening” of compacted topsoil layers will occur due to plant rooting and seasonal freeze/thaw and wet/dry cycles, this will not occur any deeper than 4 to 6 inches in our region.
- There is a range of tillage implements available for loosening highly compacted topsoil and subsoil layers. However, many of the larger implements we commonly employ on mining sites such as deep shank rippers and/or chisel plows will be of limited utility on solar sites once the panels and other infrastructure are in place. Smaller implements (e.g. roto-tillers, air knives or single shank rippers) would need to be utilized.
- Soil moisture content has a profound influence on the effectiveness of any tillage regime. If the soil is too dry, the implements will pull up large chunks of soil rather than shattering them and fuel use increases. If the soil is too wet (particularly in the subsoil), ripper shanks simply pass through the soil without shattering it. Thus the timing of any “decompacting efforts” can be critical
- There are no “magic bullets” for using chemical amendments (e.g. gypsum) or deep rooted plant species to overcome excessive compaction.

- Our experience across a range of prime farmland soil reconstruction sites (following mining) indicates that even with full soil profile reconstruction, deep ripping of subsoils, frequent tillage of returned topsoils, and correct use of lime and fertilizers based on soil testing, we should expect an initial ~25% reduction in productivity. In certain years with poor weather, yield losses can be even higher. However, we also see indications that over longer periods of time (e.g. 5 to 10 years), post reclamation productivity may approach 90%, particularly if internal soil drainage is restored. Similar results have been obtained by a range of researchers reclaiming prime farmland soils in the upper midwestern USA.

I hope this memo answers your direct questions and I will be happy to follow-up with you and your Working Group as requested and needed.

Large-Scale Solar Site Development & Legacy Soil Productivity Considerations

W. Lee Daniels 540-231-7175; wdaniels@vt.edu

School of Plant & Environmental Sciences



<https://landrehab.org/>

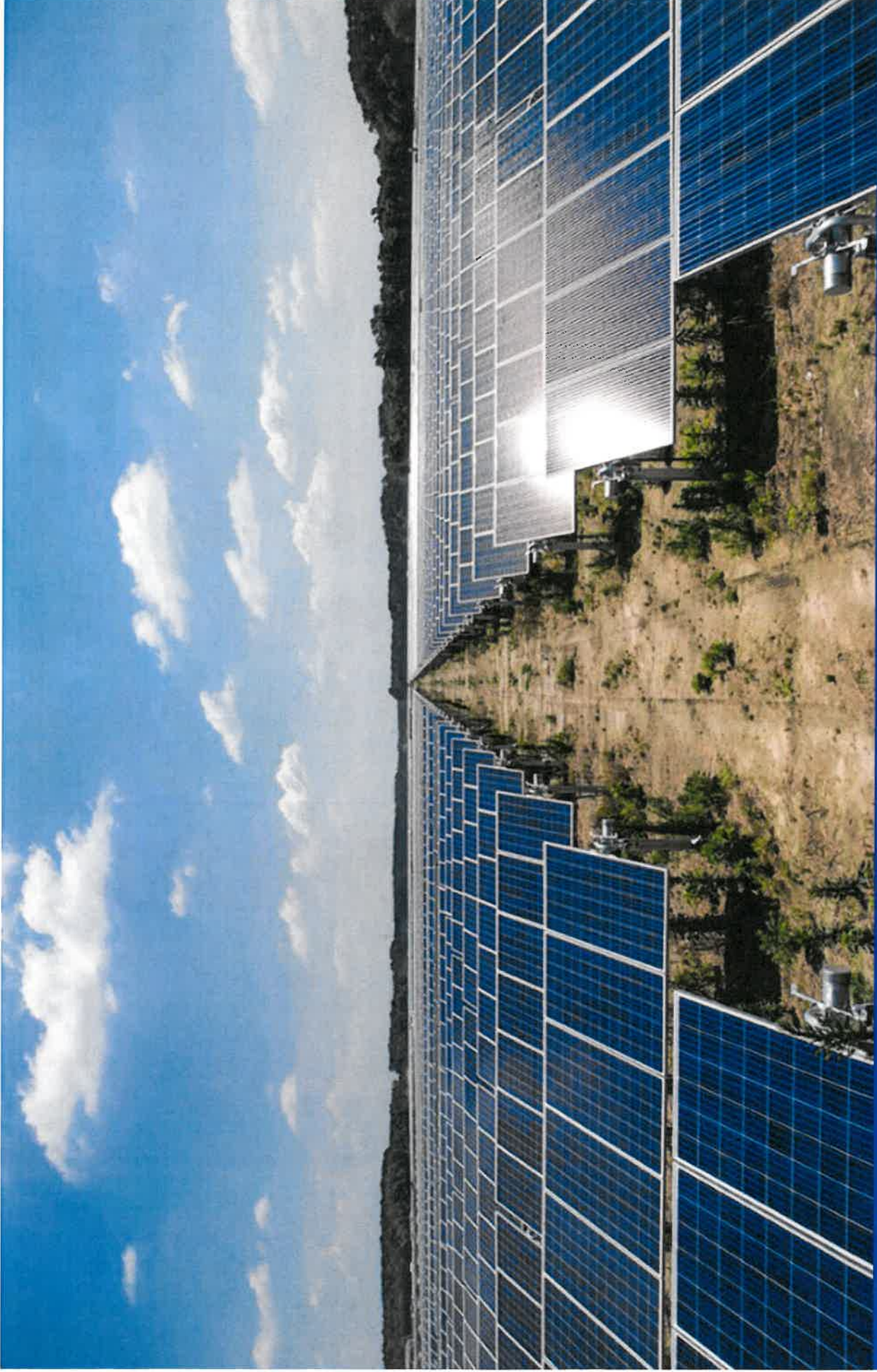


Image from Dominion published by Virginia Mercury – Louisa County

Site Development Challenges

- Soil disturbance can vary widely from < 10% to regrading of the majority of the site.
- Major disturbances are roads, trenches for internal cable distributions, regrading to level panel arrays, stormwater basins, local pad compaction for structural support, etc.
- Acidic subsoil materials left or exposed the at surface need heavy liming and extra P applications.
- Initial/construction E&S controls obviously essential
- Must avoid acid forming materials (ASS) at all costs
- Every site x design x disturbance impact is unique!

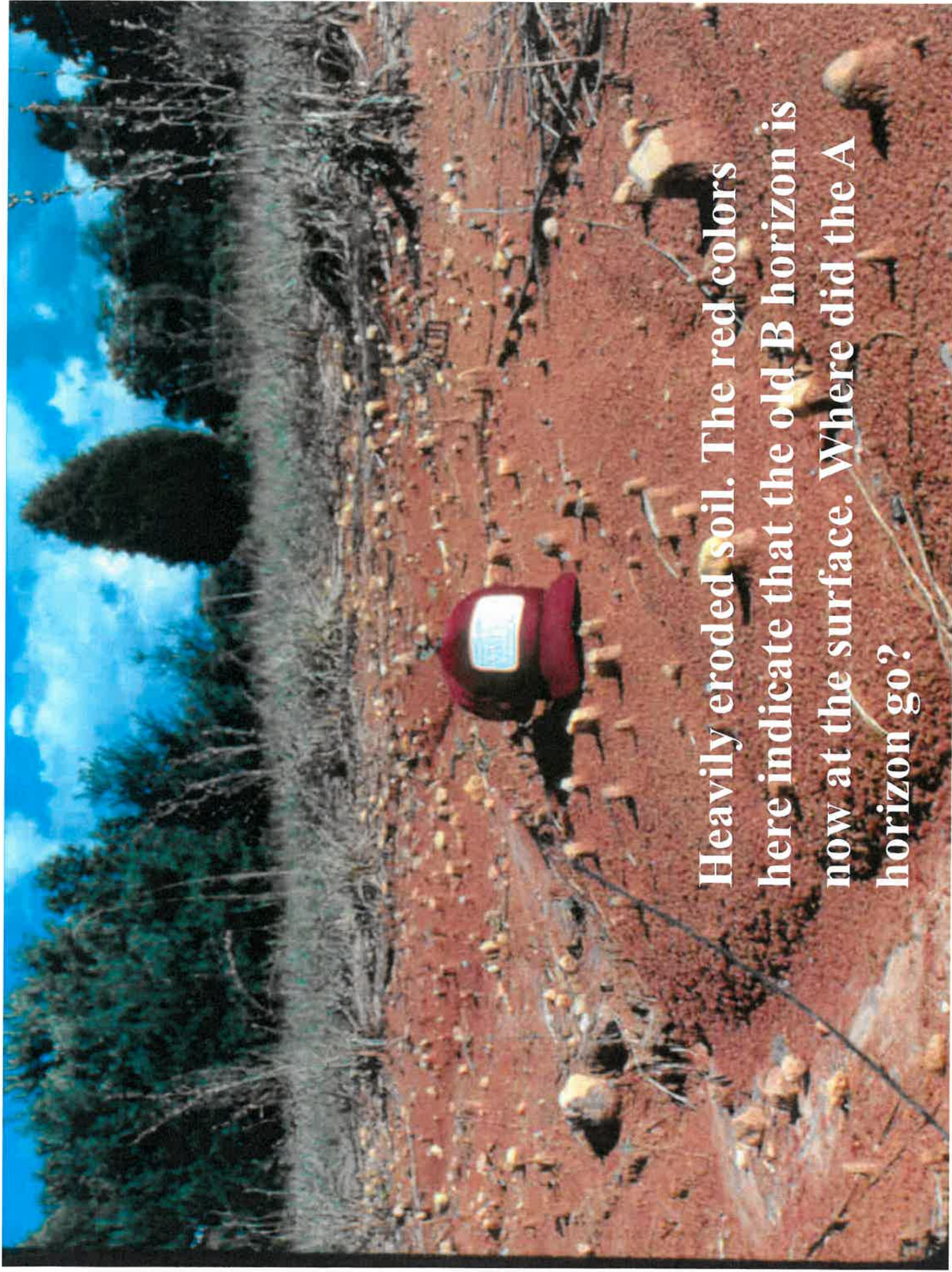
Well-vegetated relatively young site. To be clear, *I don't question our overall ability to successfully stabilize and revegetate these facilities!* Photo courtesy of John Ignosh



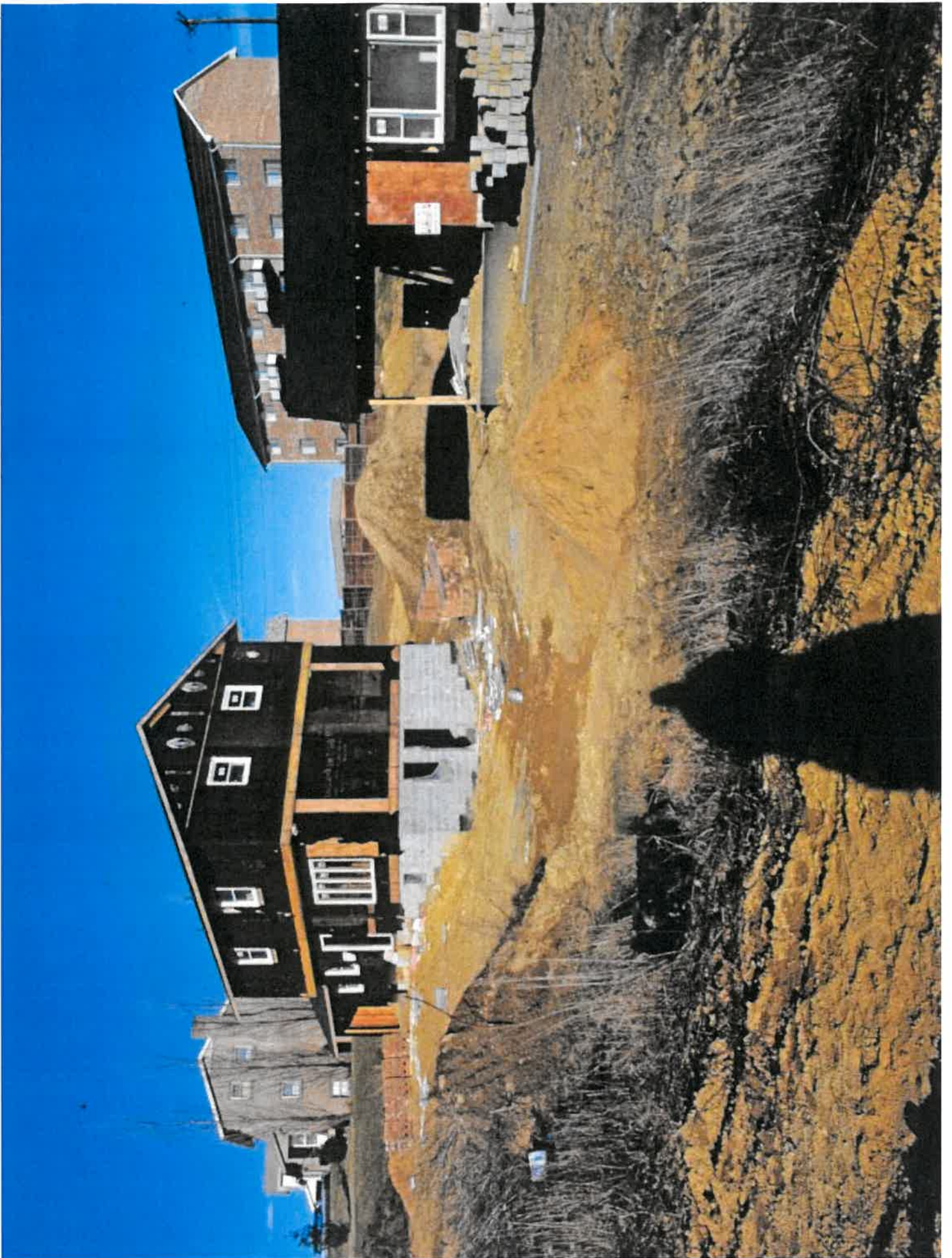
However, many sites will be extensively disturbed with large exposures of eroded or exhumed subsoil materials.



Image from Soilworks.com; marketer of soil stabilization/dust control products.



Heavily eroded soil. The red colors here indicate that the old B horizon is now at the surface. Where did the A horizon go?





12.15.2003

Major Issues with Disturbed Soils

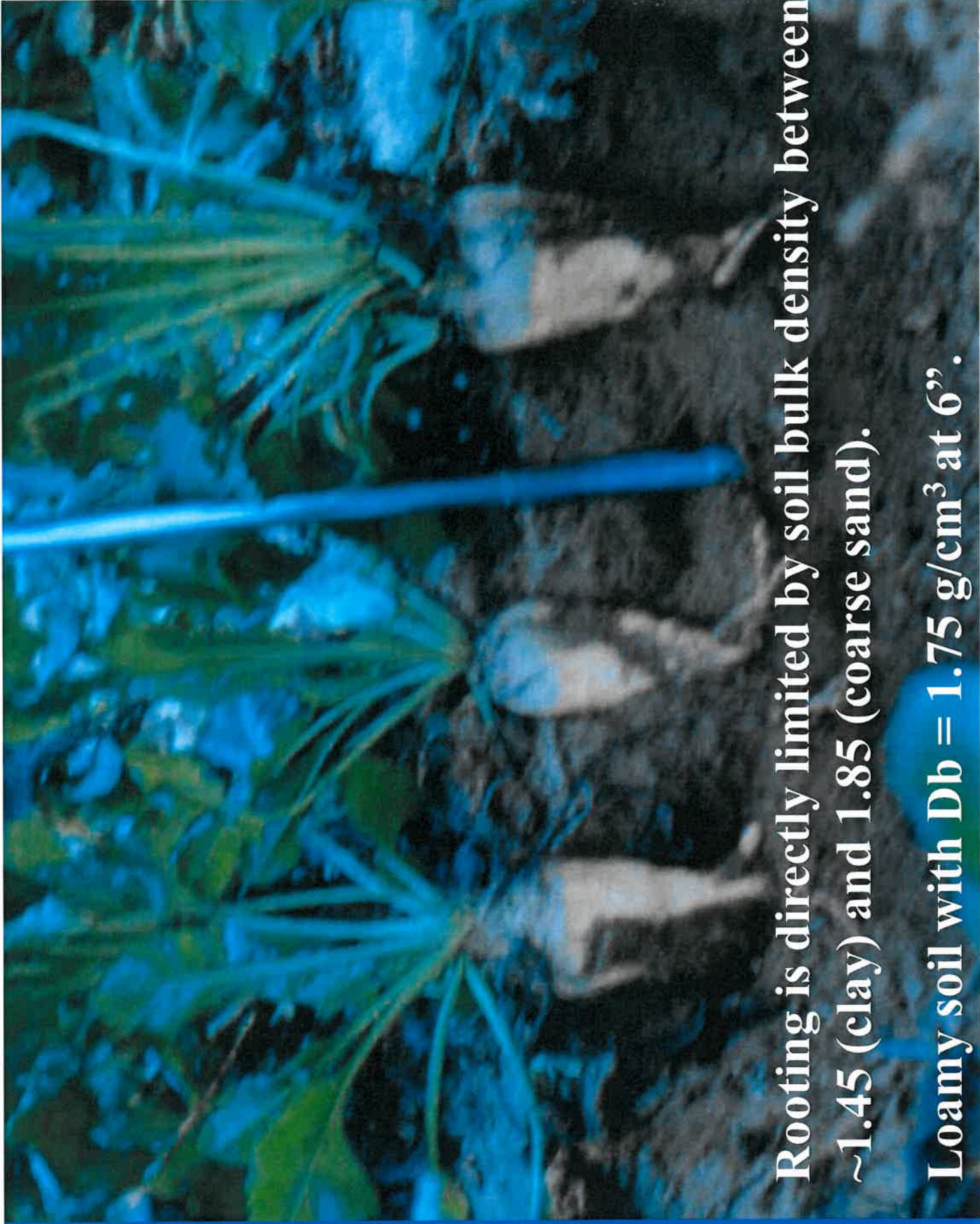
- Compaction is the dominant long term soil/plant management issue in urban soils, VDOT & utility corridors, mining reclamation, created wetlands, etc.
- Cuts and fills on a site are fundamentally different in management & remediation needs:
 - A. **Cuts** often have topsoil removed or highly variable properties with depth. May hit acid sulfate soil (ASS) materials in some areas.
 - B. **Fills** are commonly highly compacted and “layered” with dissimilar materials.
 - C. **Both** are commonly acidic and very low in plant-available P.
 - D. On a given site, depending on setting, slope & extent of excavation, you can/will have **highly variable soil quality**, often over short-range.
- Fortunately, low pH and fertility are relatively easy to deal with, compaction is not.



Highly compacted topsoil layer due to bulldozer re-grading (only two passes over disturbed subsoil materials at fully reclaimed mineral sands mining site in Dinwiddie County (details later). Can only be remediated via deep tillage. Most revegetation species need at least 6" to > 18" of effective rooting.

Compaction Problems

- Direct impedance of rooting; vegetation under stress or dies.
- Widely fluctuating winter (wet) vs. summer (desert like) conditions
- Poor infiltration & water holding; increased local runoff
- Avoid “voodoo products” that loosen compaction or make other “promises”.



Rooting is directly limited by soil bulk density between
~1.45 (clay) and 1.85 (coarse sand).

Loamy soil with $D_b = 1.75 \text{ g/cm}^3$ at 6".

Effects of subsoil compaction on 5-year old loblolly pine plantings at Iluka mineral sands soil reconstruction site. This site received deep ripping of the subsoil and topsoil replacement.

Even tap-rooted pines cannot penetrate when the subsoil B.D. is too high. At This site, subsoil is clay loam and the bulk density is 1.7 to 1.8 g/cm³

Upper image shows taproot deflected sideways at 6"; lower image shows lateral extent of finer lateral roots extending to acquire water and nutrients.



What can we do?

- Save, properly store, and reapply topsoil
- Use liberal amounts of lime, P and organic matter amendments on both exposed subsoils and returned topsoil layers
- Apply tillage (ripper, chisel plow, etc) to reconstructed areas to both subsoil (Bt horizon) and topsoil (A horizon)
- Anticipate a second round of remedial actions needed when old infrastructure is removed in 20 to 30 years?



2X Ripper Plot at Iluka Resources in Dinwiddie/Sussex Co.; loosens/shatters down to ~ 30 inches.

Here the ripper is running back up the “middles” of previous pass. This doubles the rips per unit area. Another option is to “cross-rip” if possible. Obviously, large equipment use on a USS site will be complicated by installed panel arrays!

Success is dependent upon ideal moisture so that minimal subsoil being pulled up.

Chisel plow plot operating at tillage/ripper study in Dinwiddie County. Smaller scale (narrow) tillage loosening to 12" or so can also be accomplished via a pull-behind roto-tiller, smaller rippers, etc.





Acid sulfate soil impacts to soil quality in a subdivision in Fredericksburg and immediately adjacent (behind house) surface water impacts.

Naturally occurring S containing sediments and rocks are frequently exposed by construction activity and then quickly oxidize to sulfuric acid and generate very low pH (<3.8) and soluble metal (Al/Fe/Mn) soil/water conditions.

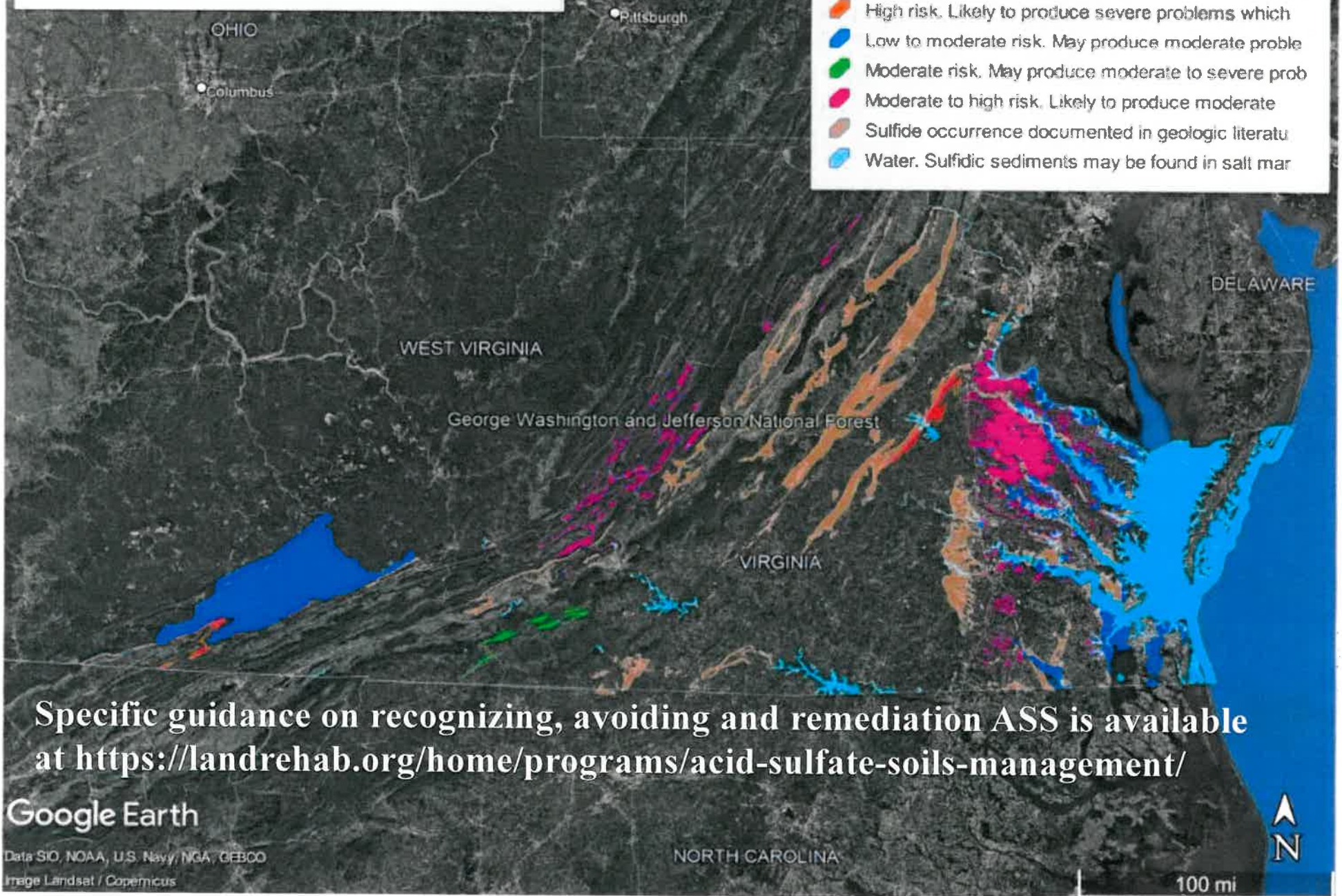
Sulfidic materials underlie much of the Coastal Plain at variable depths (usually > 5 to 10 feet). They also are common in certain regions of the Piedmont.

On solar sites, most likely encountered in lower landscapes in stormwater ponds

Virginia Acid Sulfate Soil Risk Map

Legend

- ?
- High risk. Likely to produce severe problems which
- Low to moderate risk. May produce moderate proble
- Moderate risk. May produce moderate to severe prob
- Moderate to high risk. Likely to produce moderate
- Sulfide occurrence documented in geologic literatu
- Water. Sulfidic sediments may be found in salt mar



Specific guidance on recognizing, avoiding and remediation ASS is available at <https://landrehab.org/home/programs/acid-sulfate-soils-management/>

Google Earth

Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus

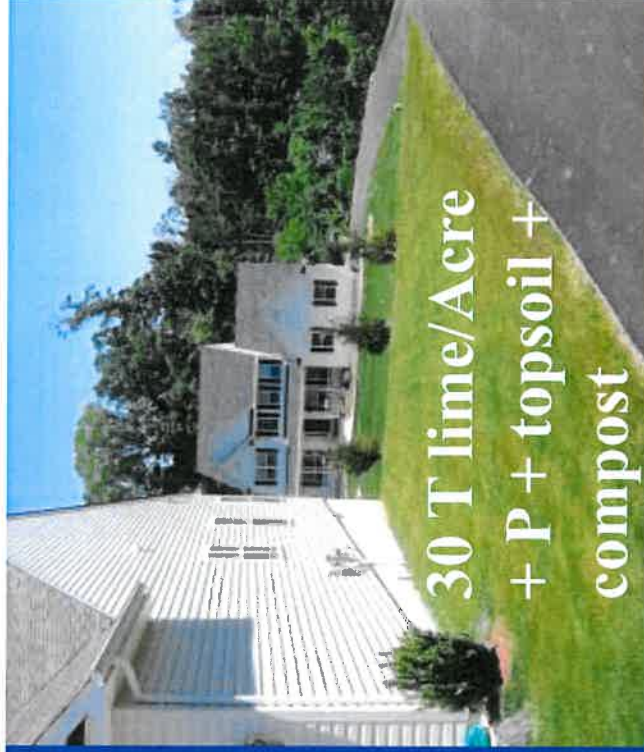
NORTH CAROLINA

100 mi





Remediated yard, summer 2006



30 T lime/Acre
+ P + topsoil +
compost

Neighbor's yard, Summer 2006



Dead Veggies + Fe-stains +
white salts = ASS

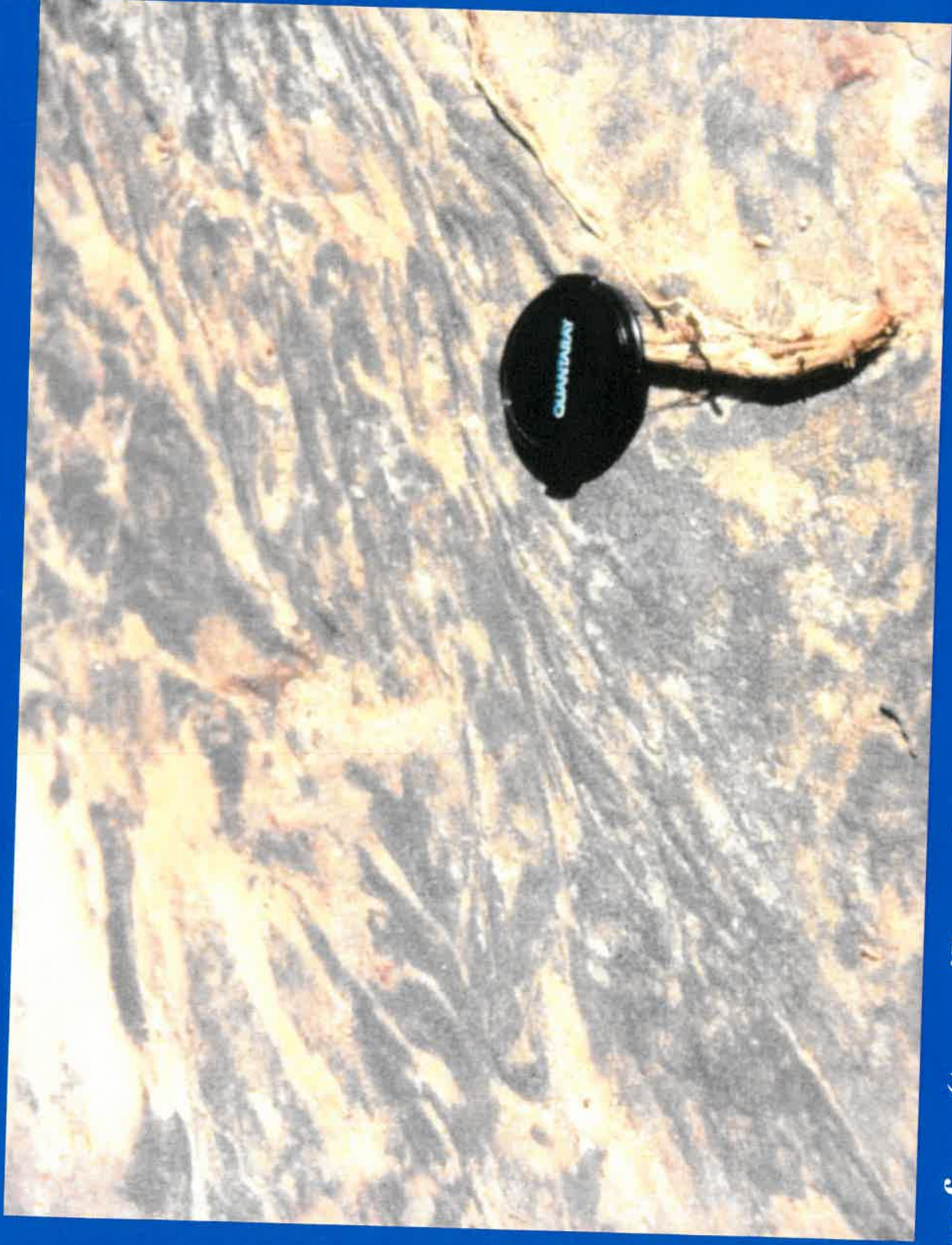


Operational Phase Soil Challenges

- Soil compaction of certain areas is inevitable during the construction phase and may be difficult to remediate once the site is operational. This will affect infiltration/runoff partitioning.
- Panels (particularly fixed) concentrate local runoff onto a “drip line” that can lead to local rilling & enhanced runoff, etc.
- Actual effects of panel arrays on stormwater runoff peak flows are not well studied (Not my area; David Sample is our lead on this!). VT is looking for cooperators to install field monitoring arrays. Our “VT Solar Panel” efforts coordinated by John Ignosh (jignosh@vt.edu).
- Establishing and maintaining uniform vegetation under/between certain panel arrays; particularly low fixed panels can be challenging. Many of these areas will also be highly disturbed.

Active mining at Old Hickory. Over 2000 acres of land have been disturbed to date with approximately 600 returned to vegetation.





Surface (topsoil) enrichment of ilmenite+rutile+zircon is frequently > 15% W:W. Subsoil is often > 5%.

Typical highly productive soil in the Old Hickory area. The topsoil is usually 3x enriched in HM relative to subsoil.

Productivity of this soil in greatly enhanced by the low bulk density, well structured subsoil that readily allows rooting to 36" or more.

Deep rooting to > 30"

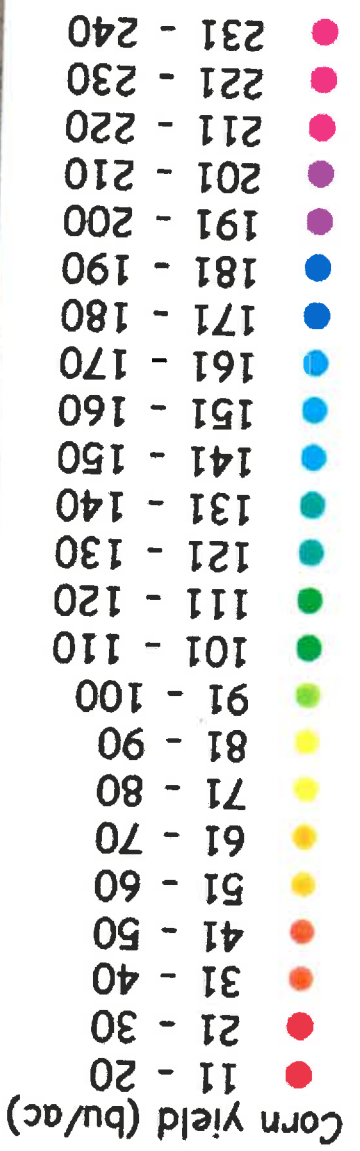
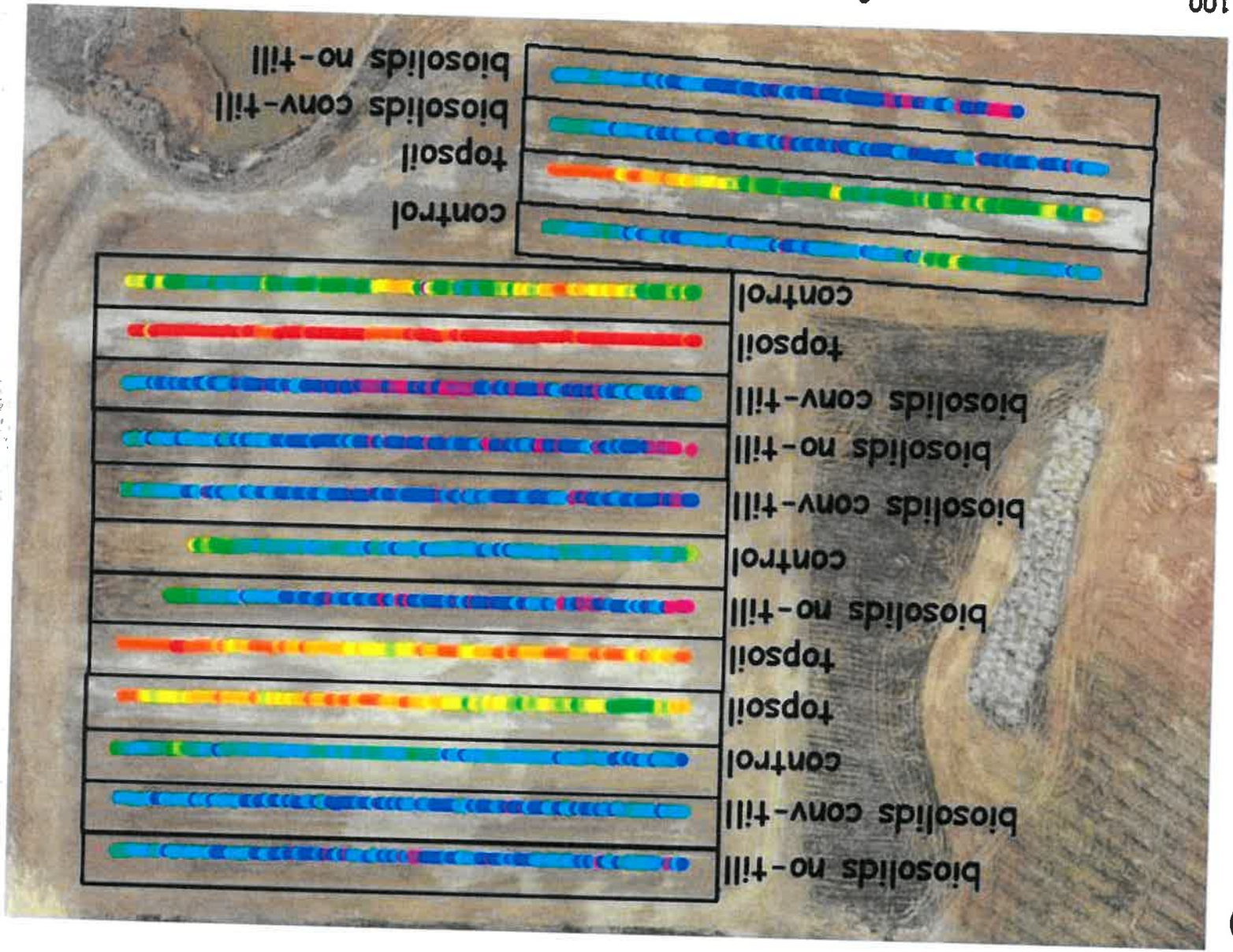
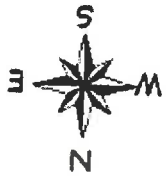


Sequence of photos (by Chuck Stilson/Iuka) showing ripping of subsoil and application of topsoil for final reclamation. The topsoil is spread with dozers and then tilled/ripped again to loosen compaction. Ripping usually occurs below topsoil; but can also cut both.

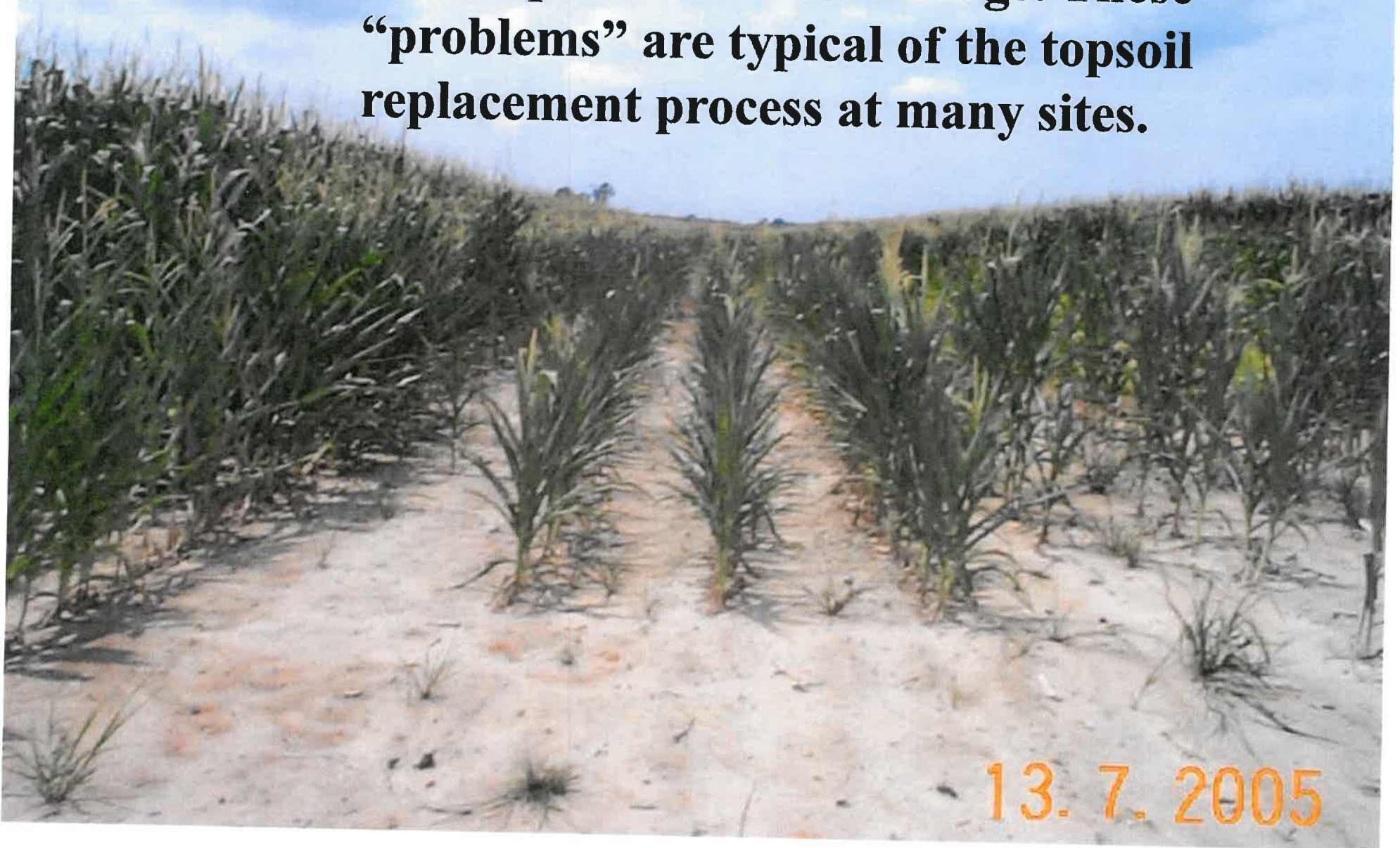


Lime (5 T/Ac) + P₂O₅ (350 lb/Ac) are added to the subsoil before ripping and then lime + N-P-K are added again to the topsoil based on soil test results.





Topsoil yields in first two years were reduced by compaction and heavy crusting that required remedial tillage. These “problems” are typical of the topsoil replacement process at many sites.



13. 7. 2005

TABLE 2

Crop yields from the Carraway-Winn Reclamation Research Farm, a local unmined prime farmland soil, and Dinwiddie County averages as applicable. Crops on all areas received identical management, including irrigation as needed.

Treatment	2005	2006	2007	2008		2009	2010		2011	2012		2013
	Corn (Mg/ha)	Wheat (Mg/ha)	Corn (Mg/ha)	Wheat (Mg/ha)	Soybean (Mg/ha)	Cotton (Mg/ha)	Wheat (Mg/ha)	Soybean (Mg/ha)	Corn (Mg/ha)	Wheat (Mg/ha)	Soybean (Mg/ha)	Corn (Mg/ha)
LBS-CT ^a	10.85 a ^b	5.04 a	3.62 b	6.27 a	2.42 ab	1.17 a	2.74 a	0.96 a	4.77 a	3.17 a	2.49 a	12.99 a
LBS-NT	10.90 a	5.16 a	3.43 b	5.65 a	2.51 a	1.18 a	2.76 a	1.11 a	4.75 a	3.20 a	2.45 a	13.03 a
TS	3.79 c	4.29 b	7.23 a	4.89 b	2.20 ab	1.18 a	2.68 a	1.15 a	4.13 a	3.18 a	2.51 a	12.24 a
C	8.53 b	4.10 b	7.30 a	4.64 b	2.11 b	1.05 a	2.51 a	1.10 a	5.30 a	3.11 a	2.34 b	11.87 a
UM	14.36	6.90	9.91	3.90	3.21	1.62	4.72	1.73	12.48	4.45	2.21	16.01
COMP	6.07	4.33	3.18	1.75	ND ^c	ND	ND	ND	ND	ND	ND	ND
County average	6.70	3.76	3.9	4.90	1.75	1.18 ^d	3.27	1.01	8.2	4.51	2.51	9.89

a. LBS – lime stabilised biosolids @ 78 Mg/ha; CT – conventional tillage; NT – no tillage; TS – 15 cm topsoil return; C – limed and fertilised control; UM – unmined control area; COMP – compacted, non-ripped zone. b. Means in the same column followed by the same letter are not significantly different at $\alpha = 0.05$. Data analysed via one-way analysis of variance followed by pairwise contrasts (Fisher's protected least significant difference). c. ND – not determined. d. Virginia South-Eastern Agricultural District average (county average not available).

Long term crop yields on reconstructed prime farmland soils following mineral sand mining. All soils were deep ripped initially and limed, fertilized and tilled annually as/if needed. Compared with adjacent unmined lands under identical management, crop yields were reduced by ~25% in most years, but often exceeded overall county average yields for “all soils in production for that crop”.

Long-Term Site Closure Challenges

- Removal of site infrastructure will result in another round of soil disturbance, including more soil compaction, re-exposure of subsoil materials to clear subsurface conduits etc.
- Return to previous land uses, particularly prime farmland rowcrop agriculture will be difficult unless large amounts of soil amendments (compost, lime, P, etc.) and heavy tillage (ripping and repeated chisel-plowing etc.) regimes are employed.
- Heavily disturbed areas (roads and extensively graded areas) will more than likely have hayland/pasture or forestry as their highest and best use.
- Any assurance that highly productive agricultural lands (e.g. rowcrops) can be readily returned to even approach existing (>75%) levels of soil productivity must be made very carefully.

Well-vegetated relatively young site. To be clear, I don't question our overall ability to successfully stabilize and revegetate these facilities! The operant questions are: (a) What can I do to limit short-term sediment losses during construction?; (b) Can we manage the existing soil/plant system over time to minimize runoff?; and (C) What will it take to return the land to reasonable levels of productivity following closure?



Large-Scale Solar Site Development & Legacy Soil Productivity Considerations

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<https://landrehab.org/>

Development of effective rehabilitation protocols for mineral sands mining in Virginia, USA

W L Daniels¹, Z Orndorff², C Stilson³, C Zimmerman⁴ and A Haywood⁵

ABSTRACT

Mineral sands mining for ilmenite, rutile and zircon has disturbed over 1000 ha of prime farmland in Virginia (USA) since 1997 and additional areas could potentially be disturbed in Virginia and North Carolina (USA) over the coming decades. Full-scale mining operations at the Old Hickory Project in Virginia were initiated in 1997 by Iluka Resources Inc (Iluka), and restoration protocols have continued to evolve in response to a variety of economic, technical and social issues. Early on, the return of these lands to agricultural row crop production was challenged by vertical stratification of tailings+slimes and lateral variability in soil physical conditions in the reclaimed pits and by limited topsoil return in some instances. Virginia Tech and Iluka have worked cooperatively with all stakeholders for over 25 years to review the pre-existing research base, conduct new and innovative site-specific research and thereby provide reasonable expectations of post-mining soil productivity levels. In 2004, Virginia Tech, Iluka and a local leaseholder (Carraway-Winn family) agreed to jointly manage a 45 ha research demonstration farm where the long-term effects of alternative soil reconstruction practices were rigorously monitored for both row crops (corn and wheat) and forage production. All mined land crop yields were also compared to an adjacent undisturbed exceptional quality prime farmland soil. Row crop yields between 2005 and 2013 were significantly above county average yields (regulatory target level) and approximately 75–80 per cent of undisturbed adjacent prime farmlands. The state regulatory authority has recently relaxed its position on the necessity of topsoil return versus use of topsoil substitutes based on appropriate on-site research results and the ability of the reclaimed soils to meet comparative local county crop yield targets. This cooperative effort allows all clientele groups to objectively assess the post-mining productivity of these mined lands while providing an invaluable educational opportunity for the mining industry.

INTRODUCTION

The paper reports on the collective results of a 25-year collaboration between Virginia Tech and Iluka Resources Inc (Iluka) (and its precursor, RGC Mineral Sands) to develop and implement protocols for the rehabilitation of prime agricultural lands following mineral sands mining in eastern Virginia, USA. As described in this paper, the successes in this program have been driven by the strong and frequent interaction of Virginia Tech's academic researchers and Iluka's engineers and technical staff.

Project history and background

Significant economic mineral sands deposits (ilmenite, rutile and zircon) were first reported to occur along the Upper Coastal Plain of Virginia, USA, in the late 1980s (Berquist and Goodwin, 1989; Carpenter and Carpenter, 1991), and soon thereafter, additional deposits were quickly discovered in similar landscapes in North Carolina. Much of the recoverable mineralised area occurs under prime farmlands (see Figure 1), and as much as 5000 ha could potentially be disturbed across this region depending on long-term market demand for titanium. This is an important peanut, soybean, tobacco and cotton-producing region and many families have farmed for over 200 years on this landscape. The Old Hickory deposit in Dinwiddie and Sussex Counties, Virginia, was the largest orebody (~2500 ha) with a smaller economic body (Brink) occurring approximately 40 km to the south. Mining

leases for Old Hickory, Brink and two smaller deposits in North Carolina were finalised in 1990/1991 by RGC Mineral Sands with the landowners, who negotiated as a block with several competing mining firms. Active mining at Old Hickory commenced in the summer of 1997, and Iluka subsequently acquired RGC's holdings and is the current operating company.

Before the initiation of this research program, the return of mineral sands mines to intensive agricultural use (for example row cropping systems) had not been studied or documented. However, considerable research was available regarding the return of coalmined lands to prime farmland status as required by USA federal coal mining regulations. In general, soil physical



FIG 1 – Premining agricultural landscape at the old hickory/concord area of Dinwiddie and Sussex Counties, Virginia, USA. Heavy minerals (ilmenite, rutile and zircon) are enriched in a 5–10 m thick highly weathered Coastal Plain capping over igneous and metamorphic basement saprolites. The high clay slimes subsoil is evident in the red excavated material shown, while the dark colour in the surface soil here is ilmenite and not organic matter (photo: W L Daniels).

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conditions such as compaction, water holding and permeability are limiting to row crop production in restored prime farmlands in the USA. Jansen and Dancer (1981) reported that corn yields on replaced topsoil depended on the quality of the topsoil and its thickness. Compaction has been reported as the most limiting factor in many mine reclamation studies. Barnhisel and Gray (1990) observed that compaction reduced yields in nearly all crops and in mine soils, respectively. Collectively, the majority of prime farmland restoration studies conducted before the initiation of the research program indicated that return of post-mining landscapes to productivity levels that approach (90 per cent) premining conditions was possible, but only with extensive soil reconstruction protocols, repeated deep tillage, intensive soil amendment and fertilisation practices and use of drought-tolerant crop cultivars (Dunker, Barnhisel and Darmody, 1992).

Post-mining land use and sustainability issues

The overall long-term sustainability of any mining operation is heavily dependent upon the quality of the post-mining landscape in relation to landowner, regulatory and general societal expectations. Clearly, the most challenging aspect of developing effective and sustainable rehabilitation strategies for the Old Hickory deposit was the fact that much of this deposit underlies prime farmland. Secondly, the silt and clay (slimes) content of the mineralised orebody is higher than this industry had mined before, generating a wide array of operational issues. Worldwide, mineral sands mines had been successfully returned to a variety of post-mining land uses including grazing, forestry, native heath/shrubland communities and wetlands/nature preserves (Brooks, 1989). However, before the initiation of this program, post-mining return of mineral sands mines to prime farmland status had never been attempted. Two important components of the Old Hickory mining lease negotiation process in the early 1990s were:

1. assurances by RGC of their intent to return the lands to intensive agricultural production following mining
2. RGC's willingness to collaborate with Virginia Tech to develop a dedicated reclamation research program.

Premining research program

Virginia Tech worked closely with all stakeholders to develop appropriate restoration protocols and to coordinate their implementation. Early (1990–1995) baseline research efforts included detailed soil and crop productivity mapping, wetland soil and geohydrologic studies and characterisation of simulated tailings and reconstructed soils (Daniels *et al*, 1991, 1996; Daniels, Orndorff and Schroeder, 2003). These early studies revealed that:

- quartz tailings generated by the proposed mine would be dominantly fine to medium sands
- the silt+clay slimes were primarily iron coated kaolinites
- the slimes content would range from ~30–>50 per cent of the bulk ore depending on extent of subaerial weathering
- the combined tailings+slimes stream would be very low in pH (4.5–5.0) and plant available phosphorus (P) (Daniels *et al*, 1991).

In a parallel study, re-blended tailings and slimes mixtures were evaluated in the greenhouse and it was found that the simulated mine soils (without topsoil) could serve as suitable plant growth media if significant levels of fertiliser P (>300 kg P/ha) were added to offset fixation potentials along with appropriate pH adjustment via liming. The initial premine soil mapping studies indicated that the native prime farmland soils owed their high levels of productivity to their thick surficial loamy sand topsoil layer (A horizon) coupled with a deep underlying sandy clay loam or clay subsoil (Bt horizon) that was well-structured and retained significant subsoil moisture reserves, but did not limit rooting due to its well-developed blocky aggregation. An initial field study (Daniels *et al*, 2003) on pilot mining pits between 1995 and 1998

compared the effects of thick (25 cm) topsoil return versus topsoil substitution via the addition of 112 Mg/ha yardwaste compost to mixed tailings and slimes following heavy P-fertilisation, liming and ripping (via chisel plow) of the reclamation surface. Over a four-year cropping rotation, post-mining productivity compared to directly adjacent prime farmland plots was reduced by 23 per cent, three per cent, 27 per cent, and 20 per cent for each crop (wheat/soybeans/corn/cotton) in sequence (Table 1). For a given crop in a given year, response to topsoiling versus compost addition to the surface varied, and neither treatment appeared superior. However, the addition of topsoil significantly reduced lateral short-range yield variability and effectively buffered the effects of subsoil texture on crop yields. Overall yield reductions in the reclaimed lands were attributed to subsoil compaction due to grading and a lack of aggregation coupled with pronounced stratification in texture with depth (Daniels, Orndorff and Schroeder, 2003). In combination, these more adverse physical properties in the reconstructed mine soils limited water and root penetration. The final soil reconstruction protocol implemented by Iluka as described later was based upon the combined results of these early studies along with associated field soil observations in the early 2000s.

Regulatory and permitting framework

The mining and reclamation operations at Old Hickory are regulated by the Virginia Division of Mineral Mining (VDMM) under their non-coal minerals mining regulations. When the post-mining land use is designated to be production (row crop) agriculture, the regulations require post-mining return to set productivity levels which are usually set at 90 per cent of local county long-term average yields. However, when the post-mining land use is hayland or pasture, they require that self-sustaining vegetation consistent with that use be viable for at least two complete growing seasons. A reclamation closure plan must be submitted and approved by VDMM, and presumably should be consistent with landowner expectations. Early versions (before 2011) of the VDMM approved reclamation and closure plan specified topsoil return and the associated subsoil reconstruction procedures discussed below. As discussed later, subsequent revisions have allowed for direct revegetation of a tailings/slimes derived topsoil substitute with landowner concurrence.

TABLE 1

Effects of various soil reconstruction treatments on row crop yields over four growing seasons at Old Hickory as reported by Daniels *et al* (2003). Pit #1 was constructed from regraded dyke subsoil materials over mixed tailings/slimes.

Pit #3 was constructed from mixed tailings and slimes. All materials were limed, P-fertilised and ripped. Subsequently, half of each pit received 25 cm of topsoil, while the other half received yardwaste compost incorporated at 112 Mg/ha. All reclamation treatments are compared to an unmined prime farmland soil that was directly adjacent. Reclamation treatments yields are means of 12 plots; unmined control values are means of 24 plots.

Treatment	1995/1996	1996	1997	1998
	Wheat (Mg/ha)	Soybeans (Mg/ha)	Corn (Mg/ha)	Cotton (Mg/ha)
Unmined control	3750 a ^a	2449 ab	8553 a	1384 a
Pit #1 topsoil	3573 a	1810 c	6587 b	1194 b
Pit #1 compost	2892 b	2386 b	7589 b	1088 b
Pit #3 topsoil	2756 bc	2684 a	4987 c	1004 b
Pit #3 compost	2375 c	2594 ab	6620 b	1130 b

a. Means in the same column followed by the same letter are not significantly different at $\alpha = 0.05$. Data analysed by one-way analysis of variance followed by pairwise contrasts (Fisher's protected least significant difference).

The regulatory permitting and approval process for these operations in the early 1990s was remarkably free of dissent from non-governmental citizen and environmental advocacy groups. This was primarily due to the fact that the operation was permitting as a no discharge facility with respect to surface waters, and strong assurances by the company (RGC/Iluka) of effective return to post-mining agricultural use. However, a number of adjacent landowners expressed concerns over the possibility of groundwater withdrawal, so make-up process water for the Old Hickory/Concord operations is withdrawn from a distant (5 km) river and piped to the site when needed.

ACTIVE MINING AND RECLAMATION

Overview of mining and reclamation processes

Premining land preparation and active ore removal generally take one to two years to complete. Immediately before mining, any existing vegetation (for example forests or old fields) are removed and root-raked as necessary. Where topsoil is being salvaged, approximately 15 cm of A horizon material is stockpiled in windrows around the edges of the mining pits. Additional barren subsoil material is utilised to build enclosing dykes (up to 4 m above grade) as necessary. Mineral enriched weathered soil and underlying Coastal Plain sediments are dry-excavated using conventional loaders and haulers, dumped locally through a double roll feeder, and then pumped with water up to several kilometres to the wet separation (concentrator) facility. The suspended soil and water mixture is then passed through sequences of hydrocyclones where the finer textured slimes (clays, silts and some very fine sands) are separated away from the mineral bearing sand fraction. On average, the deposit generates from 35–45 per cent slimes, depending on the weathering extent of the soil landscape unit being mined. The heavy mineral sands (density >4.0 g/cm³) are further separated via spirals from the lighter host quartz. No additives or chemicals are used in the separatory process. The two processed waste streams from the wet separatory facility are dominantly quartz sands (tailings) from the spirals and the slimes (silt+clay), which are partially dewatered in a thickener via the addition of an anionic polymer flocculating agent. The sand tailings and thickened slimes are then co-mingled in a single sump, and pumped together back to the reclamation pits in a 35–45 per cent solids slurry.

Once the recombined tailings+slimes stream is returned to the mined out pits, the operations move into their dewatering and pit closure phase. Depending on weather conditions, it takes anywhere from several months to a year for the surface of the pits to dry down sufficiently to support machinery. Sandy tailings beaches are readily accessed while areas of high slimes content take considerably longer to dewater to support tracked vehicles. One of the major innovations by Iluka since the late 1990s has been to limit dewatering pit size via cross-dyking, which when coupled with the use of appropriate water control/decant structures has greatly minimised segregation of tails and slimes in the pit. This effort to homogenise the texture of the dewatered tailings + slimes is further enhanced by moving the discharge point periodically around the pit dyke. Once accessible, the surface contour of the dewatered pits is graded with a bulldozer to ensure adequate convex surface drainage, and areas of highly contrasting materials are worked out with dozers and track-hoes to the extent possible. Next, agricultural lime (5–10 Mg/ha) is applied depending on texture and pH, and P fertiliser is applied at 350 kg/ha P₂O₅ to the regraded subsoil materials. These bulk subsoil amendments are then incorporated via a sequence of deep shank ripping followed by chisel-plowing and/or offset disking as needed (Figure 2). The topsoil retained in the lateral dykes is then returned with trucks and bulldozed out to approximately 15 cm thickness over the graded subsoil materials and disked or



FIG 2 – Final deep ripping of reconstructed soil profile following topsoil return. This practice was originally added in 2004 to rid the subsoil of grading related compaction and to enhance crop rooting and water infiltration. The practice was modified in later years to be applied after topsoil return in certain instances, but is routinely applied to the subsoil materials following application of lime and P fertiliser (photo: C Zimmerman).

otherwise tilled as needed. Additional inorganic nitrogen (N) and potassium (K) fertilisers are then added to the topsoiled surface per the intended revegetation mixture. When biosolids (treated municipal sewage sludge) material is used as an organic soil amendment, lime addition and P₂O₅ rates are modified and the material is placed at 45–80 Mg/ha (depending on final vegetation) and incorporated to depths up to 25 cm with a chisel plow. The overall goal of this combined treatment is to physically loosen, lime and P-fertilise both the topsoil and subsoil materials to a depth of at least 50 cm. The final reclaimed surface is then seeded with a mixture of perennial grass and legume pasture species.

The soil reconstruction process described above has been in place since the mid-2000s and was modified over time in response to a combination of early research field results and practical operational constraints faced by RGC/Iluka. Earlier reclamation efforts between 1998 and 2004 did not include the use of the deep shank ripper to loosen the subsoil or follow-up tillage of the returned topsoil layers. Current efforts are focused on improving the overall post-mining landforms to better resemble gently sloping slightly convex native landscapes along with a more intensive focus on reconstructing associated drainage swales. A wider range of post-soil placement tillage alternatives is also being evaluated, including the use of a no-till pasture ripper as described below.

As discussed above, the regulatory authority requires that the reclaimed site must maintain a viable and persistent grass/legume cover for two full growing seasons before final closure permit conditions are released. Once the land is returned to the landowners, they have the option of maintaining it in pasture/hayland use or converting it back to more intensive row crop agricultural production. To date, the majority of these lands have been maintained in hayland use following permit release.

During this demonstration period, further work is completed where necessary to continue to mitigate soil compaction and associated lack of soil aggregation (blocky structure). Over time, due to the lack of soil structure and fine-grained nature of the sand, silts and clays that make up the subsoil, these materials tend to settle and recompact. After the pasture grasses have been established, typically after 12–18 months of growth, the area is ripped again with a Urverfeth™ Zone Builder subsoiler to ~35 cm. This unit is set up with a coulter and a narrow ripping shank and a side foot (see Figure 3). The tilled area covered with vegetation is subsequently better able to continue rooting into these newly



FIG 3 – Close-up of no-till ripper used to loosen subsoils after mine soil reconstruction. This implement can be pulled through existing vegetation with minimal disturbance and is used in a post-mining context when subsoil compaction is believed to be limiting productivity (photo: C Zimmerman).

loosened soils. Return of these lands to a diverse pasture species stand has been quite successful (see Figure 4) and the forage crops improve surface soil organic matter content and aggregation over time. Landowners who choose to convert these lands to row crop production usually employ a combination of herbicide and tillage treatments to suppress the existing forage stand and prepare the soil for seeding.

Reclamation challenges in active mining at the Old Hickory site

Active mining commenced in 1997 with the excavation of two tailings disposal pits to accept the tailings and slimes generated by processing ore-bearing sands mined from first cut mine pits in 1997 through 1999 at the Old Hickory concentrator. Approximately 150 ha was mined through to January of 2003, and a second concentrator opened at Concord in 2002. Significant segregation of sandy tailings from slimes in the refilled mining pits was immediately obvious (Daniels, Orndorff and Schroeder, 2003), and the dewatered tailings/slimes mixtures were highly



FIG 4 – Final reclaimed and revegetated pasture field in second season of forage growth. Virginia state regulations require that a self-sustaining vegetation capable of supporting the designated post-mining land use (hayland and pasture here) be maintained for two full growing seasons before the lands are returned to their owners. To date, most owners have retained their reclaimed lands in hayland/pasture, but several tracts have been successfully returned to intensive rowcrop production (photo: C Zimmerman).

variable laterally and vertically due to shearing and re-dispersion of the slimes as they are pumped from the concentrator thickeners back to the mining pits. The limited flocculation of slimes at the disposal pits led to slower than originally anticipated settling rates for the dewatering tailings/slimes mixtures, which produces a number of secondary effects. First, a significant amount of process water remains entrained in the pit sediments for longer periods of time, and is delayed in its return to the concentrators. Second, the effective swell factor of the disposed tailings/slimes mixtures was greater than predicted, leading to the necessity for the enclosing dyke-walls to be raised to greater elevations than originally anticipated. Finally, the entrained water lengthened the effective dewatering period for the pits before they could support bulldozers for final grading, an issue further aggravated in periods of wet weather.

The original mining and reclamation plan specified the stripping of approximately 15 cm of native topsoil, which was to be used as part of the external pit dykes, and then graded back over the mining pit for reclamation. By the second year of the mining operations, it became obvious that the return of the stored topsoil was complicated by its location in the lower portion of the enclosing pit dykes, contamination with subsoil and other non-topsoil materials and the inability of the mining operation to constantly ensure a suitable storage location while it was being stripped. Therefore, between 1997 and 2002, certain areas received limited or no topsoil cover and required direct revegetation of the tailings/slimes materials.

In practice, the combination of lateral variability of dewatered mine soil physical properties coupled with a lack of full topsoil replacement on some areas constrained pit reclamation efforts in the early years of operations. Differential settlement over time, particularly on reclamation areas that did not receive a significant convex crown during final grading operations also complicates wet weather agricultural operations. That being said, several of the earliest reclaimed pits from the late 1990s were successfully converted into row crop agriculture once they were released back to landowners and have been productive enough to remain in that use after 15+ years.

EVOLVING IMPROVEMENT IN RECLAMATION TECHNOLOGIES

In response to the soil reconstruction constraints discussed above (for example lateral variability and topsoil limitations), Virginia Tech and Iluka initiated a new effort in 2001 to develop effective topsoil substitution strategies, particularly through the use of deep-tilled organic amendments such as biosolids as described earlier. By 2002, new modifications were also made by Iluka to water management via the internal cross-dyking and smaller dewatering pits discussed earlier and via manipulations of surface water decant sequences between pits that limited lateral separation of tailings and slimes to some extent. These changes were accompanied by new limitations on dewatering pit size, the use of rim ditches to speed dewatering, and a new suite of surface tailings+slimes homogenisation procedures greatly improved the lateral uniformity of the final reclaimed pit surfaces by 2007.

In 2004, Virginia Tech, Iluka and a local landowner (Carroway-Winn family) agreed to a ten-year research demonstration effort on a 45 ha reclaimed mine pit where the long-term effects of alternative soil reconstruction practices were rigorously monitored for both row crops and forage production. This particular area had been one the first cut pits opened by the mining operations in 1997 and 1998 and did not benefit from the improved tailings management procedures described above. It was returned to final grade in several stages between 2001 and 2003 and the majority did not receive a topsoil cover. Approximately two thirds of the area was managed in a variety of pasture management scenarios for both cool and warm season grasses.

The ten-year intensive study on the area was focused on measuring the long-term response of four major row crops (corn, wheat, cotton and double-crop soybeans) to different reclamation treatments – lime stabilised biosolids (78 dry Mg/ha) with conventional tillage (LBS-CT), biosolids (78 dry Mg/ha) with no tillage (LBS-NT), topsoil replacement (TS), and a limed/fertilised control (C) – as well as yields from a compacted area that was never ripped (COMP) and a nearby native soil unmined prime farmland area (UM). Results from ten years of management are shown in Table 2 (Orndorff *et al.*, 2011). With few exceptions, crop yields from the four reclamation treatments routinely exceeded local (Dinwiddie County) five-year county averages for all crops tested (Table 2) by at least 25 per cent. However, in making this comparison it is important to note that the research crops had the advantage of being irrigated when necessary to protect against crop failure, while the county average data were based on the combined data for all non-irrigated and irrigated croplands. That being said, these yields easily demonstrate that reclaimed mined lands following similar soil reconstruction and soil-crop management protocols should easily surpass applicable regulatory standards (for example 90 per cent of county average yields).

One interesting aspect of the early data sets from this experiment was the fact that the topsoil return plots were significantly lower in yield than the amended tailings+slimes treatments. This was due to the fact that the topsoil utilised came from a previously forested area rather than managed agricultural lands, in combination with surface crust development and grading related compaction. By the third year of the experiment, however, the topsoil recovered to subsequently equal (but not exceed) the amended tailings+slimes materials. In these intensively managed agricultural systems, fertiliser nutrients (N-P-K) were applied in most years based on frequent soil testing protocols to maintain plant availability at optimal levels for crop growth. This is the commonly utilised best practice by farmers in the region. Thus, while there are certainly assumed benefits of topsoil return with respect to post-reclamation nutrient supply and enhanced humus content and microbial populations, those benefits would be expected to be much more pronounced in situations where lands were being returned to native and/or relatively low productivity vegetation scenarios.

In comparison to nearby unmined prime farmland, crop yields from the treatment plots typically were reduced by 25–40 per cent, and the greatest one-time reduction was as high as 74 per cent (Table 2). The largest yield reductions were generally caused by excessive surface soil wetness, which limited fall harvest access (soybean) or resulted in volatile losses of spring-

applied N fertilisers (corn). This surface wetness occurred in both the spring and fall in certain seasons due to the limited infiltration and internal permeability of these reconstructed soils versus native prime farmland. It was also clear that the reclaimed soils did not provide the same level of plant available water during drought periods. In fairness, however, it should be pointed out that the unmined reference plots were located on extremely productive farmland that in fact produced the largest peanut crop in Virginia on several occasions in the mid-1980s. This therefore represents a very high standard for comparison, which may or may not be a reasonable unmined control. It is also important to point out that these lands did not benefit from the improved tailings management practices that were put into place in the mid-2000s and their inherent productivity was somewhat limited by lateral and vertical tailings/slimes stratification and differential settlement. It is also expected that the inherent productivity of these soils will improve over time due to accumulations of organic matter, enhanced microbial activity and aggregation processes. Recent (2014) detailed soil pit investigations of mine soils from this experiment (see Figure 5) reveal that both the surface topsoil (A horizon) and subsoil layers had developed significantly stronger aggregation over the ten-year study period, which has led to a deeper available rooting depth, higher root counts and lower bulk density in both soil zones. The study also indicated that Total-C had increased in the surface soils.

Currently, the research and field monitoring programs indicate that a return to hayland/pasture land use potentials will be readily achievable, while intensive row crop agricultural production should be at least 85–90 per cent of average premining levels once the soil stabilises over time and re-develops soil structure as described above. As a reference, the coal mining farmland restoration research cited earlier indicates that an actual and consistent return of 90 per cent productivity would be an outstanding outcome. Extensive or intensive forestry should also be viable across this post-mining landscape, and a number of unique water features and wildlife habitat and wetland conservation landscapes are feasible. Another interesting aspect of the full progression of mining and reclamation of this landscape is that the agricultural land base for certain landowners is actually increased over time due to conversion of previously forested or steeply sloping lands in the mine path.

Results from the premining research program (Daniels *et al.*, 2003) were combined with the Carraway-Winn Farm soil reconstruction results to develop a detailed prescription for producing a topsoil substitute. These topsoil substitutes were utilised for areas where landowners concurred with processing

TABLE 2
Crop yields from the Carraway-Winn Reclamation Research Farm, a local unmined prime farmland soil, and Dinwiddie County averages as applicable. Crops on all areas received identical management, including irrigation as needed.

Treatment	2005	2006	2007	2008		2009	2010		2011	2012		2013
	Corn (Mg/ha)	Wheat (Mg/ha)	Corn (Mg/ha)	Wheat (Mg/ha)	Soybean (Mg/ha)	Cotton (Mg/ha)	Wheat (Mg/ha)	Soybean (Mg/ha)	Corn (Mg/ha)	Wheat (Mg/ha)	Soybean (Mg/ha)	Corn (Mg/ha)
LBS-CT ^a	10.85 a ^b	5.04 a	3.62 b	6.27 a	2.42 ab	1.17 a	2.74 a	0.96 a	4.77 a	3.17 a	2.49 a	12.99 a
LBS-NT	10.90 a	5.16 a	3.43 b	5.65 a	2.51 a	1.18 a	2.76 a	1.11 a	4.75 a	3.20 a	2.45 a	13.03 a
TS	3.79 c	4.29 b	7.23 a	4.89 b	2.20 ab	1.18 a	2.68 a	1.15 a	4.13 a	3.18 a	2.51 a	12.24 a
C	8.53 b	4.10 b	7.30 a	4.64 b	2.11 b	1.05 a	2.51 a	1.10 a	5.30 a	3.11 a	2.34 b	11.87 a
UM	14.36	6.90	9.91	3.90	3.21	1.62	4.72	1.73	12.48	4.45	2.21	16.01
COMP	6.07	4.33	3.18	1.75	ND ^c	ND	ND	ND	ND	ND	ND	ND
County average	6.70	3.76	3.9	4.90	1.75	1.18 ^d	3.27	1.01	8.2	4.51	2.51	9.89

a. LBS – lime stabilised biosolids @ 78 Mg/ha; CT – conventional tillage; NT – no tillage; TS – 15 cm topsoil return; C – limed and fertilised control; UM – unmined control area; COMP – compacted, non-ripped zone. b. Means in the same column followed by the same letter are not significantly different at $\alpha = 0.05$. Data analysed via one-way analysis of variance followed by pairwise contrasts (Fisher's protected least significant difference). c. ND – not determined. d. Virginia South-Eastern Agricultural District average (county average not available).

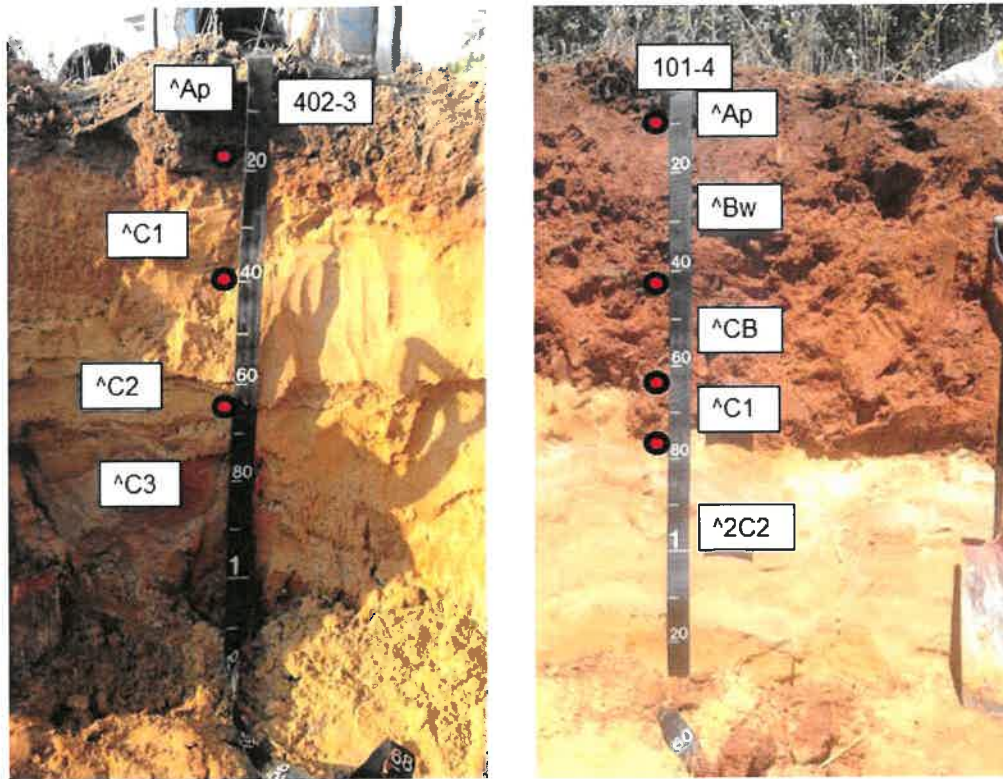


FIG 5 – Ten-year old reconstructed mine soils at Old Hickory. The mine soil on the left contains a returned topsoil layer while the mine soil on the right received biosolids at 78 Mg/ha. Both soils have redeveloped significant aggregation (structure) and have lower bulk densities versus their initial post-construction condition in 2004. This has led to enhanced water infiltration, permeability and available rooting depth/volume. Tape measure indicates centimetres and metres; red dots indicate depth of horizon boundaries (photos: Z Orndorff)

their topsoil resource rather than stockpiling it for reclamation use. Virginia Tech supported Iluka's permit variance request for this in 2010 and the practice was approved by the Virginia Department of Mines, Minerals and Energy in early 2011.

SOCIO-ECONOMIC ISSUES, LANDOWNER PERSPECTIVES AND SUSTAINABILITY

The majority of the Old Hickory orebody has been in intensive agricultural production for over 150 years, with extensive forestry practised on minor inclusions of less productive soils or wetlands. Most of the farms have been in the same family for multiple generations and are ≤ 300 ha in size. As noted above, one farm in the centre of the deposit was the highest yielding (kg/ha) peanut producer in Virginia for several years in the mid-1980s, and large areas of the deposit are clearly among the most productive agricultural landscapes in the region. However, much of the profitability of these operations has historically been based upon federal tobacco and peanut price support programs, which were drastically curtailed or eliminated by the mid-2000s. While there is some uncertainty regarding how much of this landscape would remain in intensive agricultural production over the next 20 years in the absence of mining, the inherent agricultural productivity potential of the land is beyond question. Thus, any decision to permanently alter these lands via mining generates a number of questions and implications for individual landowners, regulatory authorities and the Commonwealth as a whole.

On an individual landowner basis, the royalty return value of the processed mineral is much greater than the local current market value of prime agricultural lands. The economic return to the landowner, the regional economy and the state and local government tax base is further improved when mineral-rich

topsoil is processed, but that may have some offsetting effect on post-mining productivity potentials. The majority of current landowners have assumed that their lands will be returned to some level of agricultural productivity, with varying levels of expectations among differing individuals.

One of the most valuable aspects of this collaborative research and demonstration program has been the ability to host periodic field tours and instructional workshops for landowners, regulators and the scientific community. This cooperative effort allows all clientele groups to objectively assess the post-mining productivity of these mined lands while providing an invaluable educational opportunity for all stakeholders. Landowners and regulators are reassured by the fact that the assessments of post-mine crop productivity have been independently assessed by the university (Virginia Tech) and that research has been allowed to drive improvements in soil reconstruction and overall reclamation protocols. Many of the improvements over time have been based upon active interactions with landowners and their direct involvement in the field experiments and trials.

CONCLUSIONS

The development and implementation of effective restoration protocols at the Old Hickory mineral sands mining operation in Virginia was challenged in the early years (1997-2001) by the lack of a pre-existing research or industry knowledge base, and the fact that the orebody is higher in slimes than any mined to date. Twenty-five years of collaborative work by Virginia Tech and Iluka have now led to a detailed understanding of how the mining process interacts with final closure and reclamation protocols and allows a reasonable prediction of long-term outcomes. Taken together, the authors view the collective results as clearly indicating that:

- post-mining lands can be returned to productive and profitable levels of intensive agricultural production
- inherent soil productivity of these reclaimed lands will improve over time.

As documented in this paper, the key to success has been the detailed level of interaction and understanding achieved between the academic researchers from Virginia Tech and the mining engineers and professionals with Iluka. In 2009, Iluka's mined land reclamation efforts were recognised by the USA Interstate Mining Compact Commission as the outstanding mined land reclamation program in the nation.

ACKNOWLEDGEMENTS

The support and collaboration of RGC Mineral Resources and Iluka Resources Inc, over time, is gratefully acknowledged. In particular, Matthew Blackwell, Denis Brooks, Mike Creek, Woody Daniel, Elliott Mallard, Geoff Moore, Clay Newton, Fiona Nichols, Steve Potter, Allan Sale, Shane Tilka, Chee Saunders and Chris Wyatt have worked diligently with the authors over the years to improve mined land reclamation protocols in Virginia. Special thanks are extended also to the Carraway-Winn family for use of their land, Carl Clarke for assisting as farm manager, and the staff and students of the Virginia Tech Marginal Soils Research Group for their assistance in the field and lab. The authors also want to thank Kathryn Haering for her assistance in preparation of this manuscript.

An earlier version of this paper was originally published in the Life-of-Mine 2012 conference proceedings by the Australasian Institute of Mining and Metallurgy.

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Large-Scale Solar Site Development & Legacy Issues – Soil Considerations

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Image from Dominion published by Virginia Mercury – Louisa County

Site Development Challenges

- Soil disturbance can vary widely from < 10% to regrading of the majority of the site.
- Major disturbances are roads, trenches for internal cable distributions, regrading to level panel arrays, stormwater basins, compaction for structural support, etc.
- Acidic subsoil materials at surface need heavy liming and P applications.
- Initial/construction E&S controls obviously essential
- Must avoid acid forming materials (ASS) at all costs
- Every site x design is unique



Image from Soilworks.com; marketer of soil stabilization/dust control products.

Major Issues with Disturbed Soils

- Compaction is the dominant management issue in urban soils, VDOT & utility corridors, mining reclamation, etc.
- Cuts and fills on a site are fundamentally different in management & remediation needs:
 - A. **Cuts** often have topsoil removed or highly variable properties with depth. May hit acid sulfate soil (ASS) materials in some areas.
 - B. **Fills** are commonly highly compacted and “layered” with dissimilar materials.
 - C. **Both are commonly acidic and very low in plant-available P.**
 - D. On a given site, depending on setting, slope & extent of excavation, you can/will have **highly variable soil quality**, often over short-range.
- Acidity/pH and fertility are *relatively easy* to deal with, compaction is not.

Compaction Problems

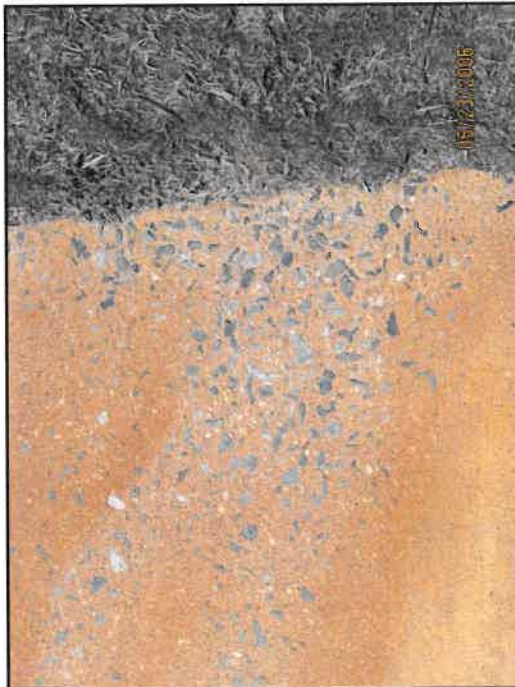
- **Direct impedance of rooting; vegetation under stress or dies.**
- **Widely fluctuating winter (wet) vs. summer (desert like) conditions**
- **Poor infiltration & water holding; increased local runoff**
- **Avoid “voodoo products” that loosen compaction or make other “promises”.**





Second round of sod placed over pH 2.5 soils in Fredericksburg.

Common symptoms are dead vegetation, Fe-staining and white salts, red acid runoff.



Cement being stripped out of concrete; leaving aggregate exposed.

Direct contact with ASS or associated drainage damages concreate, galvanized and ductile iron within months to years.

We tested the soil here and it yielded values for lime demand as high as 38 ton CaCO_3/ac . This was due to about 1.2% pyritic S content with no native lime in soil.



We recommended:
• 25 - 30 ton/ac lime
• 300 lbs/ac P
• compost if possible

Cost ~ \$7000



Remediated yard, summer 2006

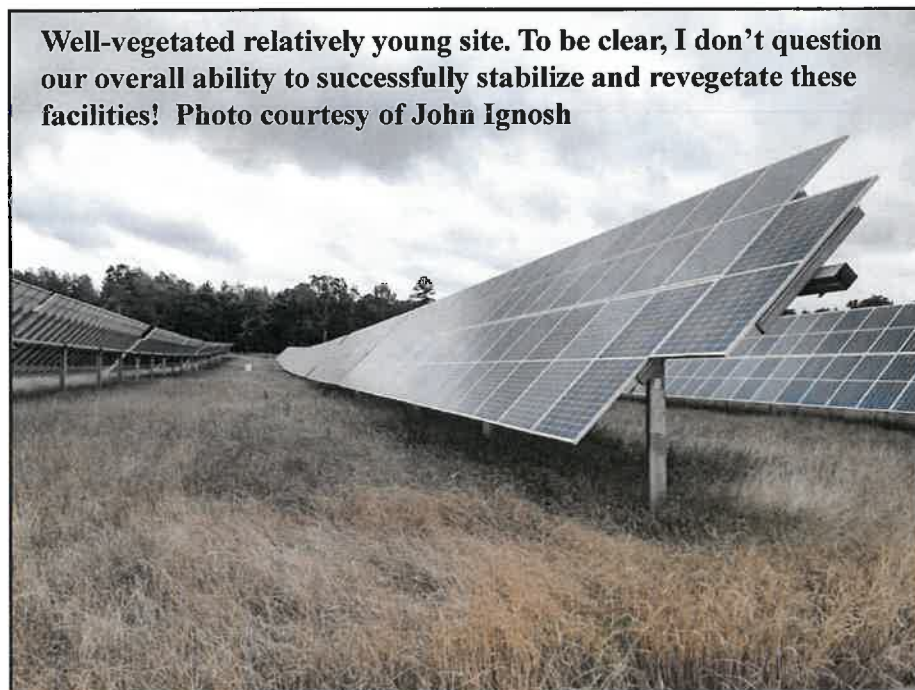
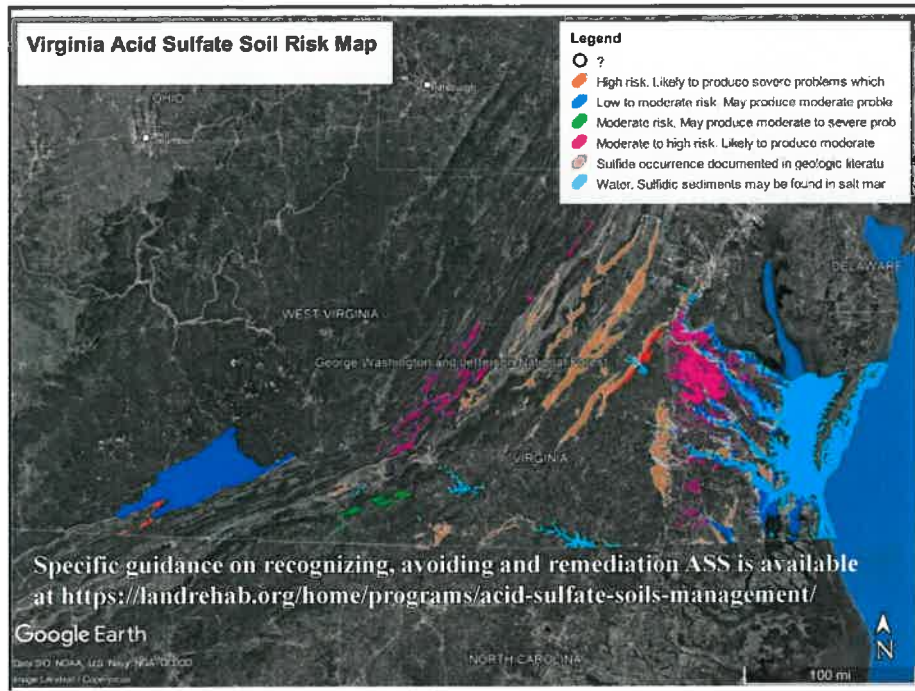


Neighbor's yard, Summer 2006



Dead Veggies + Fe-stains + white salts = ASS





Operational Phase Soil Challenges

- Soil compaction is inevitable during the construction phase and may be difficult to remediate once the site is operational.
- Panels (particularly fixed) concentrate local runoff onto a “drip line” that can lead to local rilling etc.
- Actual effects of panel arrays on stormwater runoff peak flows are not well studied (Not my area; David Sample is our lead on this!). VT is looking for cooperators to install field monitoring arrays. Our “VT Solar Panel” efforts coordinated by John Ignosh (jjgnosh@vt.edu).
- Establishing and maintaining vegetation under certain panel arrays; particularly low fixed panels can be challenging.



This is the “appropriate ripper” for these kinds of soil problems on a large open expanse mining site. On a completed solar site options for tillage will obviously be much more limited!



2X Ripper Plot at Iluka Resources.

Here the ripper is running back up the "middles" of previous pass. This doubles the rips per unit area. Another option is to "cross-rip" if possible. Obviously, complicated by installed panel arrays!

Success is dependent upon ideal moisture so that minimal subsoil being pulled up.



Chisel plow plot operating at tillage/ripper study in Dinwiddie County. Smaller scale (narrow) tillage loosening to 12" or so can also be accomplished via a pull-behind roto-tiller, smaller rippers, etc.

Same area following chisel-plowing to 12". A decent chisel plow and a 4WD tractor can pull down to 18" under ideal moisture conditions.



Long-Term Site Closure Challenges

- Removal of site infrastructure will result in another round of soil disturbance, including more soil compaction, re-exposure of subsoil materials to clear subsurface conduits etc.
- Return to previous land uses, particularly rowcrop agriculture will be very difficult unless large amounts of soil amendments (compost, lime, P, etc.) and heavy tillage (repeated chisel-plowing etc.) regimes are employed.
- Heavily disturbed areas (roads and extensively graded areas) will more than likely have hayland/pasture or forestry as their highest and best use.
- Any assurance that highly productive agricultural lands (e.g. rowcrops) can be readily returned to even approach existing (>85%) levels of soil productivity must be made *very carefully*.

Large-Scale Solar Site Development & Legacy - Soil Considerations

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Utility-Scale Solar in Virginia: An Analysis of Land Use and Development Trends

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Utility-Scale Solar in Virginia

An Analysis of Land Use
And Development Trends



Utility-Scale Solar in Virginia: An Analysis of Land Use and Development Trends

A Capstone Professional Plan

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Top photo on cover page-aerial of Silicon Ranch Solar
taken by Green Power EMC

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Acknowledgments

I would like to thank all my friends, family colleagues, classmates, and professors that have allowed me to share ideas with them throughout this process. Your comments, questions, and suggestions have all influenced this research.

Dr. Pitt for helping me in the initial formulation of this research as well as your support and expertise throughout this process.

Dr. Suen for answering many of my GIS questions and taking the time to talk through my thought process during my work on this plan.

Dr. Verma for providing thoughtful insights and patience with all my questions and ideas.

Carrie Hearne and Mike Skiffington for allowing me to work and learn alongside you both.

Special thanks to all of the faculty members of the MURP program for your guidance and support throughout my graduate studies. Although I never imagined that my graduate studies would be conducted almost entirely from home, your willingness to adapt and reimagine the MURP program for virtual learning has made this an invaluable experience.

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Executive Summary

As of January 2021, Virginia has deployed more than 1,500 megawatts (MWac) of utility-scale solar generation capacity, with thousands of additional megawatts of generating capacity under construction and planned for development in the coming years. Continued growth is anticipated because of Virginia's aggressive renewable portfolio standards in addition to recent technological improvements and declining system costs. However, an emerging concern regarding the widespread development of utility-scale solar facilities is its potentially significant land use. While solar energy has become an important component of land use considerations in many rural communities across the Commonwealth, there is very little information available that comprehensively evaluates the existing land use impacts and development trends of solar facilities. This study investigates the spatial characteristics of existing utility-scale solar facilities in Virginia using GIS techniques.

Ultimately, the data and analysis provided in this study characterize the impacts of utility-scale solar facilities and clarify some of the uncertainties related to their recent development in Virginia. By quantifying and summarizing the characteristics of the areas impacted by solar facilities, this report provides a foundation for supporting the sustainable development of future solar energy facilities. Clearly understanding the existing conditions and trends of solar development in Virginia today will help to inform better land use practices tomorrow. Accordingly, this research provides recommendations for continuing to track the development of solar facilities across the state in the coming years. It also considers policies that promote efficient land use to maximize the benefits of solar energy development while also mitigating potential impacts.

Figure 1. *Briel Solar Facility, Henrico County, VA*



(Photo taken by Aaron Berryhill)

1.0 | Introduction

As Virginia becomes increasingly dependent on renewable energy, solar energy will be an essential component of meeting future electricity needs across the state. Declining development costs combined with ambitious renewable energy targets and financial incentives have stimulated the recent growth of the solar industry. Specifically, the Virginia Clean Economy Act signed into law in 2020 validates the statewide importance of the solar industry by committing Virginia to generate electricity exclusively from carbon-free sources by 2050.

In response to statewide clean energy goals and the decreasing technology costs, large utility-scale solar facilities have quickly become the primary source of new renewable electricity generation in Virginia. Utility-scale solar facilities cover large areas of land with ground-mounted photovoltaic solar panels and operate as power plants feeding electricity into the grid for off-site use. While the exact definition of utility-scale solar often varies, this research defines a utility-scale solar facility as any solar facility owned by a utility or independent power producer with a generating capacity greater than or equal to 5 megawatts (MWac). This plan is only about utility-scale solar facilities and therefore refers to them simply as solar facilities. This does not mean that other scales and types of solar are unimportant, however, they are not the focus of this research.

While solar facilities are a viable source of clean energy with many economic opportunities available to developers, landowners, and local communities, their recent deployment has led to a growing recognition of potential land use conflicts. The declining technology costs, tax breaks, financial incentives, and affordability of rural lands have been the main drivers of the recent development of solar facilities across Virginia. However, as these facilities grow larger and more prevalent, they will become an increasingly important component of local land use patterns in many parts of rural Virginia. Accordingly, proper land use planning serves a critical role in ensuring that Virginia successfully meets future clean energy goals while also promoting sustainable and efficient land use practices.

1.1 | Project Purpose

Analyzing the ongoing land use impacts of utility-scale solar development, establishing a process for tracking future land use patterns, and providing guidance to consider the best land use practices is the primary purpose of this plan. The goal of this plan is not to undermine the opportunity and potential of solar energy. Instead, this plan seeks to inform solar energy development policies through a land use planning perspective to promote the sustainable development of solar facilities.

Balancing the economic opportunity of solar facilities along with an additional emphasis on local land use is a priority in this research. The concept of sustainable development informs this work by accentuating the collective importance of economics, equity, and the environment. Sustainability implies the need to balance the economic potential of solar energy with the need to protect the environment and promote equity. Therefore, this plan demonstrates that land use efficiency is an important component of fully realizing the potential of solar energy in Virginia.

Given the anticipated development of rural land for solar facilities, it is particularly important to quantify existing land use impacts to help develop clear project siting recommendations and policy guidance to direct future development. This plan first analyzes the current land use impacts of solar facilities in Virginia. Additionally, this research also investigates more site-specific characteristics

related to the siting of solar facilities. Finally, these findings are considered to develop appropriate goals, objectives, and strategies for guiding future development. Ultimately, this plan supports the work of local land use planners, environmental planners, and energy planners. Solar development occurs in a space where land for agricultural production, housing, commercial development, and environmental conservation all converge. This plan, therefore, considers a variety of interests to promote the sustainable development of utility-scale solar across Virginia.

1.2 | Client Description

Virginia's Department of Mines, Minerals and Energy (DMME) has been tasked with helping to achieve the state's 2050 goal of carbon-free electricity generation. An important component of this transition to renewable energy is solar energy which is overseen by the Virginia Solar Energy Development and Energy Storage Authority within the DMME. As a state agency that actively encourages the implementation of new solar development in Virginia, DMME provides a variety of reports to lawmakers and localities to assist in decision-making processes related to energy. Underlying these actions is an emphasis on encouraging a collaborative approach to meeting the future energy needs of Virginia. This plan merges the solar energy goals of the state with relevant local land-use planning considerations. The detailed analysis of the existing conditions and impacts of utility-scale solar provided in this plan will help DMME to understand the relevant factors of solar energy development more fully. This will allow DMME to promote the best interests of Virginians and their efforts to reach the 2050 clean energy goal.

1.3 | Outline of the Plan

This plan includes an analysis of the land use of solar facilities in Virginia and provides recommendations to encourage the sustainable development of future utility-scale solar facilities. The main components of this plan are:

- **Background:** A description of the existing conditions and regulatory framework specific to utility-scale solar in Virginia is provided. The general existing knowledge related to the development of solar facilities across the country and world is also discussed. Additionally, the theoretical framework subsection explains how this plan is related to a much broader understanding of sustainable development.
- **Methodology:** The research questions and methods used for the GIS analysis of the spatial characteristics of existing solar facilities are explained. Relevant studies that helped to inform the methods of this research are also presented. This section also describes the data sources and GIS processes used to analyze the land use of solar facilities.
- **Research Findings:** The results of the GIS analysis are presented and discussed. This includes assessing various environmental and social characteristics of solar facility sites in Virginia, such as location, area, land cover, conservation quality, farmland suitability, and the demographics of local communities.
- **Conclusion:** The main findings of this research are summarized and contextualized within the larger discussion of renewable energy, and land use and environmental planning.
- **Recommendations:** Based on the methods and findings of this research, this section considers topics for future analysis and suggests policy options to guide the sustainable development of new solar facilities in Virginia.

2.0 | Background

Newly updated policies, incentives, and energy portfolio standards in Virginia have helped to stimulate the rapid development of solar facilities in recent years. The development of solar energy facilities in Virginia however has occurred with little understanding of the overall land use impacts. This section provides the necessary context to better understand the motivations of this research. This includes a discussion of current conditions in Virginia, as well as an acknowledgment of the opportunities and challenges of utility-scale solar development. Additionally, this section reviews the overall existing knowledge about utility-scale solar beyond Virginia.

2.1 | Study Area

This research examines all operating utility-scale solar facilities in Virginia to better understand current conditions and provide recommendations for future development. As of January 2021, a total of 38 solar facilities in Virginia (greater than five (5) megawatts in generating capacity) were actively generating electricity with several other projects also under construction and in the permitting phases. The operation of these types of solar facilities in Virginia first began in 2016, and so far, most of the development has been confined to the eastern and southern portions of the state. This research focuses on the acreage, capacity, and location of active solar facilities as of January 2021. This includes facilities in partial operation, but not yet operating at full capacity. The overall size and capacity of facilities in this study are estimated as of January 2021 and may not represent the final size or capacity of a given facility upon the completion of project construction.

Table 1. Existing Utility-Scale Solar Facilities in Virginia (as of January 2021)

Name	MW Capacity	County	Service Date	Name	MW Capacity	County	Service Date
Eastern Shore Solar	80	Accomack	2016-12	Montross Solar	20	Westmoreland	2018-12
Scott Solar	17	Powhatan	2016-12	Gloucester Solar	19.9	Gloucester	2019-04
Woodland Solar	19	Isle of Wight	2016-12	Colonial Trail West Solar	142.4	Surry	2019-12
Whitehouse Solar	20	Louisa	2016-12	Rives Road Solar	19.7	Prince George	2020-05
Clarke Solar	10	Clarke	2017-07	Myrtle Solar	15	Suffolk City	2020-06
Remington Solar	20	Fauquier	2017-10	Pamplin Solar	15.7	Appomattox	2020-07
Correctional Solar	20	New Kent	2017-11	Grasshopper Solar	80	Mecklenburg	2020-07
Sappony Solar	20	Sussex	2017-11	Hickory Solar	20	Chesapeake City	2020-08
Buckingham Solar	19.8	Buckingham	2017-11	Mechanicsville Solar	20	Hanover	2020-09
Cherrydale Solar	20	Northampton	2017-11	Spotsylvania Solar	300	Spotsylvania	2020-09
Oceana Solar	17.6	Virginia Beach City	2017-12	Irish Road/Whitmell Solar	10	Pittsylvania	2020-10
Scott-II Solar	20	Powhatan	2017-12	Spring Grove I Solar	97.9	Surry	2020-10
Essex Solar	20	Essex	2017-12	Danville Solar	12	Pittsylvania	2020-11
Southampton Solar	100	Southampton	2017-12	Greensville County Solar	80	Greensville	2020-12
Palmer Solar	5	Fluvanna	2017-12	Twitty Creek Solar	13.8	Charlotte	2020-12
Martin Solar	5	Goochland	2017-12	Gardy's Mill Solar	14	Westmoreland	2020-12
Kentuck Solar	6	Pittsylvania	2018-05	Briel Farm Solar	18.8	Henrico	2020-12
UVA Hollyfield Solar	17	King William	2018-09	Sadler Solar	100	Greensville	2021-01
Puller Solar	15	Middlesex	2018-10	Bluestone Solar	50	Mecklenburg	2021-01

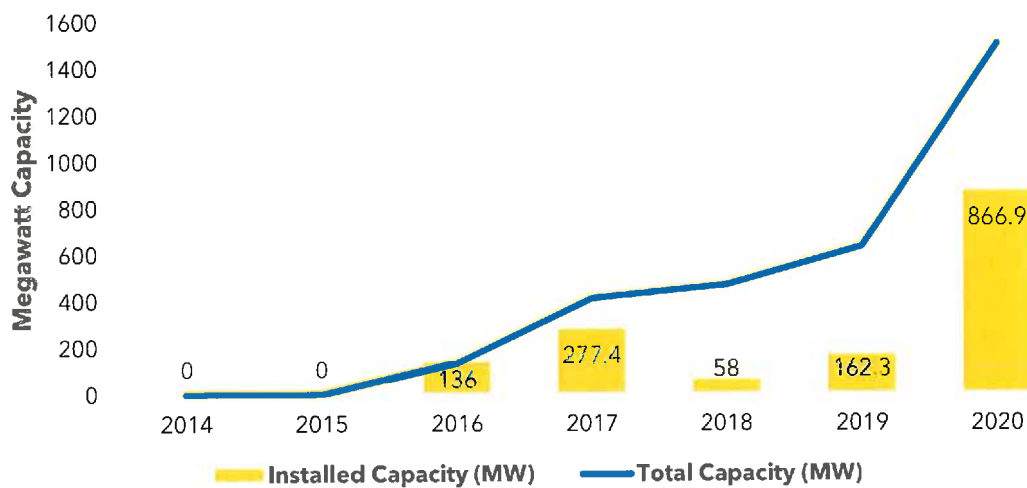
Source: U.S. EIA Monthly Electric Generator Inventory/PJM Interconnection Queue

2.2 | Context of Utility-Scale Solar in Virginia

Trends of Solar Development in Virginia

Across the United States and the world, the cost of solar development has experienced a notable decline over the past decade. Estimates from the International Renewable Energy Agency suggest that the cost of utility-scale solar electricity generation has declined 82% worldwide since 2010.¹ Similarly in the United States, the median installed cost of solar photovoltaic facilities has fallen by 70% since 2010.² These cost declines have led to the increasing prevalence of new solar facilities across the country including in Virginia (Figure 2). Nationwide, the U.S. was approaching 100,000 megawatts of installed solar generating capacity in early 2020 up from just 10,000 megawatts in 2010. For reference, a single (1) megawatt-hour of electricity can power an estimated average of 200 homes in Virginia.³

Figure 2. Annual Installations of Utility-Scale Solar by Generating Capacity in Virginia



Source: U.S. EIA Monthly Electric Generator Inventory/PJM Interconnection Queue

Despite the rapid decline in the cost of solar technology, current development has not been evenly distributed across the country. While environmental factors help to explain some of the discrepancies, state programs and policies are a major reason for the concentration of existing and planned solar projects in specific states. With a total of 2,310 megawatts of solar energy installed as of December 2020 based on SEIA estimates, Virginia ranked 11th nationally in total solar capacity.⁴ Additionally, Virginia and its neighbors in the South Atlantic region have proven to be a hotspot for recent solar facility development due to favorable state policies and financial incentives. The South Atlantic region leads the country in newly installed utility-scale solar capacity in each of the past three years.⁵ In neighboring North Carolina, the state ranks 3rd nationally in solar generating capacity trailing only California and Texas in total solar generating capacity due to solar-friendly policies first initiated in 2007. New policies passed in Virginia in 2017 and more recently in 2020 and 2021 allows

¹ IRENA (International Renewable Energy Agency), "Renewable Power Generation Costs in 2019."

² Mark Bolinger, Seel, and Robson, "Empirical Trends in Project Technology, Cost, Performance, and PPA Pricing in the United States - 2019 Edition."

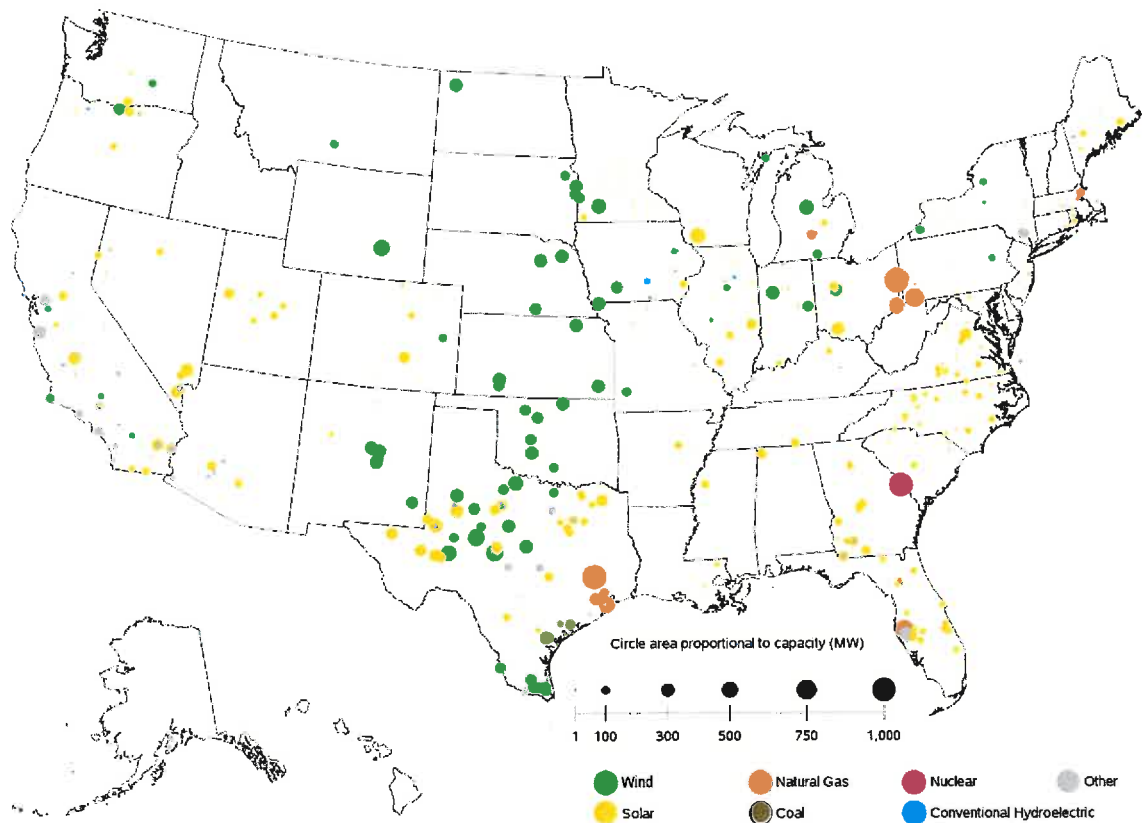
³ Solar Energy Industries Association, "What's in a Megawatt."

⁴ Solar Energy Industries Association, "Virginia Solar."

⁵ U.S. Energy Information Administration (EIA), "Most New Utility-Scale Solar in the United States Is Being Built in the South Atlantic - Today in Energy - U.S. Energy Information Administration (EIA)."

Virginia to join other solar-friendly states that actively encourage the installation of new solar facilities. As shown in *Figure 3*, all new utility energy generation facilities planned for 2021 in Virginia will come from solar sources. As a result, the Solar Energy Industries Association (SEIA) now ranks Virginia 6th nationally for projected growth in solar capacity over the next 5 years. Virginia also ranked 4th in total generating capacity of new solar installations in 2020 according to SEIA.

Figure 3. *Planned Utility-Scale Generation Projects to Become Operational in 2021*



Source: U.S. EIA Monthly Electric Generator Inventory November 2020

Recent legislation passed in 2020 helps to explain why Virginia is quickly becoming a national leader in new solar development. The 2020 Virginia Clean Economy Act (HB 1526) and HB 714/SB94 are the drivers of this change as it commits Virginia in tandem with the major local utilities (Dominion Power and Appalachian Power) to produce electricity exclusively from carbon-free sources by 2050. This goal will ultimately require a massive shift in the state’s electricity generation since 54.4% of net electricity generation in Virginia as of November 2020 came from carbon-intensive fuels such as petroleum, natural gas, and coal.⁶ Only 5.6% of net electricity generation in Virginia as of November 2020 came from nonhydroelectric renewable sources such as wind and solar.⁷ As a result, the

⁶ “Virginia - State Energy Profile Overview - U.S. Energy Information Administration (EIA).”
⁷ Ibid

Virginia economy and the energy sector specifically will likely experience a major transformation in the coming years centered around renewable energy.

In addition to the Virginia Clean Economy Act, the Virginia General Assembly also recently passed many complementary laws to encourage a transition to clean energy which includes facilitating the development of utility-scale solar projects.⁸ This new legislation offers a variety of incentives for developers and localities to consider. This includes allowing localities to negotiate siting agreements, establish revenue sharing programs, consider an exemption from the Machinery and Tools tax, and require cash payments or public improvements from solar developers. Collectively, this new legislation presents several opportunities for localities to work with solar developers to approve more solar facilities across the state.

Current Regulatory Process

Beyond the economic opportunity and clean energy potential of solar energy, the impact of solar development on the physical environment and local communities remains a relevant focus of the regulatory process. The current review and permitting process of solar facilities in Virginia is divided among various entities at the state and local levels. While this process has streamlined project approval, this regulatory system has not widely considered or compiled estimates of the overall statewide land use impacts of utility-scale solar.

Currently, the permitting of solar facilities in Virginia at the state level largely promotes the expedited development of new facilities. Smaller solar sites between 500 KW and five (5) MW in capacity or with a footprint between two (2) and ten (10) acres only need to provide notification to the Virginia Department of Environmental Quality (DEQ) and are not subject to a full review. Solar facilities greater than ten (10) acres in size and between five (5) MW and 150 MW in generating capacity are however subject to a review process through the application for a Permit by Rule (PBR) from the DEQ. Most existing projects in Virginia are in this size range and have been permitted through the PBR process from the DEQ. The components of the PBR application include an air quality analysis, assessments of cultural, wildlife, and natural heritage resources, a site and context map, a public comment period, and certification of local government approval. Larger projects over 150 MW in capacity are not subject to DEQ review and instead go through a more rigorous review process with the State Corporation Commission (SCC). Ultimately these separate state review processes have helped to expedite the permitting of new solar facilities but have also made it difficult to fully understand the extent of development and quantify the total statewide land use impacts of utility-scale solar facilities.

All solar facilities are also permitted by local governments to ensure that a project complies with all local land use ordinances. As a result, compliance with local land use requirements is an important aspect of regulating the development of solar facilities. Since solar facilities can require a large land area, localities often must consider balancing the interests of future growth areas, prime farmland, sensitive environmental or historic sites, and adjacent business or residential interests. Potential impacts include ecological changes, loss of scenery, restrictions in future development potential, a decline in agricultural production, and change in the character of an area. Given the variety of local land use factors that are considered when approving solar facilities, local and regional planners have

⁸ See Virginia LIS website to review overviews of each bill passed in the 2020 and 2021 sessions

an important role in providing clear guidance on how the development of solar projects can be mutually beneficial for a local community and the state of Virginia's overall energy needs.

Potential Impacts of Utility-Scale Solar in Virginia

Virginia may ultimately need to dedicate hundreds of thousands of acres of land to renewable energy production to meet future electricity needs from carbon-free sources. The broader implications of this potential large use land however are not well understood or contextualized. The potential loss of forested or agricultural land remains an obvious concern of the unconstrained growth of the solar industry. Despite the extensive amount of agriculture and forested land in the state, the prevalence of both land uses has already been declining because of development pressures from new sprawling residential and commercial uses. The emergence of solar facilities, if not properly managed, represents another significant threat to these important natural resources in Virginia. While the present review and approval process does consider some of these land use factors, a broader understanding of the collective impacts across the state is necessary.

As of 2021, most existing projects have been built with a capacity close to 20 megawatts and covering between 100 and 200 acres of land. However, much larger solar facilities are becoming more common across Virginia. The most notable and well-publicized utility-scale project to be proposed and approved in Virginia is the s-Power Pleinmont Solar Facility (Spotsylvania Solar Energy Center) in Spotsylvania County which is currently under construction and partially in operation. At an expected capacity of 500 MW, 1.8 million panels, and an area of 6,350 acres, the project is the fifth largest in the United States and the largest solar project east of the Rockies. Due to its extreme size, the project met opposition from several local stakeholders that contended that the very large industrial complex was inappropriate for the historic and rural character of the county.⁹ Specifically, many local residents feared that a project of such size would disturb the ecosystem, lead to lower property values, and cause irreparable damage to the local forest.¹⁰

Given the expected increase in the number and size of solar facilities across Virginia, many localities will likely face similar difficult land use decisions. While 38 utility-scale solar projects are currently in operation, the DEQ has issued dozens of permits (PBRs) for new solar facilities in the coming years and has also received many notices of intent for potential projects. This suggests that Virginia will continue to see the growth of the development of new solar facilities in the next decade. This demonstrates the importance of beginning to understand the current land use impacts of utility-scale solar facilities and develop improved siting practices.

⁹ Jacob Fenston, "A Battle Is Raging Over The Largest Solar Farm East Of The Rockies."

¹⁰ Pappas, "Massive East Coast Solar Project Generates Fury from Neighbors."

2.3 | Existing Knowledge

The transition to a carbon-free energy sector in Virginia is a part of a much larger worldwide acknowledgment of anthropogenic climate change caused largely by greenhouse gas emissions which has led to an increased reliance on renewable energy sources such as solar.¹¹ Since the sun is the most abundant energy source of renewable energy in the world, solar energy facilities of various types have steadily developed all over the world because of the relative availability, cost-effectiveness, accessibility, and efficiency of solar energy compared to other renewable energy sources.¹² Solar energy, therefore, offers significant economic, ecological, and equity benefits if properly implemented.

The Emergence of the Solar Industry

Given the potential of solar energy to help satisfy future energy demand, photovoltaic (PV) solar energy, which is the energy obtained directly from solar radiation conversion, has quickly become both an important energy source and a unique investment opportunity. The capturing of solar energy with PV panels to produce electricity is one of the most promising markets of the renewable energy sector because of recent technological advancement, high levels of investment, and a fast growth perspective.¹³ As a result, solar PV electricity is expected to be the largest, least costly, and most prominent source of energy in the long term in the next 50 years.¹⁴ With the proper technological advancements and policy support, estimates suggest that PV solar could supply 30-50% of electricity in competitive markets by 2050.¹⁵

The recent improvements in solar PV technology have allowed small distributed solar generating units to prosper in a variety of residential, commercial, and industrial settings. However, utility-scale PV solar facilities remain the primary type of solar energy generation in the United States accounting for 66% of the total net generation of electricity from solar sources in 2020.¹⁶ Despite inefficiencies in land use and transmission compared to distributed solar systems; utility-scale solar facilities have deployed new solar technologies at a much faster rate and at lower costs due to the increased ability to attract financial capital and achieve economies of scale in the construction and operation phases of the projects.¹⁷ As a result, utility-scale solar facilities remain an important part of a clean energy future because of their ability to reduce the delivered cost of power compared to other renewable energy sources.

Potential Impacts of Solar Development

The land impacts of solar energy development can be complex and are often dependent on the location, site design, and type of technology used. While solar energy is widely considered a more efficient and clean energy source, the widespread implementation of utility-scale solar facilities may impact large areas of land and place development pressure on many undeveloped rural areas.¹⁸ Land impacts however are not unique to the development of solar energy facilities. Regardless of the energy source used, electricity generation is inherently a land-intensive process. Energy sprawl

¹¹ Karl and Trenberth, "Modern Global Climate Change."

¹² Kannan and Vakeesan, "Solar Energy for Future World."

¹³ Sampaio and González, "Photovoltaic Solar Energy."

¹⁴ Breyer et al., "On the Role of Solar Photovoltaics in Global Energy Transition Scenarios."

¹⁵ Creutzig et al., "The Underestimated Potential of Solar Energy to Mitigate Climate Change."

¹⁶ "Electric Power Monthly - U.S. Energy Information Administration (EIA)."

¹⁷ Mendelsohn, Lowder, and Canavan, "Utility-Scale Concentrating Solar Power and Photovoltaic Projects."

¹⁸ Poggi, Firmino, and Amado, "Planning Renewable Energy in Rural Areas."

resulting from the energy development necessary to meet growing energy demands is already the largest driver of land use change in the United States. Estimates suggest that energy development could lead to a direct land use change of up to 2,500 square miles of land per year in the United States through 2040.¹⁹ Based on recent estimates, the total land use requirements for small and large PV installations nationwide have a capacity-weighted average of 8.9 acres per MW of production.²⁰ This means that large-scale projects over 100 MW in size can easily cover thousands of acres of land. Based on similar capacity averages, utility-scale PV could eventually use up to 17,000,000 acres of land nationally.²¹ In Virginia specifically, the total per capita solar footprint required to achieve state energy needs is estimated at 233 square meters per person which could occupy around 1.6% of the state's total land area.²²

While solar may require an extensive amount of land, studies have viewed the land use requirements of solar favorably as compared to other energy sources. Using either a land use intensity or power density metric for assessing land use requirements, solar has been found to initially require a much larger direct land footprint for the same amount of power generation.²³ However, solar and other renewables can use the same plot of land indefinitely unlike extractive energy sources that must expand their footprint to acquire additional resources. Consequently, over the full-time horizon of the life cycle of an energy production project, solar may ultimately require a smaller land footprint for an equivalent of cumulative energy production.²⁴ Additionally, proximity to PV solar facilities is considered much safer than other energy sources, meaning they also require less additional land for buffering and spacing from other uses. Finally, solar facilities are considered less time-intensive and therefore are less likely to cause long-lasting harm to the quality of land at a particular site.²⁵

Although the impacts of solar may be preferable to fossil-fuel generated energy, its development still requires a careful evaluation of trade-offs between land, energy, and ecology.²⁶ Depending on the location and size of a solar facility, specific impacts may include land conversion, agricultural productivity impacts, ecosystem modifications, habitat reduction, aesthetic changes, and adjustments to recreational potential.²⁷ Since solar facilities initiate a sudden change in land use, they can cause a variety of environmental and ecological changes both during construction, and once the facility is operational. Many of the construction impacts are the result of increased traffic and land disturbance activities, but strategies have emerged to mitigate many of these short-term impacts. By comparison, the long-term environmental impacts of solar projects are not as well understood. Changes in albedo, land temperature, microclimates, erosion, dust production, soil contamination, water pollution, precipitation regimes, and noise pollution have all been considered possible impacts of large solar projects.²⁸ Land cover change resulting from solar development could also lead to alterations of nutrient dynamics, exotic plant invasions, biodiversity loss, habitat loss and fragmentation, water stress, and species loss.²⁹ While some of these impacts have been

¹⁹ Trainor et al., "Energy Sprawl Is the Largest Driver of Land Use Change in United States."

²⁰ Ong et al., "Land-Use Requirements for Solar Power Plants in the United States."

²¹ Shum, "A Comparison of Land-Use Requirements in Solar-Based Decarbonization Scenarios."

²² Denholm and Margolis, "Land-Use Requirements and the per-Capita Solar Footprint for Photovoltaic Generation in the United States."

²³ Wachs and Engel, "Land use for United States power generation: A critical review of existing metrics"

²⁴ Fthenakis and Kim "Land use and electricity generation: A life cycle analysis", Trainor et al., "Energy Sprawl Is the Largest Driver of Land Use Change in United States."

²⁵ Turney and Ftheankis, "Environmental Impacts from the Installation and Operation of Large-scale Power Plants".

²⁶ Moore-O'Leary et al. "Sustainability of utility-scale solar energy- critical ecological concepts"

²⁷ Boer et al., "Local power and land use: spatial implications for local energy development."

²⁸ Hernandez et al., "Environmental Impacts of Utility-Scale Solar Energy."

²⁹ Ibid

more closely examined, very few solar facilities have existed for long enough to fully evaluate many of the possible negative impacts.

Solar facilities also have impacts on local communities that can influence the public perception of future solar development projects. While the general opinion of renewable energy is largely positive, the development of large solar facilities projects without adequate public input in local areas can create backlash most closely linked to proximity, a concentration of uses, and visual intrusion.³⁰ Place attachment, socio-demographic characteristics, and project-related characteristics such as size, proximity, and visibility have also proven to be relevant factors that explain local support or opposition to solar development projects.³¹ Many local communities have also expressed concern about the future decommissioning process. Traditional land use regulations do not adequately consider the concept of reversibility, which has led to uncertainty about the long-term impacts of solar development in local communities.³² These local impacts and uncertainties have ultimately made solar energy development a contentious issue in some rural communities.

Interventions and the Role of Planners

In response to the potential land use conflicts initiated by solar facilities, local policymakers and planners have an important role in coordinating local land use regulations and policies to either promote or limit the development of solar facilities. The connection between land and solar energy generation creates an important role for local land use and environmental planning within the context of energy development.³³ This means that local and regional planners will ultimately have an important influence on the future of renewable energy.

By better understanding the potential impacts of solar development, planners can promote improved land use practices and sustainable development through siting agreements, local regulations, and policy innovations. The emergence of GIS methodology to assess renewable energy impacts and identify ideal sites for development is a promising method for improving future solar development.³⁴ Through the use of GIS and statistical tools, planners can compare scenarios of solar development with competing land uses to best protect agricultural and conservation interests while still encouraging new solar development.³⁵ Further GIS assessments have also begun to include social preference data into site suitability analyses.³⁶ By using this information, planners can make more informed updates to zoning ordinances and comprehensive plans to better guide the future siting of solar facilities.

Planners have also begun to consider a variety of options to best accommodate large-scale solar projects. The use of brownfields, previously disturbed lands, and abandoned mined lands for solar projects represents an opportunity for development without the need for additional land disturbance.³⁷ The potential of agrivoltaic systems that can support both the colocation of PV systems and agriculture on the same plot of land has been explored as another siting

³⁰ Kontogianni et al., "Planning Globally, Protesting Locally."

³¹ Carlisle et al., "Utility-Scale Solar and Public Attitudes toward Siting."

³² Boer et al., "Local power and land use: spatial implications for local energy development."

³³ Kaza, Nikhil & Curtis Marie Patane "The Land Use Energy Connection"

³⁴ Poggi, Firmino, and Amado, "Planning Renewable Energy in Rural Areas."

³⁵ Dias et al., "Interplay between the Potential of Photovoltaic Systems and Agricultural Land Use."

³⁶ Brewer et al., "Using GIS Analytics and Social Preference Data to Evaluate Utility-Scale Solar Power Site Suitability."

³⁷ Klusáček et al., "From Wasted Land to Megawatts."

consideration.³⁸ Planners can also play an important role in gathering and incorporating localized land use information that may not be readily available to developers to facilitate and encourage proper siting practices. This includes information on rights-of-way, previously disturbed lands, productive agricultural land, growth boundaries, and local conservation priorities.

2.4 | Theoretical Framework

The primary purpose of this plan is to promote the sustainable development of solar facilities. Although solar facilities are a form of renewable energy that can reduce the negative environmental impacts of fossil fuels, the long-term sustainability of solar facilities must consider all the relevant environmental, economic, and social perspectives. Specifically, solar facilities can have significant impacts at the local level. Accordingly, many of the outcomes and recommendations for this plan focus on promoting solar energy as a form of sustainable energy development when proper land use practices are considered.

The concept of sustainable development has progressed from a vague idea to a more relevant aspect of the modern practice of land use planning that is particularly useful for framing this research. Broadly, the definition of sustainability as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" from the 1987 Brundtland Commission remains the most recognizable definition.³⁹ For planners, the concept of sustainable development includes finding a balance between the interests of equity, environment, and economic efficiency to minimize conflicts that arise over development, property, and natural resources.⁴⁰ Within the context of the development of solar facilities, a sustainable outcome requires maintaining a similar balance between competing interests. These competing interests include the environmental implications of land use conversion, the economic potential of solar development as a fossil fuel replacement, and the unequal distribution of opportunity and burden that specific rural communities face as a part of the siting of new solar facilities.

This means that if solar facilities are considered to be an effective replacement to conventional energy sources, the sustainability of solar facilities needs to be assessed. As a result, analyzing the impacts of solar development and properly planning for future solar facilities is important in helping to reach the objectives of sustainable development.⁴¹ Ultimately the potential of solar as a sustainable form of energy orients the focus of this plan towards a balanced solution between competing interests. Specifically, this research expands the analysis of utility-scale solar beyond economic interests to also consider other elements of sustainability such as land use and equity. This research specifically reviews the land use impacts and demographic factors of utility-scale solar development in Virginia to better inform productive land use negotiations in support of the long-range goal of the sustainable development of solar facilities in Virginia.

³⁸ Dupraz et al., "Combining Solar Photovoltaic Panels and Food Crops for Optimising Land Use"; Dinesh and Pearce, "The Potential of Agrivoltaic Systems."

³⁹ WCED (World Commission on Environment and Development), "Our Common Future."

⁴⁰ Campbell, "Green Cities, Growing Cities, Just Cities?"

⁴¹ Grilli et al., "A multi-criteria framework to assess the sustainability of renewable energy development in the Alps".

3.0 | Methodology

The process of investigating the land use impacts of utility-scale solar development in Virginia and providing recommendations for improved land use practices includes answering multiple research questions. The primary purpose of this research is to quantify land use change and the local impacts associated with the ongoing development of solar facilities in Virginia. For this research, solar facilities are defined as five (5) megawatts and above in generating capacity since that is the size that triggers a state-level review by the DEQ. Additionally, this research focuses on ground-mounted solar facilities owned either by electric utilities or independent power producers. This analysis does not include any roof-mounted distributed solar systems.

The use of geographic information systems (GIS) software to create a geospatial dataset of the boundaries of active solar facilities was necessary for the analysis of land use in this research. This dataset builds on publicly available information and expands the ability to study local land use impacts and demographic factors more accurately. This research also relies on existing datasets on land cover and demographics to analyze the existing conditions and trends across Virginia. Accordingly, this research strives to:

- 1) Quantify total statewide land use impacts
- 2) Review site-specific impacts
- 3) Consider options for future development

The following research questions guide this process:

- *What is the amount of impacted land area by utility-scale solar facilities in Virginia?*
- *What are the characteristics of the lands occupied by solar facilities in Virginia?*
- *What are the best practices for tracking and regulating the siting of utility-scale solar facilities in order to address long-term sustainability interests?*

3.1 | Sources of Information

The main purpose of this research is to produce and analyze geospatial datasets that detail the location, size, and land coverage of solar facilities in Virginia. While some existing information exists about individual solar facilities, this plan relies heavily on original research. As a result, this research draws on techniques and research methods used elsewhere in the United States.

Although limited, a few published studies have attempted to quantify the land requirements of solar facilities or assess the effect of solar facilities on land use. The National Renewable Energy Laboratory (NREL) in 2013 assessed the land requirements of a sample of solar facilities across the U.S. based on two land use metrics which included the total impacted site area and the direct impact area comprised of land directly occupied by solar arrays.⁴² Data on the area of solar facilities was collected from project information from federal, state, or local regulatory agencies. When necessary, the study also referenced data provided by developers and analyzed satellite images to identify the configuration, boundaries, and area solar facilities. This analysis follows a similar data collection process.

⁴² Ong et al., "Land-Use Requirements for Solar Power Plants in the United States."

In California, two complementary studies investigated the spatial distribution, total land use, and land cover change of solar facilities over 20 megawatts in size across the state.⁴³ These studies involved creating a geospatial dataset of utility-scale solar installations based on the total acreage or footprint of solar facilities as published in official government documentation. These studies only considered the point location of solar facilities and simply allocated size based on the published acreage of individual solar facilities. Land cover change was then estimated by comparing point locations with land cover types from the National Land Cover Dataset (NLCD) at a 30-meter resolution. More recently, a similar study of the land use trends of solar energy development trends was conducted in the state of New York.⁴⁴ The study used a one (1) megawatt threshold and also relied on NLCD data to identify land cover change based on the published land footprint sizes and the point location of solar facilities.

Similar land use studies have also been conducted by various public agencies and non-profits. Close to Virginia, work completed by the NC Sustainable Energy Association (NCSEA) and the NC Department of Agriculture & Consumer Services (NCDA&CS) provides a useful framework to contextualize the results of this research. The *Land Use Analysis of NC Solar Installations* report serves as a useful local study that quantified the amount of land conversion from PV systems in North Carolina.⁴⁵ Additionally, the *North Carolina Solar and Agriculture Report* by the NCSEA in 2017 provides a practical description of relevant land use changes related to rural agriculture areas which are highly relevant to this research.⁴⁶ Finally, in Maryland, the Governor's Task Force on Renewable Energy Development and Siting Final Report provides an example of a quantitative analysis used to forecast future land use impacts of solar development as a basis for recommending improved land use practices.⁴⁷

3.2 | Methods

GIS Analysis of Statewide Land Use Impacts

What is the amount of impacted land area by utility-scale solar facilities in Virginia?

The goal of this research question is to quantify the overall land use impact of utility-scale solar development across Virginia. Specifically, this research first consisted of gathering a total estimate of the current number of acres dedicated to solar facilities in the state. This total acreage estimate is based on the amount of land impacted by each solar facility. This is different from the total acreage of impacted parcels as reported in public permitting documentation. Finding total acreage amounts for each facility included estimating the total disturbed area of each solar facility and the footprint of physical solar panels. This information was collected and compiled in a new geospatial dataset of polygons representing the boundaries of all active facilities in Virginia. Unlike previous studies in other states that relied on point data for the location of solar facilities, this research considers the physical developed boundaries of individual solar facilities using polygon layers drawn with GIS software. All geospatial data was compiled, processed, and analyzed using ArcGIS (10.x) software. Some further statistical analysis was conducted using SPSS 26 software.

⁴³ Hernandez et al. "Land-Use Efficiency of Big Solar", Hernandez et al. "Solar Energy Development Impacts on Land Cover Change and Protected Areas".

⁴⁴ Katkar et al. "Strategic land use analysis for solar energy development in New York State"

⁴⁵ NCSEA, "Land Use Analysis of NC Solar Installations."

⁴⁶ Aldina et al., "North Carolina Solar and Agriculture."

⁴⁷ State of Maryland, "Governor's Task Force on Renewable Energy Development and Siting Final Report."

This analysis considers all utility-scale solar facilities over five megawatts (5 MW) in generating capacity in operation as of *January 2021*. This includes solar facilities that were only in partial operation at the time of this research. Subsequently, only the footprint and capacity in operation as of January 2021 were considered. As a result, this data will need to be constantly updated as more information becomes available. In total, this research considers 38 solar facilities with sizes varying from five (5) MW up to 300 MW, with the first solar facilities becoming operational in late 2016.

The U.S. Energy Information Administration’s (EIA) data on the size, location, and capacity of all electricity generation sites in the state of Virginia helped to locate most of the existing solar facilities considered in this analysis. Additionally, information from the PJM interconnection queue was referenced to verify and update any missing information from the EIA data. Similar to the 2013 NREL study, the boundaries of existing solar facilities created in this analysis were determined using published site plans in public regulatory documentation, aerial imagery, and the most recent Landsat 8 satellite imagery. This spatial information was then georeferenced and individually digitized into a polygon layer in GIS as accurately as possible. A boundary of the footprint of solar panels at each facility was constructed based on the general contiguous area covered by solar panels. This area does not include the space between rows of panels. A larger total disturbed site area was also created in GIS based on the full site area that extends beyond the physical location of solar panels (See *Figure 4* below). This includes all areas with a visible permanent disturbance or fencing surrounding the facility. This is based on site plan maps when available as well as by visually comparing land cover change based on recent aerial and satellite imagery.

Once a complete geospatial dataset of active solar facilities was created, land cover classifications were isolated at each solar facility. The analysis relies primarily on the 1-meter resolution Virginia Land Cover Dataset (VLCD) that was published in early 2016. This land cover data was collected and published before the operation of any solar facilities in Virginia. Additionally, the less detailed 2016 and 2006 National Land Cover Datasets (NLCD) (30-meter resolution) were included for supplemental findings based on methods used in previous studies. However, the VLCD ultimately

Figure 4. Visualization of GIS Analysis Methods



provided a more robust dataset for this research because of its high resolution and availability in vector format for further data processing. The VLCD data includes eleven land cover classifications, with the Forested and Cropland classifications being the two main land covers identified in this analysis. A full description of each VLCD land cover classification is available in Appendix A. The VLCD data in vector format was clipped to each solar facility using the Intersect and Dissolve features in ArcGIS. Given the overall size and spatial extent of VLCD data split into hundreds of individual tiles, the ModelBuilder in ArcGIS helped to streamline the data processing. The workflow for these data processing methods is also provided in Appendix A. Finally, the land cover data was compiled and aggregated into a statewide total based on land cover types.

Site-Specific Analysis

What are the characteristics of the lands occupied by solar facilities in Virginia?

Based on the findings of the first research question, a more detailed analysis of specific relevant variables was conducted to better understand some of the more specific impacts of solar development in Virginia. This includes detailed data on demographics, soil suitability, agricultural production, forest conservation, distance to transmission lines, and proximity to urbanized areas. Since forests and farmlands are the most likely areas to be impacted by the development of solar facilities, it is important to understand the overall quality of those lands that have been dedicated to solar facilities. The Virginia Department of Forestry's Forest Conservation Model (FCV) and the Virginia Department of Conservation and Recreation's Agricultural Model (VAM) were used to quantify the quality of forest and farmlands (See above in *Figure 4*). A full description of the methodology of these datasets can be found in Appendix A. Each of these datasets is at a 30-meter resolution, therefore there are some inconsistencies with the VLCD dataset which is more precise. Nevertheless, the FCV and VAM models offer a useful introduction that helps to describe land use patterns of solar development in more detail. Furthermore, the impacted croplands were further evaluated based on soil quality values from the Virginia Agricultural Model and the types of previously cultivated crops from the United States Department of Agriculture's (USDA) Cropland Data Layer (CDL). This analysis only used CDL data from 2015 which is a single point of time and does not provide a complete depiction of active agriculture patterns. This should be further investigated in the future.

Other locational factors included in this analysis include distance to transmission lines, proximity to urbanized areas, and demographic patterns. The demographic analysis is based on the most recent ACS 2019 5-year estimates for each census tract that contains a solar facility. Specific demographic factors that were analyzed included the median household income, poverty rate, median house value, population density, and proportion of the population by race.

Options to Guide Future Development

What are the best practices for tracking and regulating the siting of utility-scale solar facilities in order to address long-term sustainability interests?

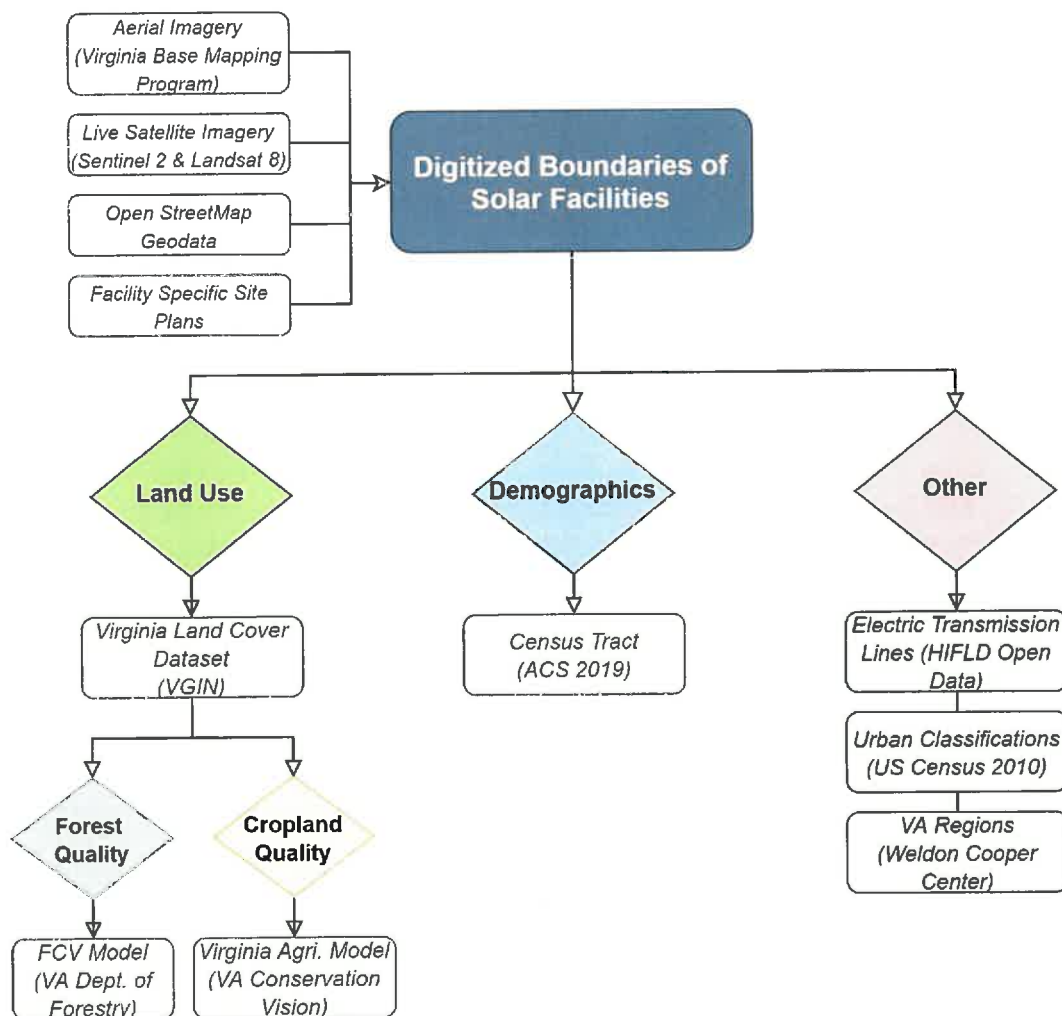
Finally, to help create pertinent recommendations for the DMME on future administrative roles and policy needs regarding the proper implementation of solar in Virginia, a brief review of best practices from other states in Virginia was conducted. This component of the research is associated with the recommendations section of the plan. The primary focus of this research is to explore if and how other states are collecting, maintaining, and analyzing geospatial information on the

development of solar facilities. These best practices largely come from other states that also have experienced rapid development of utility-scale solar. Overall, this best practice research is brief and should be explored in more detail as more adaptive and experimental policy options are explored nationwide.

3.3 | Data Sources

Below is a flowchart depicting the data sources used for the GIS analysis component of this research. The grey boxes represent the various data sources used at each step in the research process. A complete diagram of the GIS workflow and the ArcGIS ModelBuilder used for this research are located in Appendix A as well as details about each data model included in the analysis. This information is useful for being able to replicate and expand this research as more information becomes available and solar facilities continue to be developed across Virginia.

Figure 5. Data Sources Included in GIS Analysis of Solar Facilities



4.0 | Research Findings

The following section presents the research findings from each component of the GIS analysis of solar facility sites in Virginia. This includes information about the size and location of solar facilities as well as details about the site of each solar facility such as land cover change, characteristics of impacted forested land and cropland, and the demographics of the surrounding area near solar facilities. Finally, the findings section concludes with a brief discussion of best practices from other states to direct recommendations for future analysis and improved solar facility development.

4.1 | Location

Solar facilities in Virginia are more often located in rural and lightly populated areas in the eastern and southern portions of the state. The general location of Virginia's solar facilities helps to inform many of the subsequent findings of this research regarding land use and demographics. The data presented below provides a general understanding of the overall location of solar facilities in Virginia. However, the information in this section should be frequently updated as more solar facilities are constructed in Virginia to better understand ongoing and emerging land use trends.

First, as demonstrated in *Figure 6* and *Table 2*, solar facilities are primarily located in the eastern and central portions of the state. The regions used in this analysis are defined by the UVA Cooper Center as demographic regions with shared economic and cultural ties. Southside, Central, Hampton Roads, and Eastern Virginia have experienced most of the recent solar facility development. Within these regions, rural localities with small populations (*Table 3*) are more likely to have a solar facility.

Figure 6. Size and Location of Utility-Scale Solar Facilities in Virginia (January 2021)

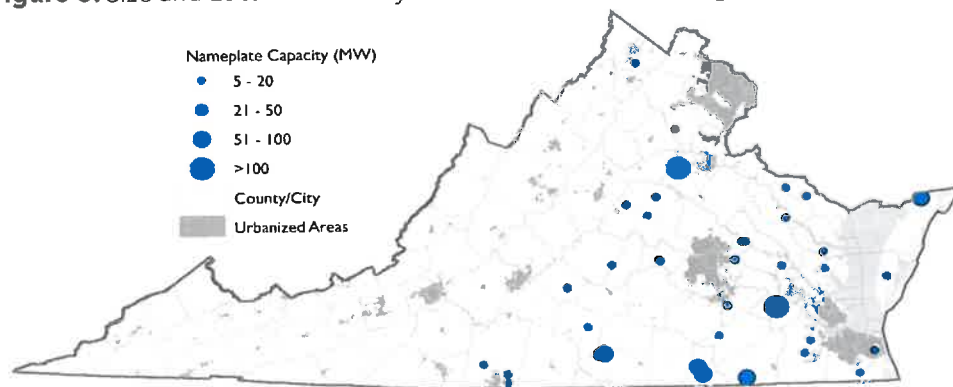


Table 2. Solar Facilities in Virginia Regions

Region	Total Facilities
Central	10
West Central	1
Southside	11
Hampton Roads	7
Eastern	6
Southwest	0
Northern	3
Valley	0

Table 3. Solar Facilities by Population Size of Locality

Locality Population Size	Total Facilities
Greater than 100,000	5
75,000 to 100,000	1
50,000 to 75,000	4
30,000 to 50,000	7
15,000 to 30,000	11
Less than 15,000	10

Additionally, Metropolitan Statistical Areas and Urbanized Areas provide further detail about the location of solar facilities and their proximity to urban and rural areas. Metropolitan Statistical Areas (MSAs) is a geographic region with a relatively high population density with shared economic ties. A total of 23 out of 38 solar facilities are in either a Metropolitan or Micropolitan Statistical Area. Since MSAs follow county boundaries, this classification does not accurately differentiate the difference between urban and rural areas. The Census Bureau’s Urbanized Area classification provides a more accurate depiction of urban and rural areas. These are the core of an MSA with a high population density. Urbanized Areas have a population of over 50,000 while Urbanized Clusters have a population of less than 50,000. Based on this classification, 25 solar facilities are greater than three (3) miles from either an urbanized area or urbanized cluster and therefore are considered to be located in rural areas.

Table 4. Solar Facilities in Metropolitan Statistical Areas

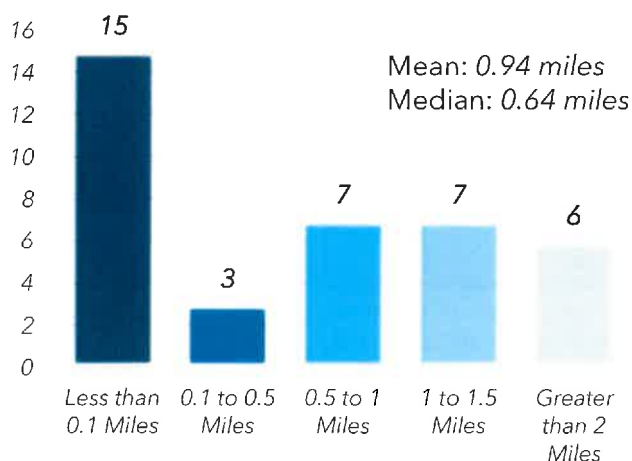
Census Statistical Area	Total Facilities
Metropolitan Statistical Area	20
Richmond MSA	9
VB-Norfolk-Newport News MSA	5
Washington-Arlington-Alexandria MSA	3
Charlottesville MSA	2
Lynchburg MSA	1
Micropolitan Statistical Area	3
Danville MSA	3
Outside an MSA	15

Table 5. Solar Facilities Near Urbanized Areas

Proximity to Urbanized Areas	Total Facilities
Urbanized Area: UA (Pop. >50,000)	
Inside UA	2
Less than 1 mile from UA	4
Less than 3 miles from UA	6
Urbanized Cluster: UC (Pop. <50,000)	
Inside UC	0
Less than 1 mile from UC	6
Less than 3 miles from UC	7
Rural	
Greater than 3 miles from UA/UC	25

Finally, another important locational consideration is the distance of solar facilities to electricity transmission lines. To date, most solar facilities have been built in very close proximity to existing transmission lines due to the lower costs in supplying electricity into the grid. A total of 25 of the state’s 38 solar facilities are located less than one mile from a distribution line. Only one solar facility is located greater than five miles from a distribution line.

Figure 7. Distance of Solar Facilities to Nearest Transmission Line



4.2 | Size and Area

Based on the location and boundaries of the 38 operational solar facilities in Virginia, a total of 13,842 acres of land has been disturbed by solar facilities. The solar facilities in this analysis represent approximately 1,500 MW of total generating capacity as of January 2021. The average acres of disturbed land per megawatt of generating capacity for all solar facilities in Virginia is 7.9 acres per megawatt (MW). However, facilities in Virginia have ranged from as low as 4.9 acres per MW up to 14.3 acres per MW (Figure 9). The topography, previous land cover, accessibility, parcel shape, and surrounding features seem to influence the ratio of disturbed acres to megawatt capacity of different solar facilities.

Similarly, the total area of the footprint of contiguous solar panels of solar facilities in Virginia equals about 6,793 acres. This is a rough estimate of the total footprint area and does not include the space between rows of panels. Based on these estimates, the solar panel footprint accounts for roughly half (50%) of the total disturbed area of utility-scale solar facilities in Virginia. Like the total disturbed site area, the panel footprint area per MW varies by facility (Figure 10).

The estimates of the disturbed site area in this analysis are often much smaller than the total acreage listed in permitting documentation from the Department of Environmental Quality, the State Corporation Commission, or specific localities. The total published acreage for a solar facility in permitting applications typically includes the area of all parcels included in the project regardless of the physically developed area. The total disturbed area of solar facilities calculated in this analysis equals about 73% of the total permitted area of the facilities (18,930 acres). On average, the disturbed area of an individual solar facility covers about 68% of the total area published in permitting documentation. Figure 8 provides a visual example of the difference between the actual disturbed area and the total permitted area of a specific solar facility site.

Total Disturbed Area of Utility-Scale Solar Sites:
13,842 acres

Average Acres per MW (Total Disturbed Area):
7.9 acres/MW

Total Area of Solar Panel Footprint:
6,793 acres

Average Acres per MW (Solar Panel Footprint Area):
4.5 acres/MW

Figure 8. Comparison of Site Areas of Greenville County Solar Facility

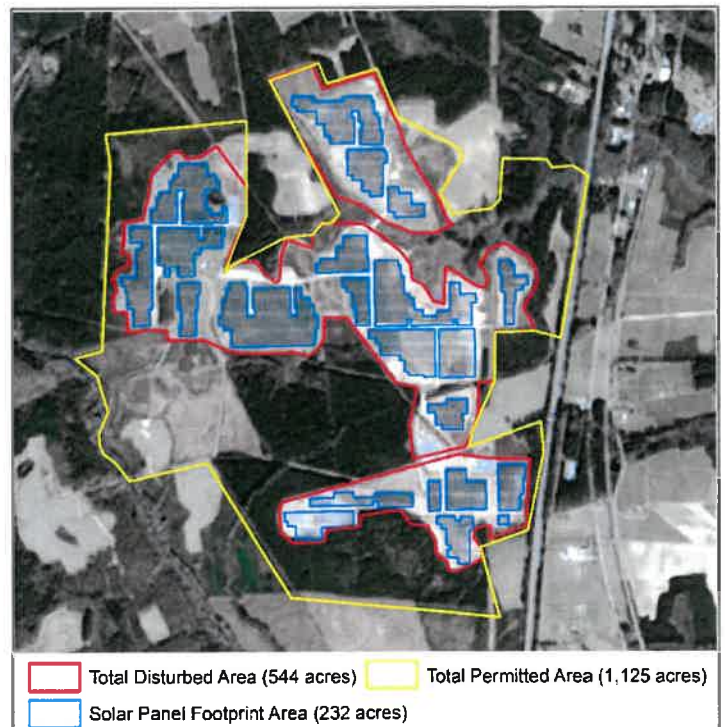


Figure 9. Distribution of the Disturbed Site Area per Megawatt Ratio of Solar Facilities

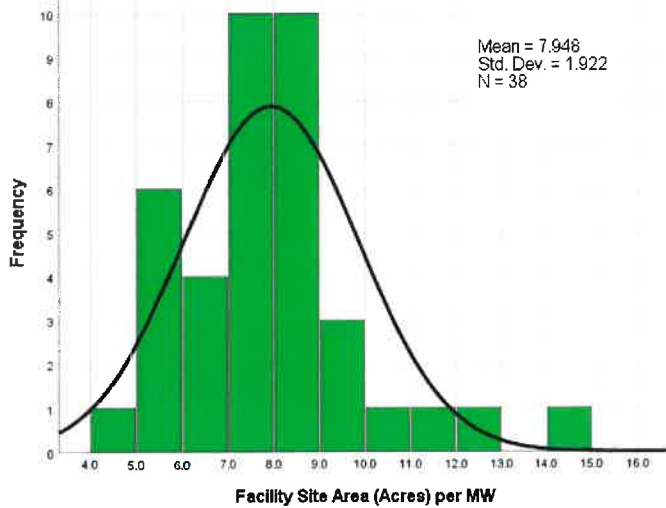
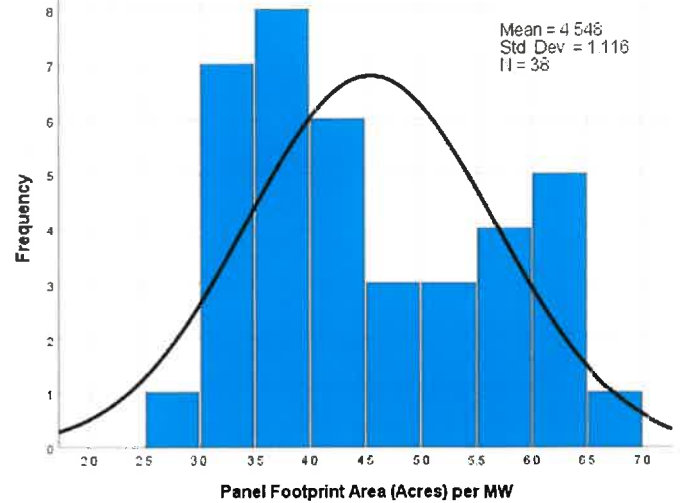


Figure 10. Distribution of the Solar Panel Footprint Area per Megawatt Ratio of Solar Facilities

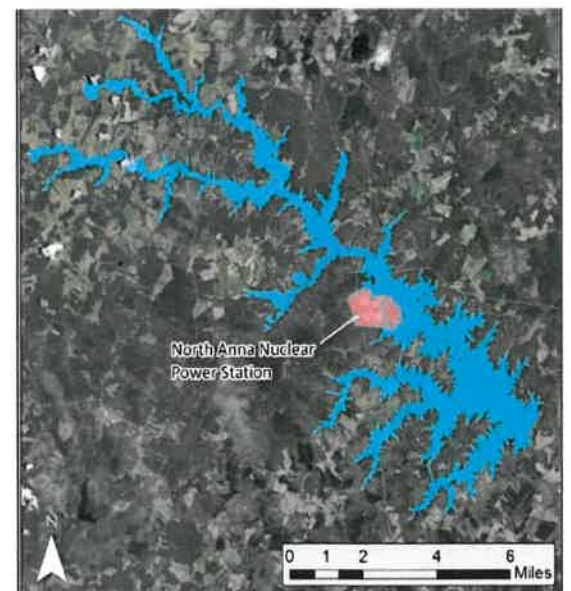


Size Comparisons

For context, the 13,842 acres of land disturbed by solar facilities amounts to about 0.05% of all Virginia land area. This is roughly the same size as Virginia’s Lake Anna (~13,000 acres). Lake Anna was originally constructed in 1972 after Dominion Energy purchased close to 18,000 acres of farm and timber lands to provide cooling water for the North Anna Nuclear Power Station. Like solar facilities, the reservoir required the conversion of forest and agricultural land into a reservoir to help serve energy generation needs. The North Anna Nuclear Power Station itself sits on a 1,075-acre site and has a capacity of 1,892 MW.

In 2020, the North Anna Power Station generated 15.8 million megawatt-hours (MWh) of electricity. With an annual capacity factor averaging over 90%, the North Anna Power Station can produce more electricity than a similar area dedicated to solar energy generation.⁴⁸ For example, the 1,500 MW of installed utility-scale solar capacity in Virginia could produce an estimated 3.2 million MWh annually based on an average capacity factor for solar of 24%.⁴⁹ This means that existing utility-scale solar facilities can generate about 20% of the annual electricity generated by the North Anna Nuclear Power Station on a similar area of disturbed land. These estimates however do not consider the differing land impacts and buffer requirements for each energy generation source.

Figure 11. Size of Lake Anna as an Area Comparison



⁴⁸ U.S. Energy Information Administration *Electricity Generation and Consumption Data (EIA-920)*

⁴⁹ U.S. Energy Information Administration *Capacity Factors for Utility Scale Generators (Table 6.07.B.)*

The total statewide acreage estimate for all of Virginia’s solar facilities is heavily influenced by a few exceptionally large facilities. Of the 38 active solar facilities, 29 are between five (5) and 20 MW in capacity and collectively account for roughly 25% of the total statewide acreage. There are zero facilities between 20 and 50 MW. Nine (9) facilities are above 50 MW in capacity and collectively account for about 75% of all land currently dedicated to solar facilities in Virginia. The two largest facilities in Virginia account for about 38% of all the land in the state currently dedicated to solar facilities. The influence of the state’s largest facilities is likely to grow as the 300 MW Pleinmont Solar project in Spotsylvania County is expanded to 500 MW. New projects such as the approved 280 MW Pulaski County Solar project will also have a significant impact on the statewide total amount of impacted land in the state.

Table 6. Share of Solar Facilities by Generating Capacity and Acres

Generating Capacity	Number of Active Facilities	Share of Total Acreage	Share of Total Capacity
5-20 MW	29	25.1%	31.3%
20-50 MW	0	0.0%	0.0%
50-75 MW	1	2.4%	3.3%
75-100 MW	6	34.6%	35.8%
>100 MW	2	37.9%	29.5%

Although the state’s largest solar facilities make up a significant portion of all impacted land, they are not more efficient based on the acres of land required to generate a megawatt of electricity. Regardless of size, both the disturbed site area and solar panel area share a linear relationship with megawatt generating capacity. While there is some variation and outliers as seen in Figures 12 and 13, the state’s largest solar facilities use land at roughly the same rate as smaller solar facilities. With correlation coefficients close to a value of one (1), both the disturbed area and panel footprint area have a strong linear relationship with megawatt capacity. This suggests that a higher generating capacity is not more efficient from a land use perspective. Moreover, this also demonstrates that larger solar facilities do not have proportionally less disturbed land given the amount of electricity that is generated.

Figure 12. Relationship Between Disturbed Site Area and Megawatt Capacity

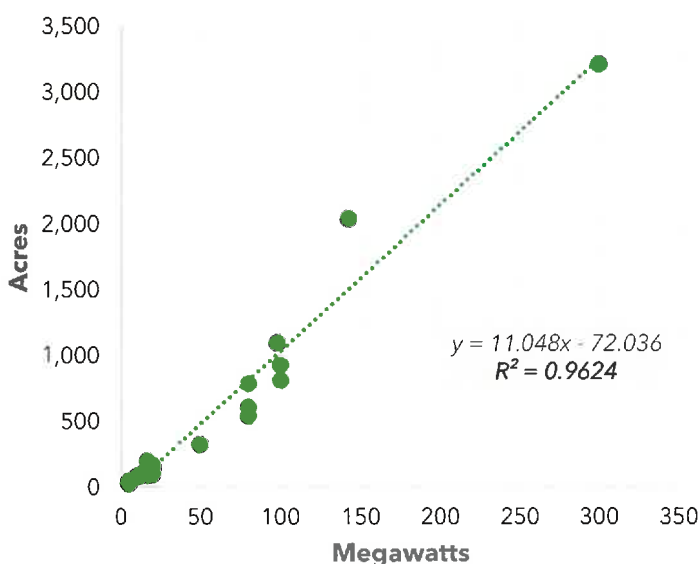
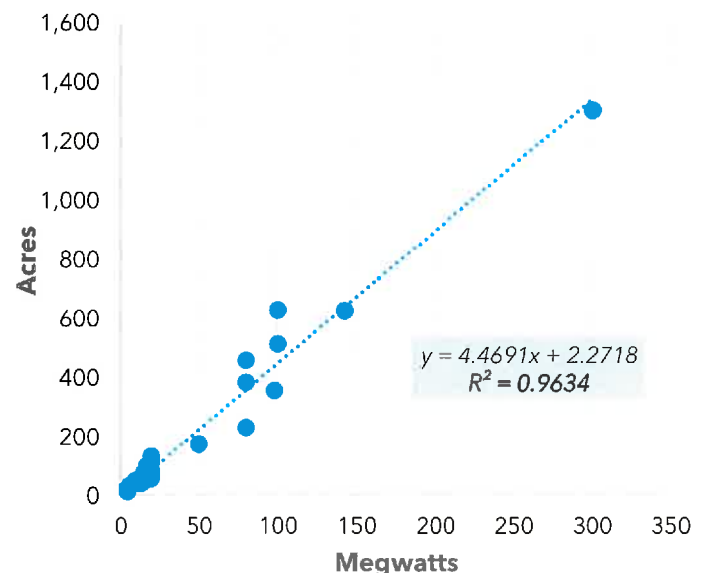


Figure 13. Relationship Between Panel Footprint Area and Megawatt Capacity



4.3 | Land Cover and Land Use Change

Based on the Virginia Statewide Land Cover Dataset (VaLCD), Virginia’s 38 active solar facilities have primarily disturbed agriculture and forested land uses. A similar analysis based on the 2016 and 2006 National Land Cover Datasets (NLCD) is in Appendix B and largely confirms the findings from the VaLCD.

Previous forested land covers (Forest, Tree, and Harvested/Disturbed) account for 62.9% of all land currently used for solar facilities. The Forest classification specifically accounts for the most land cover change (58.1%). While this suggests that forested land is most likely to be impacted, these findings are influenced by a few data outliers (see *Figures 16 and 17*). Therefore, the results of this

Table 7. Solar Facility Land Impacts by Land Cover Classification

Land Cover Classification	Total Acres	Total Percent	Facility Average
Forest	8,035.1	58.1%	38.0%
Cropland	3,443.8	24.9%	45.9%
Pasture	966.2	7.0%	5.7%
Harvested/Disturbed	471.2	3.4%	3.0%
NWI/Other	327.6	2.4%	0.7%
Shrub/Scrub	231.5	1.7%	0.6%
Tree	194.6	1.4%	2.6%
Turf/Grass	134.0	1.0%	3.1%
Impervious	30.9	0.2%	0.5%
Open Water	6.7	0.0%	0.1%
Barren	0.0	0.0%	0.0%

Virginia Land Cover Dataset

Primary Land Cover Classifications

Forest

- Forest- Areas of at least 30% canopy cover of woody vegetation and **more** than one (1) acre in size.
- Tree- Areas of at least 30% canopy cover of woody vegetation and **less** than (1) acre in size.
- Harvested/Disturbed- Areas of forest clear cut or temporary clearing of vegetation.

Agriculture

- Cropland- Areas with vegetation planted or managed for production of food, feed, or fiber.
- Pasture- Areas of grasses and legumes for livestock grazing or production of seed or hay.

Herbaceous

- Shrub/Scrub- Woody vegetation with stems less than 6 meters tall
- Turf/Grass- Grasses planted in developed settings for aesthetic or erosion purposes as well as natural grass lands.

Wetlands

- NWI/Other- Areas with at least 25% vegetation that is periodically saturated with water.

analysis do not mean that all or even most solar facilities in Virginia are built on forested land. For example, the Gloucester Solar facility pictured in *Figure 14* is on a site that was mostly cropland. The Facility Average column in *Table 7* is a normalized land cover change measurement of individual facilities.

Agriculture land (Cropland and Pasture) equals 31.9% of the land disturbed by solar facilities. The Cropland classification specifically equals about 25% of the total statewide land use. Pastures equal the remaining 7.0% of agricultural land used by solar facilities. The remaining land covers (Herbaceous, Shrub/Scrub, Wetlands, Impervious, Barren, and Water) collectively account for only 5.2% of the total disturbed area of solar facilities.

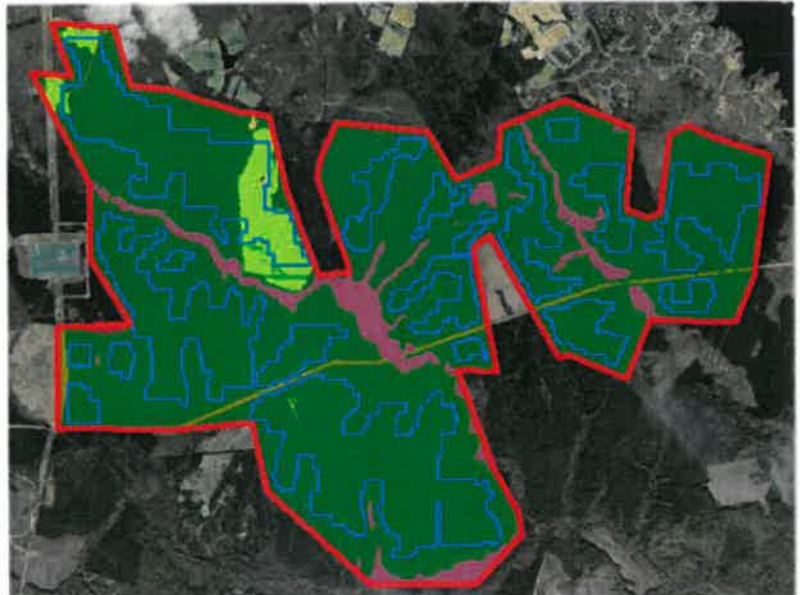
When land cover change is analyzed statewide based on individual solar facilities and not by the total statewide combined area, a slightly different trend emerges. This helps to normalize outliers like the 300 MW Pleinmont Solar and the 142 MW Colonial Trail West Solar facilities which are much larger, and both occupy sites that were more than 85% forested (*See Figure 15*). After normalizing each solar facility regardless of size, the average land cover type of a solar facility was about 46% Cropland and 38% Forest. This means that an individual solar facility in Virginia is more likely to be sited on cropland than on forest land. Nevertheless, there is still a high level of variation between the land cover changes of individual solar facilities.

Figure 14. Land Cover of Gloucester Solar, Gloucester County, VA



*Cropland: 96.8%, Tree: 3.2%

Figure 15. Land Cover of Pleinmont Solar, Spotsylvania County, VA



*Forest: 88.4%, NWI: 5.9%, Pasture: 3.6%, Shrub/Scrub: 1.4%

Although the two largest solar facilities in the state occupy mostly forested lands, there does not appear to be enough data to conclude that facility size is correlated with a specific land cover type. As shown in *Figures 16 and 17*, solar facilities up to 100 MW in capacity occupy sites with a wide range of cropland and forest land covers. However, as more large solar facilities over 100 MW in capacity are developed in Virginia this should be updated to determine if very large solar facilities continue to be sited in heavily forested areas.

Figure 16. Share of Cropland Land Cover Impacted by Each Solar Facility

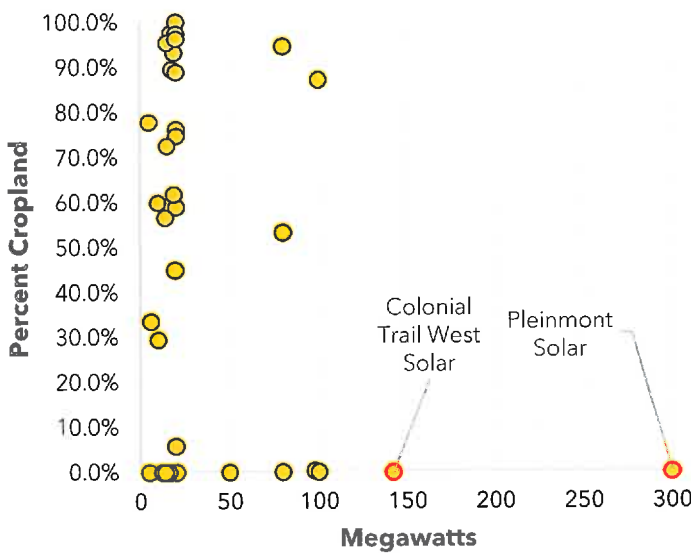
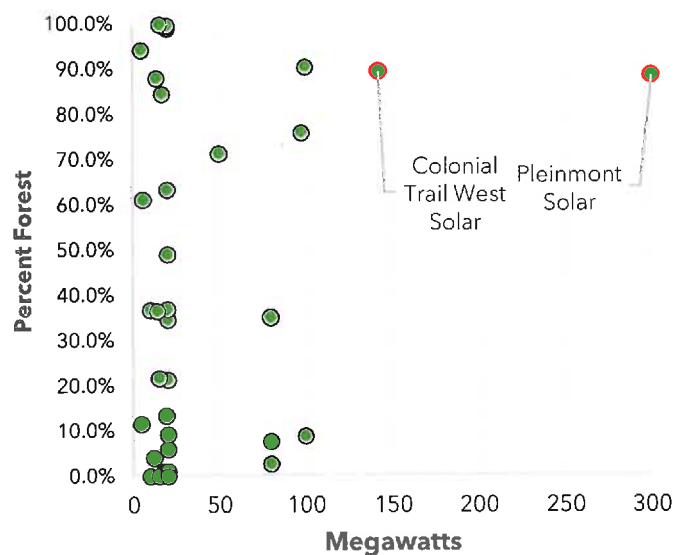


Figure 17. Share of Forest Land Cover Impacted by Each Solar Facility



While there are some facilities occupying sites with multiple previous land cover types, most facilities (26 of 38) occupy a site with a single land cover type accounting for at least 75% of the total disturbed site area. *Figure 18* reaffirms that individual solar facilities have been more often located on sites that were mostly cropland. Although the total statewide area of solar facilities was more heavily forested due to the influence of the state's largest facilities, there have been fewer total facilities constructed on heavily forested sites. This is an important distinction which means that more individual solar facilities occupy cropland, but more of the combined total acreage of all solar facilities was forested.

Figure 18. Number of Solar Facilities by Primary Impacted Land Cover Type (>75%)

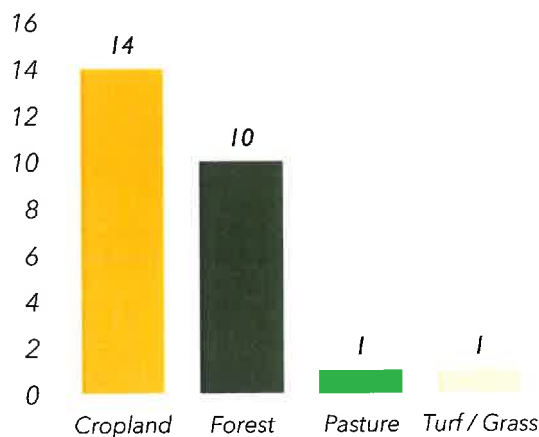
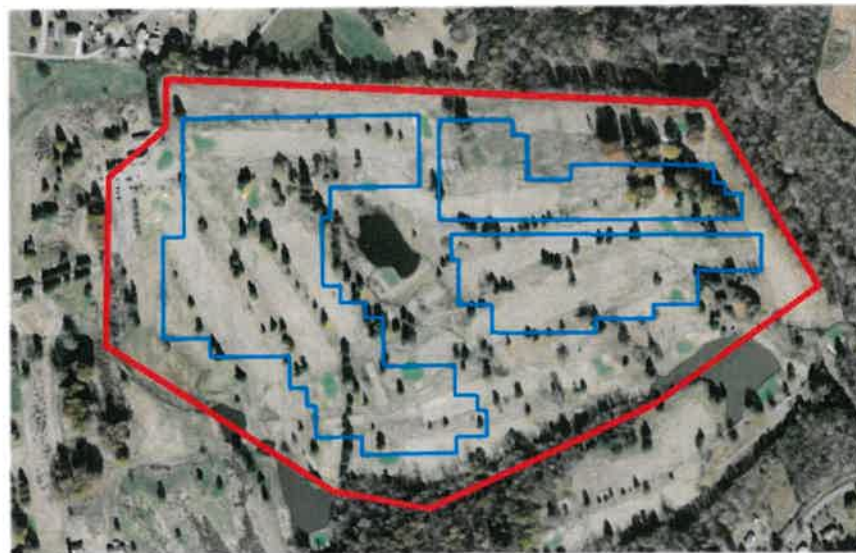


Figure 18 also presents two unique examples of specific solar facilities in Virginia that occupy sites with a single land cover type that was neither cropland nor forest. A third facility also occupies a site that was 68% pastureland. These three solar facilities pictured below represent the only three facilities in Virginia that do not occupy sites with a majority (>50%) of forested land, cropland, or a combination of both. Grasshopper Solar is an 80 MW facility located on a site previously used as pastureland for grazing. Clarke Solar (10 MW), which is the only solar facility in extreme Northern Virginia was also primarily pastureland. As previously noted, the Pasture classification includes both lands for grazing and natural grasslands. Finally, Danville Solar (12 MW) was mostly classified as Turf/Grass because of its location on an old golf course. This site was the only facility in this analysis that appeared to occupy a previously disturbed site that was used for a different active use.

Figure 19. Land Cover of Danville Solar, Pittsylvania County, VA



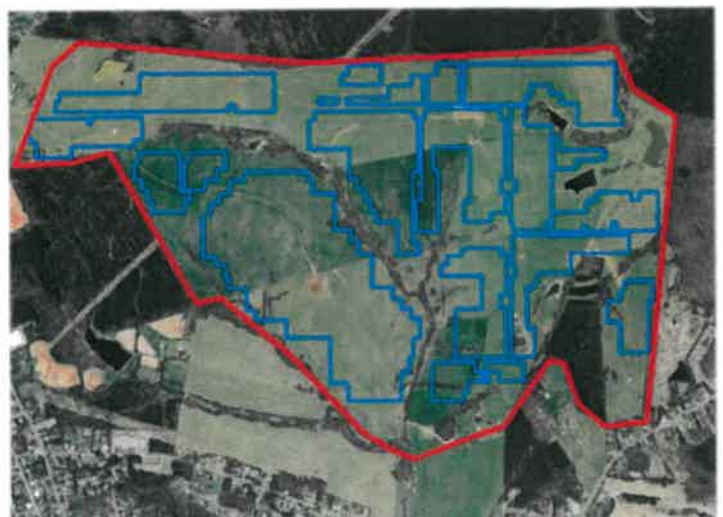
*Turf/Grass: 72.9. %, Tree: 21.1%, Forest: 4.1%

Figure 20. Land Cover of Clarke Solar, Clarke County, VA



*Pasture: 67.5%, Cropland: 29.7%,

Figure 21. Land Cover of Grasshopper Solar, Mecklenburg County, VA



*Pasture: 82.6%, Forest: 7.7%, Tree: 7.6%, Shrub/Scrub: 1.4%

4.4 | Forested Lands

Since forest and agricultural lands are most likely to be impacted by solar facilities, it is important to further analyze the type and quality of these land cover types. Accordingly, this section focuses on the overall conservation value of forested land that has been used for solar facilities, while the next section analyzes the quality and suitability of cropland that has been converted into solar facilities.

Figure 22. Distribution of Forest Conservation Values of Forest Land Impacted by Solar Facilities

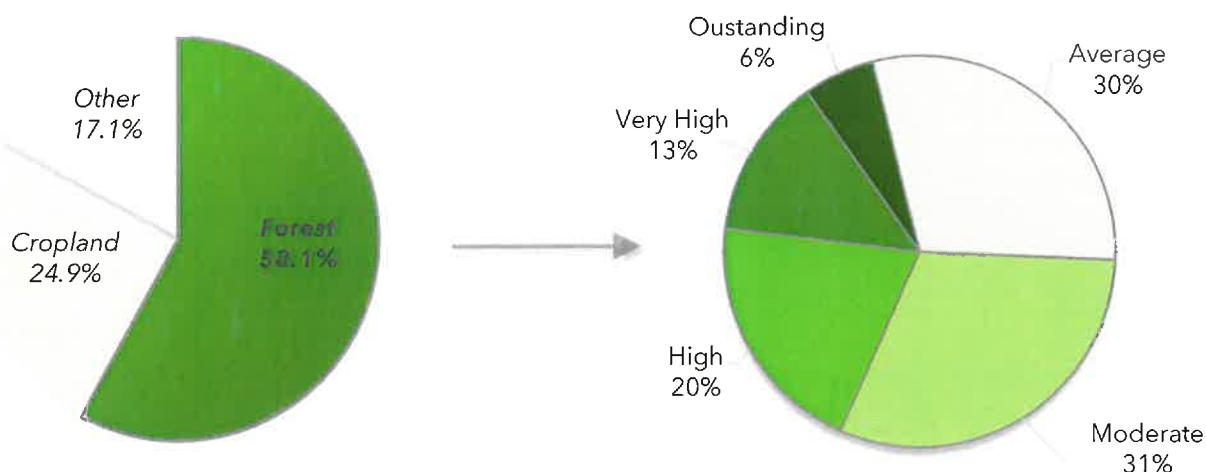


Table 8. Forest Conservation Values of Forests Impacted by Solar Facilities Compared to Statewide Distribution

Classification	Forests Impacted by Solar	All Virginia Forests
Average	29.6%	19.5%
Moderate	31.0%	20.5%
High	20.3%	20.7%
Very High	13.3%	19.4%
Outstanding	5.9%	19.8%

Based on the Virginia Department of Forestry’s Forest Conservation Model (FCV), the forested land that has been converted into solar facilities is less likely to be of the highest conservation value (Outstanding or Very High). The FCV Model identifies priority forestland by considering watershed integrity, size of forested blocks, connectivity and proximity to other conserved lands, the threat of conversion, and the presence of diminished tree species. The model equally distributes all Virginia forests into five categories with roughly 20% of all statewide forests within each category. By comparison, only 5.9% of the forest land used for solar facilities was rated Outstanding, and 13.3% was rated Very High. Instead, solar facilities have been more likely to convert forested lands with the two lowest categories of forest conservation values (Average and Moderate).

Although most solar facilities have not impacted forest lands with the highest conservation values, there are a few examples of solar facilities built primarily on forest land with the highest conservation values. This includes Scott I and II Solar (17/20 MW) in Powhatan County, Martin Solar (5 MW) in Goochland County, and Whitehouse Solar (20 MW) in Louisa County (Table B4 in Appendix B). Interestingly, these four facilities are all located in Central Virginia in contiguous counties.

4.5 | Croplands

Next, the Virginia Agricultural Model from Virginia ConservationVision helps to isolate the quality of active croplands that have been used for solar facilities. Unlike the Forest Conservation Model that equally classifies forest land into five evenly distributed classifications, the Agricultural Model has five classifications with an unequal distribution of total land in each classification. Statewide, the Agricultural Model rates a larger proportion of farmland as highly suitable. This helps to explain the larger proportion of solar facilities built on highly suitable farmland. A complete description of the methodology of the Agricultural Model and each classification is located in Appendix B.

Figure 23. Distribution of Farmland Suitability Values of Cropland Impacted by Solar Facilities

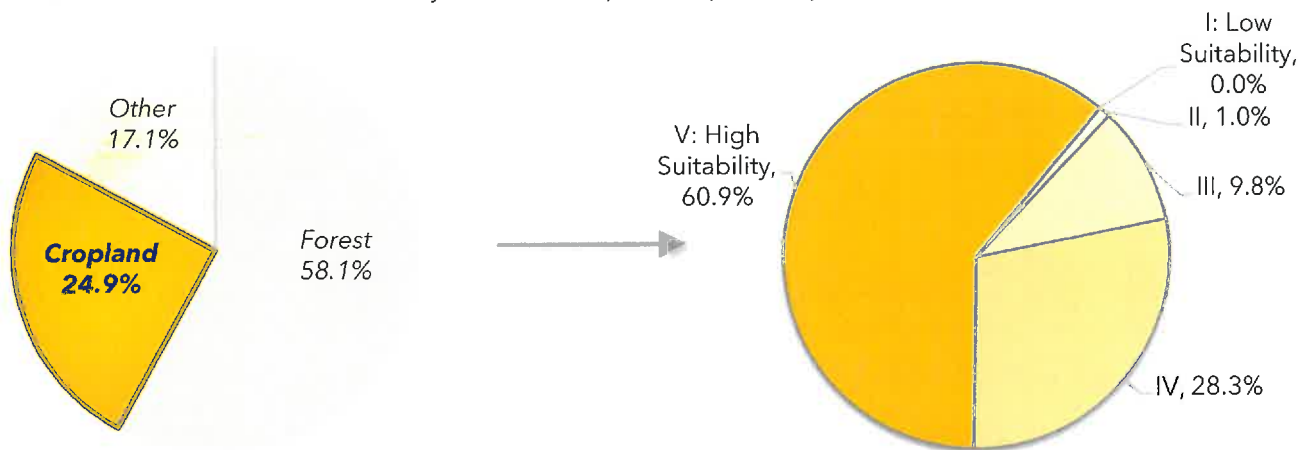


Table 9. Farmland Suitability Values of Cropland Impacted by Solar Facilities Compared to Statewide Distribution

Classification	Croplands Impacted by Solar	All Virginia Croplands
Class I: Low Suitability	0.0%	1.5%
Class II	1.0%	11.3%
Class III	9.8%	11.8%
Class IV	28.3%	39.3%
Class V: High Suitability	60.9%	36.1%

Table 10. Soil Quality Score of Cropland Impacted by Solar Facilities

Soil Quality Score	Croplands Used for Solar
Low: 0-20	0.7%
20-40	3.4%
40-60	18.2%
60-80	20.6%
High: 80-100	57.0%

Despite the difference in the methodology of the model, solar facilities still appear to be often built on croplands with the highest suitability classification. With close to 61% of the cropland used for solar facilities rated as highly suitable, solar facilities do appear to use a higher proportion of prime agricultural land. Currently, a total of six solar facilities are built on sites where most of the land (>75%) is rated as highly suitable (Class V) for agriculture. This includes Sappony Solar (20 MW) in Sussex County, Hollyfield Solar (17 MW) in King William County, Cherrydale Solar (20 MW) in Northampton County, Puller Solar (15 MW) in Middlesex County, Montross Solar (20 MW) in Westmoreland County, and Mechanicsville Solar (20 MW) in Hanover County. These facilities are mostly located in central and eastern Virginia where more fertile agricultural lands are present.

Several possible factors may help to explain the increased prevalence of siting solar facilities on cropland with high suitability. First, some of the qualities that make cropland highly suitable also make the land highly suitable for solar facilities. This may include climate, topography, accessibility, soil stability, and the size of a parcel. Many of these factors should be analyzed in more detail in the future.

To further assess the impact of solar facilities on agricultural lands, the National CropScape and Cropland Data Layer from the United States Department of Agriculture (USDA) was used to identify the types of crops cultivated on the impacted sites. Although this information changes annually, this analysis is based on the 2015 data layer and provides a basic insight into a single point in time. Based on this analysis, corn, soybeans, cotton, and wheat were the most common types of crops to be impacted. These disturbed areas account for only a very small proportion of all active cropland in the state. Corn and soybeans were the most impacted crops by solar facilities. These crops were also the most planted statewide both totaling over 450,000 acres (*Table 11*). Based on this analysis, cotton was impacted at a disproportionately high rate based on the total statewide acreage. Most of this cotton acreage comes from the Southampton Solar facility in Southampton County (388 acres) accounting for over half of all converted cotton cropland. Other culturally important crops to Virginia like tobacco and peanuts were not as widely impacted. There are likely several economic factors that help to explain these existing trends that should be explored in further detail as more facilities are built.

Table 11. Types of Crops Grown on Croplands Impacted by Utility-Scale Solar Facilities

Type of Crop	Disturbed Acres	Share of Disturbed Croplands	Total Statewide Planted Acres	Share of Statewide Croplands
Corn	914	26.5%	463,800	29.6%
Soybeans	870	25.2%	582,700	37.2%
Cotton	674	19.6%	83,800	5.3%
Double: Winter Wheat/Soybeans	410	11.9%	216,800	13.8%
Peanuts	165	4.8%	13,500	0.9%
Winter Wheat	78	2.3%	30,100	1.9%
Alfalfa	68	2.0%	23,500	1.5%
Potatoes	57	1.7%	3,300	0.2%
Sorghum	53	1.6%	10,300	0.7%
Tobacco	23	0.7%	8,600	0.5%
All Others (Each <0.5%)	106	3.1%	---	---
Other Hay/ Non Alfalfa*	68	2.0%	23,500	---

*Other Hay/Non Alfalfa is not classified as cropland in the Virginia Land Cover Dataset. It is considered pastureland. The resulting 68 acres founds in this analysis of CropScape data is likely the result of inconsistencies between each dataset.

4.6 | Demographics

In addition to the physical impacts of utility-scale solar facilities on land use, demographics are also a relevant component of development. The following research identifies the basic demographic factors of communities that are near operating solar facilities. This demonstrates what types of communities are bearing the burden of solar energy development or receiving the associated benefits that solar facilities may provide to landowners, local governments, and nearby residents. Household income and race are the two primary factors considered in this analysis. Information on population density, median house value, and poverty rate are also included.

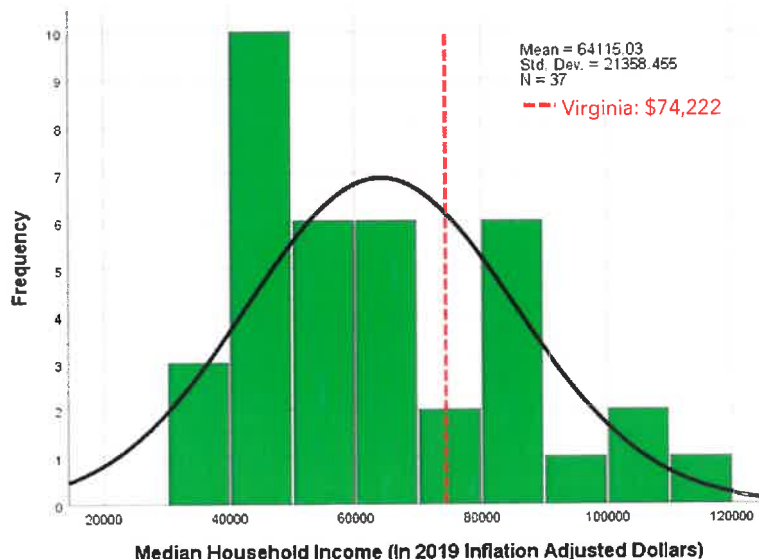
Household Income

Based on the income levels of census tracts where solar facilities are present, existing solar facilities in Virginia are in areas with a wide variety of income levels from as low as \$35,000 up to about \$120,000. Based on the Virginia average median household income of \$74,222, a larger portion of utility-scale solar facilities are sited in areas that are predominantly middle and low-income (Figure 24). A total of twelve (12) facilities are located in census tracts with median household incomes that exceed the statewide average. There are 25 facilities located in census tracts with household income levels below the statewide average. Communities with a household income level between \$40,000 and \$50,000 are the most common (10) census tract with a solar facility. The communities with lower median household income levels are also more likely to have larger solar facilities. This means that a larger share of electricity generation from solar facilities is taking place in lower-income areas (Table 12 and Figure 25).

An important component of these findings is that solar facilities are primarily located in rural areas where income levels are often lower than Virginia's more densely populated areas. The availability and cost of land are a driver of the locations of solar facilities that may also be associated with household income levels in the area. This however does not mean that solar facilities in Virginia are not also located in areas of high income. The state's largest solar facility (Pleinmont Solar in Spotsylvania County) by both acreage and megawatts is in the census tract with the highest median household income of any census tract with a solar facility.

Figure 24. Distribution of Solar Facilities by Median Household Income

*Oceana Solar is in a census tract that does not report MHI



ACS 2019 Census Tracts

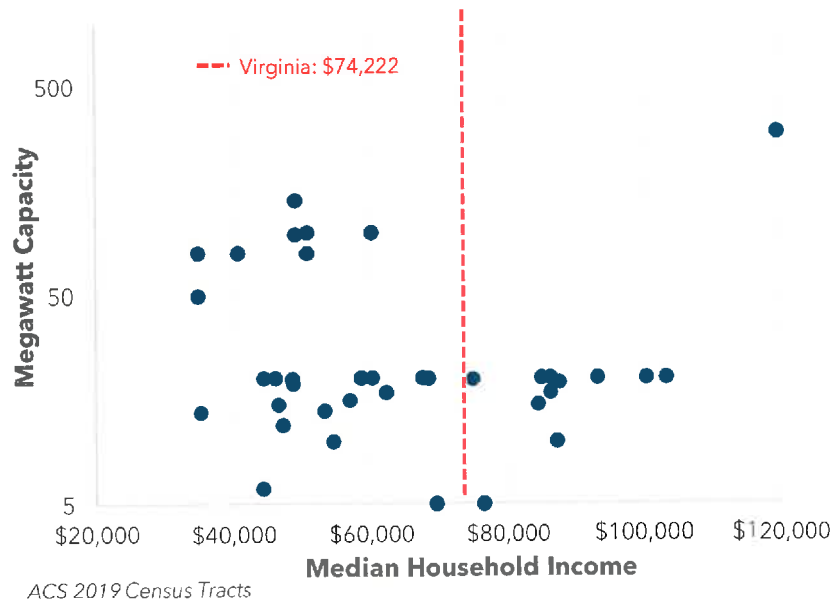
Table 12. Distribution of Solar Facilities by Median Household Income

Median Household Income	Total Facilities	Total MW	Share of Statewide Generation (MW)
< \$40,000	3	144	9.7%
\$40,000-\$59,999	16	672	45.3%
\$60,000-\$79,999	8	207	13.9%
\$80,000-\$99,999	7	121	8.2%
≥ \$100,000	3	340	22.9%

ACS 2019 Census Tracts

Although Pleinmont Solar in Spotsylvania County is an outlier as a large facility in a high-income area, it does appear that most of Virginia’s largest (>50 MW) solar facilities have been located in areas with lower household incomes. The solar facilities in Virginia with capacities up to 20 MW have been constructed in communities of varying income levels (Figure 25). There are no facilities between 20 and 50 MW in Virginia. However, of the nine (9) facilities larger than 50 MW, eight of them are located in census tracts with median household incomes at or below \$60,000. This is well below the statewide average of \$74,222. This suggests an emerging trend where larger solar facilities are being located in lower-income areas. This trend is preliminary and will require further analysis as more solar facilities are built. However, these findings do substantiate the importance of creating beneficial siting agreements that allow local governments and nearby residents to maximize the benefits available through siting agreements to improve local quality of life, particularly in distressed and low-income communities.

Figure 25. Solar Facility Size Compared to Local Median Household Income



Race

Like income, there are a few notable trends based on the percentage of the population by race in the communities where solar facilities are located. To date, solar facilities have been built in areas with a very small minority population as well as other areas with a relatively high minority population. However, based on the total average (26.6%), solar facilities have been slightly more likely to be in areas with an African American population greater than the statewide average of 19.8% (Figure 26). By comparison, the average percent White population of census tracts with solar facilities was 68.9% compared to the state average of 67.7% (Figure 27). A total of 22 solar facilities (out of 38) are in census tracts with an African American population above the statewide average. Additionally, four (4) solar facilities have been built in areas with an African American population greater than 50%. Moreover, the siting of solar facilities is far less common in areas with significant populations of all other races. This is likely the result of demographic patterns in rural Virginia that consists primarily of White and African American populations.

Figure 26. Distribution of Solar Facilities by Black or African American Population of Nearest Census Tract

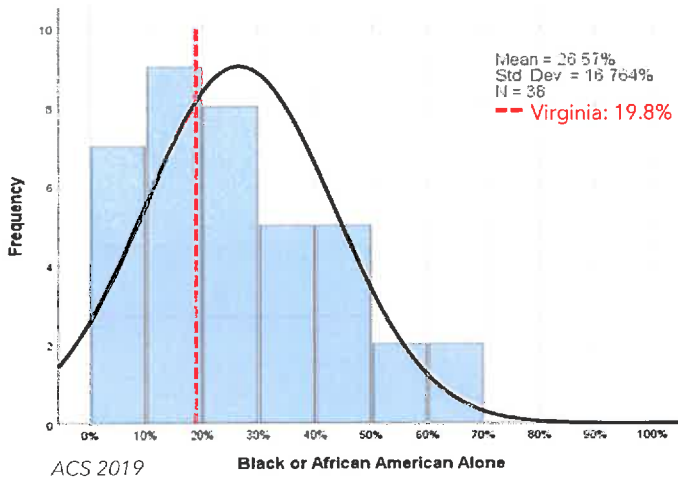


Figure 27. Distribution of Solar Facilities by White Population of Nearest Census Tract

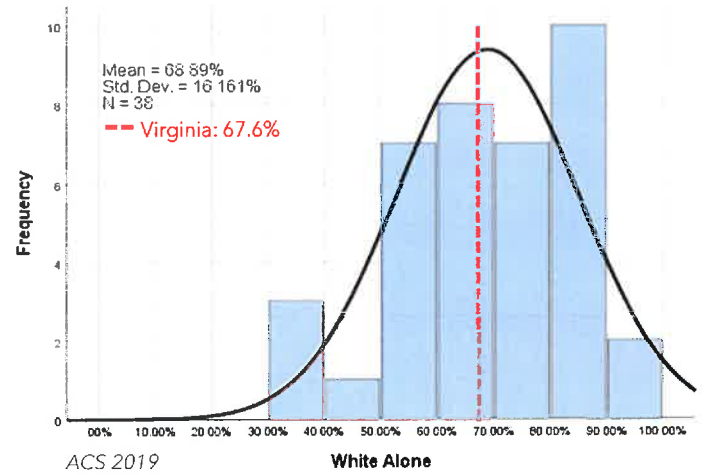
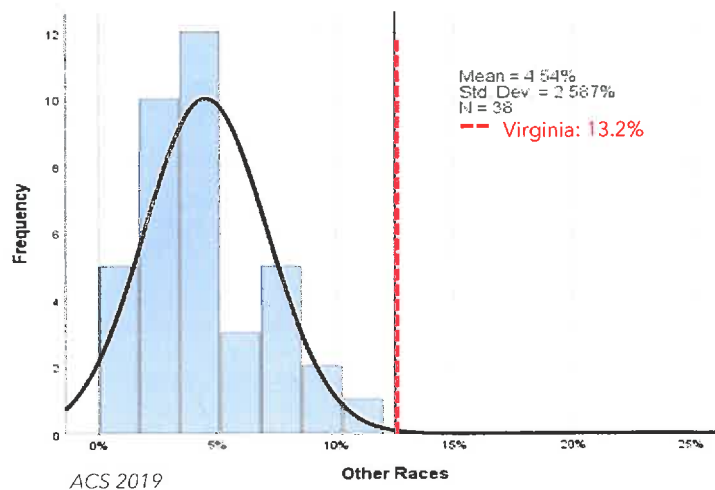
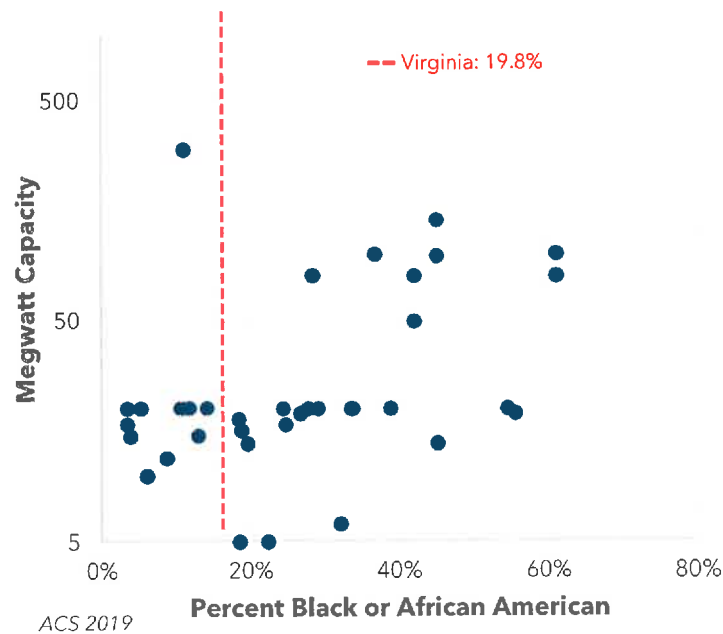


Figure 28. Distribution of Solar Facilities by Population of Other Races of Nearest Census Tract



Similar to household income, it does appear that most of Virginia's largest solar facilities are located in census tracts with a relatively high African American population. The Pleinmont Solar facility in Spotsylvania County is the only exception to this trend. All other solar facilities over 50 MW in size are in census tracts with an African American population that is greater than 25%. Further analysis will be necessary to identify potential explanations for this pattern and to understand the potential impacts and benefits of solar development on minority populations.

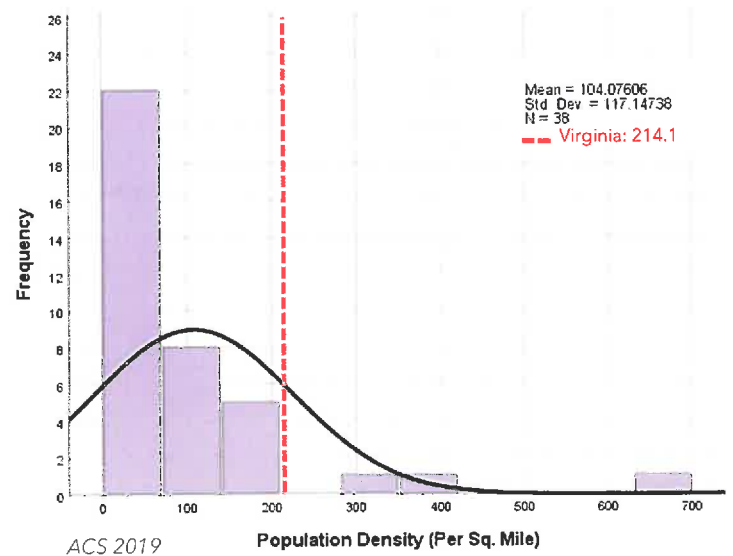
Figure 29. Solar Facility Size Compared to Percent African American Population of Nearest Census Tract



Additional Demographic Factors

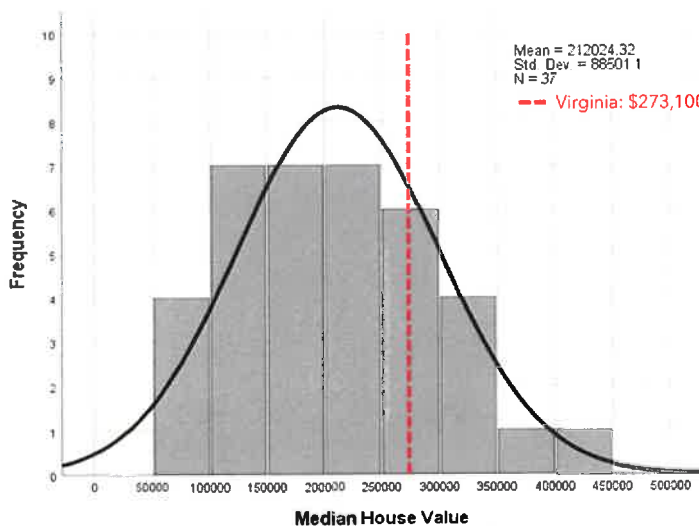
In addition to income and race, there are a few additional demographic factors that provide further insight into the development patterns of utility-scale solar facilities. First, the data on population density indicates that solar facilities are typically located in less dense rural areas. Most solar facilities are in census tracts with less than 50 people per square mile. Given the total land requirements for solar facilities, the population density of surrounding communities will likely continue to remain relatively low. The solar facilities in Fauquier County, Henrico County, and Virginia Beach City are the only sites that have been built in census tracts with population densities that exceed that statewide average (Figure 30).

Figure 30. Distribution of Solar Facilities by Population Density of Nearest Census Tract



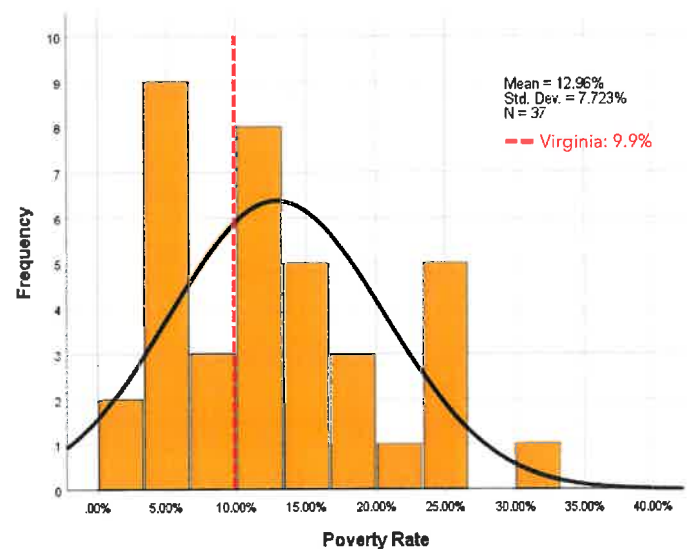
Both the median house value and the poverty rate of communities with solar facilities are similar to the household income findings. Overall, solar facilities are less likely to be built in locations with very high median house values and are more likely to be built in areas with higher poverty rates. While both vary widely, the comparison of the average to the statewide average provides a useful comparison (Figures 31 and 32). The local poverty rate should be carefully considered in siting agreements of new solar facilities to ensure that they actively contribute to and improve the quality of life for residents.

Figure 31. Distribution of Solar Facilities by Median House Value of Nearest Census Tract



ACS 2019

Figure 32. Distribution of Solar Facilities by Poverty Rate of Nearest Census Tract

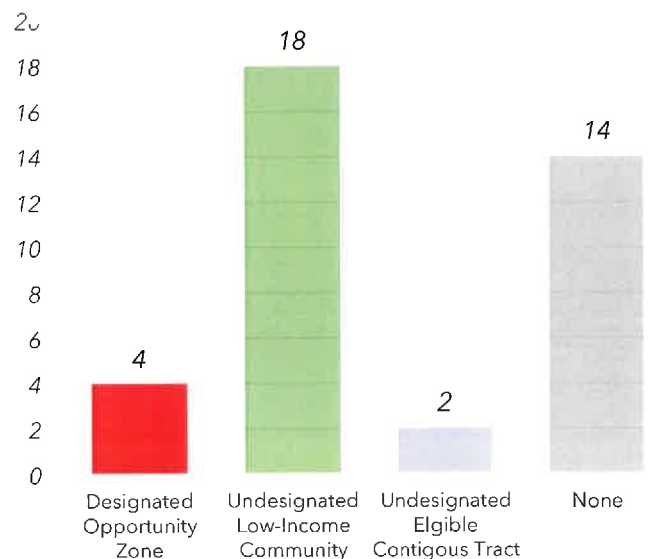


ACS 2019

Opportunity Zones

Currently, only four (4) solar facilities are located in census tracts that are designated as Opportunity Zones. An additional 18 facilities are located in census tracts that are undesignated low-income communities that qualify for an opportunity zone designation. This is an important distinction given the economic incentives and benefits available to both developers and local communities choosing to site solar facilities in opportunity zones.

Figure 33: Solar Facilities in Officially Designated Census Tracts



4.7 | Best Practices

Through the passage of the Virginia Clean Economy Act in 2020, Virginia made an important step in joining a host of other states that have committed to a transition to 100% clean energy. This is a major decision that includes overcoming several hurdles to fully realize a future that is free of carbon emissions. Many other states have already taken steps to renewable energy that are transferable to the implementation of solar energy in Virginia.

First, expanding the quantity and quality of public information available on the rapidly expanding implementation of renewable energy is critical to promoting transparency and supporting further analysis on the subject. To date, many government agencies have struggled to maintain comprehensive data on the rapid expansion of solar energy. Compiling and updating this information provides a basis for eliminating misconceptions and identify policy priorities. Accordingly, some states have already begun to develop and publish informative datasets focused on the implementation of solar infrastructure. Agencies like the California Energy Commission, the Maryland Energy Administration, and the New York State Energy Research have published information on the size and location of all solar facilities in the state.⁵⁰ Other nonprofits like the North Carolina Sustainable Energy Association have partnered with public agencies to collect basic information on the size and location of solar facilities.

However, the state of New Jersey stands out for its committed effort to consistently update and publish solar development information. This includes comprehensive geospatial information on the size, location, and boundaries of all solar facilities greater than one (1) MW. Within the State of New Jersey's Board of Public Utilities, the Office of Clean Energy has established the New Jersey Clean Energy Program to promote renewable energy. This includes the Solar Activity Report which is published monthly that provides detailed information for all solar projects that are installed and currently under development in New Jersey.⁵¹ The report categorizes all installed and planned solar projects in the state and routinely updates their status of development. Furthermore, this information is provided to the Department of Environmental Protection's Climate Change, Clean Energy, and Sustainability Element to create various GIS data layers related to solar. This includes the physical boundaries of all PV solar facilities greater than one (1) MW classified as either grid supply installations or behind-the-meter installations.⁵² This data was collected in a manner similar to the methods used in this research based on aerial and live satellite information.

Ultimately, this information should also be compiled in a comprehensive national database. The United States Wind Turbine Database (USWTDB) offers a foundation for creating a similar database of all solar energy infrastructure in the United States. The database is constantly updated with accurate geospatial information through a collaboration between the U.S. Department of Energy, the U.S. Geologic Survey, the American Clean Power Association, and the Electricity Markets and Policy Group. A similar collaboration for solar energy facilities to properly understand the larger development impacts nationwide will be an important component of promoting their sustainable development in the coming years.

⁵⁰ <https://www.nyserda.ny.gov/All-Programs/Programs/NY-Sun/Solar-Data-Maps/Statewide-Projects>,
https://ww2.energy.ca.gov/sitingcases/solar/index_cms.html

⁵¹ <https://njcleanenergy.com/renewable-energy/project-activity-reports/project-activity-reports>

⁵² <https://www.state.nj.us/dep/aqes/gisdownloads.html>

5.0 | Conclusion

This research has explored several factors related to the recent development of utility-scale solar facilities in Virginia. Understanding the impacts and opportunities of the historical placement of solar facilities is critical to avoiding future land use conflicts and supporting Virginia's energy and decarbonization goals. The development of utility-scale solar facilities like many other methods of electricity generation is a land-intensive process with real impacts on local communities. This research characterizes some of these impacts and provides a foundation for future analysis and policy considerations. It also substantiates the role that local and regional planners have in the siting decisions of utility-scale projects and their influence on the future of energy generation in Virginia.

Virginia's 2050 clean energy goal and its deployment of solar energy is a necessary, appropriate, and attainable goal consistent with statewide management policies and practices. However, as Virginia continues to encourage utility-scale solar development, it is important to contextualize the current development patterns and impacts of solar development to inform better land use practices. Specifically, the land use of existing utility-scale solar installations in rural areas primarily on forested and agricultural land demonstrates the high degree of connectedness and interdependence between the land use and activity of urban and rural areas. This is not a new occurrence unique to solar development. Rural areas have long held a critical role in providing consumption goods such as food, energy, raw materials, and labor to urban areas. The recent development of solar facilities in rural areas is just a new example of this relationship. As Virginia's most populated areas grow and demand more energy, the interests of natural rural areas must be carefully considered to realize a sustainable energy future. The findings and recommendations in this research are guided by this need to balance local land use interests with larger statewide renewable energy goals.

Finding this balance between local land use interests and renewable energy goals substantiates the role of planners in a clean energy future. The widespread deployment of solar energy facilities has led to the intersection of energy planning and land use planning unlike ever before. Given the prevalence and size of new solar facilities occupying land in many of Virginia's localities, local planners will be directly involved in numerous siting decisions. The challenges and opportunities that solar facilities present in local communities demonstrate the outsized role that local planning will have on the clean energy future in Virginia.

Additionally, this discussion of utility-scale solar facilities is part of a much larger transition occurring in Virginia and worldwide to mitigate the harmful impacts of fossil fuel energy generation. The development of utility-scale solar facilities is not independent of efforts to reduce energy use, integrate local distributed solar systems into the urban fabric, and promote other renewable energy sources. While utility-scale solar is an important source of affordable and reliable renewable energy, it is only one of many components of Virginia's clean energy future. As planners, policymakers, researchers, and developers consider land use regulations to guide the development of solar facilities, they must also recognize their role in simultaneously supporting other activities that can reduce local energy use and incorporate energy generation into the built environment.

Finally, while the findings of this research have clarified some uncertainties about the impacts of utility-scale solar across Virginia, it has also exposed many more topics, questions, and concerns that should be explored in the future. The dataset created for this research has significant value for continuing to assess and characterize the potential impacts of solar development. This research has

simply investigated some of the most pressing topics related to the development of solar facilities, but there remain many unexplored factors that this dataset may help to explain. This data should be explored, updated, and shared to fully understand all the relevant impacts and ongoing trends. For this reason, this research simply serves as a foundation for further research and analysis.

6.0 | Recommendations

Based on the analysis and research into the existing land use and development trends of solar facilities in Virginia, a list of recommendations is provided below to help encourage the sustainable development of solar energy facilities. The specific goals and objectives are oriented towards continuing to assess the related impacts of solar facilities while also planning new solar energy systems that reduce potential conflicts with land use while also expanding access and opportunity. Specifically, the recommendations in this plan build upon the overarching pursuit of sustainable development. The methods and findings of this research establish a foundation for continuing to track the development of utility-scale solar facilities. The findings also reveal new areas of interest and concern that should be further evaluated. Finally, this research provides the necessary context to promote policy guidance and development strategies that more fully balance environmental, social, and economic sustainability interests.

The recommendations of this plan are intended for the Virginia Department of Mines, Minerals, and Energy and are informed by the results of this research. However, the findings and recommendations for this plan are also informative and useful for a variety of stakeholders. The sustainable development of solar energy facilities in Virginia will ultimately be a collaborative process and the following recommendations are intended to complement the ongoing work of numerous stakeholders across the state.

6.1 | List of Recommendations

Vision: Virginia has abundant solar energy to sustainably power the Commonwealth for generations. Proper energy and land use planning can minimize the unfavorable impacts of solar energy development while fully maximizing the benefits and opportunities of the widespread deployment of solar energy facilities.

Goal 1: Ensure that Virginia’s transition to clean energy and specifically solar is consistently tracked, documented, and accessible.

Objective 1.1: Develop and maintain a comprehensive dataset on the implementation of solar energy infrastructure across Virginia.

- a. Reference new statewide aerial photography from the Virginia Base Mapping Program to confirm and update the exact location and boundaries of existing solar facilities.
- b. Establish a consistent criterion for data updating and entry that follows a scalable framework.
- c. Publish a GIS data layer available for public access quarterly that includes the boundaries and attributes of all solar facilities greater than 1 MW in Virginia.
- d. Create an online mapper displaying basic information on the location, size, and attributes of existing solar facilities.
- e. Coordinate with entities outside Virginia to establish a national database on solar infrastructure similar to the U.S. Wind Turbine Database (USWTDB) hosted by the United States Geologic Survey (USGS).

Objective 1.2: Collaborate with other state agencies to expand the quality and quantity of available information.

- a. Work with the Department of Environmental Quality (DEQ) to update the Permit by Rule (PBR) application requirements to include a digitized vector GIS layer of solar site boundaries and solar panel footprint.
- b. Build and update a queryable database that relates state land cover, land use, conservation, and demographic information collected by other agencies with the locations of solar facilities.
- c. Partner with the Department of Conservation and Recreation to update the ConserveVirginia dataset to better accommodate the ongoing implementation of solar infrastructure across rural areas.

Objective 1.3: Partner with academic and non-profit researchers to improve the accuracy of the data and determine new topics for additional tracking.

- a. Offer research grants to researchers to conduct large quantitative analyses on siting data.
- b. Compile and evaluate the relevant siting factors of battery storage units associated with utility-scale solar facilities.

Objective 1.4: Provide local and state decision-makers with the data tools and appropriate analysis to inform policymaking.

- a. Improve the Virginia Solar Energy Development and Energy Storage Authority Annual Report by including maps and other spatial information that show the most common areas of existing and recent solar development across the state.
- b. Coordinate with the DEQ and SCC to create and publish an annual report on land use trends of solar development.

Goal 2: Fully evaluate the drivers and impacts of solar energy facility siting throughout Virginia.

Objective 2.1: Study the specific economic factors of landowners, developers, and corporate and public energy buyers that have driven the development of utility-scale solar facilities.

- a. Review ownership and leasing records of parcels with utility-scale solar facilities that consider previous activity on developed lands.
- b. Explore the impacts of land leasing and sale costs on the location and size of solar facilities.
- c. Study the business models associated with different sized utility-scale solar facilities, and how that might influence land use and demographic impacts.
- d. Support greater access to transmission line data and information on sub-station access to help further analyze the drivers that determine the location of future development.

Objective 2.2: Identify specific sites to monitor local land impacts such as microclimates, soil moisture, temperature, runoff, and wildlife access.

Objective 2.3: Explore possible patterns and trends of subcategories of utility-scale solar facilities in Virginia.

- a. Based on UVA Cooper Center's classification of Demographic Regions, explore land use and siting patterns of solar facilities specific to different regions in the state.
- b. Compare data of county-specific development trends with local zoning ordinances, comprehensive plans, and local regulatory processes to evaluate the influence and impact of local regulations.

Goal 3: Promote strategies to help offset and mitigate any existing and expected negative land use impacts.

Objective 3.1: Advocate for the colocation of utility-scale solar facilities that maintain productive farm uses within active solar site areas.

- a. Review the latest research on agrivoltaics and agriphotovoltaics (APV) to understand the viability of crop production and grazing in and around solar facilities.

-
- b. Work with the Virginia Department of Conservation and Recreation (DCR) to expand the Virginia Pollinator Smart Program.

Objective 3.2: Establish guidance and incentives to discourage widespread solar development on prime farmlands or forest conservation areas.

- a. Partner with the DEQ and DCR to establish criteria for preferable solar siting locations based on the locations of prime farmland, rare habitats, and important forests.
- b. Maintain the agricultural use assessment on solar sites when proper strategies such as size limitation, colocation, percent of project area, and soil quality guidance are followed.

Goal 4: Develop policy guidance and incentives that capitalize on viable underutilized, disturbed, and degraded lands and maximize quality of life benefits to local communities.

Objective 4.1: Work with policymakers to incentivize solar development on brownfields, degraded lands, abandoned mined land (AML) sites, parking canopies, and concentrated animal operation feeding operations (CAFOs).

- a. Create a project-based award to encourage solar energy production in areas of best use.
- b. Help localities to offer loan guarantees or low-interest loans for the development of brownfields for solar energy purposes.

Objective 4.2: Upgrade DMME and DEQ information on brownfields and make it more accessible to solar developers.

Objective 4.3: Assess environmental justice siting impacts.

- a. Set a target to ensure communities most affected by air, land, or water pollution receive the benefits of state spending on programs, grants, and investments in solar energy.
- b. Allocate workforce training funds for solar energy jobs that benefit communities of color and historically economically disadvantaged communities.
- c. Support tax credits for renewable energy investment in economically distressed areas.
- d. Integrate data on environmental justice communities from EPA EJ Screen and the Greenlink Equity Map with mapping efforts of solar facilities.

6.2 Implementation

Executing these recommendations will require multiple actors and partnerships to fully realize the potential of utility-scale solar in Virginia. The four main goals in this plan cover different topics and are not necessarily iterative. Therefore, the implementation schedule below outlines a separate phased approach for each goal. The schedule is categorized into *short-term* (0-3 years), *mid-term* (3-5 years), *long-term* (5-10+ years), and *ongoing*.

Goal 1

Expanding the quantity, quality, and availability of data related to the development of utility-scale solar facilities in Virginia is an immediate need. Improving access to this data represents an important step in being able to fully understand the potential land use impacts of utility-scale solar in Virginia. However, this goal requires a substantial amount of work and collaboration with a variety of entities to properly track the size, location, and impact of utility-scale solar infrastructure in Virginia and nationwide. In addition to the DMME, the DEQ, DCR, federal agencies, other state energy agencies, non-profits, universities, and solar developers will all be important contributors to a robust and accurate dataset tracking the implementation of solar facilities.

	Short Term	Mid Term	Long Term	Ongoing
1.1 Maintain dataset on solar development				
1.1: a) Update GIS Layers				
1.1: b) Establish consistent data collection processes				
1.1: b) Publish GIS layer of active solar facilities				
1.1: c) Create online mapper on solar development				
1.1: d) Assist in creation of a national dataset on solar				
1.2 Collaborate with state agencies				
1.2: a) Update DEQ's PBR application requirements				
1.2: b) Build database of land impacts				
1.2: c) Update ConserveVirginia				
1.3 Partner with universities and non-profits				
1.3: a) Develop research grants				
1.3: b) Gather info on battery storage				
1.4 Inform policymakers				
1.4: a) Improve Annual Solar Report				
1.4: b) Create annual report on land use				

Goal 2

Expanding the knowledge and research on both the impacts and benefits of utility-scale solar facilities will also require extensive collaboration outside of the DMME. In addition to agencies like DEQ and DCR, fully understanding the impacts of solar facilities will also require the inclusion of local governments, landowners, developers, and community members to fully assess local factors related to the development of utility-scale solar facilities.

	Short Term	Mid Term	Long Term	Ongoing
2.1 Study economic factors				
2.1: a) Review property history				
2.1: b) Explore land sale and leasing information				
2.1: c) Study developer business models				
2.1: d) Support access to transmission and substation data				
2.2 Conduct case studies of specific solar facilities				
2.3 Evaluate classifications of solar facilities				
2.3: a) Study development patterns by region				
2.3: b) Compare development with local land use policy				

Goal 3

Promoting strategies to actively mitigate potential impacts of utility-scale solar development will require creative strategies that include working with local and state policymakers to develop policies and tax incentives to influence the ideal types of development.

	Short Term	Mid Term	Long Term	Ongoing
3.1 Advocate for colocation				
3.1: a) Literature review of agrivoltaics				
3.1: b) Promote VA Pollinator Smart Program				
3.2 Protect farmland and forests				
3.2: a) Establish siting criteria near sensitive lands				
3.2: b) Maintain land use assessment for proper siting				

Goal 4

Finally, maximizing the benefits of utility-scale solar development emphasizes distributing the benefits and burdens of solar development to the most appropriate locations.

	Short Term	Mid Term	Long Term	Ongoing
4.1 Incentivize development on disturbed land				
4.1: a) Provide financial benefit to proper siting				
4.1: b) Loan guarantees/low-interest loans				
4.2 Upgrade availability of data on brownfields				
4.3 EJ siting impacts				
4.3: a) Create target for investment				
4.3: b) Allocate workforce training funds				
4.3: c) Support tax credit in distressed areas				
4.3: d) Integrate solar with EJ mapping tools				

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Appendix A: Methods

Data Sources

Virginia Land Cover Dataset

Created by the Virginia Geographic Information Network (VGIN), the Virginia Land Cover Dataset is a 12-classification scheme of statewide land use at a 1-meter resolution. The dataset was released in 2016 and is largely based on VGIN orthophotography from 2011 to 2015. The dataset also relies on a variety of state and national geospatial datasets to refine the classification scheme. The statewide dataset is very large and therefore is divided into tiled imagery and is available in both raster and vector format. For this analysis, the vector format was used.

Classifications:

Water

11 - Open Water

Developed

21 - Impervious Extracted

22 - Impervious External

31 - Barren

Forested

41 - Forest

42 - Tree

Shrubland

51 - Shrub/Scrub

Disturbed

61 - Harvested/Disturbed

Herbaceous

71 - TurfGrass

Planted/Cultivated

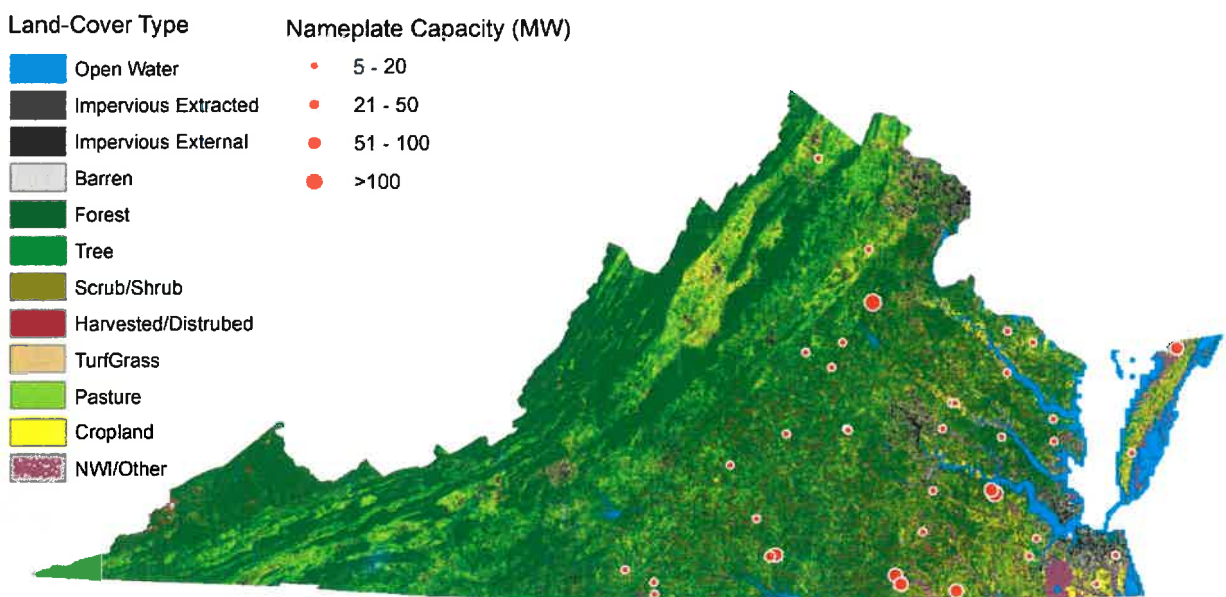
81 - Pasture

82 - Cropland

Wetlands

91 - NWI/Other

Figure A1. Virginia Land Cover Dataset with Solar Overlay



For a complete description of the methodology of this dataset and a description of each classification, please review the Technical Plan of Operations in the link below.

https://www.vita.virginia.gov/media/vitavirginiagov/integrated-services/pdf/LandCover_TechnicalPlanOfOperations_v7_20160506.pdf

Forest Conservation (FCV) Model

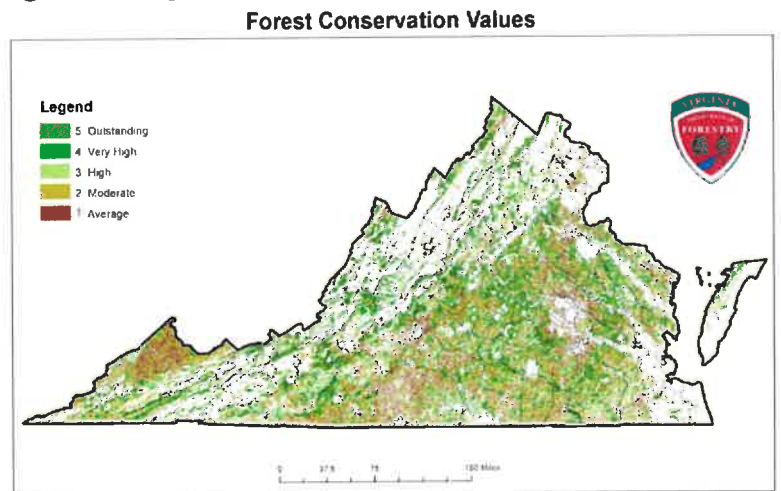
The Forest Conservation Value (FCV) model is a tool designed by the Virginia Department of Forestry (VDOF) to identify the highest priority forestland for conservation in Virginia. The model was created in 2013 and later refined in 2017. The model is available in raster format at a 30-meter resolution. The model ranks all forestland in Virginia from 1 (lowest) to 5 (highest). Six key components are considered in the model: Forested Blocks, Forest Management Potential, Connectivity, Watershed Integrity, Threat of Conversion, and Significant Forest Communities and Diminished Tree Species

Classifications:

- 1: Average
- 2: Moderate
- 3: High
- 4: Very High
- 5: Outstanding

<https://www.dcr.virginia.gov/natural-heritage/vaconvisforest>

Figure A2. Virginia FCV Model



Virginia Agricultural Model

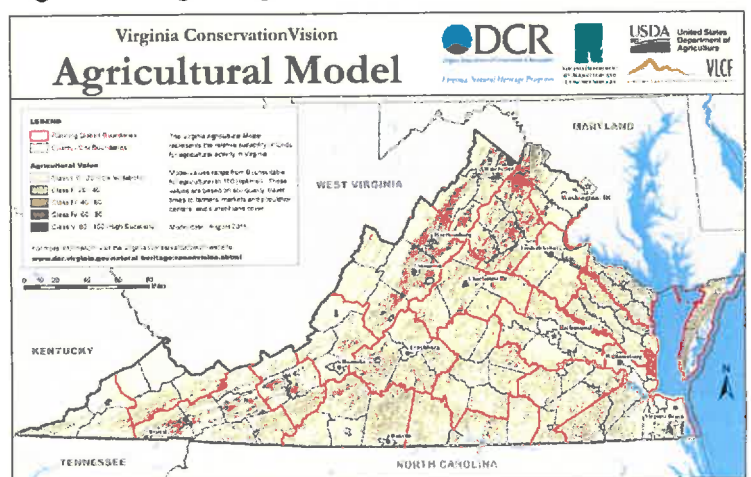
The Virginia Agricultural Model created by the Virginia Department of Conservation and Recreation's Virginia Natural Heritage Program in 2015 quantifies the relative suitability of lands for agricultural activity across the state. It is a raster dataset at a 30-meter resolution that ranks the agricultural value of lands ranges from 0 (unsuitable) to 100 (optimal). Agricultural value is assessed primarily based on inherent soil suitability, but also accounts for current land cover as well as travel time between agricultural producers and consumers. Soil suitability includes information from the gSSURGO geodatabase and the National Commodity Crop Productivity Index.

Classifications:

- 0-20 (Low Suitability)
- 20-40
- 40-60
- 60-80
- 80-100 (High Suitability)

<https://www.dcr.virginia.gov/natural-heritage/vaconvisagric>

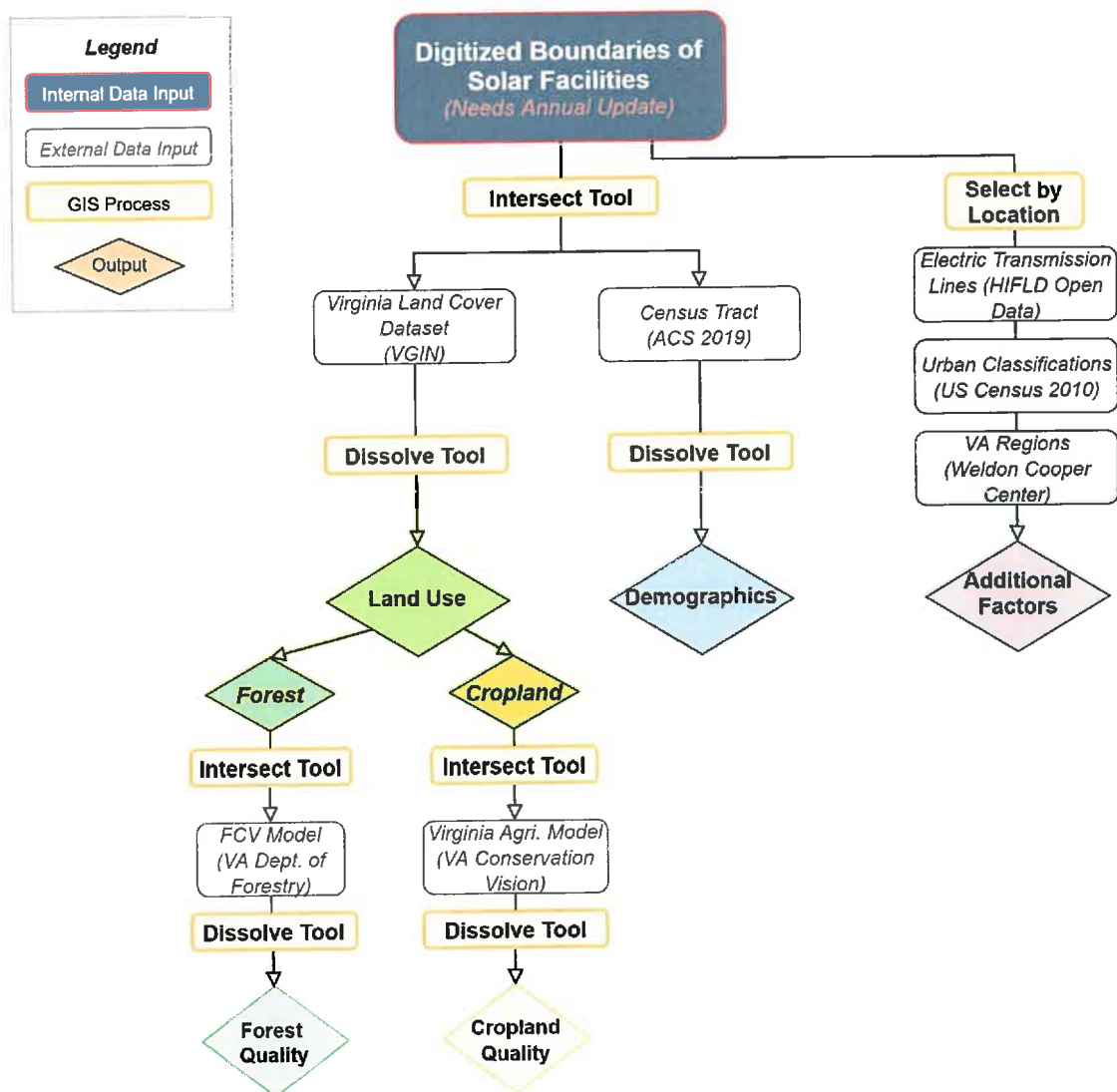
Figure A3. Virginia Agricultural Model



Workflow

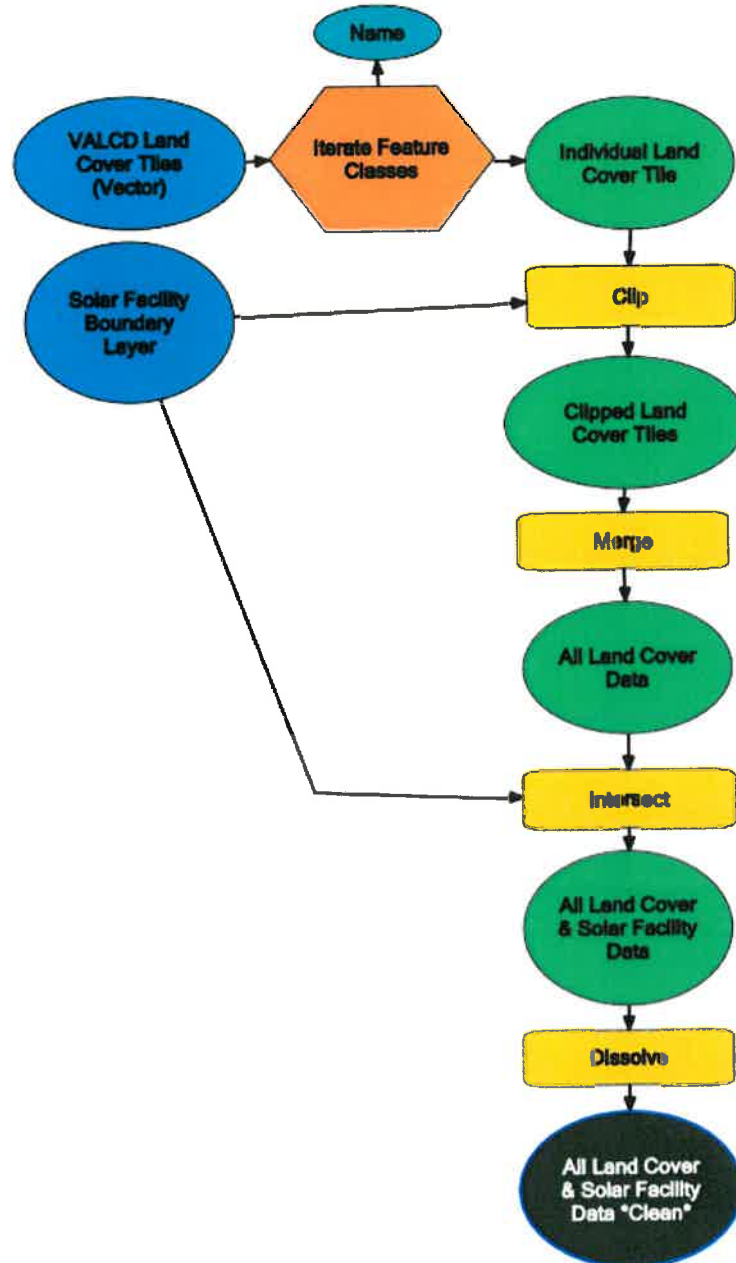
The workflow of the GIS analysis conducted in this research is diagrammed in the figure below. This information is presented to ensure that this analysis is easily replicable as more solar facilities are added across the state in the coming years. The diagram details the data input used and the GIS geoprocessing tools used in ArcMap to conduct this analysis. The process used to extract land use information is simplified in this diagram. The full workflow of extracting land cover change using ModelBuilder is shown on the next page. The continual update of the boundaries of new solar facilities and the revisions to the boundaries of existing solar facilities will be a major task necessary to refine and expand the findings of this research.

Figure A4. Workflow of GIS Analysis of Solar Facility Land Use



The figure below details the workflow used in the ArcMap ModelBuilder to analyze the land use of solar facilities based on the Virginia Land Cover Dataset. Since the land cover dataset is large and split into hundreds of tiles, ModelBuilder helps to automate the geoprocessing of this dataset to match the boundaries of each solar facility in Virginia.

Figure A5. Diagram of ArcMap ModelBuilder Used to Analyze Land Use



Appendix B: Results

NLCD Findings

National Land Cover Database (NLCD) data serves as a supplement to the Virginia Land Cover dataset which was the primary dataset used in this analysis. Since NLCD data has been used in similar analyses of solar facilities conducted in the United States, it was included in the analysis as a comparison to the results of other studies that were discussed in the methodology section. NLCD data is at a lower resolution (30-meter resolution) than the Virginia Land Cover data (1-meter resolution) and therefore was not considered for the primary component of this research. NLCD data is collected every five (5) years, while the Virginia Land Cover data has only been published once in 2016, so the NLCD data also provided a greater understanding of land cover change across time. Ultimately, the NLCD data uses a different methodology, classification system, and larger raster resolution, which provides slightly different results. Nevertheless, it offers a useful comparison to affirm many of the research findings from the Virginia Land Cover dataset.

Table B1. Solar Facility Land Cover Change (NLCD Data)

NLCD 2006 Total Change		NLCD 2016 Total Change	
Forest	45.44%	Forest	37.68%
Cultivated Crops	25.33%	Cultivated Crops	28.93%
Shrub/Scrub	10.59%	Herbaceous	14.06%
Hay/Pasture	7.23%	Hay/Pasture	7.28%
Herbaceous	6.32%	Shrub/Scrub	6.45%
Wetlands	2.93%	Wetlands	3.26%
Developed	2.04%	Developed	2.29%
Open Water	0.11%	Open Water	0.04%
Barren Land	0.01%	Barren Land	0.01%

Full Research Findings Results

The full tabular results of the GIS analysis discussed in the research findings are presented on the next four (4) pages. This includes the total disturbed and solar footprint acreages for the 38 solar facilities in operation in Virginia as of January 2021. It also includes the results on land cover change, quality of forest land impacted, and quality of cropland impacted represented as percentages for each solar facility. In some cases, these estimates represent the site area of an individual solar facility as of January 2021 and may not represent the final project area upon the completion of construction or expansion projects. This information should be updated frequently. This information is also available in spreadsheets for additional analysis and manipulation.

Table B2. Background Information for Operating Solar Facilities in Virginia as of January 2021

Name	MW	County	Service Date	Panel Area (Acres)	Disturbed Site Area (Acres)
Eastern Shore Solar	80	Accomack	2016-12	459.5	613.9
Scott Solar	17	Powhatan	2016-12	105.6	206.4
Woodland Solar	19	Isle of Wight	2016-12	106.1	145.6
Whitehouse Solar	20	Louisa	2016-12	84.2	160.2
Clarke Solar	10	Clarke	2017-07	51.5	87.2
Remington Solar	20	Fauquier	2017-10	78.8	114.7
Correctional Solar	20	New Kent	2017-11	63.1	153.0
Sappony Solar	20	Sussex	2017-11	92.5	147.1
Buckingham Solar	19.8	Buckingham	2017-11	62.3	116.7
Cherrydale Solar	20	Northampton	2017-11	114.2	163.2
Oceana Solar	17.6	Virginia Beach City	2017-12	62.3	96.2
Scott-II Solar	20	Powhatan	2017-12	70.0	111.6
Essex Solar	20	Essex	2017-12	125.9	174.9
Southampton Solar	100	Southampton	2017-12	628.3	813.6
Palmer Solar	5	Fluvanna	2017-12	30.3	43.2
Martin Solar	5	Goochland	2017-12	19.0	29.2
Kentuck Solar	6	Pittsylvania	2018-05	38.9	57.7
UVA Hollyfield Solar	17	King William	2018-09	73.4	134.2
Puller Solar	15	Middlesex	2018-10	64.8	114.5
Montross Solar	20	Westmoreland	2018-12	81.3	106.5
Gloucester Solar	19.9	Gloucester	2019-04	79.1	133.3
Colonial Trail West Solar	142	Surry	2019-12	626.2	2039.4
Rives Road Solar	19.7	Prince George	2020-05	64.4	98.4
Myrtle Solar	15	Suffolk City	2020-06	81.5	111.9
Pamplin Solar	15.7	Appomattox	2020-07	53.8	110.3
Grasshopper Solar	80	Mecklenburg	2020-07	385.5	790.2
Hickory Solar	20	Chesapeake City	2020-08	138.4	150.9
Mechanicsville Solar	20	Hanover	2020-09	90.1	166.5
Spotsylvania Solar	300	Spotsylvania	2020-09	1306.9	3211.0
Irish Road/Whitmell Solar	10	Pittsylvania	2020-10	57.7	83.8
Spring Grove I Solar	97.9	Surry	2020-10	357.9	1096.8
Danville Solar	12	Pittsylvania	2020-11	46.2	100.9
Greensville County Solar	80	Greensville	2020-12	232.5	544.0
Twittys Creek Solar	13.8	Charlotte	2020-12	46.5	103.3
Gardy's Mill Solar	14	Westmoreland	2020-12	47.9	93.5
Briel Farm Solar	18.8	Henrico	2020-12	74.1	157.0
Sadler Solar	100	Greensville	2021-01	514.3	931.5
Bluestone Solar	50	Mecklenburg	2021-01	177.7	329.4

Table B3. Solar Facility Land Cover Change (Virginia Land Cover Dataset)

Name	MW	County	Open Water	Impervious	Barren	Forest	Tree	Shrub/Scrub	Disturbed	Turf/Grass	Pasture	Crop land	NWI/Other
Bluestone Solar	50	Mecklenburg	0.0%	0.1%	0.0%	71.3%	5.7%	6.0%	0.0%	0.0%	16.7%	0.0%	0.2%
Briel Farm Solar	18.8	Henrico	0.0%	0.6%	0.0%	13.4%	7.4%	0.0%	0.0%	2.9%	12.7%	61.8%	1.2%
Buckingham Solar	19.8	Buckingham	0.0%	0.0%	0.0%	63.2%	0.6%	0.0%	27.6%	2.7%	0.0%	5.8%	0.0%
Cherrydale Solar	20	Northampton	0.6%	0.0%	0.0%	21.3%	1.2%	0.0%	0.0%	1.7%	0.0%	74.8%	0.4%
Clarke Solar	10	Clarke	0.0%	0.6%	0.0%	0.0%	1.6%	0.0%	0.0%	0.7%	67.5%	29.6%	0.0%
Colonial Trail West Solar	142.4	Surry	0.0%	0.1%	0.0%	89.4%	0.2%	3.6%	2.6%	0.1%	0.8%	0.0%	3.3%
Correctional Solar	20	New Kent	0.0%	0.5%	0.0%	98.9%	0.3%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%
Danville Solar	12	Pittsylvania	0.7%	1.2%	0.0%	4.1%	21.1%	0.0%	0.0%	72.9%	0.0%	0.0%	0.1%
Eastern Shore Solar	80	Accomack	0.0%	0.8%	0.0%	2.5%	0.7%	0.0%	0.8%	0.5%	0.0%	94.6%	0.0%
Essex Solar	20	Essex	0.0%	0.1%	0.0%	34.5%	5.9%	0.0%	0.0%	0.4%	0.0%	59.0%	0.0%
Gardy's Mill Solar	14	Westmoreland	0.0%	1.7%	0.0%	36.4%	1.9%	0.0%	0.0%	3.3%	0.0%	56.7%	0.0%
Gloucester Solar	19.9	Gloucester	0.0%	0.0%	0.0%	0.0%	3.2%	0.0%	0.0%	0.0%	0.0%	96.8%	0.0%
Grasshopper Solar	80	Mecklenburg	0.6%	0.1%	0.0%	7.6%	7.7%	0.0%	0.0%	0.0%	82.6%	0.0%	1.4%
Greensville County Solar	80	Greensville	0.0%	0.6%	0.0%	35.0%	0.2%	0.9%	7.3%	0.6%	1.1%	53.4%	1.1%
Hickory Solar	20	Chesapeake City	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%
Irish Road/Whitmell Solar	10	Pittsylvania	0.0%	0.4%	0.0%	36.7%	0.5%	0.0%	0.0%	2.5%	0.0%	60.0%	0.0%
Kentuck Solar	6	Pittsylvania	0.0%	0.0%	0.0%	61.0%	2.1%	0.0%	0.0%	3.3%	0.0%	33.6%	0.0%
Martin Solar	5	Goochland	0.0%	0.0%	0.0%	94.2%	0.0%	0.0%	0.0%	0.0%	5.7%	0.0%	0.0%
Mechanicsville Solar	20	Hanover	0.0%	0.9%	0.0%	0.0%	1.4%	0.0%	0.0%	1.4%	0.0%	96.3%	0.0%
Montross Solar	20	Westmoreland	0.0%	0.8%	0.0%	1.1%	0.1%	0.0%	0.0%	0.6%	0.0%	97.4%	0.0%
Myrtle Solar	15	Suffolk City	0.0%	2.0%	0.0%	0.0%	1.4%	0.0%	0.0%	1.1%	0.0%	95.4%	0.0%
Oceana Solar	17.6	Virginia Beach City	0.0%	0.0%	0.0%	1.1%	0.0%	0.0%	0.0%	0.5%	0.0%	89.6%	8.7%
Palmer Solar	5	Fluvanna	0.0%	0.6%	0.0%	11.6%	9.7%	0.0%	0.0%	0.0%	0.4%	77.8%	0.0%
Pamplin Solar	15.7	Appomattox	0.0%	0.0%	0.0%	99.9%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
Puller Solar	15	Middlesex	0.0%	0.7%	0.0%	21.6%	4.4%	0.0%	0.0%	0.7%	0.0%	72.6%	0.0%
Remington Solar	20	Fauquier	0.0%	0.0%	0.0%	6.0%	7.1%	0.1%	0.0%	0.3%	9.7%	76.2%	0.5%
Rives Road Solar	19.7	Prince George	0.0%	1.1%	0.0%	36.9%	4.1%	0.0%	0.0%	12.7%	0.0%	45.0%	0.2%
Sadler Solar	100	Greensville	0.0%	0.1%	0.0%	90.4%	0.0%	0.3%	6.8%	0.0%	0.8%	0.0%	1.7%
Sappony Solar	20	Sussex	0.0%	0.0%	0.0%	9.2%	0.5%	0.0%	1.2%	0.0%	0.0%	89.0%	0.1%
Scott Solar	17	Powhatan	0.0%	0.2%	0.0%	84.6%	1.2%	0.0%	12.9%	1.2%	0.0%	0.0%	0.0%
Scott-II Solar	20	Powhatan	0.0%	0.1%	0.0%	99.6%	0.1%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%
Southampton Solar	100	Southampton	0.0%	0.1%	0.0%	8.7%	0.4%	0.0%	3.6%	0.0%	0.0%	87.2%	0.0%
Spotsylvania Solar	300	Spotsylvania	0.0%	0.0%	0.0%	88.4%	0.3%	1.4%	0.2%	0.1%	3.6%	0.0%	5.9%
Spring Grove I Solar	97.9	Surry	0.0%	0.1%	0.0%	75.9%	0.1%	7.3%	14.0%	0.1%	0.0%	0.3%	2.2%
Twittys Creek Solar	13.8	Charlotte	0.0%	0.5%	0.0%	88.0%	4.0%	3.2%	0.0%	4.1%	0.0%	0.0%	0.2%
UVA Hollyfield Solar	17	King William	0.0%	0.0%	0.0%	0.6%	0.5%	0.0%	0.0%	1.3%	0.0%	97.5%	0.1%
Whitehouse Solar	20	Louisa	0.0%	0.0%	0.0%	49.0%	0.8%	0.0%	37.0%	0.0%	13.2%	0.0%	0.0%
Woodland Solar	19	Isle of Wight	0.0%	2.5%	0.0%	0.7%	0.6%	0.0%	0.8%	2.2%	0.0%	93.3%	0.0%

Table B4. Quality of Impacted Forest Land as Percent of Total Facility Disturbed Area (Virginia Department of Forestry Forest Conservation Values (FCV) Data)

Name	MW	County	Average	Moderate	High	Very High	Outstanding
Bluestone Solar	50	Mecklenburg	61.9%	18.7%	1.4%	0.0%	0.0%
Briel Farm Solar	18.8	Henrico	2.1%	8.1%	0.6%	0.0%	0.0%
Buckingham Solar	19.8	Buckingham	2.5%	31.6%	49.4%	6.0%	0.0%
Cherrydale Solar	20	Northampton	9.2%	10.0%	1.0%	0.0%	0.0%
Clarke Solar	10	Clarke	0.0%	3.5%	0.0%	0.0%	0.0%
Colonial Trail West Solar	142.4	Surry	37.1%	39.2%	17.0%	2.1%	0.0%
Correctional Solar	20	New Kent	54.4%	37.6%	6.1%	0.1%	0.0%
Danville Solar	12	Pittsylvania	0.5%	0.7%	0.2%	0.0%	0.0%
Eastern Shore Solar	80	Accomack	2.8%	3.9%	0.5%	0.1%	0.0%
Essex Solar	20	Essex	23.6%	5.4%	0.0%	0.0%	0.0%
Gardy's Mill Solar	14	Westmoreland	3.9%	16.8%	7.7%	0.0%	0.0%
Gloucester Solar	19.9	Gloucester	1.5%	2.6%	0.0%	0.0%	0.3%
Grasshopper Solar	80	Mecklenburg	17.1%	8.1%	0.9%	0.2%	0.0%
Greensville County Solar	80	Greensville	20.6%	16.4%	5.9%	0.0%	0.0%
Hickory Solar	20	Chesapeake City	0.0%	0.0%	0.0%	0.0%	0.0%
Irish Road/Whitmell Solar	10	Pittsylvania	3.1%	0.0%	0.0%	0.0%	0.0%
Kentuck Solar	6	Pittsylvania	12.8%	47.1%	2.0%	0.0%	0.0%
Martin Solar	5	Goochland	2.3%	0.1%	6.4%	2.3%	73.3%
Mechanicsville Solar	20	Hanover	0.0%	0.0%	0.0%	0.0%	0.0%
Montross Solar	20	Westmoreland	1.2%	0.9%	0.0%	0.0%	0.0%
Myrtle Solar	15	Suffolk City	1.9%	0.0%	0.0%	0.0%	0.0%
Oceana Solar	17.6	Virginia Beach City	0.0%	0.0%	0.0%	0.0%	0.7%
Palmer Solar	5	Fluvanna	8.6%	1.2%	0.0%	0.0%	0.0%
Pamplin Solar	15.7	Appomattox	35.5%	48.8%	14.9%	0.0%	0.0%
Puller Solar	15	Middlesex	0.3%	8.4%	15.9%	0.5%	0.0%
Remington Solar	20	Fauquier	0.5%	0.2%	1.3%	0.8%	0.0%
Rives Road Solar	19.7	Prince George	35.5%	7.8%	0.0%	0.0%	0.0%
Sadler Solar	100	Greensville	14.2%	37.8%	27.1%	5.4%	0.0%
Sappony Solar	20	Sussex	5.3%	2.0%	1.3%	1.3%	0.0%
Scott Solar	17	Powhatan	0.0%	0.0%	0.2%	75.2%	24.6%
Scott-II Solar	20	Powhatan	0.0%	0.0%	0.3%	46.4%	53.0%
Southampton Solar	100	Southampton	6.6%	1.3%	0.1%	0.0%	0.0%
Spotsylvania Solar	300	Spotsylvania	12.3%	20.3%	26.1%	23.2%	11.5%
Spring Grove I Solar	97.9	Surry	44.6%	35.6%	11.6%	1.3%	0.0%
Twittys Creek Solar	13.8	Charlotte	54.6%	30.0%	11.2%	1.0%	0.0%
UVA Hollyfield Solar	17	King William	0.0%	0.1%	4.9%	0.2%	0.0%
Whitehouse Solar	20	Louisa	3.4%	1.0%	24.5%	59.3%	11.0%
Woodland Solar	19	Isle of Wight	0.0%	0.5%	1.2%	1.2%	0.2%

Table B5. *Quality of Impacted Cropland as Percent of Total Facility Disturbed Area (Virginia ConservationVision Agricultural Model Data)*

Name	MW	County	Class I	Class II	Class III	Class IV	Class V
Bluestone Solar	50	Mecklenburg	0.0%	0.7%	0.0%	1.1%	20.8%
Briel Farm Solar	18.8	Henrico	0.0%	0.0%	0.3%	35.9%	51.6%
Buckingham Solar	19.8	Buckingham	0.0%	0.0%	0.0%	10.8%	4.8%
Cherrydale Solar	20	Northampton	0.0%	0.0%	0.0%	1.8%	78.3%
Clarke Solar	10	Clarke	0.0%	9.4%	81.7%	2.6%	5.4%
Colonial Trail West Solar	142.4	Surry	0.0%	0.0%	0.1%	1.3%	2.9%
Correctional Solar	20	New Kent	0.0%	0.0%	0.0%	0.0%	0.0%
Danville Solar	12	Pittsylvania	0.0%	5.5%	0.7%	11.8%	20.9%
Eastern Shore Solar	80	Accomack	0.0%	0.1%	17.2%	32.4%	47.6%
Essex Solar	20	Essex	0.3%	0.4%	0.0%	2.5%	66.2%
Gardy's Mill Solar	14	Westmoreland	1.8%	0.0%	0.0%	65.4%	0.0%
Gloucester Solar	19.9	Gloucester	0.0%	0.0%	7.0%	90.8%	1.8%
Grasshopper Solar	80	Mecklenburg	0.1%	3.4%	18.3%	27.5%	44.4%
Greensville County Solar	80	Greensville	0.0%	2.2%	4.8%	0.2%	50.8%
Hickory Solar	20	Chesapeake City	0.0%	0.0%	0.0%	98.5%	0.0%
Irish Road/Whitmell Solar	10	Pittsylvania	0.0%	0.0%	0.0%	1.4%	73.8%
Kentuck Solar	6	Pittsylvania	0.0%	0.0%	0.0%	26.9%	16.4%
Martin Solar	5	Goochland	0.0%	0.0%	0.0%	5.4%	0.0%
Mechanicsville Solar	20	Hanover	0.0%	9.0%	5.6%	0.0%	85.4%
Montross Solar	20	Westmoreland	0.0%	1.0%	0.5%	4.4%	89.3%
Myrtle Solar	15	Suffolk City	0.0%	0.0%	4.5%	63.0%	27.8%
Oceana Solar	17.6	Virginia Beach City	0.0%	0.0%	0.0%	93.4%	0.0%
Palmer Solar	5	Fluvanna	0.0%	0.0%	0.0%	79.3%	0.0%
Pamplin Solar	15.7	Appomattox	0.0%	0.0%	0.0%	0.4%	0.0%
Puller Solar	15	Middlesex	0.0%	0.0%	0.0%	0.6%	75.3%
Remington Solar	20	Fauquier	0.0%	0.4%	19.7%	52.4%	24.8%
Rives Road Solar	19.7	Prince George	0.0%	0.0%	0.0%	5.4%	51.6%
Sadler Solar	100	Greensville	0.0%	0.0%	0.0%	0.0%	0.3%
Sappony Solar	20	Sussex	0.0%	0.0%	0.0%	5.6%	84.3%
Scott Solar	17	Powhatan	0.0%	0.0%	0.0%	0.0%	0.0%
Scott-II Solar	20	Powhatan	0.0%	0.0%	0.0%	0.0%	0.9%
Southampton Solar	100	Southampton	0.0%	0.0%	12.8%	10.0%	69.8%
Spotsylvania Solar	300	Spotsylvania	0.0%	0.0%	0.3%	1.6%	1.9%
Spring Grove I Solar	97.9	Surry	0.0%	0.0%	0.1%	0.2%	1.4%
Twittys Creek Solar	13.8	Charlotte	0.0%	0.0%	0.0%	0.0%	0.0%
UVA Hollyfield Solar	17	King William	0.0%	0.1%	11.2%	2.1%	86.6%
Whitehouse Solar	20	Louisa	0.0%	0.0%	0.1%	12.0%	0.0%
Woodland Solar	19	Isle of Wight	0.0%	4.2%	22.5%	49.6%	21.6%

Table B6. Demographic Information for Census Tracts with Solar Facilities (Census Tract; ACS 2019)

Name	MW	County	Total Population	Population Density (Per Sq. Mile)	% White Population	% Black Population	% Other Race Population	Median Household Income (2019)	Poverty Rate	Median House Value
Martin Solar	5	Goochland	4369	42.6	73.2%	22.4%	4.4%	69743	5.40%	\$208,200
Palmer Solar	5	Fluvanna	6181	143.0	77.4%	18.6%	4.0%	76571	5.10%	\$278,800
Kentuck Solar	6	Pittsylvania	3952	188.0	66.4%	32.2%	1.4%	44467	23.50%	\$141,300
Irish Road/Whitmell Solar	10	Pittsylvania	2755	50.5	87.2%	6.1%	6.7%	54699	9.90%	\$147,500
Clarke Solar	10	Clarke	3048	48.8	89.7%	6.1%	4.2%	87417	4.10%	\$346,300
Danville Solar	12	Pittsylvania	6276	64.7	86.6%	8.7%	4.7%	47346	20.00%	\$95,300
Twittys Creek	14	Charlotte	5392	29.9	77.1%	19.7%	3.2%	35387	32.40%	\$139,700
Gardys Mill	14	Westmoreland	4561	49.7	53.7%	45.1%	1.2%	53448	16.20%	\$184,100
Puller Solar	15	Middlesex	2560	110.2	87.0%	13.0%	0.0%	46719	11.60%	\$252,800
Myrtle Solar	15	Suffolk City	2144	69.7	89.7%	4.0%	6.3%	84632	1.90%	\$315,000
Pamplin Solar	16	Appomattox	4341	29.6	78.6%	18.9%	2.5%	57105	14.40%	\$142,900
Hollyfield Solar	17	King William	4423	48.0	71.9%	24.8%	3.3%	62371	15.70%	\$206,600
Scott Solar I	17	Powhatan	8933	137.0	93.8%	3.5%	2.6%	86469	5.60%	\$291,200
Oceana Solar	18	Virginia Beach City	2574	311.1	71.6%	18.5%	9.9%	n/a	n/a	n/a
Briel Solar	19	Henrico	5954	635.1	41.7%	55.5%	2.9%	48859	15.60%	\$162,800
Woodland Solar	19	Isle of Wight	3845	40.2	70.4%	26.8%	2.8%	87739	4.00%	\$246,400
Whitehouse Solar	20	Louisa	5576	96.3	66.3%	24.5%	9.2%	44531	18.80%	\$189,700
Sappony Solar	20	Sussex	2454	14.9	38.7%	54.4%	6.9%	46250	18.60%	\$95,600
Buckingham Solar	20	Buckingham	5740	59.8	57.0%	38.9%	4.1%	48750	18.10%	\$144,900
Cherrydale Solar	20	Northampton	3442	48.1	62.4%	33.7%	4.0%	58750	15.70%	\$218,200
Montross Solar	20	Westmoreland	3430	57.4	65.7%	29.2%	5.1%	60349	12.10%	\$174,700
Essex Solar	20	Essex	3665	50.5	64.6%	24.5%	10.8%	67661	12.60%	\$216,300
Gloucester Solar	20	Gloucester	3825	161.0	83.1%	14.2%	2.7%	68542	11.80%	\$274,500
Rives Road	20	Prince George	5311	199.3	59.4%	33.9%	6.8%	75012	4.60%	\$182,100
Remington Solar	20	Fauquier	5822	362.0	81.1%	10.7%	8.2%	85141	9.60%	\$265,600
Scott Solar II	20	Powhatan	8933	137.0	93.8%	3.5%	2.6%	86469	5.60%	\$291,200
Correctional Solar	20	New Kent	9758	85.8	80.1%	11.8%	8.1%	93352	10.80%	\$311,700
Hickory Solar	20	Chesapeake City	9654	166.6	67.5%	27.9%	4.6%	100461	5.50%	\$390,000
Mechanicsville Solar	20	Hanover	3062	101.0	87.4%	5.3%	7.3%	103362	1.10%	\$341,200
Bluestone Solar	50	Mecklenburg	4838	45.7	53.3%	42.1%	4.6%	34958	24.80%	\$101,300
Grasshopper Solar	80	Mecklenburg	4838	45.7	53.3%	42.1%	4.6%	34958	24.80%	\$101,300
Eastern Shore Solar	80	Accomack	5771	79.6	68.8%	28.5%	2.7%	40779	10.50%	\$154,800
Greensville Solar	80	Greensville	4124	22.8	37.9%	61.1%	1.0%	50840	12.50%	\$87,700
Spring Grove I Solar	98	Surry	2933	33.0	51.0%	45.0%	4.0%	49193	25.30%	\$231,200
Sadler Solar	100	Greensville	4124	22.8	37.9%	61.1%	1.0%	50840	12.50%	\$87,700
Southampton Solar	100	Southampton	3706	23.3	60.3%	36.8%	2.9%	60250	9.10%	\$160,800
Colonial Trail West	142	Surry	2933	33.0	51.0%	45.0%	4.0%	49193	25.30%	\$231,200
Pleinmont Solar	300	Spotsylvania	5405	111.4	81.5%	11.1%	7.3%	119643	4.50%	\$434,300

Additional Resources Shared:

From RAP SME member Aaron Berryhill:

Virginia Solar Survey | Virginia Solar Initiative (coopercenter.org)

<https://solar.coopercenter.org/solar-survey>

Subject: WG-2+3 RESOURCE TO SHARE: Justice 40

Date: Monday, July 18, 2022 at 3:27:47 PM Eastern Daylight Time

From: Oliva, Michelle Lara (mlo5n)

To: hb206rap-support@virginia.edu

BCC: chip@chipdicks.com, jdunscumb@tnc.org, jeff.hammond@apexcleanenergy.com, ben.saunders@aes.com, vhiggins@chesapeakeclimate.org, psanner@cbf.org, kenny.jesensky@kimley-horn.com, kseaford@stratacleanenergy.com, weatheredrockconsulting@gmail.com, chris.dodson@timmons.com, kyle@va-agribusiness.org, mdreiling@vedp.org, cconnors@vaforestry.org, juniper@erols.com, joe.weber@dcr.virginia.gov, terry.lasher@dof.virginia.gov, jonamores@aep.com, chris.hawk@apexcleanenergy.com, walter.crenshaw@aes.com, pfanning@cbf.org, Katie.Crum@kimley-horn.com, nrovner@tnc.org, jbolthouse@pecva.org, dan.jamison@timmons.com, rick.thomas@timmons.com, lauren.wheeler@timmons.com, rcrockett@advantusstrategies.com, kfarrelly@vedp.org, Fogel, Jonah (jf3ku)

Workgroup 2+3 Co-Leads Primary, Alternate and SME Members:

Passing along this resource & info shared by WG-2+3 Member, Jonah Fogel:

“In the Workgroup 2+3 discussion, there was a lot of conversation around values and functions. Judy and Chip hosted a great conversation and the group generated some good ideas.

Environmental Justice was brought up but unlike water, recreation, conservation, or other agency responsibilities, there is little in the way of state policy goals or specific outcomes. It occurred to me that the Biden administration’s [Justice 40 Initiative](#) may serve as a starting point for discussion around this topic. While DEQ has a responsibility to consider EJ, it’s not programmed into the solar permitting process in any specific way. Likewise, guidance is scant regarding what mitigations might even look like (or their reasonableness).

The Climate and Economic Justice Screening Tool linked from the Justice 40 page might help generate some useful conversations among committee members. <https://screeningtool.geoplatform.gov/en/#7.67/36.546/-78.033> There are likely other such tools but this one is tied to the energy transition specifically, so I thought I’d pass it along for the group to consider. One of the enumerated topics in the Screening Tool is agricultural losses due to climate change.

The USDA provides some recommendations to help communities adapt to climate impacts. There is much work to be done but document may help stimulate thinking about how mitigation can serve ag and forest resilience, not just offsetting project impacts <https://www.usda.gov/sites/default/files/documents/climate-smart-ag-forestry-strategy-90-day-progress-report.pdf>”

Shared by:
Jonah Fogel
Program Manager, ERI
E jfogel@virginia.edu
P 804.332.2005
www.eri.virginia.edu



Virginia DCR Natural Heritage Program

Joe Weber

Chief of Biodiversity Information and Conservation Tools
Virginia Department of Conservation and Recreation





Data to Consider for HB 894

- Natural Heritage Conservation Sites
- Virginia Natural Landscape Assessment
 - Ecological Cores
 - Resilience Corridors
- ConservationVision
 - Agricultural Model
- ConserveVirginia
 - Agriculture and Forestry Category

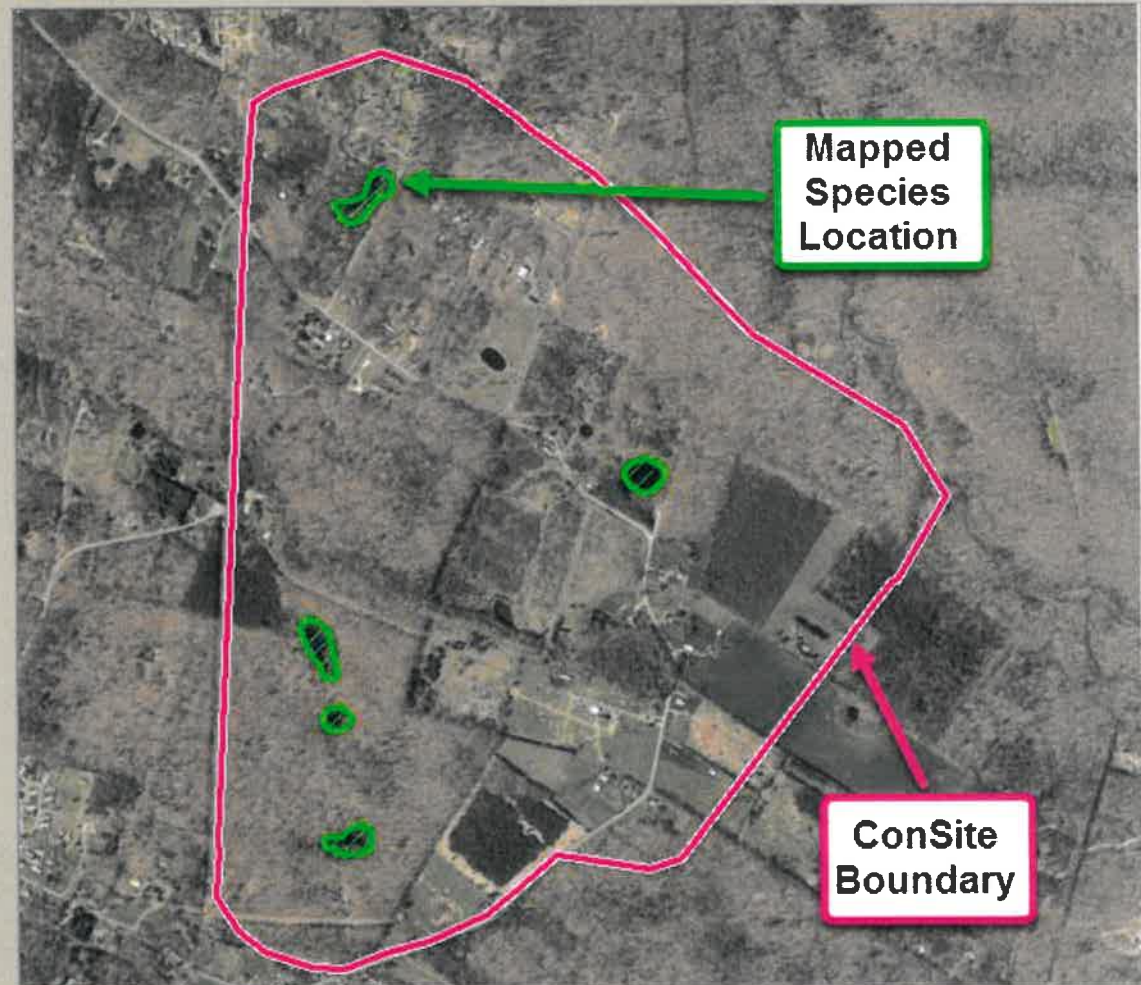
Natural Heritage Element Occurrences and Conservation Sites

Element Occurrence:

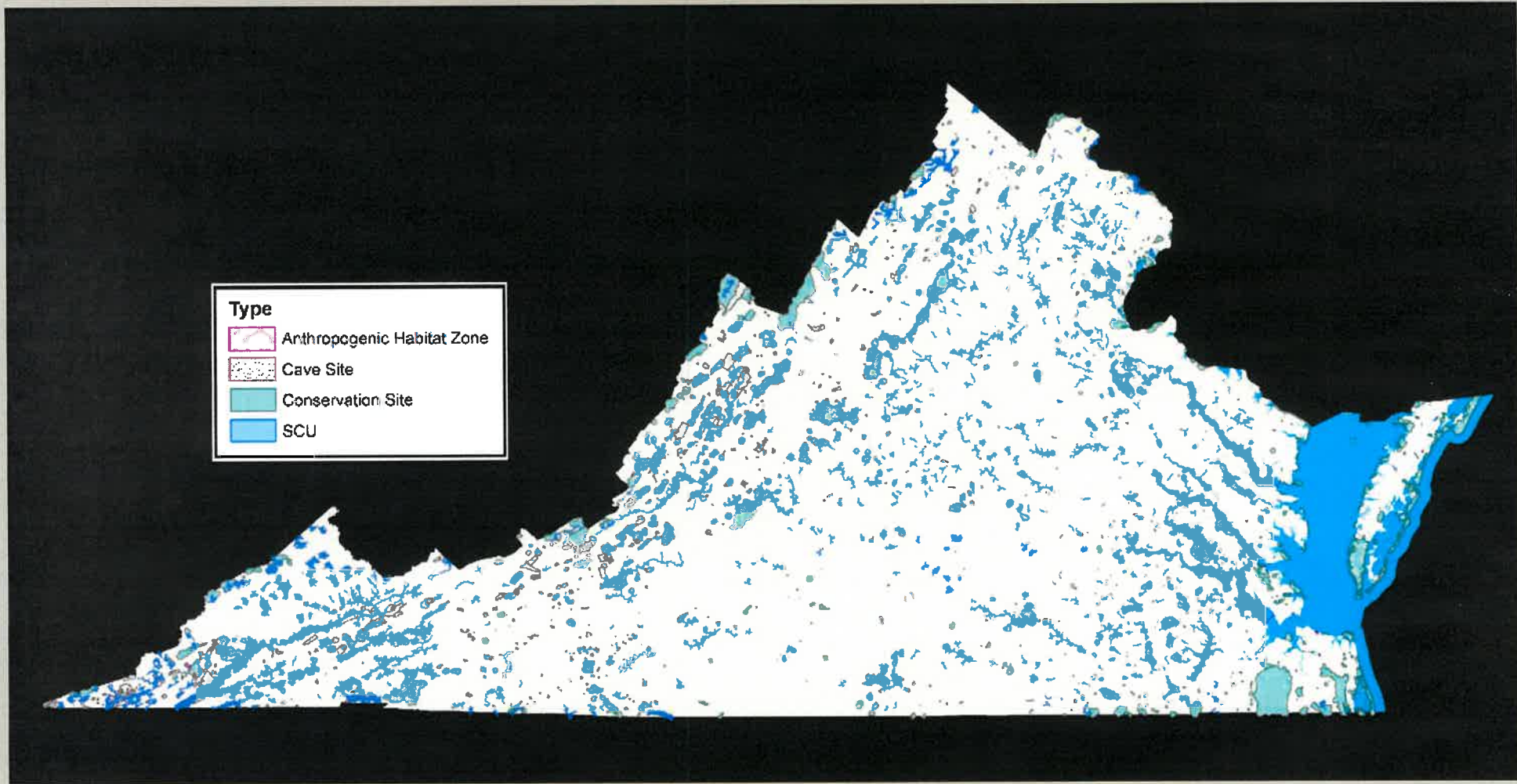
- Area of land and/or water that contains NHR
- Represents habitat of population
- Ranked for rarity and viability

Conservation Site:

- is a non-regulatory boundary
- surrounds mapped elements
- includes habitat and buffer area



Natural Heritage Conservation Sites



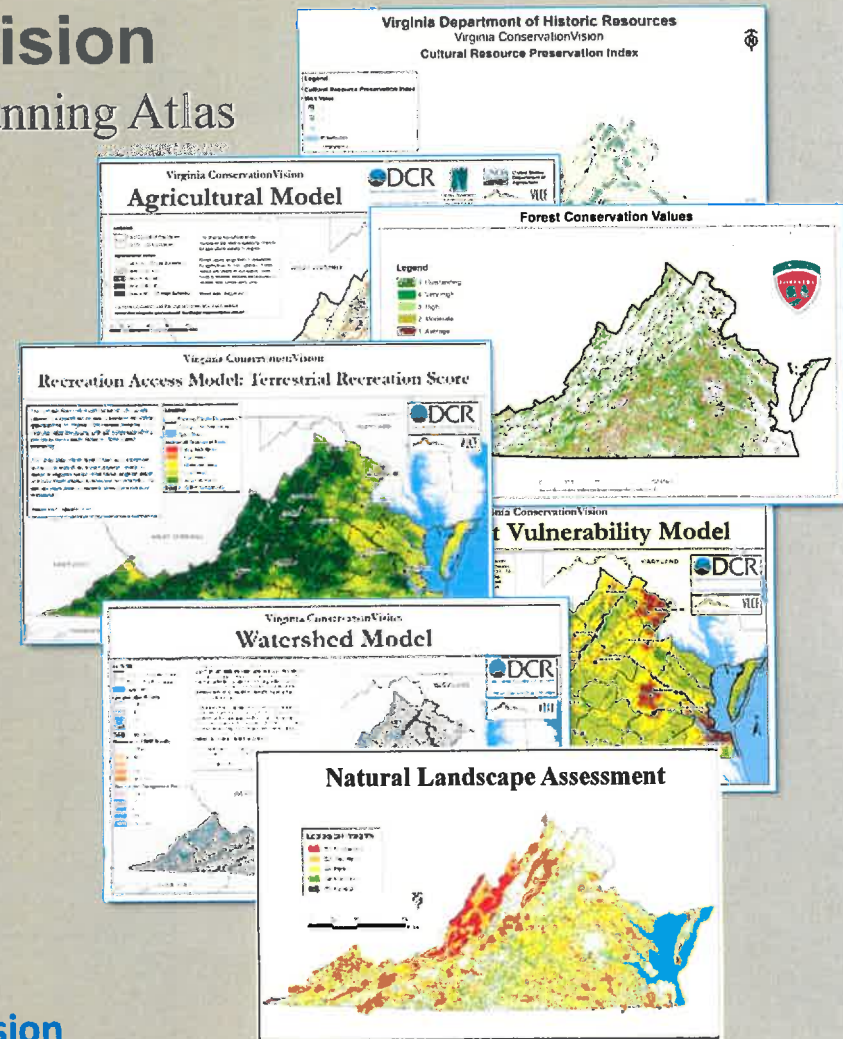
ConservationVision

Virginia's Conservation Planning Atlas

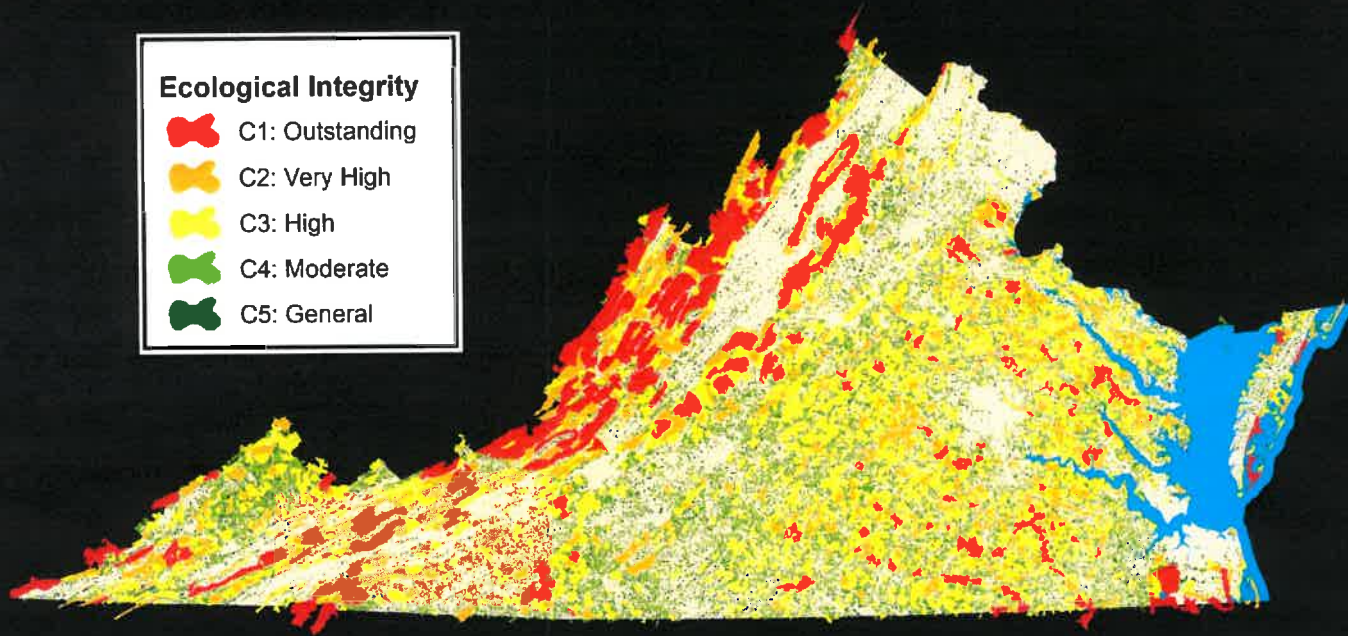
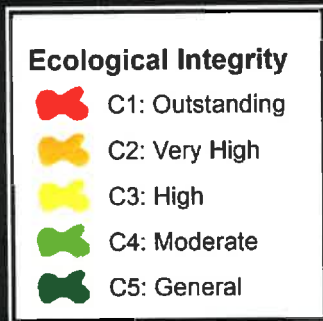
Conservation Themes:

- Ecological Integrity
- Cultural Assets
- Agriculture
- Forestry
- Recreation
- Watersheds
- Vulnerability to Development
- Potential Rare Species Richness
- Wetlands

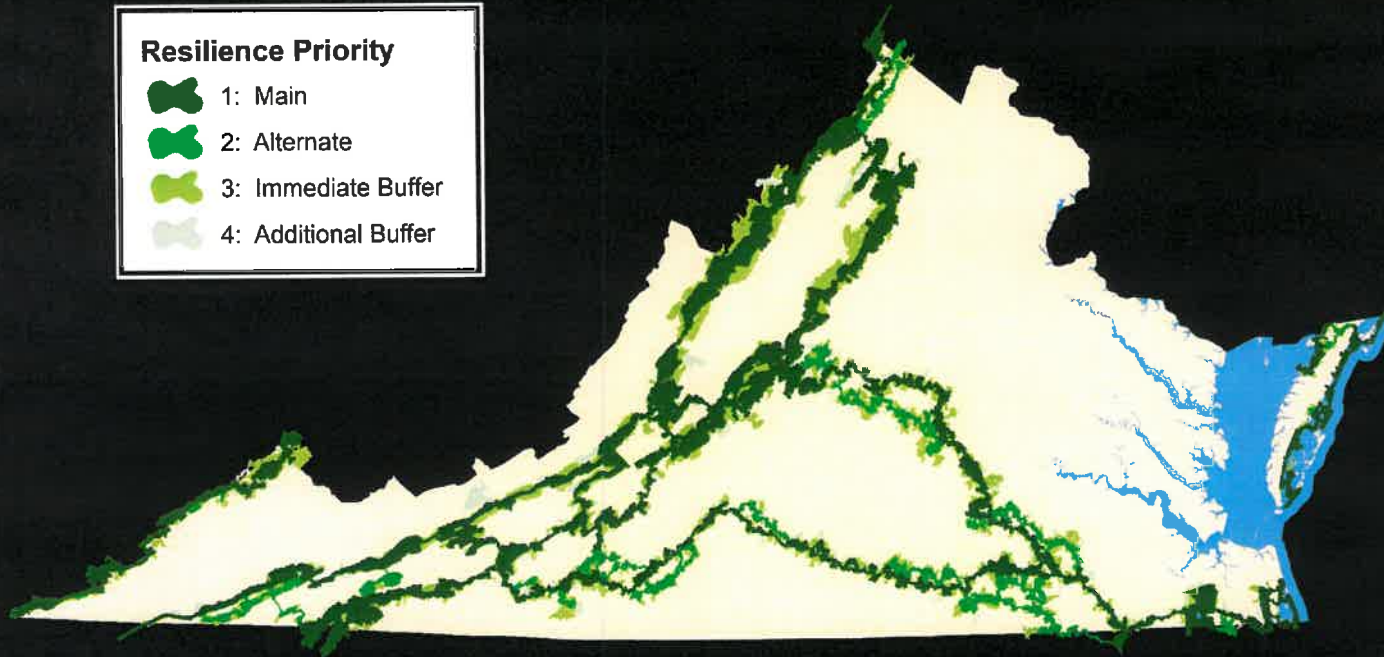
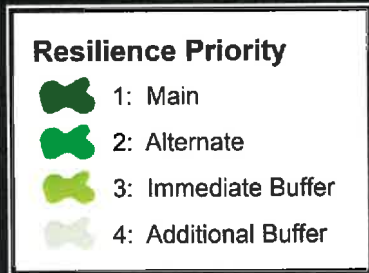
<http://www.dcr.virginia.gov/natural-heritage/vaconvision>



2017 Ecological Cores



Resilience Corridors



Virginia ConservationVision Agricultural Model



LEGEND

- Planning District Boundaries
- County / City Boundaries

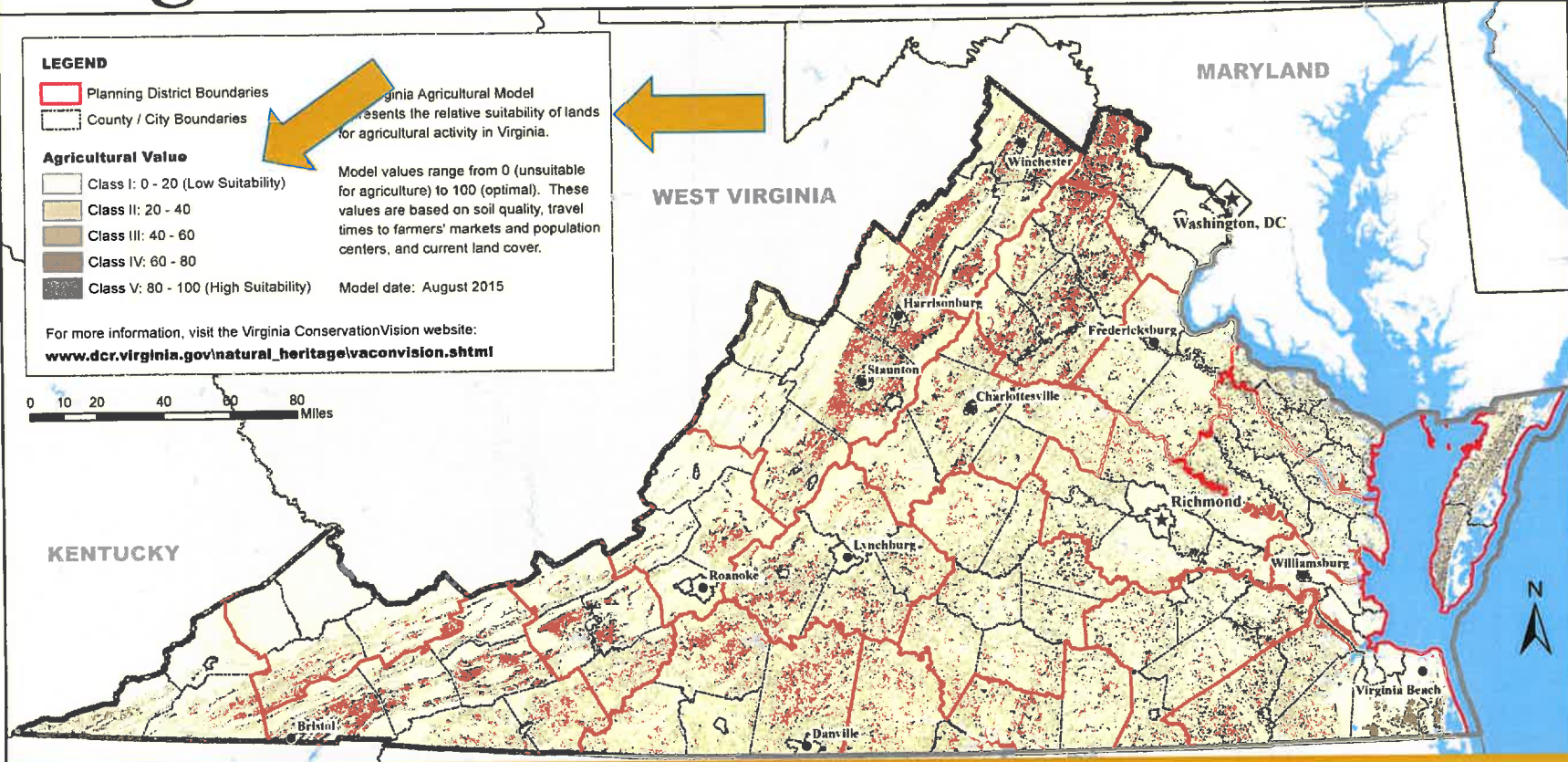
Agricultural Value

- Class I: 0 - 20 (Low Suitability)
- Class II: 20 - 40
- Class III: 40 - 60
- Class IV: 60 - 80
- Class V: 80 - 100 (High Suitability)

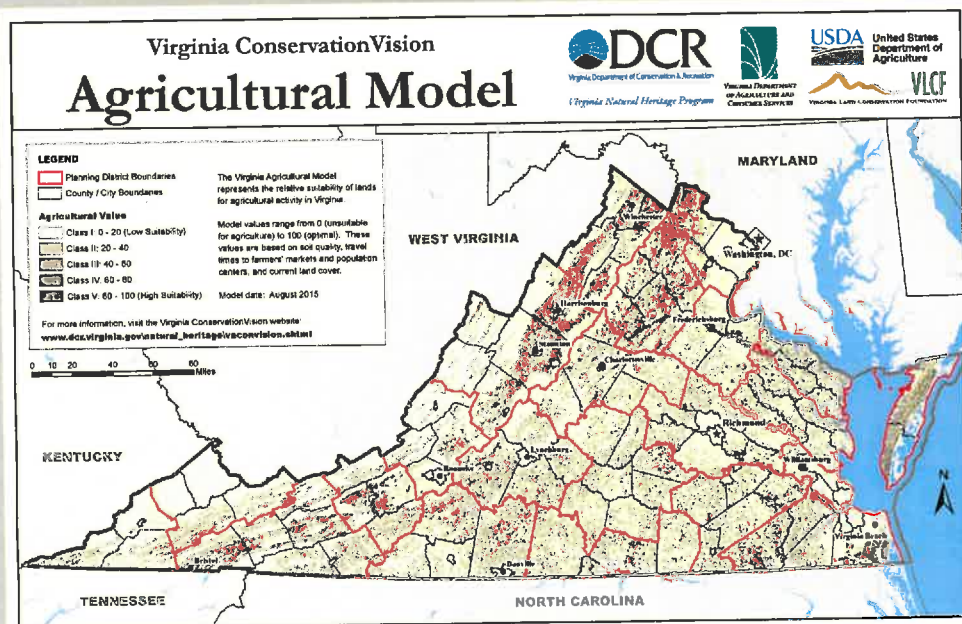
Model values range from 0 (unsuitable for agriculture) to 100 (optimal). These values are based on soil quality, travel times to farmers' markets and population centers, and current land cover.

Model date: August 2015

For more information, visit the Virginia ConservationVision website:
www.dcr.virginia.gov/natural_heritage/vaconvision.shtml



<https://www.dcr.virginia.gov/natural-heritage/vaconvisagric>



Model Inputs:

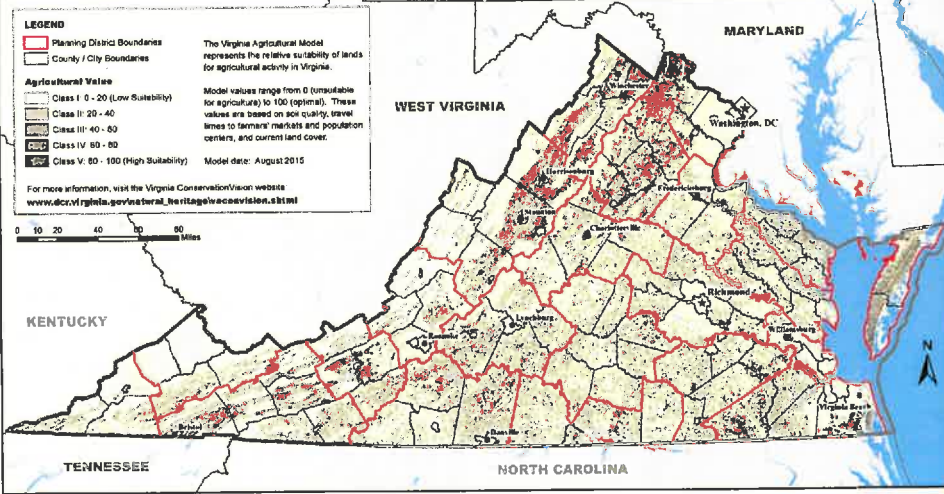
- ▶ Soil Quality Score
 - ▶ Prime Farmland Classification
 - ▶ Non-irrigated Capability Class
 - ▶ National Commodity Crop Productivity Index
- ▶ Foodshed Score
- ▶ Land Cover Score

$$AVS = \frac{\text{Land Cover Score}}{100} \times [(0.8 \times \text{Soil Quality Score}) + (0.2 \times \text{Foodshed Score})]$$

Consultation:

- Natural Resources Conservation Service (NRCS)
- Virginia Department of Agriculture and Consumer Services (VDACS)

Virginia ConservationVision Agricultural Model



Data Sources:

- Soil surveys (gSSURGO)
- U.S. Census data
- Farmers' market locations
- Road Centerlines
- National Land Cover Database
- Agricultural field polygons



ConserveVirginia

DATA SUBMISSIONS AND ORGANIZATION

REQUESTED

- Spatial data representing only highest statewide priorities on unprotected lands

RECIEVED

- Twenty-four (24) priority layers from 15 state and federal agencies and conservation organizations

ORGANIZED

- Consolidated into 7 logical categories

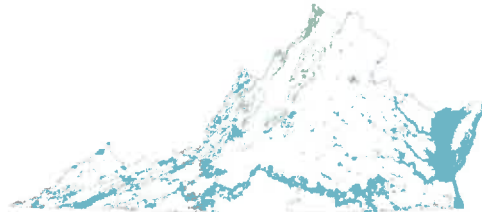
Scenic Preservation



Agriculture & Forestry



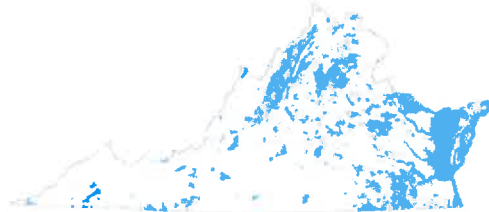
Natural Habitat & Ecosystem Diversity



Floodplains & Flooding Resilience



Water Quality Improvement



Protected Landscapes Resilience



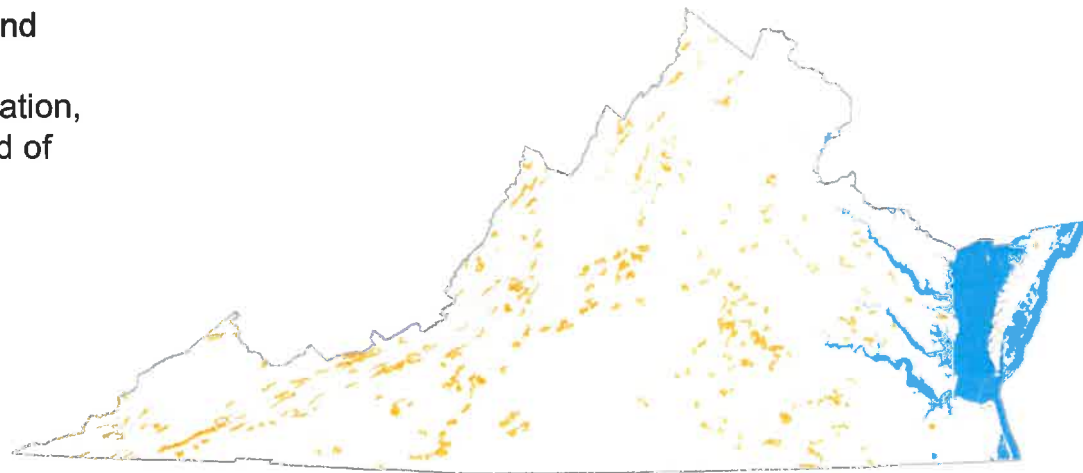
Cultural & Historic Preservation



Agriculture & Forestry

INPUTS

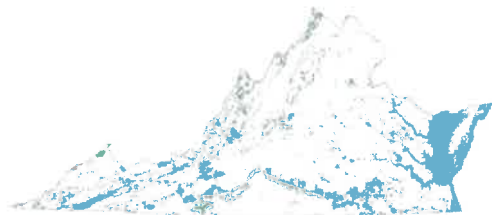
- Priority Working Farms Under Threat
 - Developed by the American Farmland Trust
 - Assessment of extent, diversity, location, and quality of agricultural lands, and of threats from development
- Forest Conservation Values
 - Developed by VDOF
 - Identifies the highest quality, most productive, and most vulnerable forestland for conservation



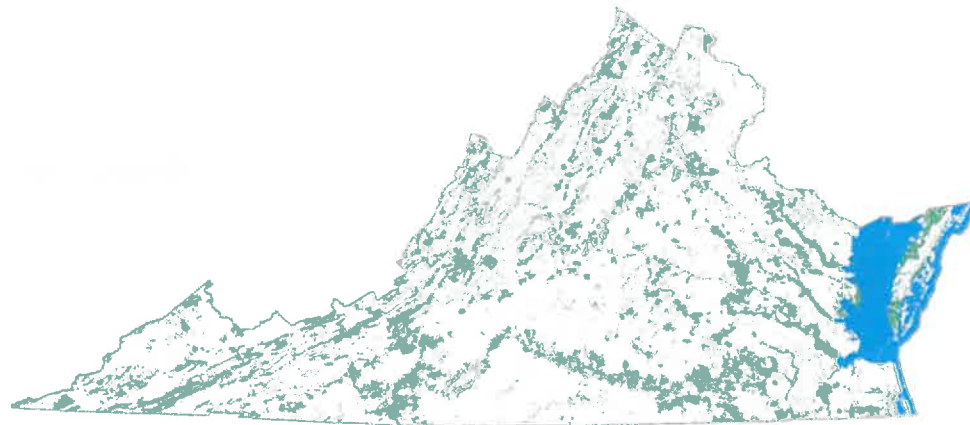
ConserveVirginia

MASHUP

Overlapping areas are counted only once.



Natural Habitat & Ecosystem Diversity



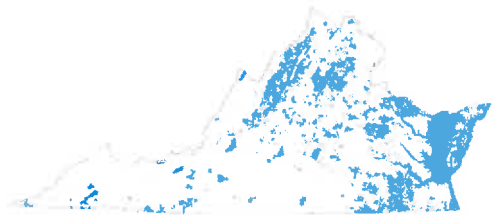
Agriculture & Forestry



Cultural & Historic Preservation



Protected Landscapes Resilience



Water Quality Improvement



Floodplains & Flooding Resilience



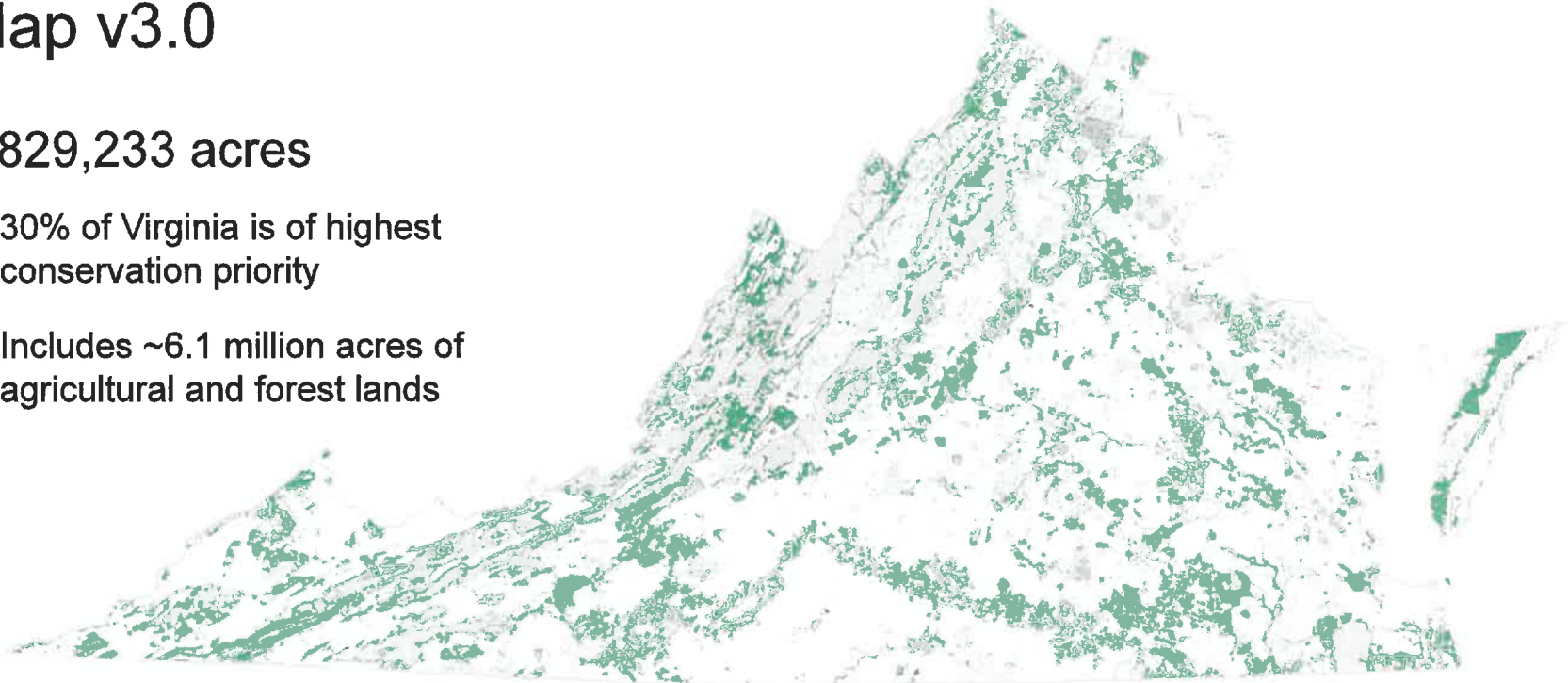
Scenic Preservation

ConserveVirginia

Map v3.0

7,829,233 acres

- 30% of Virginia is of highest conservation priority
- Includes ~6.1 million acres of agricultural and forest lands



https://vanhde.org/



Virginia Department of Conservation and Recreation

[Home](#) | [Map](#) | [Species/Communities Search](#) | [Terms & Conditions](#) | [About Us](#) | [Contact Us](#) | [Help](#)

Welcome to the Virginia Department of Conservation and Recreation's *Natural Heritage Data Explorer*

This site provides interactive access to various map data representing Natural Heritage resources and other conservation values in Virginia.

[ConserveVirginia](#), Virginia's statewide land conservation plan, is now available here.

The Virginia Natural Heritage Data Explorer was updated on March 18, 2022. To ensure the updates work correctly, we recommend refreshing your browser's cache. Instructions can be found [here](https://www.refreshyourcache.com/en/home/):

[This site should be viewed in Firefox version 3.6 or higher, Google Chrome, or Safari version 3 or higher, or Internet Explorer 10 or higher.](#)



Open Access: You do not need to register for use, nor log in, if you are interested in using the site for land use planning or conservation planning. Anyone can freely view and create maps of conservation status and conservation values, by clicking the "[Map](#)" tab above. Click the "[Species/Communities Search](#)" tab to search our database and create summaries of Natural Heritage Resources (i.e. rare species populations and natural communities) by conservation status ranks, counties, watersheds, and other descriptors.

Subscription Access: A subscription is required to access additional sensitive Natural Heritage Resources data, and/or to use the site for project review. If you represent a company, conservation organization or government agency looking for this service, please send an email with contact information and how your organization or company will utilize the website to nhderegister@dcr.virginia.gov. We will respond to your request within 5 business days.

User login

E-mail or username *

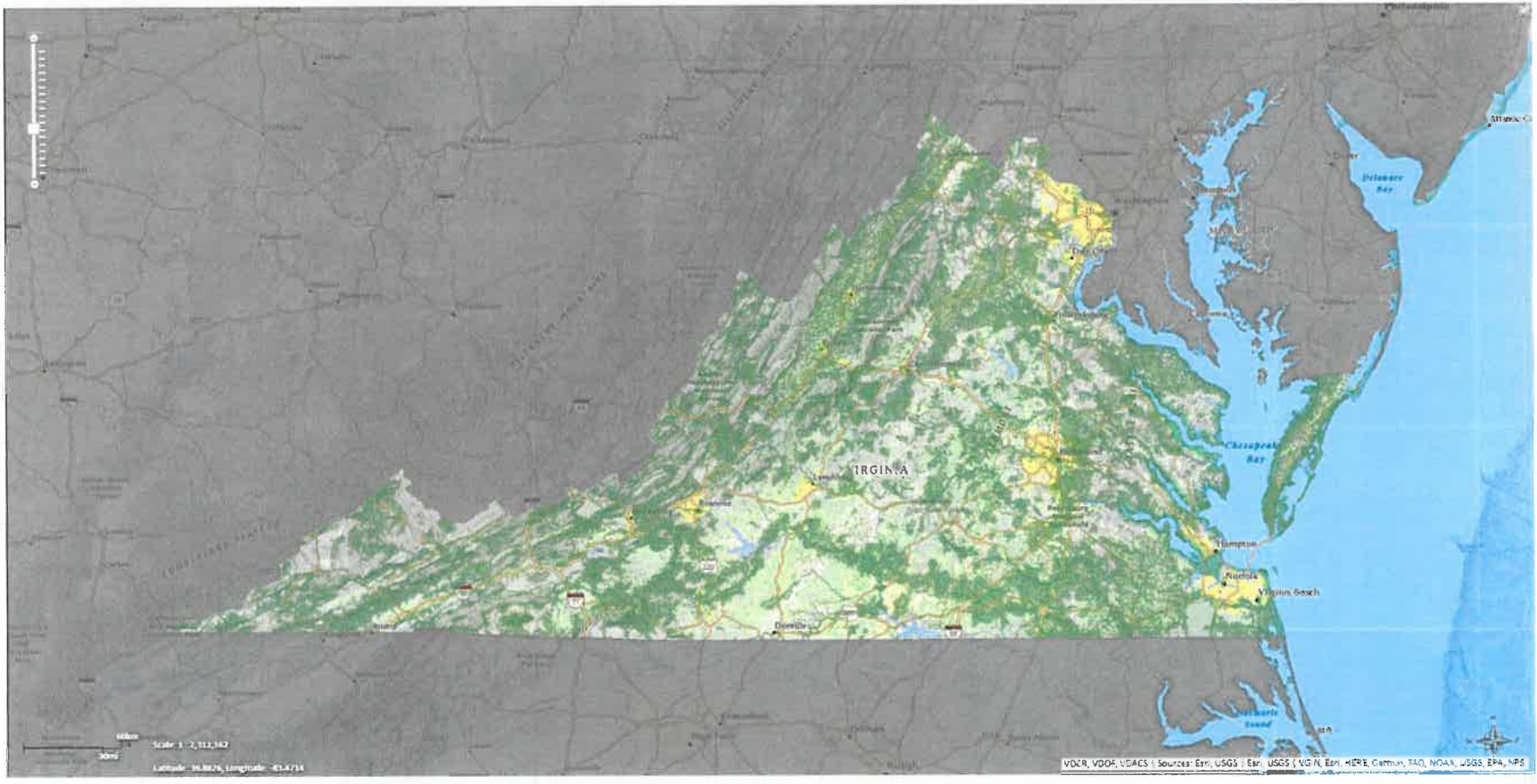
Password *

- [Create new account](#)
- [Request new password](#)

Log in

Layers Make a Map Feature Search

- Managed Conservation Lands
 - Managed Conservation Lands
 - Conservation
 - Wildlife Lands
 - Conservation Lands
 - Conservation Lands
 - Wildlife Lands
 - Wildlife Lands
- ConserveVirginia v3.0
 - ConserveVirginia v3.0
 - ConserveVirginia Map
 - Agriculture & Forestry Category
 - Natural Habitat & Ecosystem Diversity Category
 - Floodplains & Flooding Resilience Category
 - Cultural & Historic Preservation Category
 - Scenic Preservation Category
 - Protected Landscapes Resilience Category
 - Water Quality Improvement Category
- Conservation Planning
 - Potential Rare Species Richness
 - Ecological Cores
 - High
 - Medium
 - Low
 - Very Low
 - Very High
 - Natural Land Network
 - Forest Conservation Values
 - Watershed Impact Model
 - Nature-based Recreation Access Model
 - Cultural Resource Preservation Index
 - Agricultural Model
 - High
 - Medium
 - Low
 - Very Low
 - Very High
 - Development Vulnerability Model





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Richmond, VA 23219
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Conserving Virginia's biodiversity through inventory, information management, protection, and stewardship

Response to WG-4 Questions/Requests from SME Joe Weber, Chief of Biodiversity Info & Conservation Tools, Division of Natural Heritage, Virginia Dept of Conservation & Recreation

Joe Weber
Chief of Biodiversity Information and Conservation Tools
Virginia Natural Heritage Program
Department of Conservation and Recreation
600 East Main Street
Richmond, Virginia 23219
(804) 371-2545

On Sun, Aug 7, 2022 at 10:03 PM Chris Gordon <Chris.Gordon@edf-re.com> wrote:

In advance of the next RAP meeting when the work groups will be coming together to share and discuss the draft proposals, (we) have a few requests that I feel would be valuable stats/visual aids to assist in the discussions, particularly for Work Group #4's task at hand. Please see below and let me know if this is something that can be pulled together.

1. Prime Farmland in the Commonwealth of Virginia
 - a. What is the total acreage of farmland in Virginia?
 - b. What is the total acreage of prime farmland in Virginia?
 - c. Please provide a map of Virginia showing all of the prime farmland in Virginia.
2. Virginia Natural Heritage Data (<https://vanhde.org/content/map>)
 - a. What is the total acreage of land in Virginia that is considered a C1: Outstanding Ecological Core?
 - b. What is the total acreage of land in Virginia that is considered a C2: Very High Ecological Core?
 - c. Please provide a map showing all of the C1: Outstanding Ecological Core areas in Virginia.
 - d. What is the total acreage of land in Virginia that is considered a 5: Outstanding Forest Conservation Value?
 - e. Please provide a map showing all of the 5: Outstanding Forest Conservation Value areas in Virginia.
 - f. Please provide a map showing both C1: Outstanding Ecological Cores & 5: Outstanding Forest Conservation Value areas on the same map.

Also: A "map showing all of the C1: Outstanding Ecological Core areas and C2: Very High Ecological Core areas in Virginia" would also be helpful.

From: <hb206rap-support-request@virginia.edu> on behalf of "Weber, Joseph" <joseph.weber@dcr.virginia.gov>
Reply-To: "Weber, Joseph" <joseph.weber@dcr.virginia.gov>
Date: Tuesday, August 16, 2022 at 4:41 PM
To: "hb206rap-support@virginia.edu" <hb206rap-support@virginia.edu>
Subject: [hb206rap-support] SME Request

I am following up with the maps of ecological cores that you requested. Attached are maps showing:

- 1.) all ecological cores, i.e., ranks C1 through C5
- 2.) C1:Outstanding and C2:Very High ecological integrity cores
- 3.) only C1:Outstanding ecological integrity cores.

I would recommend using both C1 and C2 cores for assessing development impacts because:

- 1.) almost 60% of C1 cores are already conserved (see table) and not developable, thus, only 40% of this class could be considered for development in the first place
- 2.) in terms of numbers, C1 and C2 cores together would represent less than 3.5% (873) of all the cores and habitat fragments in Virginia (25,289)
- 3.) C2 cores have very high ecological integrity and are almost as important as C1 cores
- 3.) C2 cores are often associated with C1 cores in complexes (see map) that provide enhanced ecosystem services
- 4.) C2 cores often contain habitats of rare species
- 5.) there are few C1 cores east of the Blue Ridge Mountains
- 6.) this would be consistent with how DCR reviews development projects for impacts to ecological cores--if a development project intersects either a C1 or C2 core, DCR recommends an impact analysis that uses a standardized and documented methodology that assesses impacts to all intersected cores and which results in an estimate of mitigation acres that may be addressed using a combination of avoided deforestation offsite (i.e., conservation), afforestation, and enhancement.

I think using C1 and C2 cores would be a reasonable compromise that could conserve the most valuable cores, while including only a small fraction of the total number of cores and habitat fragments.

Thanks,
Joe

From: <hb206rap-support-request@virginia.edu> on behalf of "Weber, Joseph"
 <joseph.weber@dcr.virginia.gov>
 Reply-To: "Weber, Joseph" <joseph.weber@dcr.virginia.gov>
 Date: Tuesday, August 16, 2022 at 10:28 AM
 To: "hb206rap-support@virginia.edu" <hb206rap-support@virginia.edu>
 Subject: [hb206rap-support] Fwd: SME Request

I can answer your questions about ecological cores, which I think is best done with this summary table for the 2017 VaNLA:

Summary of Ecological Cores and Habitat Fragments by integrity rank in Virginia.

Ecological Integrity Rank	Count	Acres	Percentage of Virginia Land Area *	Acreage of Cores and Habitat Fragments Conserved ~	Percentage of Cores and Habitat Fragments Conserved ^
1	249	2,553,553	10.1	1,457,191	57.1
2	624	2,145,731	8.5	620,283	28.9
3	2,223	3,467,291	13.7	401,983	11.6
4	5,219	2,657,570	10.5	142,079	5.3
5	16,974	1,898,455	7.5	75,060	4.0
Total	25,289	12,722,601	50.3	2,696,597	

* Large water bodies were excluded.






~ Only lands protected in perpetuity for conservation of natural resources were included.

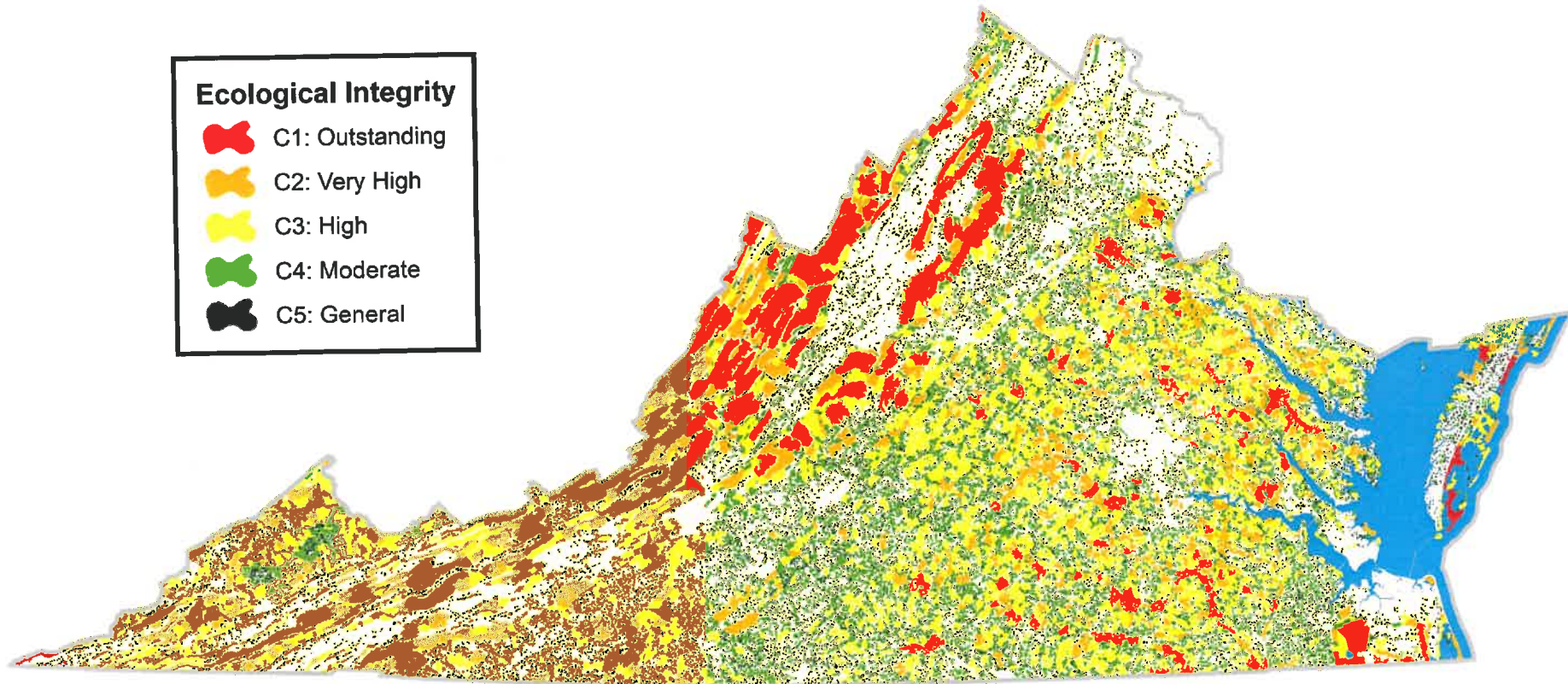
^ Percentage is based on area.

Also note that 21.2% of total core and HF area statewide is conserved and that the total area of Virginia is 25,270,000 acres.


I will work on maps later today, but I need to go to an appointment now. As for your FCV questions, I really should defer to DOF as they developed those data. Also, you should know that the workgroup for HB894 is developing a map of prime farmland, so you might want to reach out to Daniel Goerlich at VT.

Ecological Integrity

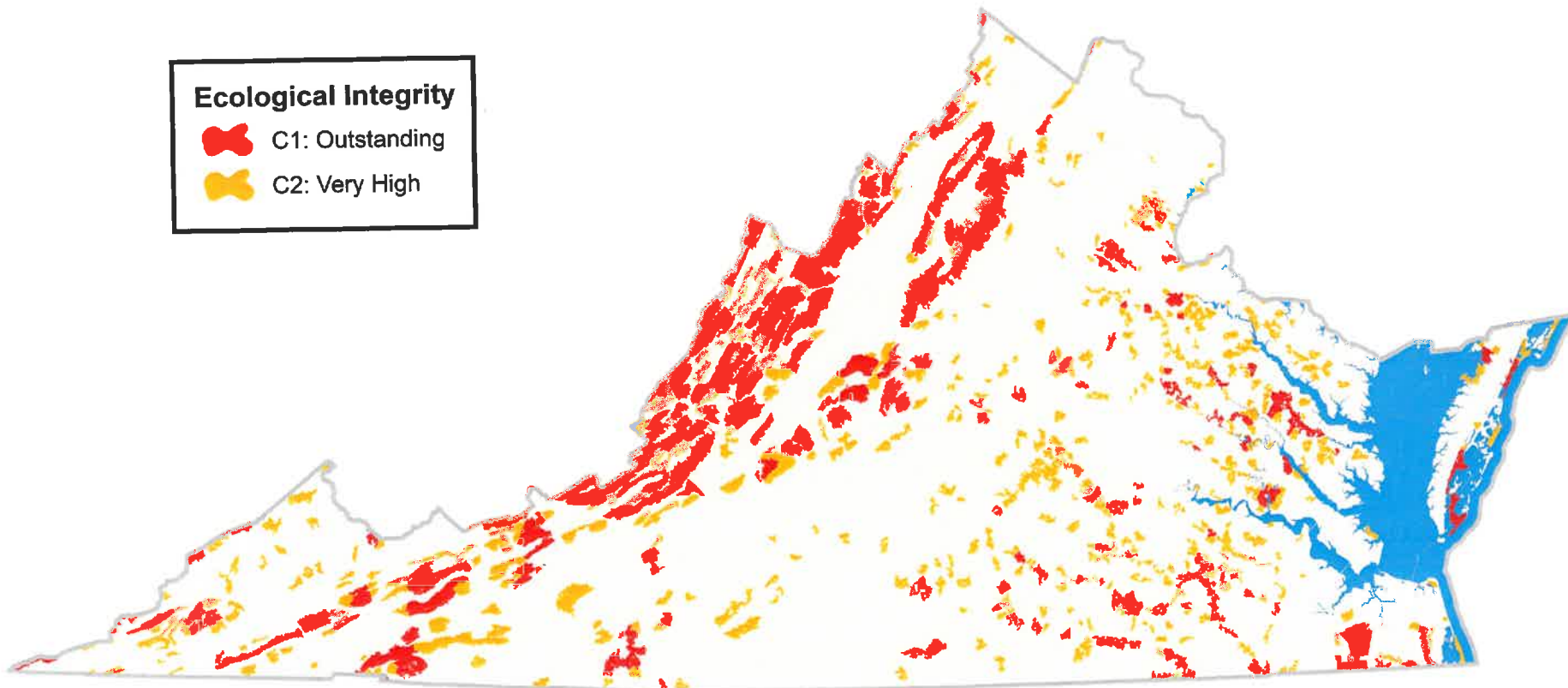
-  C1: Outstanding
-  C2: Very High
-  C3: High
-  C4: Moderate
-  C5: General




Ecological Integrity

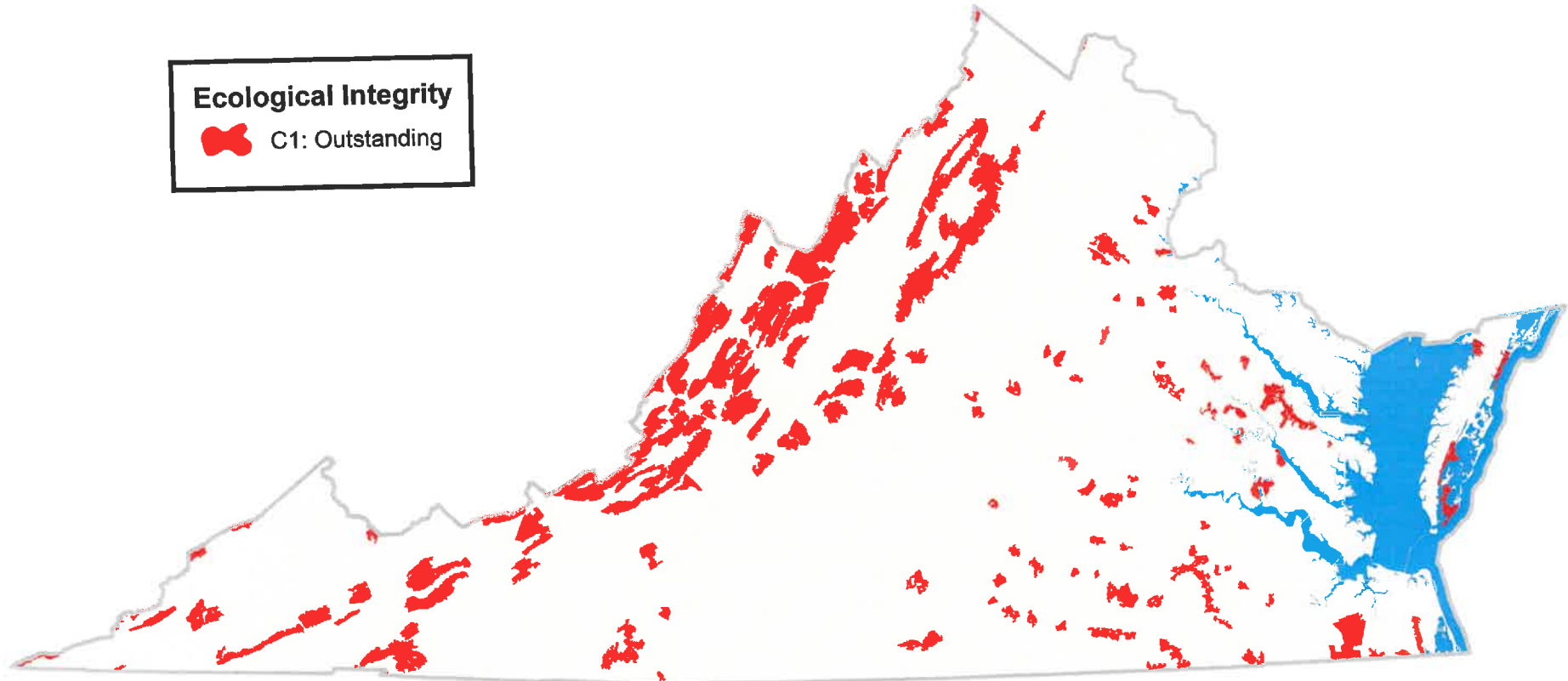
 C1: Outstanding

 C2: Very High



Ecological Integrity

 C1: Outstanding





Forest Conservation Value Model

2020 Edition

Prepared by:

Kim Biasioli, Jim Pugh, and Mike Santucci

Virginia Department of Forestry

900 Natural Resources Drive, Suite 800

Charlottesville, VA 22903

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Introduction

Virginia's forests provide tremendous economic and ecological benefits. The timber industry contributes twenty-one billion dollars annually to the state's economy, and accounts for 2% of the state's gross domestic product (GDP). It provides a job to one in forty workers and is the third largest industry in the state (Rephann 2017). Forests also support the economy and provide health and environmental benefits through recreation, tourism, provision of clean air and water, carbon sequestration, and habitat for biodiversity.

The primary objective of Virginia Department of Forestry's (VDOP) Forestland Conservation Program is to maintain these benefits by keeping Virginia's forestland intact. This objective is driven by trends showing that forestland in Virginia is becoming highly fragmented and parcelized (VDOP 2010). As Virginia's population increases and metropolitan areas continue to expand outward into the rural countryside, we anticipate that forest loss and increased parcelization will continue. Strategic, informed, and targeted conservation efforts, using data-driven tools such as the Forest Conservation Value (FCV) model, are critical to help maintain an intact forest land base and the numerous benefits it provides.

Model Overview

The FCV model is a tool designed by the VDOP to strategically identify the highest priority forestland for conservation in Virginia. The intent is to maximize the efficiency of limited resources by focusing conservation efforts on the highest quality, most productive, and most vulnerable forestland statewide.

The original FCV model was developed in 2013 by the VDOP. Since that time, a number of factors necessitated an update to the 2013 model. The agency has sharpened its focus and priorities through a strategic planning effort completed in 2017. In 2017, VDOP's Forestland Conservation Program implemented a new conservation ranking and prioritization system designed to identify the highest priority projects on a quarterly basis; the FCV is a key component of this ranking system. The FCV is further intended to contribute to the Virginia ConservationVision, the suite of GIS models maintained by the Virginia Department of Conservation and Recreation (DCR) to inform a cohesive, statewide strategy for land conservation. As this multitude of needs were identified and as new data has become available, VDOP has taken the opportunity to create an up to date, improved FCV model to help inform both internal and statewide conservation efforts throughout the Commonwealth.

The 2018 model applied a completely new approach, with different criteria, methodology, and datasets selected for the analysis than were used in 2013. As a result, a direct comparison between the 2013 and 2018 models is not recommended. The 2018 model was designed and documented with the intention that it could be updated easily in the future as new data became available.

In 2020 the model was updated with more recent data for Conserved Lands and SSURGO soils, and with multi-year data from the National Land Cover Dataset (NLCD). The multi-year NLCD

allowed development of a more accurate forest cover dataset based on a pattern of productive forest land use over time rather than the landcover class from a single year. The 2020 model replaces the 2018 version and direct comparison between the two is not recommended.

Model Components

In order to provide a spatial representation of the relative value of Virginia's forests, six key components were identified based on a wide variety of criteria that support the model's objective. The following is a description and justification for the inclusion of each of these components in the model; the specific data used to represent each component are described in the Methods section of this report.

Forested Blocks

Large, contiguous blocks of forestland have a much greater ecological integrity than small fragments of forestland. In general, they are less frequently and less intensively disturbed, and tend to have fewer roads and less edge effect relative to their area, resulting in fewer entry points for spread of invasive species. Large blocks of forestland also provide greater ecological benefits overall by protecting water quality, storing carbon, and providing high quality habitat for forest-dwelling wildlife. In order to survive, many wide-ranging species require large areas of interior habitat to access feeding habitat, to move and reproduce, and to ensure genetic integrity of their populations. Larger blocks of habitat will further allow species to move as needed as the climate changes (Beier 2012). This coarse filter approach of conserving a broader landscape with a diversity of habitats and topography, in order to increase the likelihood of maintaining the species within it, is a widely accepted approach in biodiversity conservation (Schulte 2012).

From an economic perspective, large blocks of forestland provide economies of scale that allow for more long-term, sustainable management and a sustained flow of timber and other wood products to support the forest industry in Virginia. For private landowners, size of the forested parcel is directly correlated with the likelihood of conducting a commercial timber harvest (Butler 2008, Moldenhauer and Bolding 2009). Smaller forested blocks are generally less likely to be managed, as the relative benefit of accessing the site and transporting materials decreases significantly below this threshold. Larger blocks of forestland also provide indirect economic benefits, by providing protection from storm and flood damage and mitigating impacts of climate change.

Forest Management Potential

Managed forests in Virginia are a significant contributor to the state's economy, providing a continuous flow of wood products to support the third largest industry in the state (Rephann 2017). An ability to manage and generate income is a strong motivator for private landowners to retain their forestland, ensuring the sustained flow of the important natural functions and values those forests provide. Therefore, the likelihood and ability of a particular forested parcel to contribute to sustainable forest management increases its forest conservation value.

Two main concepts, probability of harvest and site productivity, were identified as the major drivers of a site's forest management potential. The likelihood a forest is managed is influenced by landowner objectives, biophysical conditions, and socioeconomic factors. Physical conditions such as size of the tract, slope, soil conditions, and distance to roads, as well as socioeconomic factors such as ownership, population density of the surrounding area, and distance to markets may influence the availability of the wood supply (Prisley 2015). A forest's likelihood of being managed is also influenced by the quality of the site, or its inherent ability to produce biomass. Although site productivity can be influenced by management techniques, sites with a naturally high site quality may already have optimal growing conditions, producing better timber and growing trees faster. Therefore, sites with the greatest site quality are generally more suitable for planting, management, and investment.

Connectivity

Connectivity of the natural landscape is an important concept in conservation planning which can have positive ecological, economic, and social impacts on a particular area. There are many benefits to having a well-connected natural landscape, including improved provision of ecological services such as water quality, greater habitat connectivity for species and natural communities, increased opportunities for gene transfer, and resilience to climate change (Beier 2012, Tewksbury et al. 2002). As a result, many conservation efforts focus on protecting and enhancing connectivity to offset the impacts of habitat loss and fragmentation on biodiversity conservation (Rudnick et al. 2012).

Larger, well-connected forested areas are also important from an economic standpoint as they are more likely to be managed and support the forest industry. Forestlands that connected or are in close proximity can be aggregated for forest management or for mitigation banking purposes, offering income generating opportunities for landowners that may not exist for that property in isolation. Connecting and consolidating conserved properties can also further support existing conservation efforts, and may improve the ability of land management organizations to efficiently manage and steward conserved lands.

Watershed Integrity

The VDOF is committed to protecting water quality through implementation of Best Management Practices for Water Quality (BMPs) on forest harvesting operations, encouraging establishment of riparian forest buffers, and improving and protecting watersheds through management and land conservation (VDOF 2018). Water quality is one component of watershed integrity, which more is more broadly defined as the capacity of a watershed to support the ecological processes and functions essential to the sustainability of biodiversity and the watershed resources and services provided to society (Flotemersch et al. 2015). The watershed integrity component of the FCV is intended to prioritize conservation of lands that maximize protection of these water quality benefits and help maintain the value of existing high-integrity watersheds.

A number of factors influence the overall integrity of a watershed. These include physical factors such as topography, slope, landscape position, soil type, and erodibility. Watersheds that protect drinking water sources, wetlands, headwater streams, karst, and important aquatic ecosystems may have a higher relative importance (Hazler et al. 2018). Maintaining hydrologic connectivity throughout the drainage area can also help maintain flow regimes and may be essential for sustaining aquatic biodiversity (Freeman et al. 2007).

Land cover is another particularly important component of watershed integrity, as it influences the amount of impervious surface and runoff potential in the watershed. Forested land cover provides tremendous benefits and services to watersheds by regulating water flow and sediment, providing habitat, and protecting and purifying the freshwater supply (Hanson et al. 2011). As a result, the proportion of forest cover, impervious surface, and relative pollution loads within a watershed all influence its integrity.

Threat of Conversion

In Virginia, approximately a half-million acres of forestland has been converted to non-forest uses in the past four decades and much of that conversion is attributed to residential and commercial development. A majority of this forest conversion comes from family forest lands, which are commonly parcelized when transferred from one generation to the next. This is especially important because private individuals, which are often family forest landowners, hold two-thirds of the total forestland in Virginia (Brandeis et al. 2018, VDOF 2018). Typical ownerships are less than 100 acres and the average family parcel size is just eighteen acres; these are numbers on the edge of economic and ecological functionality (Butler et al. 2016).

Land conversion trends are primarily driven by population growth, which itself has many direct and indirect impacts on Virginia's forests and forest industry. As human populations grow, demands for both forest products and natural areas for recreation increase. At the same time, expansion of residential and urban areas, as well as the patterns of parcelization and fragmentation of the rural landscape, tend to reduce the amount of land available for production. Fragmentation in the rural-urban interface can have impacts on wildlife habitat and often increases both fire risk and the challenges of fire management (Wear et al. 1999).

A number of factors can help identify which forestlands are most vulnerable to conversion. These include proximity to roads and urban centers, historical changes in land cover in the region, and socio-political factors such as employment opportunities, school district quality, and access to attractive waterbodies (Hazler et al. 2016). In general, the most highly threatened forests have the highest forest conservation value; however, those that are already highly fragmented and located within growth areas are likely to have a lower ecological integrity and less potential for forest management, and as a result may not be the highest priority for conservation.

Significant Forest Communities and Diminished Tree Species

Virginia is home to a number of forested natural communities that are rare, uncommon, or of exceptional quality. While many of these significant natural communities, identified by the DCR's Natural Heritage Program, are already protected, many are privately owned and scattered throughout the landscape. These forests face numerous threats, including fragmentation, conversion, invasive species, insects and disease, changes to their natural disturbance regimes, and climate change.

Many of these same threats are related to the decline of important tree species in Virginia, such as longleaf pine and red spruce. Restoration of these diminished tree species is part of the VDOF's forest research program, and protection of their potential habitat is critical to future restoration efforts. For these reasons, the ability of a site to protect significant forested communities or have potential for restoration of diminished tree species contributes to its forest conservation value.

Methods

Overview

Data input layers were created based on the six FCV components and were ultimately combined to create the final FCV model. Methods for creating each layer varied based on the type of data available and its most appropriate application. ArcGIS software was used for all spatial data processing. All input datasets were clipped to the state boundary of Virginia and reprojected to the Lambert Conformal Conic Nad83 coordinate system prior to processing. A 30 meter snap raster derived from the state boundary of Virginia was used to set cell size and alignment for all raster processing.

Data Processing: The Six Key Components

Forested Blocks

We used DCR's most recent Ecological Cores dataset (VaNLA2017_EcologicalCores_IDandRank) to represent contiguous blocks of forest. We copied the source geodatabase feature class to shapefile format, added a new double precision field "Acres" to the attribute table, and calculated acres based on Lambert Conformal Conic Nad83 projection. We then added a new integer field "Rank" to the attribute table and calculated rank based on acreage as shown in Table 1.

Acres	Rank
<50	0
50-100	1
101-500	2
501-1000	4
1001-5000	6
5001-10,000	8
>10,000	10

Table 1. Acres and rank for Forested Blocks.

We converted the forest blocks shapefile to 30 meter floating point raster format based on the attribute field "Rank" and restricted the output to forested areas which have not been previously conserved using the FCV Mask. We then rescaled the remaining data values to range from 0 to 1 to be consistent with other FCV inputs. See Map 2 for an example of the Forested Blocks input layer over a potential open-space easement.

Forest Management Potential

Two main concepts, probability of harvest and site productivity, were identified as the major drivers of a site's forest management potential. The data were derived from the following two sources and combined to create the Forest Management Potential input layer.

- **Harvest Probability (weighting - 25%)** – To determine the probability of a particular site being harvested and contributing to Virginia's forest economy we used the harvest probability component of the "Baseline Analysis of Virginia's Commercial Wood Supply", completed by Stephen P. Prisley, Ph.D., from Virginia Tech's Center for Natural Resources Assessment and Decision Support (CeNRADS) in February 2015 (Prisley 2015). The analysis uses various geospatial datasets to determine what proportion of existing forest inventory might be considered available to wood markets, to identify it spatially, and to develop indicators of the sustainability of Virginia's wood supply. Examples of the datasets used for the analysis include roads, terrain, population, soils, wood mill locations, previous harvest locations, and more.

We restricted the input Harvest Probability dataset (intharvprob) to forested areas which have not been previously conserved using the FCV Mask. We then rescaled the remaining data values to range from 0 to 1 to be consistent with other FCV inputs.

- **Site Productivity (weighting - 75%)** – To determine the quality of a site for growing trees, foresters typically use a measure called site index. The site index is an estimate of the number of feet a tree can grow in height in a specified number of years. A higher site index indicates a higher potential productivity and a higher likelihood that the area will be managed for timber; areas with lower site index are less likely to produce a sustained yield over time, and are therefore generally not

worth the effort or investment to actively manage. To create the site productivity layer, the methodology used by the Southern Forest Land Assessment (Jacobs et al. 2008) was adapted for Virginia using the most current data available. The method looks at site index for all species at the site (within a defined map unit) and selects the highest value. This method identifies the maximum potential for growing trees – of any species – at the site.

We used statewide 2020 gSSURGO soils data from the Natural Resource Conservation Service (NRCS) to calculate site index values. Detailed information about this dataset can be found at: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/?cid=nrcs142p2_053627. The data can be downloaded from <https://datagateway.nrcs.usda.gov/>.

The gSSURGO data is delivered as a statewide ESRI geodatabase. From this database we used the raster dataset MapunitRaster_10m to identify unique soil map units based on map unit key (mukey field). We resampled this 10 meter raster to a 30 meter raster in Lambert Conformal Conic Nad83 projection to match the resolution of other FCV inputs. We used the Component table (component) to identify unique soil components (cokey field) and associated component percentages (compct_r field) for each map unit. We used the Component Forest Productivity table (coforprod) to identify unique site index values (siteindex_r field) and associated species names (plantsciname field) for each component.

The gSSURGO data structure is summarized in Table 2 below. Spatial data consists of groups of pixels representing individual map units identified by map unit key (mukey). Each map unit is associated with one or more unique components identified by component key (cokey). Each component has an associated percentage value (compct_r) which is the proportion of the map unit represented by that component. Each component also has one or more site index values (siteindex_r) based on individual tree species.

Format	Raster Dataset	Table			
Name	MapunitRaster_10m	component		coforprod	
Field Name	mukey	cokey	compct_r	siteindex_r	plantsciname
Description	Map Unit	Component	Component %	Site Index	Species
Value	117756	9310804	80	65	Liquidambar styraciflua
		9310805	3	90	Liquidambar styraciflua
				76	Quercus phellos
				75	Quercus alba
				Null	Quercus falcata

Table 2. Summary of gSSURGO data structure.

In our example map unit 117756 is comprised of components 9310804 and 9310805. Component 9310804 represents 80% of the map unit and component 9310805 represents 3% of the map unit. Component 9310804 has a site index value of 65 for a single tree species. Component 9310805 has site index values for four species ranging from 75 to 90 with one Null value.

We calculated weighted site index values for each component as shown in the table below. We used the maximum site index value for each component regardless of species and weighted these by component percentage. For map units where the sum of component percentages was less than 100 we normalized the existing values to sum to 100. The sum of the weighted component site index values yielded the final site index value for each map unit.

Map Unit	Component	Component %	Normalized Component %	Maximum Site Index	Weighted Site Index
mukey	cokey	compct_r	norm_comppct_r	MAX_siteindex	wt_site_index
117756	9310804	80%	96.39%	65	62.65
	9310805	3%	3.61%	90	3.25
Map Unit Site Index					65.9

Table 3. Example calculation of map unit site index.

In our example the component percent values for the two components were 80% and 3% respectively. Because the sum of these values is less than 100 we normalized these component percent values to 96.39 and 3.61 respectively. The normalized component percent values were multiplied by their corresponding maximum site index values of 65 and 90 to produce weighted site index values of 62.65 and 3.25

respectively. The sum of these weighted site index values yielded the final site index value of 65.9 for the map unit.

We restricted the output raster (siteindex) to forested areas which have not been previously conserved using the FCV Mask. We then rescaled the remaining data values to range from 0 to 1 to be consistent with other FCV inputs.

The final Forest Management Potential dataset (formgtptl) consists of the weighted sum of the Site Index and Harvest Probability datasets with Site Index weighted 75% and Harvest Probability weighted 25%. After computing the weighted sum of the Site Index and Harvest Probability datasets we rescaled the data values to range from 0 to 1 to be consistent with other FCV inputs. See Map 3 for an example of the Forest Management Potential input layer over a potential open-space easement.

Connectivity

The connectivity data layer is intended to maximize the impact of forest conservation efforts by encouraging expansion of existing conserved lands and contiguity of the forested landscape. It was created using DCR's Conserved Lands layer and the ArcGIS Kernel Density tool. We calculated kernel density based on points derived from the Conserved Lands property boundaries. The kernel density tool scores each pixel based on the proportion of conserved lands within two miles; a higher proportion of conserved lands within the two mile radius yields a higher score for that pixel. The Conserved Lands layer does include open lands and historic sites such as battlefields and historic buildings; however, the final FCV model ultimately includes only areas with forest cover.

We converted the vector features in DCR's 2019 Conserved Lands dataset (All_ConservedLands_Easements_2018) to 30 meter raster format in Lambert Conformal Conic NAD 83 projection. We then converted the raster dataset into point features and used the ArcGIS Kernel Density tool to calculate density within a two mile radius of each point. Because the distribution of the kernel density data was skewed by a few very high values, we applied a log transformation to normalize the dataset. We restricted the normalized input data to forested areas which have not been previously conserved using the FCV Mask. We then rescaled the data to range from 0 to 1 to be consistent with other FCV inputs. See Map 4 for an example of the Connectivity input layer over a potential open-space easement.

Watershed Integrity

DCR's Virginia Watershed Model was selected as the most current and relevant dataset to represent watershed integrity in the Forest Conservation Value analysis. The Watershed Model quantifies the relative importance or value of land as it contributes to water quality and watershed integrity (Hazler et al. 2018), and includes different outputs for conservation, restoration, or stormwater management prioritization. The FCV utilizes the Conservation Priority Score, a raster dataset based on soil sensitivity, landscape position, land cover, and watershed integrity data, and specifically designed to geographically identify high priority lands for conservation.

We restricted the input Watershed Model dataset (ConsPriorScore.tif) to forested areas which have not been previously conserved using the FCV Mask. We then rescaled the data to range from 0 to 1 to be consistent with other FCV inputs. See Map 5 for an example of the Watershed Integrity input layer over a potential open-space easement.

Threat of Conversion

We used the 2015 DCR Development Vulnerability Model to represent the threat of conversion in the FCV model. The Vulnerability model is a relative measure of the likelihood of land development, based on travel times to urbanized areas and impervious growth hotspots, as well as current land protection status (Hazler et al. 2016). Areas with a raw score >50 were considered too developed to warrant conservation efforts, as they are already predominantly urban or suburban. Areas with a raw score of <10 were considered to be not immediately threatened, as they were primarily in extremely rural areas and far from roads and urban centers. As a result, only pixels with a raw score between 10 and 50 were clipped out of the overall Vulnerability Model, rescaled, and included in the FCV analysis.

We reclassified the input Vulnerability Model dataset (VulnMod_cls) by setting all values less than 10 and greater than 50 to zero and leaving all other values unchanged. We restricted the dataset to forested areas which have not been previously conserved using the FCV Mask. We then rescaled the data to range from 0 to 1 to be consistent with other FCV inputs. See Map 6 for an example of the Threat of Conversion input layer over a potential open-space easement.

Significant Forest Communities and Diminished Tree Species

This data layer is comprised of the following two sources, which were combined to identify areas with the greatest capacity for protection of known forest resources with a high importance, those with potential for restoration of diminished tree species in Virginia, or a combination of both.

- **Significant Forested Natural Communities** - The DCR's Natural Heritage Program identifies and documents natural communities that are significant because they are rare, uncommon, or outstanding examples of that natural community type. Known and documented examples of these significant natural communities are known as Element Occurrences (EOs). For this analysis, we selected EOs of significant terrestrial natural communities that are forested community types. This is binary data reflecting presence/absence statewide.

We selected the desired forested community types from DCR's Tier 3 EO Reps dataset (eoreps.shp). We converted the selected vector features to 30 meter raster format in Lambert Conformal Conic NAD 83 projection and reclassified No Data values to zero and all other values to one. We restricted the output to forested areas which have not been previously conserved using the FCV Mask.

- **Areas for Potential Restoration of Diminished Tree Species** – Areas for potential restoration of diminished tree species and their habitat were identified using the Landfire BPS dataset. BPS stands for Biophysical Settings and is a vegetation model that shows the natural plant communities that may have been dominant on the landscape pre Euro-American settlement. It is a potential vegetation model, based on both the current biophysical environment and an approximation of the historical disturbance regime. Natural plant communities which had one of the species of interest identified as a dominant component of that community were selected from the statewide model. The species of interest include red spruce, table mountain pine, longleaf pine, atlantic white cedar, and bald cypress. This is binary data reflecting presence/absence statewide.

We selected the desired natural plant communities from the Landfire BPS dataset (us_130bps). We copied the selected raster features to a 30 meter raster in Lambert Conformal Conic Nad 83 projection and reclassified No Data values to zero and all other values to one. We restricted the output to forested areas which have not been previously conserved using the FCV Mask. See Map 7 for an example of the Significant Forest Communities and Diminished Tree Species input layer over a potential open-space easement.

Final Synthesis and Weighting

In order to focus the model specifically onto areas of interest statewide, we created and applied two masks to each of the six data input layers.

- **Forest Cover Mask** – In order to identify only forested lands for the analysis, we created a forest cover mask using the National Land Cover Database (NLCD) (Homer et al. 2012). Although other land cover types may have potential forest conservation value, we determined that only forest categories of land cover as well as scrub/shrub categories, which are often actually regenerating forestland, would best represent areas with FCV in the model. Therefore, we did not include all other land cover categories, such as agricultural lands, open water, and developed areas, in the FCV model.

We used 2011, 2013, and 2016 NLCD data subset to the VA state boundary to define forested areas. We reclassified the landcover for each year based on the table below.

NLCD Class	FCV Class
Open Water	NonForest
Developed, Open Space	NonForest
Developed, Low Intensity	NonForest
Developed, Medium Intensity	NonForest
Developed, High Intensity	NonForest
Barren Land	Open Land

Deciduous Forest	Forest
Evergreen Forest	Forest
Mixed Forest	Forest
Shrub/Scrub	Forest
Herbaceous	Open Land
Hay/Pasture	Open Land
Cultivated Crops	Open Land
Woody Wetlands	Forest
Emergent Herbaceous Wetlands	Open Land

We then created a matrix of all possible combinations of values for the three years and reclassified the matrix as forest or nonforest based on the following parameters:

1. All 2011 forest classes which converted to open land in 2013 and remained open land in 2016 were reclassified as forest.
2. All 2013 forest classes which converted to open land in 2016 were reclassified as forest.
3. All NonForest and Open Land classes from 2011 were reclassified based on their 2016 values.

The resulting 30 meter raster dataset depicts excluded non-forest areas with value zero and forested areas with value one.

- Conserved Lands Mask – We created a conserved lands mask using the DCR’s 2019 Conserved Lands layer and VDOF’s 2019 easement layer. The purpose of the FCV model is to prioritize forest lands for conservation; therefore, already conserved lands were not given an FCV score. Testing different iterations of the model further revealed that including existing conserved lands skewed the model heavily to produce an inaccurate view of statewide priorities.

We combined the 2019 conserved lands dataset from DCR with DOF’s most recent easement dataset to define previously conserved lands. We converted the original polygon features to a 30 meter raster format in Lambert Conformal Conic NAD 83 projection with conserved lands given a value of one. We then reclassified values of one to zero and No Data to one. The resulting 30 meter raster dataset depicts excluded conserved lands with value zero and the remainder of VA with value one.

We multiplied the forest cover and conserved lands masks together to produce the final FCV Mask. This mask depicts the FCV extent with value one and all excluded areas with value zero.

After the masks were applied, each dataset was individually rescaled from 0-1 and then combined in the FCV model according to the weighting shown in Table 4. Weights were determined by averaging the suggested weights of each Forest Conservation team member and

then adjusted slightly through various iterations of the draft model, until it was determined that the model best reflected actual FCV on the ground.

Model Component	Weighting (%)
Forested Blocks	21
Forest Management Potential	18.5
Connectivity	16
Watershed Integrity	24
Threat of Conversion	12.5
Significant Forest Communities and Diminished Tree Species	8

Table 4. Final weighting of the FCV model.

The model was then classified into five categories using a quantile classification method, in which each class contains an equal number of cells.

Results and Discussion

The final output of the model is a statewide raster dataset available for GIS users to download on the VDOF's website at: <http://www.dof.virginia.gov/gis/download/index.htm>. It is also available as a layer in IFRIS, the VDOF's internal web mapping service.

Model values range from 0 to 1 and are classified into five categories of FCV for ease of interpretation: very low, low, medium, high, and very high. The model is best viewed in conjunction with the DCR Conserved Lands layer, available at: <http://www.dcr.virginia.gov>, as this provides context for interpretation of the results.

In order to demonstrate the output of each of the six model components and the final FCV model, Maps 1-8 show an example of an individual property that was being considered as a potential open space easement at the time of development of the model. The example shown is located in the eastern region of the state; it is important to note that although the FCV is a statewide model, it behaves differently in different regions due to the emphasis of different model inputs in those areas. For example, properties in the western region of the state have a much greater likelihood of being proximate to conserved lands, while areas in the eastern part of the state are likely to have a greater forest management potential.

The primary purpose of the FCV model is to prioritize forestland for conservation. It may also be used by natural resource professionals and conservation planners for a wide variety of other applications, and will likely be most effective when combined with other planning and conservation tools. The model is best applied at a local or project-level scale, as the results may be difficult to recognize at a larger scale.

In developing the model, many different choices and assumptions were made regarding the data inputs that were selected, how they were combined and weighted, and the processing

methodology. We attempted to make these decisions objectively and with the best data available at the time. However, the final output of the model is the result of the compilation of a number of disparate datasets, some of which vary in scale, resolution, measurement units, currency, and source of the data; this is an element of GIS modelling that introduces uncertainties and a limitation of the analysis.

The quality of the model is also limited by the quality and currency of the data used in the input layers. For example, in some areas, the NLCD data may incorrectly classify newly regenerating or planted forestland as open land, and without the resources to validate each pixel, these inconsistencies will occasionally be reflected in the final model output. Another limitation we recognize is duplication of some of the data within the data sources we used, which often resulted in heavier weighting toward that factor. For example, proximity to roads was a primary component of both the vulnerability model and the probability of harvest dataset, resulting in a greater emphasis on roads in the final output of the model. Throughout the process of model development, these limitations were identified and adjusted for, where possible and appropriate.

VDOF will continue to improve the FCV model and incorporate new data as opportunities arise. Complete and detailed documentation has been provided in order to facilitate this process for future iterations of the analysis.

Acknowledgements

This project is the result of a collaborative effort among VDOF staff, including the authors of the original 2013 FCV model and the current forestland conservation and GIS staff. Bettina Ring, Rob Farrell, Andrew Fotinos, and Amanda Scheps provided feedback and insights on the weighting of the model. We also appreciate the feedback received from DCR staff, particularly Joe Weber and Kirsten Hazler for their review of the model, and for the use of the other ConservationVision model data in this analysis. We'd also like to thank Steve Prisley from Virginia Tech for the use and interpretation of the harvest probability data.

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Maps

Map 1. Overview of a potential open-space easement in Southampton County.

Map 2. Forested Blocks input layer over a potential open-space easement in Southampton County.

Map 3. Forest Management Potential input layer over a potential open-space easement in Southampton County.

Map 4. Connectivity input layer over a potential open-space easement in Southampton County.

Map 5. Watershed Integrity input layer over a potential open-space easement in Southampton County.

Map 6. Threat of Conversion input layer over a potential open-space easement in Southampton County.

Map 7. Significant Forest Communities and Diminished Tree Species input layer over a potential open-space easement in Southampton County.

Map 8. Final output of the FCV model over a potential open-space easement in Southampton County.

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



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VCPC wishes to thank Summer Research Assistant Merrill Robinson, a Master of Public Administration and Master of City and Regional Planning student at the University of North Carolina-Chapel Hill, for her invaluable assistance with editing and finalizing this report.

Editing and project support was provided by Gray Montrose, Assistant Director at the Virginia Coastal Policy Center.

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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VCPC is especially grateful to the Virginia Environmental Endowment for providing generous funding to support our work as well as to establish the Center in Fall 2012.

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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 solar⁶ 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

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

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

¹⁶ VA. CODE ANN. § 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 plan²⁸ 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 839³⁶.

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

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

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

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 Vogelsson, *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

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

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”); Vogel song, *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.

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

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-a6iy3xol5aupha3zk34yez4rq-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 375,000 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

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

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-spotsyvanias-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_67ceffc2-54f5-11eb-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

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

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 sPower¹³⁶ 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

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 Vogelsson, *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/3n2s011.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

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 Vogel song, *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 Vogel song, *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

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

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

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_reuse_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

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 pushback¹⁸⁹ and lack of regional capacity, volatility in energy production and consumption related to low capacity for

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 households¹⁹¹ 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

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. Assem., 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. Assem., 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. Assem., 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 Rule¹⁹⁹ 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

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

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=ef7fac9ee33d4d0aa580a32ac33b0a8a#>

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.

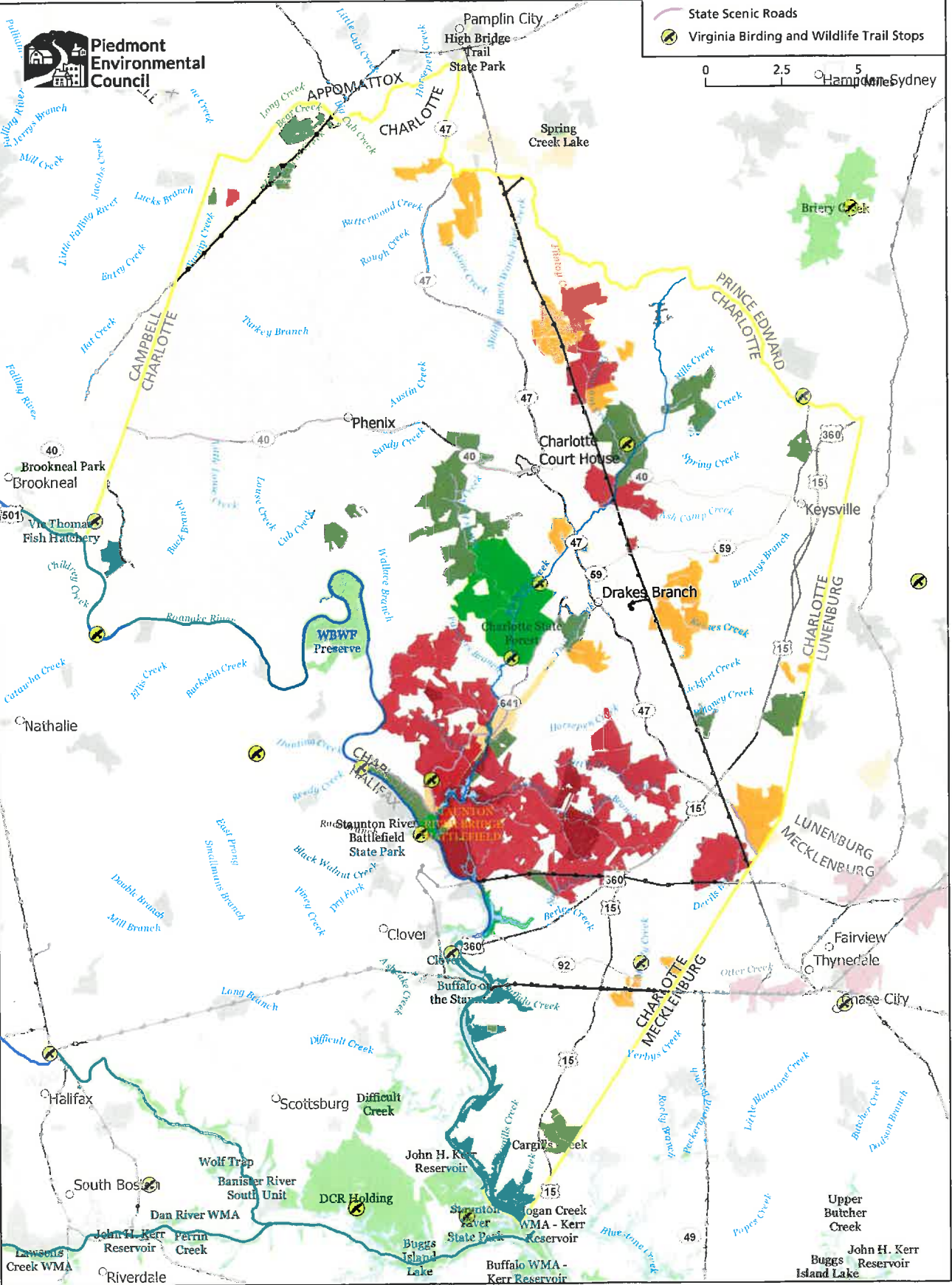
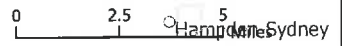
disturbances to or loss of farmlands and forests, as well as economic or social impacts, such as loss of historic or culturally important land and loss of pastoral character in rural areas.

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.

Potential Utility Scale Solar Facilities Charlotte County

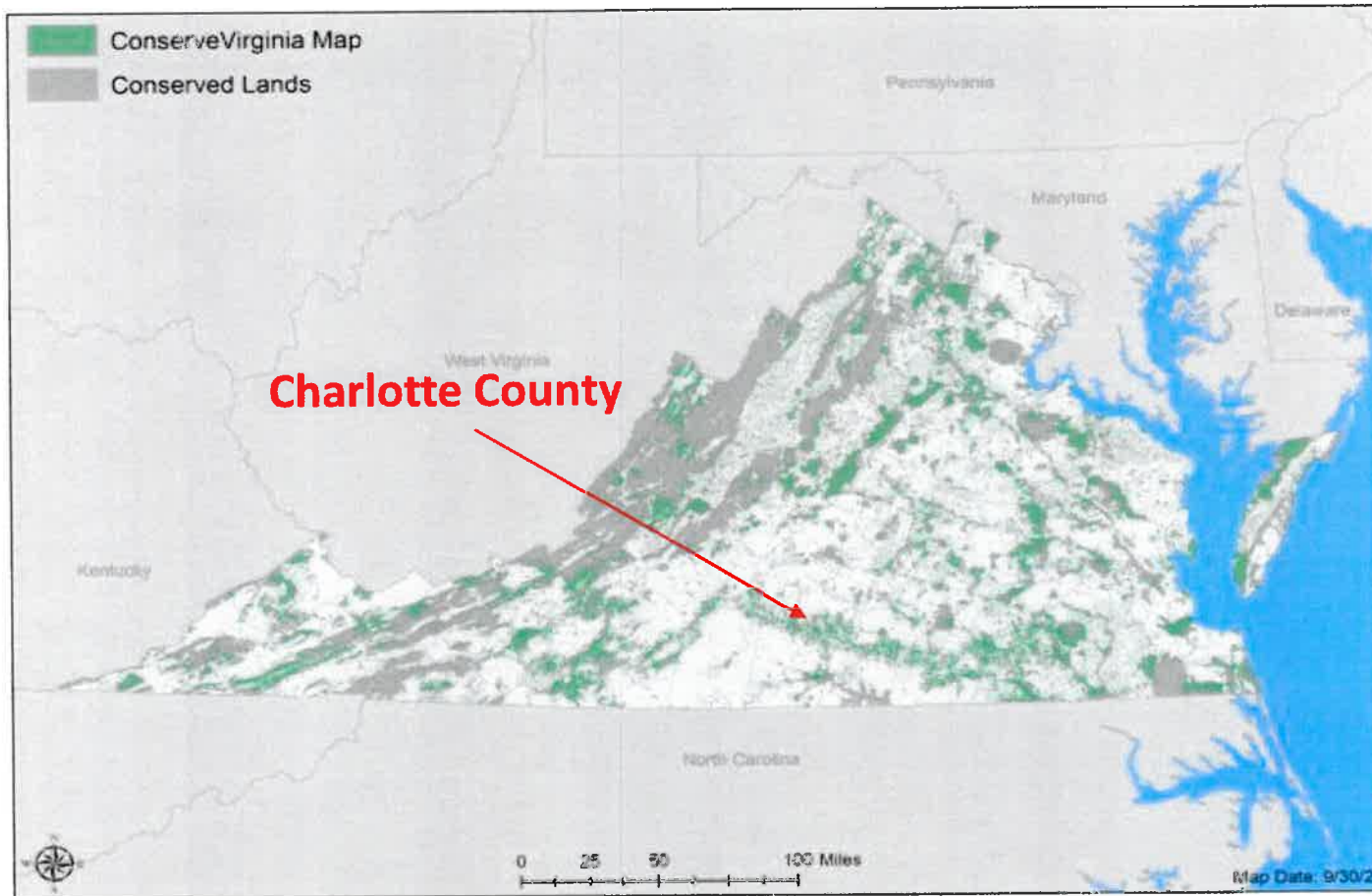


- Solar projects: Conditional Use Permit Obtained or Pending
- Solar projects: Recorded Options
- Publicly Owned Land
- Conservation Easements
- Historic Districts
- Civil War Battlefield
- Electric Transmission
- State Scenic Rivers
- State Scenic Roads
- Virginia Birding and Wildlife Trail Stops



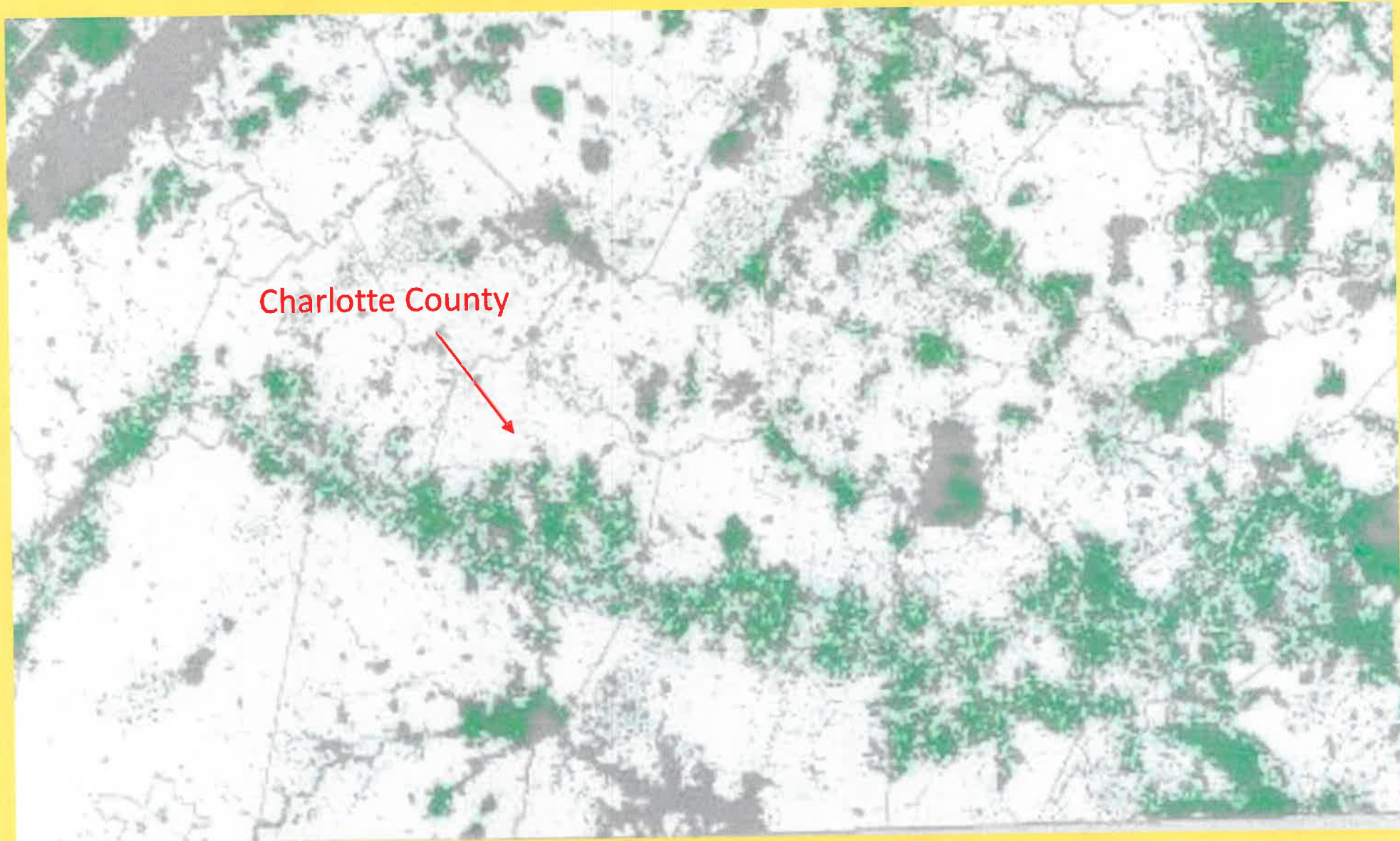
Piedmont
Environmental
Council

ConserveVirginia Map



ConserveVirginia Methodology

To create *ConserveVirginia*, the Office of the Secretary of Natural Resources led an extensive effort to identify and map the Commonwealth's highest value conservation lands. Knowing that land conservation can address a wide array of interests and needs, the process began by identifying what conservation values were important to Virginians. In total, the Secretary, working closely with the land conservation community and a number of state agencies, identified 24 mapped data models, which have been divided into seven categories, each representing a different overarching conservation value. The categories are: Agriculture & Forestry; Natural Habitat & Ecosystem Diversity; Floodplains & Flooding Resilience; Cultural & Historic Preservation; Scenic Preservation; Protected Landscapes Resilience; and Water Quality Improvement.



Charlotte County

A close up of the Conserve Virginia state map shows that much of central Charlotte County, i.e. the Roanoke Creek corridor, is considered by natural resource agencies as high priority for conservation.



Twittys Creek Solar, a 134-acre, 15-megawatt installation along Highway 59, is the first solar project operating in Charlotte County, Va. Melissa Lyttle for the New York Times

The New York Times

Wednesday, September 21, 2022

Are There Better Places to Put Large Solar Farms Than These Forests?

By Gabriel Popkin

Mr. Popkin is an independent journalist who writes about science and the environment. He has written extensively about threats to trees and forests.

CHARLOTTE COURT HOUSE, Va. — In Charlotte County, population 11,448, forests and farms slope gently toward pretty little streams. The Roanoke River, whose floodplain includes [one of the most ecologically valuable and intact forests](#) in the Mid-Atlantic, forms the county's southwestern border.

On a recent driving tour, a local conservationist, P.K. Pettus, told me she's already grieving the eventual loss of much of this beautiful landscape. The Randolph Solar Project, a 4,500-acre project that will take out some 3,500 acres of forest during construction, was approved in July to join at least five other solar farms built or planned here thanks to several huge transmission lines that crisscross the county. When built, it will become one of the largest solar installations east of the Rocky Mountains. Although she is all for clean energy, Ms. Pettus opposed the project's immense size, fearing it will destroy forests, disrupt soil and pollute streams and rivers in the place she calls home.

"I was so excited and hoped to see solar canopies over parking lots, solar panels on rooftops, solar panels on big box stores" after Virginia passed a 2020 law requiring the elimination of fossil fuels from its power sector by 2050, Ms. Pettus says. "I never dreamed it would involve so much deforestation and grading in a place I deeply care about."

The conflict Ms. Pettus described is becoming increasingly common in rural Virginia, where a recent boom in solar farm construction has given many people pause. Conservationists and farmland advocates argue that the solar gold rush is displacing valuable forests and farms when panels could instead be going on already developed or degraded land, including abandoned industrial sites and landfills. Some even warn that a decades-long push to protect the Chesapeake Bay could be undermined by panel-driven forest loss.

Since approving Randolph and another large installation, Charlotte County has put a hold on any new solar projects until at least 2024. Measures like these, which have been implemented in at least [31 states](#), may become a major hindrance to implementing the Inflation Reduction Act, recently signed into law by President Biden. For the great promise of renewable energy to be realized, states like Virginia must create an environment where solar, nature and people can peaceably coexist.

"It's very unsettling from our side to see the hardening on the sides of the issue," says Judy Dunscomb, a senior conservation scientist with the Nature Conservancy, which supports both renewable energy and forest conservation. "Folks are trying to push through these really big projects on the one hand, and localities are becoming increasingly anxious about the potential impacts of those projects."

The ambitious targets in Virginia's 2020 Clean Economy Act make it an early mover in the eastern United States, but nearly every state could face some version of this conflict. In every conceivable scenario that avoids catastrophic climate change, solar energy must play a central role in shifting our economy off fossil fuels. For example, a recent report from [Net-Zero America](#), a research group at Princeton University, found that for the U.S. economy to be fully decarbonized by 2050 U.S. solar production may need to grow more than 20-fold, potentially occupying an aggregate area the size of West Virginia.

Utility-scale solar is now as cheap as or cheaper than any other form of power, but it is space-intensive. The American Farmland Trust projects that to meet renewable energy targets, many eastern states, which have relatively high population densities, may need to devote [between 1.5 percent and 6 percent](#) of their undeveloped land to solar panels.

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Still, there's plenty of space for those panels, even in a future in which most or all of our electricity comes from clean sources, and in which widespread deployment of electric cars and heat pumps ratchets up demand for electricity. Several independent estimates suggest the country could power itself with roughly the acreage currently dedicated to land most everyone would agree is already degraded. And up to 39 percent could be met by putting panels on roofs. "We have tremendous opportunity on rooftops, on parking lots, on other areas like that," says Garrett Nilsen, the deputy director for the U.S. Department of Energy's Solar Energy Technologies Office.

Yet rooftops and parking lots are not where most panels are going in Virginia, or elsewhere in the United States. [A 2021 study](#) found that most solar panels in Virginia end up in forests and on farmland. And nationwide, about half of new solar is built in deserts; more than four-fifths of the rest goes on farmland, forest land or grasslands, according to [a separate analysis](#).

That makes sense; such land is often cheap and easy to build on. Public and corporate policies are also driving big solar development to such spaces. The 2020 Virginia Clean Economy Act has converged with the needs of one of the state's fastest-growing industries: data centers. Many of these facilities are operated by tech giants, such as Amazon, Google and Microsoft, that have committed to renewable energy. The centers will soon gobble up two gigawatts of power, [a recent report](#) estimated — almost one-sixth of the state's total power consumption.

Neither the state nor the tech giants determine where new solar projects go. Siting is instead left up to developers, who often seek out large, flat parcels near transmission lines, and to local governments and planning and zoning boards, which are often unprepared to assess solar's environmental impacts. And Virginia offers relatively few incentives to encourage development on rooftops, parking lots or other developed or degraded areas.

The solar installations that are coming online will help reduce carbon emissions from fossil fuels. But the forests and farms they often replace help the climate too. Virginia's forests absorb about one-fifth of the state's emitted carbon dioxide, and it will need every bit of those trees' carbon-sucking power to offset emissions from hard-to-decarbonize sectors such as transportation and heavy industry, Ms. Dunscomb says.

Forests also support wildlife, prevent erosion and keep pollutants from running off into waterways. Deforested land loses some of its ability to absorb storm water, leading to increased flood risk and dirtier water downstream. At the same time that Virginia is attempting to add some 30,000 acres of forest annually to meet its obligations under the Chesapeake Bay Agreement, which requires that states in the bay's watershed reduce the pollution they send into the bay, it may be losing close to that amount to new solar arrays, estimates Chris Miller of the Piedmont Environmental Council in Warrenton.

Farmland's environmental impact is more mixed — it can be a carbon sink or source, an absorber or source of water pollution and a stronghold or destroyer of biodiversity, depending on how it's managed. But it has another obvious and important use: growing food. Solar panels

typically take farmland out of production, and it's not yet clear whether these conversions are temporary or permanent.

These issues came to a head during the several-year debate over the Randolph Solar Project, which will deliver a whopping 800 megawatts to the grid, nearly as much as a typical nuclear plant. Ms. Pettus fears that Randolph, along with several other large projects that have already been approved in the county, will send soil and storm water streaming into Roanoke Creek, which includes several pristine wetlands and ultimately drains to the Roanoke River. Runoff from deforested slopes could harm water quality and aquatic life, Ms. Pettus says.

Francis Hodsoll, the C.E.O. of SolUnesco, the developer of the Randolph Solar Project, has promised to preserve 6,000 acres of trees on the 13,000-acre site, create wildlife corridors and ensure that the project doesn't harm water quality — something he acknowledges certain earlier projects did not do. "I think everybody who wants solar to continue in Virginia has gotten very serious about this issue," he says.



The Amazon Solar Farm developed by Dominion Energy in Climax, VA, a 1,500-acre, 120-megawatt project. Melissa Lyttle for The New York Times

Aaron Ruby, a media relations manager for Dominion Energy, which plans to buy the project and complete its construction, promises that the company will maintain protective buffers around wetlands and waterways, capture storm water and minimize grading and topsoil loss. Still, 3,500 acres of forest will be removed to make room for the panels. Much of that would likely have been cut anyway at some point, but the solar project will prevent new trees from regrowing and absorbing carbon.

After numerous hearings, the county's board of supervisors in July gave the project a conditional use permit, enticed by hundreds of millions of dollars in projected revenue that they hope will allow them to lower property taxes.

The solar boom has created new alliances. Environmental groups such as the Piedmont Council and the Chesapeake Bay Foundation, while supporting clean energy generally, have found themselves joining farm bureaus to call for measures to reduce large-scale solar's impacts on nature and farmland. This spring, the Virginia legislature passed a bill acknowledging that utility-scale solar can have a "significant adverse impact" on forests and farmland and creating an advisory panel to develop measures to reduce this impact.

Meanwhile, libertarians and free-market conservatives have allied with the solar industry to back property owners' rights to use their land as they wish.

There are also softer values at play. Solar panels can have a futuristic beauty, but for many people they're a blight. Much of the opposition to large solar projects has centered less on nature than on aesthetics, historical preservation, property values and rural character. Some of it has also been fueled by [misinformation](#).

Motivated residents can scuttle projects, as happened last year when the Culpeper County board of supervisors nixed a proposed solar installation in central Virginia in response to citizen opposition. Other counties have revised zoning rules to restrict the size of new projects or even ban them altogether. And again, it's not just happening in Virginia: Researchers from M.I.T. found that between 2008 and 2021, [53 utility-scale renewable energy projects were delayed or blocked in the United States](#), leading to almost 4,600 megawatts of lost generating capacity — enough to power nearly a million homes.

If today's relatively modest solar rollout is already facing such strong headwinds, imagine what will happen when states and companies move closer toward going 100 percent renewable. The Inflation Reduction Act's tax credits and other incentives could quintuple the amount of solar installed annually by 2025, [according to Princeton's Zero Lab](#), but only if developers and installers win approval for projects.

There are plenty of places where solar energy could be developed without triggering conflicts with natural resources or concerns about rural landscapes. Rooftops and parking lots combined could, in theory, meet nearly 80 percent of the nation's electricity needs, according to the Department of Energy. But absent incentives, such sites are generally more expensive to develop than forest or farmland.

Dominion, in partnership with T.N.C., will also be developing a solar farm in southwestern Virginia on a flattened mountaintop that was blasted away for coal. Projects like this one hit a sweet spot: big enough to realize economies of scale, sited on already degraded land, and poised to boost the economy of a region that sorely needs it. More such former industrial sites are available — on landfills, for example — but they are often far from transmission lines. And the surfaces of such sites can be unstable, making construction complicated and expensive. “We can’t really brownfield our way out of this,” Ms. Dunscomb acknowledges.

But an [analysis](#) she recently conducted also delivered good news: With careful planning, Virginia can meet its solar needs while protecting the most valuable forests, wetlands and other ecosystems. Marginal farmland with poor soil, typically used for hay or pasture rather than crops, could be a better option than forest or prime farmland, for example. While some places are too steep or too far from high-voltage transmission lines to be potential solar sites, a more equitable, transparent and environmentally sensitive distribution of solar energy is possible.

States that are still ramping up their solar efforts should learn from what’s happening in Virginia. Because just about the worst thing that could happen to the climate is for one of its best allies to be seen as such a bad neighbor that nobody wants it around.

Gabriel Popkin is an independent journalist who writes about science and the environment. He has written extensively about threats to trees and forests.
















The
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New England District

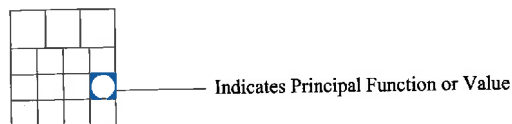
Wetland Functions and Values
A Descriptive Approach

Graphical Representation of Wetland Functions and Values

Wetland I.D.	Total Acres			Impacted Acres
				
				
				

Symbols Key

-  Groundwater Recharge/Discharge
-  Floodflow Alteration (Storage & Desynchronization)
-  Fish and Shellfish Habitat
-  Sediment/Toxicant Retention
-  Nutrient Removal/Retention/Transformation
-  Production Export (Nutrient)
-  Sediment/Shoreline Stabilization
-  Wildlife Habitat
-  Recreation (Consumptive & Non-Consumptive)
-  Educational/Scientific Value
-  Uniqueness/Heritage
-  Visual Quality/Aesthetics
- ES** Endangered Species



This graphical summary of wetland characteristics was developed as a tool to help construct an annotated map of functions and values for project analysis. Based on the findings reported on a data collection form, an icon box is prepared for each wetland investigated during Phase II of the Highway Methodology. The Endangered Species value may be added when present.



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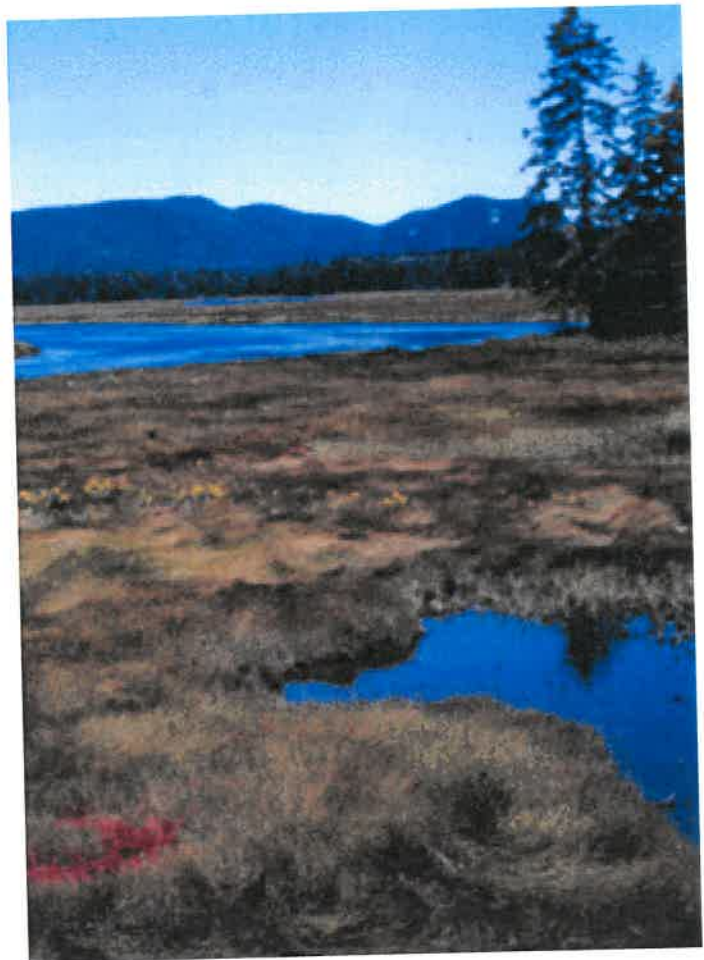
We wish to acknowledge both the Connecticut and New Hampshire Department of Transportation for the opportunities they provided to develop ideas and acquire experience reflected in this booklet. Detailed questions regarding information contained in this booklet may be directed to Regulatory Branch, at the Corps, New England District at 1-800-362-4367 (within Massachusetts) or 1-800-343-4789 (outside Massachusetts).




A New England forested wetland.

Preface

This booklet provides guidance to permit applicants, consultants, and U.S. Army Corps of Engineers project managers on how to identify and display wetland functions and values acceptable for the Corps New England District Regulatory Program. It is a supplement to the Highway Methodology Workbook published by the Regulatory Branch in 1993, which defines procedures to integrate Section 404 permit requirements with highway planning and engineering and the National Environmental Policy Act (NEPA). The evaluation of wetland functions and values is an integral part of the overall phased approach of the Highway Methodology. Use of this booklet for highway projects, and other projects with an integrated planning process, should be preceded by review of the Highway Methodology Workbook. The wetland functions and values "Descriptive Approach" presented in this booklet, however, can be used for any project where the characterization of wetland resources is necessary for Section 404 permit requirements. It is important to note that, although wetland evaluations form the base from which impact assessments are made, they are two distinct processes. Impact assessment is only briefly addressed in this booklet.



Wetlands add diversity and beauty to the landscape.



Definition of a wetland...

Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Introduction

For some years now, the Regulatory Branch has recognized the limitations of wetland assessment methodologies that generate numerical weightings, rankings, and/or averaging of dissimilar wetland functions, which unnecessarily bias a project reviewer. For many of these regional or national methods, the base data is not reported and it is difficult for the reviewer to reconstruct the indicators that were considered to predict the functions and values of a wetland. As a result, we advocate an approach that includes a qualitative description of the physical characteristics of the wetlands, identifies the functions and values exhibited, and most importantly, the bases for the conclusions using "best professional judgement." All readily available data are used by an interdisciplinary team for evaluation and subsequent consensus recommendations to the Corps decisionmaker.

There was an initial concern by applicants and consultants that a descriptive approach to evaluate wetlands would be unorganized, unpredictable, not legally defensible, and difficult to document. In response, we developed a format to collect and display this information which is described in this booklet.



Evaluating a wetland

In addition, and in the context of the Highway Methodology, this booklet takes the approach one step further and describes ways to graphically represent the functions and values of wetlands separately, as well as in relationship to other constraints or resources.

Visualizing geographical relationships between dissimilar resources is key to making permit decisions that are sensitive to all natural and human resources including, but not limited to, the protection of wetlands. As a consequence, study areas are depicted using multiple constraint graphics. These tools build on the McHarg (1969) overlay techniques of the 1960s. They are facilitated by the use of Computer Aided Drafting and Design (CADD) and Geographic Information Systems (GIS). Neither of these computer methods is necessary, however, they can save time and add flexibility to the planning process.

What are wetland functions and values?

Wetland functions and values form a very important part of Section 404 permit decisions by the Corps. **Functions** are self-sustaining properties of a wetland ecosystem that exist in the absence of society. Functions result from both living and non-living components of a specific wetland. These include all processes necessary for the self-maintenance of the wetland ecosystem such as primary production and nutrient cycling. Therefore, functions relate to the ecological significance of wetland properties without regard to subjective human values.

For example, a wetland that has slowly moving water performs the function of retaining sediments and toxicants. That is, the physical characteristic of a wetland that causes surface water to move slowly serves to let suspended particulates settle out of that water. This function traps sediments carried to it in runoff from uplands or upstream areas and clarifies the water. Identification of that function helps the Corps evaluate (1) whether the impacts of a project may impair that function and (2) whether such impacts are permissible.




Great Blue Heron

Values are benefits that derive from either one or more functions and the physical characteristics associated with a wetland. Most wetlands have corresponding societal value. This is recognized in various federal, state, and local wetland legislation that was enacted to protect these resources. The value of a particular wetland function, or combination thereof, is based on human judgment of the worth, merit, quality, or importance attributed to those functions. For example, a particular wetland might be considered valuable because it is known to store flood waters upgradient or adjacent to a developed area. That function is valuable to society because it attenuates flood waters which lessens the destructive severity of flood events. Another wetland might be valued because its combination of diverse wildlife habitat and picturesque setting offers various recreational and educational opportunities. The judgment of value is based on the opinion of recognized experts whose views are ultimately weighed and considered by the Corps in its permit process.



The proximity of development may alter wetland functions and values. Therefore, evaluation of the resource must consider not only the wetland, but also adjacent land use and associated interrelationships.

The "Descriptive Approach" to wetland functions and values presented in this booklet is twofold and incorporates both wetland science and human judgment of values. Intermixing science with value judgments in this way, while difficult, has proven to be both effective and acceptable. The evaluator first determines if a wetland is suitable for particular functions and values and why, followed by a determination of what functions and values are principal and why. (The purpose of designating a principal function and value category is discussed later in this booklet.) Functions and values can be principal if they are an important physical component of a wetland ecosystem (function only) and/or are considered of special value to society, from a local, regional, and/or national perspective.



What wetland functions and values are considered by the Corps in its Section 404 permit process?

The 13 functions and values that are considered by the Regulatory Branch for any Section 404 wetland permit are listed below. The list includes eight functions and five values. Values are grouped together at the end of the list.

These are not necessarily the only wetland functions and values possible, nor are they so precisely defined as to be unalterable. However, they do represent the best working "palette" of descriptors which can be used to paint an objective representation of the wetland resources associated with a proposed project.



GROUNDWATER RECHARGE/DISCHARGE — This function considers the potential for a wetland to serve as a groundwater recharge and/or discharge area. Recharge should relate to the potential for the wetland to contribute water to an aquifer. Discharge should relate to the potential for the wetland to serve as an area where groundwater can be discharged to the surface.



FLOODFLOW ALTERATION (Storage & Desynchronization) — This function considers the effectiveness of the wetland in reducing flood damage by attenuation of floodwaters for prolonged periods following precipitation events.



FISH AND SHELLFISH HABITAT — This function considers the effectiveness of seasonal or permanent waterbodies associated with the wetland in question for fish and shellfish habitat.



SEDIMENT/TOXICANT/PATHOGEN RETENTION — This function reduces or prevents degradation of water quality. It relates to the effectiveness of the wetland as a trap for sediments, toxicants, or pathogens.



NUTRIENT REMOVAL/RETENTION/TRANSFORMATION — This function relates to the effectiveness of the wetland to prevent adverse effects of excess nutrients entering aquifers or surface waters such as ponds, lakes, streams, rivers, or estuaries.

PRODUCTION EXPORT (Nutrient) — This function relates to the effectiveness of the wetland to produce food or usable products for humans or other living organisms.



SEDIMENT/ShORELINE STABILIZATION — This function relates to the effectiveness of a wetland to stabilize streambanks and shorelines against erosion.



WILDLIFE HABITAT — This function considers the effectiveness of the wetland to provide habitat for various types and populations of animals typically associated with wetlands and the wetland edge. Both resident and/or migrating species must be considered. Species lists of observed and potential animals should be included in the wetland assessment report.



RECREATION (Consumptive and Non-Consumptive) — This value considers the effectiveness of the wetland and associated water-courses to provide recreational opportunities such as canoeing, boating, fishing, hunting, and other active or passive recreational activities. Consumptive activities consume or diminish the plants, animals, or other resources that are intrinsic to the wetland, whereas non-consumptive activities do not.



EDUCATIONAL/SCIENTIFIC VALUE — This value considers the effectiveness of the wetland as a site for an “outdoor classroom” or as a location for scientific study or research.



UNIQUENESS/HERITAGE — This value relates to the effectiveness of the wetland or its associated waterbodies to produce certain special values. Special values may include such things as archaeological sites, unusual aesthetic quality, historical events, or unique plants, animals, or geologic features.




VISUAL QUALITY/AESTHETICS — This value relates to the visual and aesthetic qualities of the wetland.



THREATENED or ENDANGERED SPECIES HABITAT — This value relates to the effectiveness of the wetland or associated waterbodies to support threatened or endangered species.

ES



How are wetland functions and values applied to the Regulatory Program?

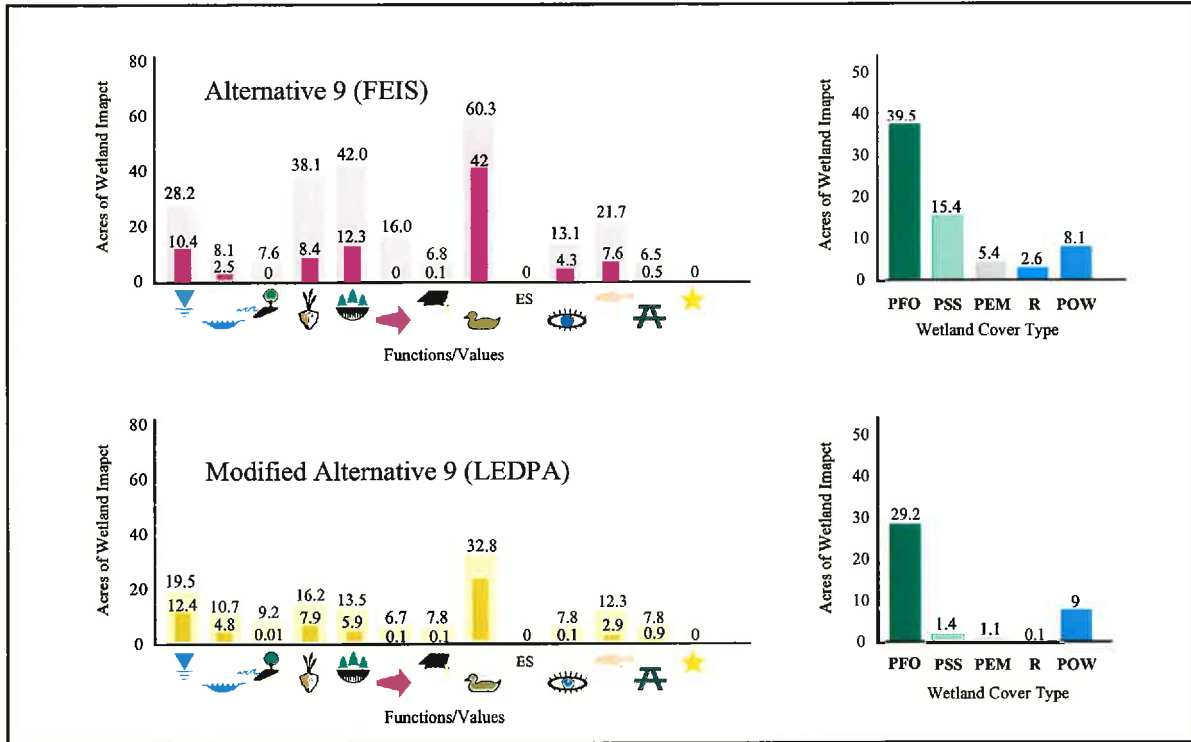
Wetland functions and values are used by the Corps in a variety of ways including to:

- describe site characteristics
- compare project alternatives
- avoid and minimize project impacts
- determine significance of impacts
- weigh environmental impacts against project benefits
- design and monitor compensatory mitigation

These required uses come from various statutes, regulations, and policies including:

- Corps permit regulations, Title 33 Code of Federal Regulations (CFR) Parts 320 through 330
 - public notice and other permit decision documents including special conditions for compensatory mitigation.
- National Environmental Policy Act, 40 CFR, Parts 1500 - 1508 and Corps Appendix B implementing regulations.
 - environmental assessment or environmental impact statement.
- Clean Water Act Section 404(b)(1) Guidelines, 40 CFR, Part 230.
 - compliance determination including selection of the **least environmentally damaging practicable alternative (LEDPA)**, significance of impacts and appropriate mitigation.
- Environmental Protection Agency / Department of the Army Memorandum of Agreement on Mitigation.
 - sequencing process to avoid, minimize, and only as a last resort, compensate for aquatic resource values impacted.
 - strive for no overall net loss of wetland functions and values.

Direct Impact Quantification for Wetland Functions/Values and Cover Types



Symbols Key

- | | | | |
|--|--|--|---|
| | Groundwater Recharge/Discharge | | Sediment/Shoreline Stabilization |
| | Floodflow Alteration (Storage & Desynchronization) | | Wildlife Habitat |
| | Fish and Shellfish Habitat | | Recreation(Consumptive & Non-Consumptive) |
| | Sediment/Toxicant Retention | | Educational/Scientific Value |
| | Nutrient Removal/Retention/Transformation | | Uniqueness/Heritage |
| | Production Export (Nutrient) | | Visual Quality/Aesthetics |
| | ES Endangered Species | | |

Legend

- | | | | |
|--|------------------------------------|--|----------------------------|
| | Function/Value | | PFO-Palustrine Forested |
| | Principal Function & Value Portion | | PSS-Palustrine Scrub-Shrub |
| | | | PEM-Palustrine Emergent |
| | | | R-Riverine |
| | | | POW-Palustrine Open Water |

The above graphics display wetland cover types, functions/values, and principal functions and values portions quantified for acreage of direct impacts under the footprint of the fill. Other information, including impacts beyond the footprint, may be quantified as data exists, but dissimilar factors should not be combined or weighted. Also illustrated is a comparison of Alternative 9 with a modified alignment.

What wetland evaluation method does the Corps accept?

The Regulatory Branch advocates a qualitative, descriptive approach to wetland assessment based on consensus of an interdisciplinary team of professionals.

The team is normally comprised of the applicant's consultant, Corps staff, and state and Federal agency staff. The consultant should first seek guidance from the Corps, then evaluate the wetlands. The team could either be party to this effort directly or could review the consultant's work product and offer comments. Typically the end result is a consensus of the professionals involved; however, the Corps will make the final determination. This approach has proven to be practical, cost effective, and acceptable for the purpose intended.

The evaluation should be a qualitative description of the physical characteristics of the wetlands, including a determination of the principal functions and values exhibited, and the bases for the conclusions. Generally, readily available information from site visits and existing literature is used. On some occasions the Corps may require more extensive studies.



Consensus among professionals may be reached in the field during wetland investigations

The Wetland Evaluation Technique (WET II) is not an acceptable method. It is not regionally sensitive and does not consider wildlife habitat corresponding to the concerns of the Corps, particularly as expressed by the US Fish and Wildlife Service. WET II analyses typically include high, moderate, and low rankings, which can imply a more quantifiable data base than actually exists, thereby biasing the reviewing agencies.

Numerical methods in general are to be avoided unless the data is readily available to support the analysis. In no case, however, should arbitrary weighting be applied to wetland functions, nor should dissimilar functions be ranked.

Note: Where project conditions warrant, the Corps may require a more detailed method than described in this booklet.

Summary of Evaluation Results for Wetlands

Ground Water Recharge	M		*
Ground Water Discharge	L	M	*
Floodflow Alteration	L	H	H
Sediment Stabilization	L	M	*
Sediment/Toxicant Retention	H	L	M
Nutrient Removal/Transformation		M	L
Production Export		M	*
Wildlife Diversity/Abundance	L	*	*
Wildlife D/A Breeding	*	H	L
Wildlife D/A Migration	*	H	*
Wildlife D/A Wintering	*	L	*
Aquatic Diversity/Abundance	L	L	*
Uniqueness/Heritage	L	*	*
Recreation	L	*	*

Note: "H"=High, "M"=Moderate, "L"=Low, "U"=Uncertain, and "*"s identify areas where functions and values are not evaluated.

Methods using subjective weightings are not acceptable.

Does the Corps have a prescribed format for wetland evaluation?

Any appropriate format may be used. As a guide we developed a wetland evaluation form that can be used by the evaluator to organize various information consistent with wetland evaluation requirements discussed in the previous section. The form shown on the next page is structured such that it directs the evaluator to include all pertinent wetland information and draw the necessary conclusions about the presence or absence of functions and values, as well as principal function and value determinations. The form allows additional space for backup rationale and best professional judgement. Refer to Appendix A for a blank reproducible form.

To begin with, the area or extent of each wetland to be evaluated should be determined. For large projects with multiple wetlands, the Corps will typically coordinate this determination with the interdisciplinary team.



Interdisciplinary Team Coordination

Descriptive wetland information is recorded on the form either in the office or in the field. The top portion of the form allows space for a general description of the wetland with respect to the surrounding landscape and hydrologic systems. Information regarding potential impacts is also documented here.

The procedure then requires each wetland that is potentially impacted by a project alternative to be visited. Each is evaluated considering the presence or absence of the 13 wetland functions and values defined earlier. A simple yes or no column is checked and documentation supporting the presence or absence of a function and/or value is recorded. A standard, but flexible, list of rationale factors for each function and value, numbered for easy reference, will facilitate this documentation. A sample list is shown in Appendix A.

Wetland Function-Value Evaluation Form

Total area of wetland _____ Human made? _____ Is wetland part of a wildlife corridor? _____ or a "habitat island"? _____
 Adjacent land use _____ Distance to nearest roadway or other development _____
 Dominant wetland systems present _____ Contiguous undeveloped buffer zone present _____
 Is the wetland a separate hydraulic system? _____ If not, where does the wetland lie in the drainage basin? _____
 How many tributaries contribute to the wetland? _____ Wildlife & vegetation diversity/abundance (see attached list) _____

Wetland I.D. _____
 Latitude _____ Longitude _____
 Prepared by: _____ Date _____
 Wetland Impact:
 Type _____ Area _____
 Evaluation based on:
 Office _____ Field _____
 Corps manual wetland delineation completed? Y _____ N _____

Function/Value	Suitability		Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
	Y	N			
Groundwater Recharge/Discharge					
Floodflow Alteration					
Fish and Shellfish Habitat					
Sediment/Toxicant Retention					
Nutrient Removal					
Production Export					
Sediment/Shoreline Stabilization					
Wildlife Habitat					
Recreation					
Educational/Scientific Value					
Uniqueness/Heritage					
Visual Quality/Aesthetics					
ES Endangered Species Habitat					
Other					

Notes:

* Refer to backup list of numbered considerations.

Wetland Evaluation Form - When completed, the above wetland evaluation form with backup information provides the permit reviewer with sufficient information regarding the wetland's overall characteristics.

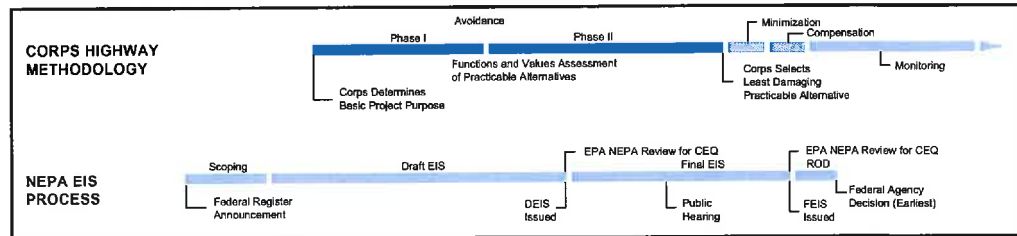
Next, the format requires the evaluator to check the column regarding the principal functions and values designation (Refer to page 4 for definition). Since wetlands are apt to contain most functions and values to some degree, it is helpful to identify those few that are most important.

Focusing on the principal functions and values helps the reviewer more easily assimilate information for large projects with multiple wetlands. The next column provides space for the evaluator to substantiate the principal function and value designation and/or to record other notes.

With the exception of reporting principal function and/or value, the forms do not report weighted or biased data. Therefore, each can be interpreted from the perspective and independent judgment of each reviewer. The bottom of the form provides space for additional narrative descriptions, including unusual or noteworthy conditions. The objective of the form is to document an unbiased record of the wetland, including its location, function, appearance and relationship to its adjacent land use.

Attachments to each form are recommended and should include a sketch of the wetland in relation to the impact area and surrounding landscapes, an inventory of vegetation and potential wildlife species, and a photo of the wetland. This additional information facilitates understanding functions and the subjective analysis of values.

How are the phases of the Highway Methodology incorporated?



Wetland resources are evaluated in both Phase I and Phase II of the Highway Methodology using different levels of information, commensurate with the project planning stage. They are evaluated further when the least environmentally damaging practicable alternative (LEDPA) is selected and when mitigation is considered.

For Phase I, a large number of alternatives may be under consideration and only limited field observations are made in order to screen out those which are obviously either not practicable or not a potential LEDPA. It is not necessary to complete the wetland evaluation forms at this stage because existing information is typically very general. Wetland boundaries are defined as a composite of National Wetland Inventory and Natural Resource Conservation Service maps. Cover types according to the Cowardin et. al. (1979) system (See Appendix A) and key wetland functions and values can be derived from the literature, limited field investigations, or public input. These should be noted on the wetland resource map.

For Phase II, additional field work is typically warranted but it is still of a limited nature sufficient to satisfy the selection of the LEDPA. The wetland evaluation forms should be completed for Phase II.

The LEDPA is then subjected to a three parameter delineation of the affected wetlands using the required Corps method and the New England District's field worksheets. At the same time, additional observations of wetland functions and values may be added to the Phase II field evaluation worksheets. The figure opposite illustrates the progression of wetland information from Phase II (black) to the LEDPA Phase (red).

The wetland evaluation should be complete for use in the Corps permit decision documents, including the determination of mitigation requirements.

A critical part of the Highway Methodology is the graphical display of project constraints, including wetland resources. Examples of ways to display wetland functions and values are shown in the next section.

Wetland Function-Value Evaluation Form

Total area of wetland 11.5 ac. Human made? No Is wetland part of a wildlife corridor? Yes or a "habitat island"? No

Adjacent land use Forest, Residential Distance to nearest roadway or other development 0'

Dominant wetland systems present POWH, PFO1E Contiguous undeveloped buffer zone present Yes

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Mid

How many tributaries contribute to the wetland? 1 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. WD1-1

Latitude N41°44'54.86 Longitude W71°44'54.86

Prepared by: LDC, JCL Date 12-7-92

Wetland Impact:
Type Fill Area 4.9 AC

Evaluation based on:
Office Field

Corps manual wetland delineation completed? Y N

Function/Value	Suitability		Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
	Y	N			
Groundwater Recharge/Discharge	X		2,6,7,9,10,11,12,13		A layer of organic soil blankets the thin glacial till overburden in this area. This wetland is an expression of groundwater discharge.
Floodflow Alteration	X	X	2,5,6,7,8,9,11,13,14		Water flow constricted by culvert, some detention occurring in this ponded, well-saturated area. Portion of wetland at impact area does not store floodwater.
Fish and Shellfish Habitat		X	1,5,(6),9,10,14,15,16,17		Culvert restricts access, wetland is relatively small, fisheries site #15.
Sediment/Toxicant Retention	X		3,4,5,6,7,8,9,10,12		Sediments can drop out in the ponded section.
Nutrient Removal	X		2,3,5-15		Potential for sediment and nutrient removal exists, logging activities have occurred adjacent to wetland.
Production Export		X	1,2,4,5,6,7,9,10,12,14		Outflow is constricted, little transport occurs via wildlife, wetland is predominantly attenuating nutrients.
Sediment/Shoreline Stabilization		X	4,6,9,10,12,13,14,15		Low flow velocities.
Wildlife Habitat	X		1,2,4,5,6,7,8,(13),16,17,18,19,21	X	Except for minor road, this wetland is well buffered, and directly connected to the Hop River. Good amphibian habitat.
Recreation	X		2,4,5,6,8,9,10		Wetland is easily accessible, and has some potential to function as educational and recreational area.
Educational/Scientific Value	X		2,3,5,8,9,10,11,12,13		Potential for pond study to occur. No known educational use.
Uniqueness/Heritage	X	X	7,(14),17,18,20,22,29	X	Prehistoric archaeological sensitive sites adjacent to wetlands. Archaeologic artifacts found adjacent to wetland by local archaeologist.
Visual Quality/Aesthetics	X		1,2,3,4,5,6,7,8,9,10,11,12		Direct view of wetland exists from roadway. Open water contrasts with surrounding forest land.
ES Endangered Species Habitat		X	None		None found or known to occur here.
Other					

Notes: Additional vegetative species noted at 3/24/93 Wetland Delineation field visit (Refer to Wetland Delineation Form). Phase II wetland assessment is relatively indicative of functions and values present at impact area.

*Refer to backup list of considerations.



Are there good examples to follow?

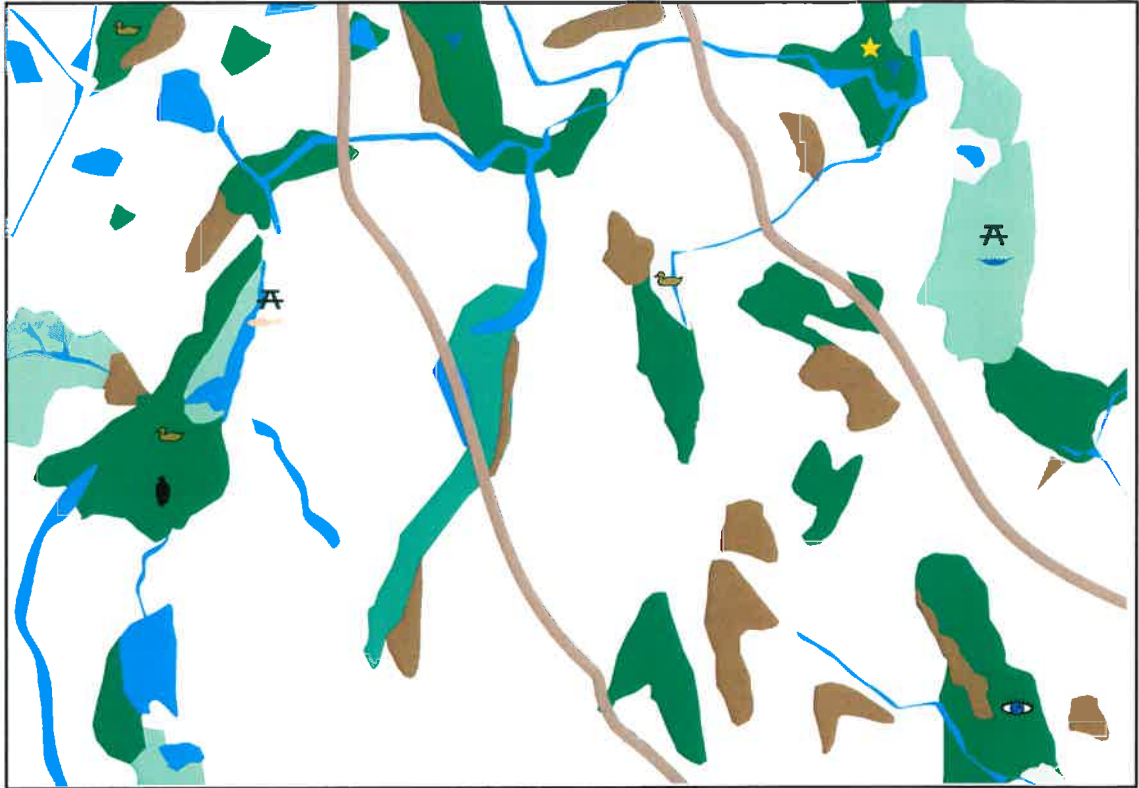
Good examples describe the wetland system and its individual components clearly with factual supporting data at an appropriate scale and level of detail commensurate with the project development stage. The objective is to graphically display complex wetland information in a format that facilitates assimilation by reviewers and expedites regulatory decisions. The figures in this section represent some good examples of wetland evaluation graphics at various phases in the process.

The figure on the next page defines a portion of an 80 square mile Phase I study area and illustrates the general distribution and configuration of wetlands based on data from National Wetland Inventory and Natural Resource Conservation Service (formerly Soil Conservation Service) maps augmented with approximately two person weeks of field investigations. Principal functions and values that can be identified using existing literature or limited field investigations are shown.

The figure on the following page illustrates the various aspects of the wetland evaluation process, including the completed wetland evaluation form with corresponding backup information and an entire study area graphic that includes information on the functions and values for all wetlands evaluated. This graphic is an example of what is used in Phase II of the Highway Methodology to facilitate the LEDPA decision.

From this graphic, a reviewer can analyze such things as wetland position in the landscape, configuration, cover type, and corresponding functions and values. Potential impacts to each system can be implied by the relative location of the highway with respect to each wetland, considering typical impacts associated with highways (e.g., runoff, noise, habitat fragmentation).

To make a complete, informed decision regarding other project impacts and the practicability of an alternative, multiple constraints must also be shown and evaluated.



A typical Phase I wetlands constraint graphic.

Symbols Key

	Groundwater Recharge/ Discharge		Sediment/Shoreline Stabilization
	Floodflow Alteration (Storage & Desynchronization)		Wildlife Habitat
	Fish and Shellfish Habitat		Recreation(Consumptive & Non-Consumptive)
	Sediment/Toxicant Retention		Educational/Scientific Value
	Nutrient Removal/ Retention/Transformation		Uniqueness/Heritage
	Production Export (Nutrient)		Visual Quality/Aesthetics
	ES	Endangered Species	

Legend

	H.S.-Hydric Soil
	PEM-Palustrine Emergent
	PSS-Palustrine Scrub-Shrub
	PFO-Palustrine Forested
	L-Lacustrine
	R-Riverine



US Army Corps
of Engineers.
New England District

Graphical Approach to Wetland Evaluation

Wetland Function-Value Evaluation Form

Total area of wetland: 11.5a Human made? No Is wetland part of a wildlife corridor? No or a "habitat island"? No
 Adjacent land use: Forest Distance to nearest roadway or other development: 12
 Dominant wetland systems present: Swamp Contiguous undeveloped buffer zone present: No
 Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? At A
 How many tributaries contribute to the wetland? 1 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D.: WD1-1
 Latitude: 42°42'54.20" N Longitude: 71°44'04.00" W
 Prepared by: JDS/RL Date: 12-7-02
 Wetland Impact:
 Type: P2 Area: 4.7AC
 Evaluation based on:
 Office Field
 Corps manual wetland delineation completed? Y N

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	X	2, 6, 7, 9, 10, 11, 12, 13		A large volume of water is discharged into the wetland from the adjacent road and parking lot.
Floodflow Alteration	X	2, 3, 6, 7, 9, 11, 12, 14		Water flow is altered by the presence of the wetland. The wetland acts as a natural filter for sediment and other pollutants.
Fish and Shellfish Habitat	X	1, 2, 3, 6, 9, 10, 14, 15, 16, 17		The wetland provides habitat for fish and shellfish.
Sediment/Toxicant Retention	X	7, 8, 9, 10, 11, 12, 14		The wetland acts as a natural filter for sediment and toxicants.
Nutrient Removal	X	2, 3, 11, 12		The wetland acts as a natural filter for nutrients.
Production Export	X	1, 2, 4, 5, 6, 7, 9, 10, 11, 14		The wetland provides habitat for various plant and animal species.
Sediment/Shoreline Stabilization	X	4, 6, 7, 10, 11, 12, 14, 15		The wetland acts as a natural filter for sediment.
Wildlife Habitat	X	1, 2, 3, 6, 7, 9, 10, 11, 12, 14, 15, 16, 17	X	The wetland provides habitat for various wildlife species.
Recreation	X	2, 4, 5, 6, 9, 10		The wetland provides habitat for various plant and animal species.
Educational/Scientific Value	X	2, 3, 6, 9, 10, 11, 12, 14		The wetland provides habitat for various plant and animal species.
Uniqueness/Heritage	X	2, 11, 12, 14, 15, 16, 17	X	The wetland provides habitat for various plant and animal species.
Visual Quality/Aesthetics	X	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12		The wetland provides habitat for various plant and animal species.
ES Endangered Species Habitat	X	None		None present.
Other				

Notes: **Additional vegetation species noted on 7-24-02. Wetland Delineation field visit (Refer to Wetland Delineation Form). Please fill wetland assessment as reactively indicative of functions and values present at inspection.**
 *Refer to backup list of considerations.

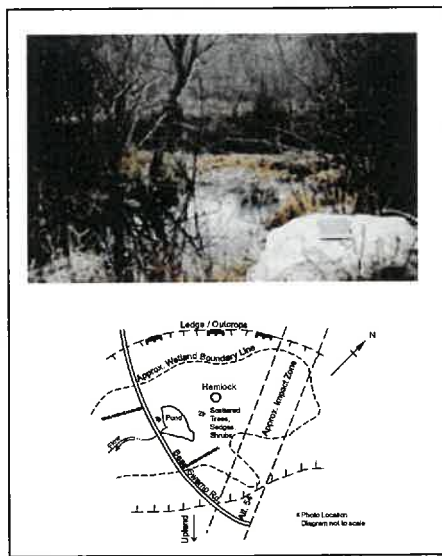
Completed Wetlands Functions and Values Evaluation Field Observation Form

Species List WD1-1

Vegetative	
Common Name	Scientific Name
Slippery Elm	<i>Ulmus rubra</i>
Yellow Birch	<i>Betula lutea</i>
Poplar	<i>Populus sp.</i>
White Oak	<i>Quercus alba</i>
Shagbark Hickory	<i>Carya ovata</i>
Grey Birch	<i>Betula populifolia</i>
Ash	<i>Fraxinus sp.</i>
Speckled Alder	<i>Ainus rugos</i>
American Hornbeam	<i>Carpinus caroliniana</i>
American Hop Hornbeam	<i>Ostrya virginiana</i>
Winterberry	<i>Ilex verticillata</i>
Maleberry	<i>Lyonia ligustrina</i>
Hazelnut	<i>Corylus americana</i>
Highbush Blueberry	<i>Vaccinium corymbosum</i>
Sweet Pepperbush	<i>Clethra alnifolia</i>
Azalea	<i>Rhododendron sp.</i>
Dogwood	<i>Comus sp.</i>
Sensitive Fern	<i>Onoclea sensibilis</i>
Cattail	<i>Typha latifolia</i>
Meadowsweet	<i>Spiraea latifolia</i>
Sphagnum Moss	<i>Sphagnum sp.</i>
Skunk Cabbage	<i>Symplocarpus foetidus</i>

Wildlife	
Common Name	Scientific Name
Blue Jay	<i>Cyanocitta cristata</i>
White-tailed Deer	<i>Odocoileus virginianus</i>
Muskrat	<i>Ondatra zibethicus</i>
Raccoon	<i>Procyon lotor</i>
Black-capped Chickadee	<i>Parus atricapillus</i>
Tufted Titmouse	<i>Parus bicolor</i>
American Goldfinch	<i>Carduelis tristis</i>

WD1-1 Vegetation and wildlife species list



Photographs of WD1-1 wetland

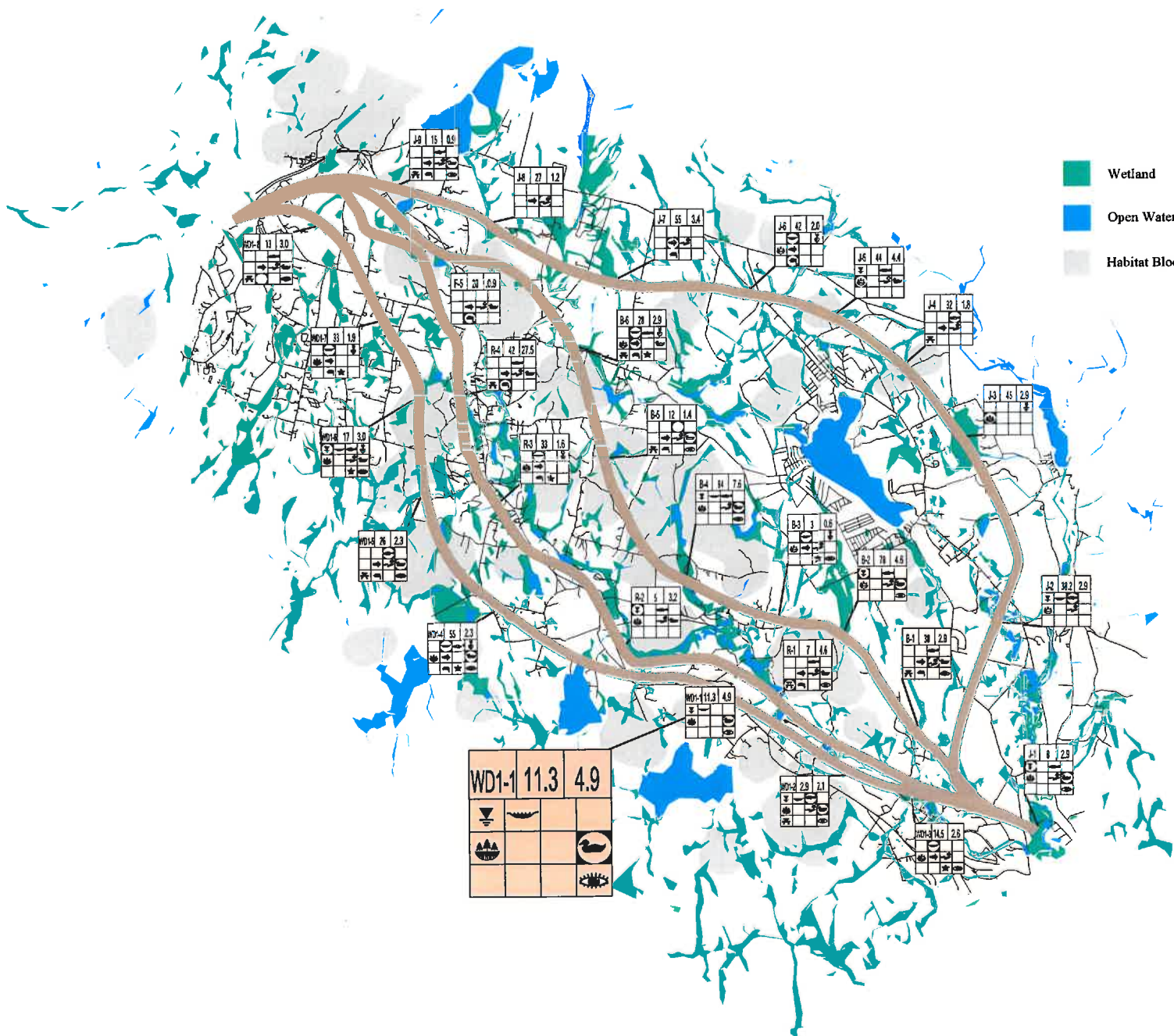
The above information constitutes a complete wetland function/value package. It can easily be converted into descriptive text for environmental documents or graphical display as shown on the right.

Wetland I.D.	Total Acres	Impacted Acres



Symbols Key

- Groundwater Recharge/ Discharge
- Sediment/Shoreline Stabilization
- Floodflow Alteration (Storage & Desynchronization)
- Wildlife Habitat
- Fish and Shellfish Habitat
- Recreation (Consumptive & Non-Consumptive)
- Sediment/Toxicant Retention
- Educational/Scientific Value
- Nutrient Removal/ Retention/Transformation
- Uniqueness/Heritage
- Production Export (Nutrient)
- Visual Quality/Aesthetics
- Endangered Species



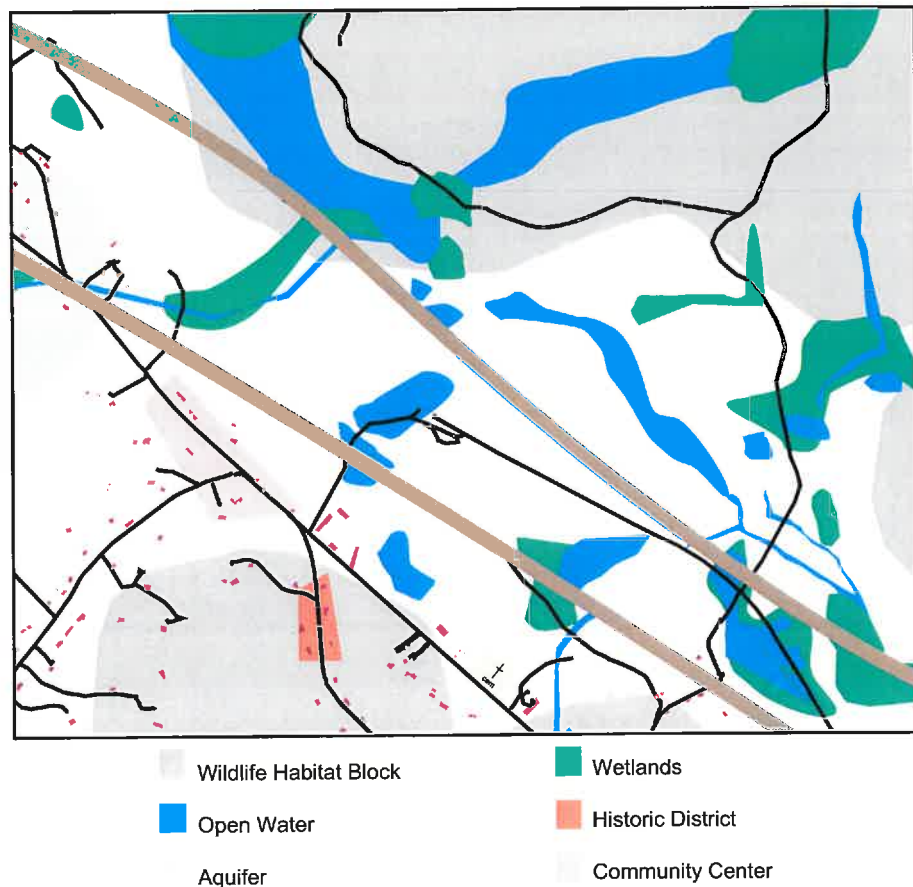
- Wetland
- Open Water
- Habitat Block

WD1-1	11.3	4.9

How are resources other than wetlands considered in the Corps permit decision?

Wetlands may appear to receive disproportionate attention in the Corps permit process because the Section 404(b)(1) Guidelines require the Corps to permit the practicable alternative that has the least adverse impact on the aquatic ecosystem, provided there are no other significant adverse environmental consequences (among other tests). Impacts on other resources of concern, including such things as aquifers, wildlife habitat blocks, and socio-economic constraints must therefore be considered before a LEDPA can be determined.

It is important that these other resources be displayed along with the wetland functions and values in order to give the decisionmaker a complete picture when evaluating alternatives. A typical multi-constraint map overlay is shown in the figure below.



Natural resources and community factors must all be considered in light of the multi-constraints that define the study area.





Appendix A

Wetland evaluation supporting documentation; Reproducible forms.

Below is an example list of considerations that was used for a New Hampshire highway project. Considerations are flexible, based on best professional judgment and interdisciplinary team consensus. This example provides a comprehensive base, however, and may only need slight modifications for use in other projects.



GROUNDWATER RECHARGE/DISCHARGE— This function considers the potential for a wetland to serve as a groundwater recharge and/or discharge area. It refers to the fundamental interaction between wetlands and aquifers, regardless of the size or importance of either.

CONSIDERATIONS/QUALIFIERS

1. Public or private wells occur downstream of the wetland.
2. Potential exists for public or private wells downstream of the wetland.
3. Wetland is underlain by stratified drift.
4. Gravel or sandy soils present in or adjacent to the wetland.
5. Fragipan does not occur in the wetland.
6. Fragipan, impervious soils, or bedrock does occur in the wetland.
7. Wetland is associated with a perennial or intermittent watercourse.
8. Signs of groundwater recharge are present or piezometer data demonstrates recharge.
9. Wetland is associated with a watercourse but lacks a defined outlet or contains a constricted outlet.
10. Wetland contains only an outlet, no inlet.
11. Groundwater quality of stratified drift aquifer within or downstream of wetland meets drinking water standards.
12. Quality of water associated with the wetland is high.
13. Signs of groundwater discharge are present (e.g., springs).
14. Water temperature suggests it is a discharge site.
15. Wetland shows signs of variable water levels.
16. Piezometer data demonstrates discharge.
17. Other



FLOODFLOW ALTERATION (Storage & Desynchronization)— This function considers the effectiveness of the wetland in reducing flood damage by water retention for prolonged periods following precipitation events and the gradual release of floodwaters. It adds to the stability of the wetland ecological system or its buffering characteristics and provides social or economic value relative to erosion and/or flood prone areas.

CONSIDERATIONS/QUALIFIERS

1. Area of this wetland is large relative to its watershed.
2. Wetland occurs in the upper portions of its watershed.
3. Effective flood storage is small or non-existent upslope of or above the wetland.
4. Wetland watershed contains a high percent of impervious surfaces.
5. Wetland contains hydric soils which are able to absorb and detain water.
6. Wetland exists in a relatively flat area that has flood storage potential.
7. Wetland has an intermittent outlet, ponded water, or signs are present of variable water level.
8. During flood events, this wetland can retain higher volumes of water than under normal or average rainfall conditions.
9. Wetland receives and retains overland or sheet flow runoff from surrounding uplands.
10. In the event of a large storm, this wetland may receive and detain excessive flood water from a nearby watercourse.
11. Valuable properties, structures, or resources are located in or near the floodplain downstream from the wetland.
12. The watershed has a history of economic loss due to flooding.
13. This wetland is associated with one or more watercourses.
14. This wetland watercourse is sinuous or diffuse.
15. This wetland outlet is constricted.
16. Channel flow velocity is affected by this wetland.
17. Land uses downstream are protected by this wetland.
18. This wetland contains a high density of vegetation.
19. Other

FISH AND SHELLFISH HABITAT (FRESHWATER) — This function considers the effectiveness of seasonal or permanent watercourses associated with the wetland in question for fish and shellfish habitat.



CONSIDERATIONS/QUALIFIERS

1. Forest land dominant in the watershed above this wetland.
 2. Abundance of cover objects present.
- STOP HERE IF THIS WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE**
3. Size of this wetland is able to support large fish/shellfish populations.
 4. Wetland is part of a larger, contiguous watercourse.
 5. Wetland has sufficient size and depth in open water areas so as not to freeze solid and retain some open water during winter.
 6. Stream width (bank to bank) is more than 50 feet.
 7. Quality of the watercourse associated with this wetland is able to support healthy fish/shellfish populations.
 8. Streamside vegetation provides shade for the watercourse.
 9. Spawning areas are present (submerged vegetation or gravel beds).
 10. Food is available to fish/shellfish populations within this wetland.
 11. Barrier(s) to anadromous fish (such as dams, including beaver dams, waterfalls, road crossing) are absent from the stream reach associated with this wetland.
 12. Evidence of fish is present.
 13. Wetland is stocked with fish.
 14. The watercourse is persistent.
 15. Man-made streams are absent.
 16. Water velocities are not too excessive for fish usage.
 17. Defined stream channel is present.
 18. Other

Although the above example refers to freshwater wetlands, it can also be adapted for marine ecosystems. The following is an example provided by the National Marine Fisheries Service (NMFS) of an adaptation for the fish and shellfish function.

FISH AND SHELLFISH HABITAT (MARINE) — This function considers the effectiveness of wetlands, embayments, tidal flats, vegetated shallows, and other environments in supporting marine resources such as fish, shellfish, marine mammals, and sea turtles.

CONSIDERATIONS/QUALIFIERS

1. Special aquatic sites (tidal marsh, mud flats, eelgrass beds) are present.
2. Suitable spawning habitat is present at the site or in the area.
3. Commercially or recreationally important species are present or suitable habitat exists.
4. The wetland/waterway supports prey for higher trophic level marine organisms.
5. The waterway provides migratory habitat for anadromous fish.
6. Essential fish habitat, as defined by the 1996 amendments to the Magnuson-Stevens Fishery & Conservation Act, is present (consultation with NMFS may be necessary).
7. Other



SEDIMENT/TOXICANT/PATHOGEN RETENTION — This function reduces or prevents degradation of water quality. It relates to the effectiveness of the wetland as a trap for sediments, toxicants, or pathogens in runoff water from surrounding uplands or upstream eroding wetland areas.

CONSIDERATIONS/QUALIFIERS

1. Potential sources of excess sediment are in the watershed above the wetland.
2. Potential or known sources of toxicants are in the watershed above the wetland.
3. Opportunity for sediment trapping by slow moving water or deepwater habitat are present in this wetland.
4. Fine grained mineral or organic soils are present.
5. Long duration water retention time is present in this wetland.
6. Public or private water sources occur downstream.
7. The wetland edge is broad and intermittently aerobic.
8. The wetland is known to have existed for more than 50 years.
9. Drainage ditches have not been constructed in the wetland.

STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.

10. Wetland is associated with an intermittent or perennial stream or a lake.
11. Channelized flows have visible velocity decreases in the wetland.
12. Effective floodwater storage in wetland is occurring. Areas of impounded open water are present.
13. No indicators of erosive forces are present. No high water velocities are present.
14. Diffuse water flows are present in the wetland.
15. Wetland has a high degree of water and vegetation interspersion.
16. Dense vegetation provides opportunity for sediment trapping and/or signs of sediment accumulation by dense vegetation is present.
17. Other



NUTRIENT REMOVAL/RETENTION/TRANSFORMATION — This function considers the effectiveness of the wetland as a trap for nutrients in runoff water from surrounding uplands or contiguous wetlands and the ability of the wetland to process these nutrients into other forms or trophic levels. One aspect of this function is to prevent ill effects of nutrients entering aquifers or surface waters such as ponds, lakes, streams, rivers, or estuaries.

CONSIDERATIONS/QUALIFIERS

1. Wetland is large relative to the size of its watershed.
2. Deep water or open water habitat exists.
3. Overall potential for sediment trapping exists in the wetland.

4. Potential sources of excess nutrients are present in the watershed above the wetland.
 5. Wetland saturated for most of the season. Pondered water is present in the wetland.
 6. Deep organic/sediment deposits are present.
 7. Slowly drained fine grained mineral or organic soils are present.
 8. Dense vegetation is present.
 9. Emergent vegetation and/or dense woody stems are dominant.
 10. Opportunity for nutrient attenuation exists.
 11. Vegetation diversity/abundance sufficient to utilize nutrients.
- STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.
12. Waterflow through this wetland is diffuse.
 13. Water retention/detention time in this wetland is increased by constricted outlet or thick vegetation.
 14. Water moves slowly through this wetland.
 15. Other

PRODUCTION EXPORT (Nutrient) — This function evaluates the effectiveness of the wetland to produce food or usable products for humans or other living organisms.



CONSIDERATIONS/QUALIFIERS

1. Wildlife food sources grow within this wetland.
2. Detritus development is present within this wetland.
3. Economically or commercially used products found in this wetland.
4. Evidence of wildlife use found within this wetland.
5. Higher trophic level consumers are utilizing this wetland.
6. Fish or shellfish develop or occur in this wetland.
7. High vegetation density is present.
8. Wetland exhibits high degree of plant community structure/species diversity.
9. High aquatic vegetative diversity/abundance is present.
10. Nutrients exported in wetland watercourses (permanent outlet present).
11. "Flushing" of relatively large amounts of organic plant material occurs from this wetland.
12. Wetland contains flowering plants that are used by nectar-gathering insects.
13. Indications of export are present.
14. High production levels occurring, however, no visible signs of export (assumes export is attenuated).
15. Other

SEDIMENT/ShORELINE STABILIZATION — This function considers the effectiveness of a wetland to stabilize streambanks and shorelines against erosion.



CONSIDERATIONS/QUALIFIERS

1. Indications of erosion or siltation are present.
2. Topographical gradient is present in wetland.
3. Potential sediment sources are present up-slope.
4. Potential sediment sources are present upstream.
5. No distinct shoreline or bank is evident between the waterbody and the wetland or upland.
6. A distinct step between the open waterbody or stream and the adjacent land exists (i.e., sharp bank) with dense roots throughout.
7. Wide wetland (>10') borders watercourse, lake, or pond.
8. High flow velocities in the wetland.
9. The watershed is of sufficient size to produce channelized flow.
10. Open water fetch is present.
11. Boating activity is present.
12. Dense vegetation is bordering watercourse, lake, or pond.
13. High percentage of energy-absorbing emergents and/or shrubs border a watercourse, lake, or pond.
14. Vegetation is comprised of large trees and shrubs that withstand major flood events or erosive incidents and stabilize the shoreline on a large scale (feet).
15. Vegetation is comprised of a dense resilient herbaceous layer that stabilizes sediments and the shoreline on a small scale (inches) during minor flood events or potentially erosive events.
16. Other



WILDLIFE HABITAT — This function considers the effectiveness of the wetland to provide habitat for various types and populations of animals typically associated with wetlands and the wetland edge. Both resident and/or migrating species must be considered. Species lists of observed and potential animals should be included in the wetland assessment report.¹

CONSIDERATIONS/QUALIFIERS

1. Wetland is not degraded by human activity.
2. Water quality of the watercourse, pond, or lake associated with this wetland meets or exceeds Class A or B standards.
3. Wetland is not fragmented by development.
4. Upland surrounding this wetland is undeveloped.
5. More than 40% of this wetland edge is bordered by upland wildlife habitat (e.g., brushland, woodland, active farmland, or idle land) at least 500 feet in width.
6. Wetland is contiguous with other wetland systems connected by a watercourse or lake.
7. Wildlife overland access to other wetlands is present.
8. Wildlife food sources are within this wetland or are nearby.
9. Wetland exhibits a high degree of interspersed vegetation classes and/or open water.
10. Two or more islands or inclusions of upland within the wetland are present.
11. Dominant wetland class includes deep or shallow marsh or wooded swamp.
12. More than three acres of shallow permanent open water (less than 6.6 feet deep), including streams in or adjacent to wetland, are present.
13. Density of the wetland vegetation is high.
14. Wetland exhibits a high degree of plant species diversity.
15. Wetland exhibits a high degree of diversity in plant community structure (e.g., tree/shrub/vine/grasses/mosses)
16. Plant/animal indicator species are present. (List species for project)
17. Animal signs observed (tracks, scats, nesting areas, etc.)
18. Seasonal uses vary for wildlife and wetland appears to support varied population diversity/abundance during different seasons.
19. Wetland contains or has potential to contain a high population of insects.
20. Wetland contains or has potential to contain large amphibian populations.
21. Wetland has a high avian utilization or its potential.
22. Indications of less disturbance-tolerant species are present.
23. Signs of wildlife habitat enhancement are present (birdhouses, nesting boxes, food sources, etc.).
24. Other

¹In March 1995, a rapid wildlife habitat assessment method was completed by a University of Massachusetts research team with funding and oversight provided by the New England Transportation Consortium. The method is called WEThings (wetland habitat indicators for non-game species). It produces a list of potential wetland-dependent mammal, reptile, and amphibian species that may be present in the wetland. The output is based on observable habitat characteristics documented on the field data form. This method may be used to generate the wildlife species list recommended as backup information to the wetland evaluation form and to augment the considerations. Use of this method should first be coordinated with the Corps project manager. A computer program is also available to expedite this process.

RECREATION (Consumptive and Non-Consumptive) — This value considers the suitability of the wetland and associated watercourses to provide recreational opportunities such as hiking, canoeing, boating, fishing, hunting, and other active or passive recreational activities. Consumptive opportunities consume or diminish the plants, animals, or other resources that are intrinsic to the wetland. Non-consumptive opportunities do not consume or diminish these resources of the wetland.



CONSIDERATIONS/QUALIFIERS

1. Wetland is part of a recreation area, park, forest, or refuge.
2. Fishing is available within or from the wetland.
3. Hunting is permitted in the wetland.
4. Hiking occurs or has potential to occur within the wetland.
5. Wetland is a valuable wildlife habitat.
6. The watercourse, pond, or lake associated with the wetland is unpolluted.
7. High visual/aesthetic quality of this potential recreation site.
8. Access to water is available at this potential recreation site for boating, canoeing, or fishing.
9. The watercourse associated with this wetland is wide and deep enough to accommodate canoeing and/or non-powered boating.
10. Off-road public parking available at the potential recreation site.
11. Accessibility and travel ease is present at this site.
12. The wetland is within a short drive or safe walk from highly populated public and private areas.
13. Other

EDUCATIONAL/SCIENTIFIC VALUE — This value considers the suitability of the wetland as a site for an “outdoor classroom” or as a location for scientific study or research.



CONSIDERATIONS/QUALIFIERS

1. Wetland contains or is known to contain threatened, rare, or endangered species.
2. Little or no disturbance is occurring in this wetland.
3. Potential educational site contains a diversity of wetland classes which are accessible or potentially accessible.
4. Potential educational site is undisturbed and natural.
5. Wetland is considered to be a valuable wildlife habitat.
6. Wetland is located within a nature preserve or wildlife management area.
7. Signs of wildlife habitat enhancement present (bird houses, nesting boxes, food sources, etc.).
8. Off-road parking at potential educational site suitable for school bus access in or near wetland.
9. Potential educational site is within safe walking distance or a short drive to schools.
10. Potential educational site is within safe walking distance to other plant communities.
11. Direct access to perennial stream at potential educational site is available.
12. Direct access to pond or lake at potential educational site is available.
13. No known safety hazards exist within the potential educational site.
14. Public access to the potential educational site is controlled.
15. Handicap accessibility is available.
16. Site is currently used for educational or scientific purposes.
17. Other



UNIQUENESS/HERITAGE — This value considers the effectiveness of the wetland or its associated waterbodies to provide certain special values. These may include archaeological sites, critical habitat for endangered species, its overall health and appearance, its role in the ecological system of the area, its relative importance as a typical wetland class for this geographic location. These functions are clearly valuable wetland attributes relative to aspects of public health, recreation, and habitat diversity.

CONSIDERATIONS/QUALIFIERS

1. Upland surrounding wetland is primarily urban.
2. Upland surrounding wetland is developing rapidly.
3. More than 3 acres of shallow permanent open water (less than 6.6 feet deep), including streams, occur in wetlands.
4. Three or more wetland classes are present.
5. Deep and/or shallow marsh or wooded swamp dominate.
6. High degree of interspersion of vegetation and/or open water occur in this wetland.
7. Well-vegetated stream corridor (15 feet on each side of the stream) occurs in this wetland.
8. Potential educational site is within a short drive or a safe walk from schools.
9. Off-road parking at potential educational site is suitable for school buses.
10. No known safety hazards exist within this potential educational site.
11. Direct access to perennial stream or lake exists at potential educational site.
12. Two or more wetland classes are visible from primary viewing locations.
13. Low-growing wetlands (marshes, scrub-shrub, bogs, open water) are visible from primary viewing locations.
14. Half an acre of open water or 200 feet of stream is visible from the primary viewing locations.
15. Large area of wetland is dominated by flowering plants or plants that turn vibrant colors in different seasons.
16. General appearance of the wetland visible from primary viewing locations is unpolluted and/or undisturbed.
17. Overall view of the wetland is available from the surrounding upland.
18. Quality of the water associated with the wetland is high.
19. Opportunities for wildlife observations are available.
20. Historical buildings are found within the wetland.
21. Presence of pond or pond site and remains of a dam occur within the wetland.
22. Wetland is within 50 yards of the nearest perennial watercourse.
23. Visible stone or earthen foundations, berms, dams, standing structures, or associated features occur within the wetland.
24. Wetland contains critical habitat for a state- or federally-listed threatened or endangered species.
25. Wetland is known to be a study site for scientific research.
26. Wetland is a natural landmark or recognized by the state natural heritage inventory authority as an exemplary natural community.
27. Wetland has local significance because it serves several functional values.
28. Wetland has local significance because it has biological, geological, or other features that are locally rare or unique.
29. Wetland is known to contain an important archaeological site.
30. Wetland is hydrologically connected to a state or federally designated scenic river.
31. Wetland is located in an area experiencing a high wetland loss rate.
32. Other

VISUAL QUALITY/AESTHETICS — This value considers the visual and aesthetic quality or usefulness of the wetland.



CONSIDERATIONS/QUALIFIERS

1. Multiple wetland classes are visible from primary viewing locations.
2. Emergent marsh and/or open water are visible from primary viewing locations.
3. A diversity of vegetative species is visible from primary viewing locations.
4. Wetland is dominated by flowering plants or plants that turn vibrant colors in different seasons.
5. Land use surrounding the wetland is undeveloped as seen from primary viewing locations.
6. Visible surrounding land use form contrasts with wetland.
7. Wetland views absent of trash, debris, and signs of disturbance.
8. Wetland is considered to be a valuable wildlife habitat.
9. Wetland is easily accessed.
10. Low noise level at primary viewing locations.
11. Unpleasant odors absent at primary viewing locations.
12. Relatively unobstructed sight line exists through wetland.
13. Other








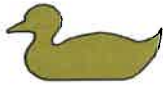




ENDANGERED SPECIES HABITAT — This value considers the suitability of the wetland to support threatened or endangered species.

ES












CONSIDERATIONS/QUALIFIERS

1. Wetland contains or is known to contain threatened or endangered species.
2. Wetland contains critical habitat for a state or federally listed threatened or endangered species.

	System	Subsystem	Class
Wetlands and Deep Water Habitats	Marine	Subtidal	<ul style="list-style-type: none"> • Rocky Bottom • Unconsolidated Bottom • Aquatic Bed • Reef
		Intertidal	<ul style="list-style-type: none"> • Aquatic Bed • Reef • Rocky Shore • Unconsolidated Shore
	Estuarine	Subtidal	<ul style="list-style-type: none"> • Rocky Bottom • Unconsolidated Bottom • Aquatic Bed • Reef
		Intertidal	<ul style="list-style-type: none"> • Aquatic Bed • Reef • Streambed • Rocky Shore • Unconsolidated Shore • Emergent Wetland • Scrub-Shrub Wetland • Forested Wetland
	Riverine	Tidal	<ul style="list-style-type: none"> • Rock Bottom • Unconsolidated Bottom • Aquatic Bed • Rocky Shore • Unconsolidated Shore • Emergent Wetland
		Lower Perennial	<ul style="list-style-type: none"> • Rock Bottom • Unconsolidated Bottom • Aquatic Bed • Rocky Shore • Unconsolidated Shore • Emergent Wetland
		Upper Perennial	<ul style="list-style-type: none"> • Rock Bottom • Unconsolidated Bottom • Aquatic Bed • Rocky Shore • Unconsolidated Shore
		Intermittent	<ul style="list-style-type: none"> • Streambed
	Lacustrine	Limnetic	<ul style="list-style-type: none"> • Rock Bottom • Unconsolidated Bottom • Aquatic Bed
		Littoral	<ul style="list-style-type: none"> • Rocky Bottom • Unconsolidated Bottom • Aquatic Bed • Rocky Shore • Unconsolidated Shore • Emergent Wetland
	Palustrine		<ul style="list-style-type: none"> • Rock Bottom • Unconsolidated Bottom • Aquatic Bed • Unconsolidated Shore • Moss-Lichen Wetland • Emergent Wetland • Scrub-Shrub Wetland • Forested Wetland

Wetland I.D.	Total Acres	Impacted Acres	
			
			
			

Symbols Key

-  Groundwater Recharge/ Discharge
-  Sediment/Shoreline Stabilization
-  Floodflow Alteration (Storage & Desynchronization)
-  Wildlife Habitat
-  Fish and Shellfish Habitat
-  Recreation (Consumptive & Non-Consumptive)
-  Sediment/Toxicant Retention
-  Educational/Scientific Value
-  Nutrient Removal/ Retention/Transformation
-  Uniqueness/Heritage
-  Production Export (Nutrient)
-  Visual Quality/Aesthetics
- ES** Endangered Species

Wetland Function-Value Evaluation Form

Total area of wetland _____ Human made? _____ Is wetland part of a wildlife corridor? _____ or a "habitat island"? _____













Adjacent land use _____ Distance to nearest roadway or other development _____

Dominant wetland systems present _____ Contiguous undeveloped buffer zone present _____

Is the wetland a separate hydraulic system? _____ If not, where does the wetland lie in the drainage basin? _____

How many tributaries contribute to the wetland? _____ Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. _____
 Latitude _____ Longitude _____
 Prepared by: _____ Date _____
 Wetland Impact:
 Type _____ Area _____
 Evaluation based on:
 Office _____ Field _____
 Corps manual wetland delineation
 completed? Y _____ N _____

Function/Value	Suitability Y / N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge				
 Floodflow Alteration				
 Fish and Shellfish Habitat				
 Sediment/Toxicant Retention				
 Nutrient Removal				
 Production Export				
 Sediment/Shoreline Stabilization				
 Wildlife Habitat				
 Recreation				
 Educational/Scientific Value				
 Uniqueness/Heritage				
 Visual Quality/Aesthetics				
ES Endangered Species Habitat				
Other				

Notes:

* Refer to backup list of numbered considerations.



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SEPTEMBER 1999

NAEEP-360-1-30a

**This brochure supersedes NEDEP-360-1-30a
NOVEMBER 1995**

Resource from Kevin Seaford, 7/21:

Here's a link to the Maryland Forest Conservation Act worksheet I was telling you about:

<https://dnr.maryland.gov/forests/Documents/forestconservationworksheet.pdf>

The NCSU white paper is attached as is the NREL Life Cycle Greenhouse Gas Emissions from Solar Photovoltaics.

Here's a link to the NREL's Life Cycle Assessment Harmonization website

<https://www.nrel.gov/analysis/life-cycle-assessment.html>

Also, here is this definition from the mining/reclamation section of the regs that clearly focuses on prime farmland soils that are in or have historically been used in crop production.

[4VAC25-130-700.5. Definitions. \(virginia.gov\)](#)

"Prime farmland" means those lands which are defined by the Secretary of Agriculture in 7 CFR Part 657 (Federal Register Vol. 4, No. 21) and which have historically been used for cropland.

This section also defines what it means to have "historically been used".

"Historically used for cropland" means (1) lands that have been used for cropland for any five years or more out of the 10 years immediately preceding the acquisition, including purchase, lease, or option, of the land for the purpose of conducting or allowing through resale, lease, or option the conduct of surface coal mining and reclamation operations; (2) lands that the division determines, on the basis of additional cropland history of the surrounding lands and the lands under consideration, that the permit area is clearly cropland but falls outside the specific five-years-in-10 criterion, in which case the regulations for prime farmland may be applied to include more years of cropland history only to increase the prime farmland acreage to be preserved; or (3) lands that would likely have been used as cropland for any five out of the last 10 years, immediately preceding such acquisition but for the same fact of ownership or control of the land unrelated to the productivity of the land.

FOREST CONSERVATION WORKSHEET

Note: Use 0 for all negative numbers that result from the calculations.

Net Tract Area

- A. Total Tract Area
- B. Deductions (Critical Area, area restricted by local ordinance or program)
- C. Net Tract Area $\text{Net Tract Area} = \text{Total Tract (A)} - \text{Deductions (B)}$

A=
B=
C=

Land Use Category: Medium Density Residential

- D. Afforestation Threshold (Net Tract Area [C] x _____%)
- E. Conservation Threshold (Net Tract Area [C] x _____%)

D =
E =

Existing Forest Cover

- F. Existing Forest Cover within the Net Tract Area
- G. Area of Forest Above Conservation Threshold
If the Existing Forest Cover (F) is greater than the Conservation Threshold (E), then $G = F - E$; otherwise $G = 0$.

F =
G =

Breakeven Point

- H. Breakeven Point (Amount of forest that must be retained so that no mitigation is required)
 - (1) If the Area of Forest Above Conservation Threshold (G) is greater than 0, then $H = (0.2 \times \text{the Area of Forest Above Conservation Threshold (G)}) + \text{the Conservation Threshold (E)}$;
 - (2) If the Area of Forest Above Conservation Threshold (G) is equal to 0, then $H = \text{Existing Forest Cover (F)}$
- I. Forest Clearing Permitted Without Mitigation
 $I = \text{Existing Forest Cover (F)} - \text{Breakeven point (H)}$

H =

I =

Proposed Forest Clearing

- J. Total Area of Forest to be Cleared
- K. Total Area of Forest to be Retained
 $K = \text{Existing Forest Cover (F)} - \text{Forest to be Cleared (J)}$

J =

K =

Planting Requirements

If the Total Area of Forest to be Retained (K) is at or above the Breakeven Point (H), no planting is required, and no further calculations are necessary (L=0, M=0, N=0, P=0, Q=0, R=0).

Otherwise, calculate the planting requirement(s) as follows:

- L. Reforestation for Clearing Above the Conservation Threshold
 - (1) If the Total Area of Forest to be Retained (K) is greater than the Conservation Threshold (E), then $L = \text{the Area of Forest to be Cleared (J)} \times 0.25$;
 - (2) If the Forest to be Retained (K) is less than or equal to the Conservation Threshold (E), then $L = \text{Area of Forest Above Conservation Threshold (G)} \times 0.25$
- M. Reforestation for Clearing Below the Conservation Threshold
 - (1) If Existing Forest Cover (F) is greater than the Conservation Threshold (E) and the Forest to be Retained (K) is less than or equal to the Conservation Threshold (E), then $M = 2.0 \times (\text{Conservation Threshold (E)} - \text{Forest to be Retained (K)})$
 - (2) If Existing Forest Cover (F) is less than or equal to the Conservation Threshold (E), then $M = 2.0 \times \text{Forest to be Cleared (J)}$
- N. Credit for Retention Above the Conservation Threshold
If the area of Forest to be Retained (K) is greater than the Conservation Threshold (E), then $N = K - E$; Otherwise $N = 0$
- P. Total Reforestation Required $P = L + M - N$
- Q. Total Afforestation Required
If Existing Forest Cover (F) is less than the Afforestation Threshold (D), then $Q = \text{Afforestation Threshold (D)} - \text{Existing Forest Cover (F)}$
- R. Total Planting Requirement $R = P + Q$

L =

M =

N =

P =

Q =

R =



NC CLEAN ENERGY

TECHNOLOGY CENTER

**Balancing Agricultural Productivity
with Ground-Based Solar
Photovoltaic (PV) Development**

AUGUST 2017



NC STATE UNIVERSITY

Balancing Agricultural Productivity with Ground-Based Solar Photovoltaic (PV) Development

Introduction

For centuries North Carolina farmers have made a major contribution to the state's economy by working the land and providing billions of pounds of agricultural and forestry products to meet demands for food and fiber. This resource serves as a foundational economic building block for the state. North Carolina's farming and forestry community provides North Carolinians and people across the world with food and fiber. That said, the demands of our growing, modern society require renewable forms of energy to begin to replace finite non-renewable energy resources that have traditionally provided the means for transportation, electricity, and much more.

Given that land and climatic conditions suitable for agriculture are finite, solar development may compete with agricultural land use. One use converts sunlight and fertilizer into food and fiber, while the other converts sunlight into electricity. The purpose of this paper is to explore the extent to which solar photovoltaic facilities and agricultural production compete for land use, as well as the extent to which agricultural production is affected by solar development. The paper is divided into two sections:

- (1) Understanding the Context of Solar Development and Agriculture in North Carolina.
 - (1.1) Developing Renewable Energy,
 - (1.2) Landowner Land Use Choice,
 - (1.3) Solar Facility Construction,
 - (1.4) Duration of Solar Use,

- (2) Weighing the Impact of PV Development on Agriculture
 - (2.1) Solar PV Land Use
 - (2.2) Impact on Agricultural Productivity

1. Understanding the Context of Solar Development and Agriculture in North Carolina

This section provides some background on solar development in North Carolina. By illustrating the existing demand for renewable energy (1.1), touching on the state's political climate towards private land use (1.2), and highlighting two important considerations of PV development (1.3 and 1.4), the context surrounding the two competing land uses of solar development and agriculture can be better understood. As agriculture is and has been a dominant, established land use in this state for generations, discussion in this section will primarily focus on the increasing demands of land to be used for solar development.

1.1 Developing Renewable Energy

Currently, almost all of North Carolina's electricity is generated from fuels, such as coal, natural gas, and uranium, which are produced outside the state. Some coal plants in North Carolina are reaching the end of their useful lives and being retired.^{1,2} Alternative sources of energy, such as solar and wind, have become much more economically attractive in the last several years, making it possible to economically replace some nuclear, coal, and gas electricity generation with these sources.³

More than three hundred privately financed utility-scale solar facilities operate in North Carolina under current electricity prices, regulations, and policies, with more planned for the future. As with any new technology, price drops and performance improvements may be expected over time as production volumes increase and experience is gained. Since 2009, the total cost to develop and build a utility-scale solar facility in North Carolina has dropped from over \$5 per watt to about \$1 per watt. This rapid cost reduction in utility-scale solar facilities has greatly improved the financial viability of solar projects; many solar projects are now being planned even without the North Carolina renewable energy tax credit that expired at the end of 2015.^{4,5}

In addition to the increasingly attractive economics, some of the shift towards solar energy has been driven by policy choices. Solar and other types of renewable energy have many benefits that have motivated support from policymakers. For instance, they do not use imported fuel, reducing our exposure to fuel price volatility. Solar energy also does not produce the air pollution and greenhouse gases emitted by fossil fuel-powered electricity generation, and it avoids some other environmental risks associated with fossil and nuclear fuels such as coal ash and radioactive waste disposal. Reduction of air pollution has been part of state and national policy for decades, and the U.S. has seen steadily improving air quality as a result⁶ Solar and other clean energy sources assist in this ongoing reduction in air pollution.

Solar energy offers many benefits to North Carolina. However, while solar development provides a source of clean in-state energy, it requires land to do so. This means that solar energy projects will sometimes compete with other potential land uses.

1.2 Landowner Land Use Choice

North Carolina policy generally leaves land use decisions in the hands of landowners. That said, the state, local, and federal governments can encourage or discourage specific landowner choices through the incentives or disincentives that they provide for particular uses, as well as through various forms of regulation, such as zoning rules and environmental restrictions. The balance of state-provided incentives for agricultural or solar energy production can, in some cases, be the determining factor in the decision to invest in solar or agriculture development. Also, the current grid infrastructure limits the sites feasible for solar development; it is only feasible to connect solar to certain locations in the grid and only to a limited density.

North Carolina has granted local governments the power to regulate land use in their jurisdictions, although state and federal rules apply in many circumstances. This means that local

governments can manage land development with the needs of the community in mind, while also safeguarding natural resources. These land-use regulations can put limits on the allowed uses for some land and thus limit landowners' options, in some cases affecting the viability of solar development. Some agricultural land has been exempted from certain regulations due to "grandfathering," and changing the land use to solar may remove these exemptions, which can affect the ability to return the land to agricultural use in the future.⁷

Land use regulations that may be relevant to solar development, depending on the location, can include (but are not limited to):⁸

- Local zoning and land use rules (fencing, buffer zones between buildings and roads, border shrubs/trees, etc.)
- Floodplain development rules
- Erosion and sedimentation rules
- Permitting regarding military and air traffic impact
- Water quality rules (i.e. Neuse nutrient strategy rules, Coastal Area Management Act rules)
- USDA wetlands impact rules

To determine whether these and other rules are relevant for a potential solar development, landowners and solar developers should consult their local government planning departments, the Soil and Water Conservation Division of the N.C. Department of Agriculture and Consumer Services, the USDA Natural Resources Conservation Service office, and the USDA Farm Services Agency.

1.3 Solar Facility Construction

Solar panels are supported by steel or aluminum racks. The racks are attached to galvanized steel posts driven 6-8 feet into the ground without concrete, although very occasionally, site conditions require the use of cement grout in the pile hole. The only concrete is generally at the inverter/transformer pads which are typically about 10' by 20' each. There is usually no more than one such pad per MW of AC capacity. At some sites these pads are precast concrete or steel skids that sit above grade on helical steel piers. Much of the wiring at the site is above-ground attached to the racking under the rows of panels. The rest of the wiring is 2 to 3 feet underground either as direct-bury cables or in 2"-6" PVC conduit. Most sites involve minimal grading of the land.

Every site provides access for vehicles, which requires roads, or "access aisles," to be constructed. These roads are sometimes improved with gravel, but they do not require application of concrete or asphalt. Many sites only use gravel close to the entry to the public Right of Way, as required by NCDOT regulation, with the rest of the access aisles as simply compacted native soil. Some developers use reusable wooden logging mats to provide temporary stabilization during construction to avoid the need for the addition of gravel. A best practice when building a gravel access aisle is to strip the organic topsoil, place a geotextile fabric under the aggregate and redistribute the topsoil on site to assist in soil stabilization. This will provide stability for the aggregate, allow for more efficient removal of the gravel at the end of the project's life cycle by providing separation between aggregate and subgrade, while preserving the valuable topsoil on site for future agricultural use.⁹ Well-drafted leases will specify allowable construction techniques

and locations of roads and other infrastructure. The NC Department of Environmental Quality (DEQ) requires soil erosion and sedimentation control plans and permits and inspects implemented measures on the site until vegetative groundcover is established.

1.4 Duration of Solar Use

Currently in North Carolina most utility-scale solar projects have a 15-year Power Purchase Agreement (PPA) with the local electric utility. Some developers prefer to purchase the land, while others prefer to lease, depending on the project's business model and financing arrangements. Typical land leases have a term of 15 to 30 years, often with several optional 5-year extensions.¹⁰ While specific lease rates are generally undisclosed, in our understanding lease rates often range between \$500 and \$1,000 per acre per year. Most solar PV panel manufacturers include a 25-year power warranty on their panels, which cover the panels to produce at least 80% of their original power output at the expiration of the warranty period.

Modern solar facilities may be considered a temporary, albeit long-term, use of the land, in the sense that the systems can be readily removed from the site at the end of their productive life. At this point, the site can be returned to agricultural use, albeit with a potential for some short-term reduction in productivity due to loss of topsoil, compaction, change in pH, and change in available nutrients. Leasing farmland for solar PV use, particularly land that is not actively being farmed today, is a viable way to preserve land for potential future agricultural use. PV use is particularly valuable in this regard when compared to commercial or residential development, which require changes to the land that are very difficult to reverse. For landowners struggling to retain ownership of their land due to financial strains, solar leasing may provide a vital, stable income solution. It may also serve as a more appealing alternative to selling their land to buyers intending to use the land for other, more permanent non-agricultural uses.

While it is very difficult to predict the state of electricity, agriculture, and real estate markets 25 or more years into the future, existing circumstances can provide some insight into the likelihood of today's solar facilities continuing as solar facilities at the end of the initial PV modules' useful lifetime. The economics of existing solar facilities are such that many of the projects built today are likely to update some of their equipment after 20 or more years and continue to operate as a solar electricity facility for many more years. The ability to facilitate interconnection to the electric grid provides great value to a landowner. A parcel of land featuring this capability in today's market will likely also appeal to solar developers in the future due to the infrastructure cost savings.

2. Weighing the Impact of PV Development on Agriculture

The purpose of this section is to explore how the competing land uses of solar development and agriculture interact and can coexist with each other. Subsection 2.1 provides analysis of data and metrics that quantify the current and potential amount of solar development on agricultural land in North Carolina. Subsection 2.2 explores the impacts that solar development could have on future agricultural production on the developed site and neighboring properties. Taken together, Section 2 of this factsheet provides several factors to consider when weighing the impact of PV development on agriculture.

2.1 Solar PV Land-Use

The NC Sustainable Energy Association (NCSEA) with the North Carolina Department of Agriculture and Consumer Services (NCDA&CS) used GIS software to quantify the amount of solar land use. As of December 2016, solar installations occupied 0.2 percent (9,074 acres) of North Carolina's 4.75 million acres of cropland.¹¹ NCDA&CS has provided an updated estimate; they estimate that 14,864 acres of cropland, or 0.31 percent of the total, were occupied by solar development at the end of the first quarter of 2017.¹² NCSEA and NCDA&CS were able to locate and quantify solar use for 318 of 341 currently-installed utility-scale facilities in North Carolina. A map of the solar installations in the state prepared by NCSEA is available at: <http://energyncmaps.org/gis/solar/index.html>.¹³ The researchers extrapolated the per-MW findings of the 318 sites found in aerial photos to generate an estimate for the remaining 23 projects not yet visible in the latest aerial photography. Across all projects, 79% of solar project area was formerly farmland, defined as land identified from aerial photography to have been used for crops, hay, or pasture before solar development. On average, the solar projects occupied 5.78 acres per MW_{AC}.

N.C. has been losing farmland to various forms of development for many years. Over the last decade, North Carolina has lost about one million acres of cropland to development and housing. Since 1940, total cropland in N.C. has fallen from 8.42 million acres to 4.75 million acres (as of 2012). The North Carolina Department of Agriculture has identified farmland preservation as one of its top priorities since 2005.

As of the end of 2016, solar PV installations added 2,300 MW_{AC} of solar generating capacity to North Carolina's electricity grid, making NC second in the nation for installed solar PV capacity. These installations generate enough electricity to power approximately 256,000 average N.C. homes, equaling 6.2% of all households in the state.¹⁴ NCSEA and NCDA&CS published the summary of their land-use analysis in February of 2017 and NCSEA released a report on this research in April of this year.¹⁵

If the current siting and production trends were to continue until ground-mounted solar produced, on average, an amount of electricity equal to 100% of N.C.'s current electricity use, solar facilities would cover about 8% of current N.C. cropland.¹⁶ This is an unrealistic extreme to illustrate the limited possible magnitude of land usage for solar even at very high solar generation levels, yet even this scenario would occupy only about half of the N.C. cropland acreage lost to development in the last 10 years. Even if solar were to provide all of our electricity, ground-mounted utility-scale solar will almost certainly not be the only source of electricity. As PV prices continue to decline it is likely that North Carolina will see more and more rooftop and parking lot canopies, reducing the need for green field development. A recent Department of Energy study found that rooftop systems have the technical capability to meet 23.5% of North Carolina's electricity demand.¹⁷

A more likely scenario, even assuming that fossil fuel and nuclear based electricity is entirely phased out, is that other sources of renewable electricity and technologies will meet a large portion of our electricity needs. A Stanford University study of the optimal mix of renewable energy sources for each state to achieve 100% renewable energy found that North Carolina would

get only 26.5% of its electricity from utility-scale solar plants.¹⁸ At this still highly expanded level of solar development, based off of the 8.3% land use for 100% solar figure calculated earlier, the amount of NC cropland used for solar would be around 2.2%.

More realistically, in the next decade or two, solar electricity may grow to provide around 5 – 20% of North Carolina’s electricity, which would allow solar to meet, or nearly meet, the full requirements of the North Carolina Renewable Energy and Energy Efficiency Portfolio Standard. At the 12.5% REPS requirement, this is about 13 GW_{AC} of PV, which will require about 75,000 acres of land at the average historic density found in the NCCETC/NCDA study. This is not an insignificant amount of land, but if split between agricultural and non-agricultural land at the same ratio as the first 2.3 GW installed in NC this represents about 1.1% of cropland in the state. NCSEA projects that by 2030, utility-scale solar will provide 5.03% of North Carolina’s electricity and use 0.57% of available cropland.¹⁹

Solar energy’s land use requirements are comparable to those of existing energy sources. According to an MIT study, supplying 100% of U.S. electricity demand in 2050 with solar would require us of about 0.4% of the country’s land area; this is only half the amount of land currently used to grow corn for ethanol fuel production, and about the same amount of land as has been disturbed by surface coal mining.²⁰

For landowners interested in solar development, it is important to understand the agricultural value of the land before entering into a solar lease agreement. Careful due diligence in the siting phase can help mitigate the use of the most valuable farmland. Landowners can contact their county tax office for property value information. The following online resources can assist landowners and developers in assessing the agricultural value of land before selecting the final footprint for solar development:

- www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/dma/
The USDA Natural Resources Conservation Service provides several tools in this link to identify soil types on property.
- www.ncmhtd.com/rye/ The North Carolina Realistic Yields Database provides landowners with a useful mapping and soil analysis tool that produces realistic productivity yields for expected crops given the landowner’s property location and soil type.

2.2 Impact on Agricultural Productivity

This subsection provides an overview of impacts that solar development may have on agricultural land. The discussion of these impacts is divided into the following subtopics: construction grading and soil preservation, compaction, erosion, weed control, toxicity, and pollinators, followed by a brief discussion of decommissioning. The subtopic discussions illustrate that solar development, with proper planning and implementation, results in a small but manageable impact on the future agricultural productivity of the land on which it is sited. Further, these discussions also illustrate that solar development is unlikely to significantly affect the agricultural productivity of neighboring properties now or in the future.

Construction Grading and Soil Preservation

The amount of grading necessary to prepare a parcel for a utility-scale solar facility is dependent on the slope of land and the type of solar mounting used. In much of N.C., fixed-tilt mounting of PV requires little to no grading for installation of the PV system. Single-axis tracking systems that slowly rotate each row of panels to track the sun's path across the sky generally require flatter land (typically less than 8% grading) and thus more often require grading of the site, particularly for projects in the Piedmont region or farther west.²¹ Typical construction practices require that topsoil be stripped and stockpiled prior to cut/fill operations. The stockpiled topsoil will be redistributed across graded areas, to assist in growing adequate ground cover as quickly as possible to provide ground stabilization. The stripping, stockpiling and redistribution of topsoil in this manner will have some impact on the amount of organics and nutrients that remain in the soil immediately after placement. However, proper ground stabilization practices include soil testing to determine the appropriate levels of lime, fertilizer and seed to be applied to establish ground cover. Proper installation practices require these additives to be tilled into the soil, which effectively reduces the compaction of the upper soil stratum, typically to a depth of 8"-12". Typical solar projects will not remove any topsoil from the project site, partly due to financial implications, but more importantly due to its value in establishing ground cover as quickly as possible²² (removing soil also requires a mining permit).²³ Most landowners steer solar projects to their least productive soils on a given piece of property to the extent practical.²⁴

Soil Quality

Modern agriculture relies on regular additions of lime and fertilizer to maintain soil pH and fertility. Solar facilities maintain vegetative ground covers that can help build soil quality over time, which may require lime and fertilizer to be applied. When the vegetation is cut, the organic matter is left in place to decompose which adds valuable organic matter to the soil. A facility operation and maintenance schedule should include a plan for maintenance of sufficient plant groundcover to protect soil from erosion. Maintaining healthy plant cover will require monitoring of soil fertility and may call for the addition of fertilizer or lime to ensure sufficient nutrients are available for plant growth and that soil pH is adequate. Vegetation mixes may help balance soil nutrient needs, but will need to be managed. Species composition will change over time.²⁵ NREL and others are researching and using vegetation mixes that include many native grasses with deep root systems; many include some nitrogen fixing plants as well. According to a study published in July 2016 that measured soil and air microclimate, vegetation and greenhouse gas emissions for twelve months under photovoltaic (PV) arrays, in gaps between PV arrays and in control areas at a UK solar sited on species-rich grassland, UK scientists found no change in soil properties among the three locations.²⁶ After a solar project is removed, a routine soil test (available from the North Carolina Department of Agriculture) should be obtained to determine fertility requirements, including lime, for optimum crop production.

Compaction

Soil compaction can negatively impact soil productivity and will occur to some degree on every solar site. Soil compaction can also limit water infiltration into the soil environment, and lead to greater surface water runoff during rain events.²⁷ In addition to the roads built in and

around solar project sites, the construction of the facility itself as well as regular use of lawn mowers compacts the soil, decreasing the ability of plant roots to grow. However, use of land as a solar site will avoid agriculture-related activities that can induce compaction, such as tillage. There are no data available on the degree of compaction common at solar facilities, but it is possible that some sites could experience heavy compaction in frequently used areas. In cases of heavy compaction, hard pans in the soil will form that can take decades to naturally free up; however, tractor implements such as chisels and vibrators designed to break up hard pan can often remove enough compaction to restore productivity. To prevent damage to soil due to compaction, landowners can negotiate for practices that will result in the least amount of compaction and for roads to be constructed on less productive land. Additionally, maintaining healthy groundcover, especially varieties with deep root systems, can serve to keep the soil arable for potential future agricultural use. The appropriate use of alternative vegetative maintenance strategies, such as grazing with sheep, can reduce the use of mowing equipment onsite and therefore the compaction that may result from using this equipment.²⁸ Furthermore, livestock grazing works to cycle nutrients in the pasture ecosystem onsite and improve the soil.

Erosion

According to its current Stormwater Design Manual, the N.C. Department of Environmental Quality allows solar panels associated with ground-mounted solar farms to be considered *pervious* if configured such that they promote sheet flow of stormwater from the panels and allow natural infiltration of stormwater into the ground beneath the panels.²⁹ For solar development, an erosion control and sedimentation permit is required, which involves on-site inspections and approval by the North Carolina Department of Environmental Quality. The permit requires establishment of permanent vegetative ground cover sufficient to restrain erosion; according to DEQ staff, the site must be “completely stabilized,” although this does not require a specific percentage of ground cover.³⁰ In-depth information on erosion control and sedimentation laws, rules, principles, and practices is available at the NC DEQ’s website, at <http://deq.nc.gov/about/divisions/energy-mineral-land-resources/energy-mineral-land-permit-guidance/erosion-sediment-control-planning-design-manual>. Once permanent vegetation is established it will be necessary to maintain soil pH and fertility as mentioned above in order to ensure sufficient, healthy, and continuous ground cover for erosion control.

Weed and Vegetation Control

Maintenance of vegetation on site can be accomplished using several options, including but not limited to the following: mowing, weed eaters, herbicides, and sheep. Reductions in fertilizer use on the site will slow growth of vegetation and weeds. Mowing allows the landowner to have the option of laying cut grass or vegetation on grounds of site to decompose and improve long-term soil fertility. In some cases, landowners have used grazing animals, normally sheep, to frequent the solar site grounds and control the vegetation and weeds, which also returns organic matter to the soil on site

Like most lawns and parks, many utility-scale solar facilities in N.C. use a combination of mowing and herbicides to maintain the vegetation. When using herbicides, applicators are advised to be mindful of label instructions and local conditions. Herbicide persistence is affected by the

organic matter content and moisture level of the soil. The importance of complying with legal responsibilities in using the treatments cannot be stressed enough, especially for land located near surface water, land where the surface is near the water table, or where application might carry over to other neighboring lands.

Herbicide use at solar facilities is typically similar to that in agriculture, and the types of herbicides used are similar between the two uses. As such, the impact of herbicides used at solar facilities on neighboring land and the environment is likely to be no more than that of conventional agriculture. Herbicide use differs widely among different crops and farming techniques, so the change in herbicide appliance between agricultural and solar use will vary in individual cases, but in the aggregate, there is no reason to believe that solar facilities will result in more herbicide impacts on neighboring lands than do current agricultural uses.³¹ Herbicide use can be discontinued 1-2 years before decommissioning of a site, minimizing any residual impact on crop production at former solar sites.³²

A number of sites use sheep at low densities to maintain vegetation during the growing season, although the sheep do not fully replace the need for mowing and/or herbicide use. The sheep are leased from sheep farmers, and the demand for sheep at solar facilities has been beneficial for North Carolina's sheep industry.³³ The grazing of sheep at solar facilities incorporates local farmers into the management of the sites, engaging the local community with solar development. The growth of solar farms represents a huge opportunity for the North Carolina sheep industry, with thousands of acres that are fenced well for sheep, and allow North Carolina farmers to diversify into new agricultural products for which there is increasing demand.³⁴

Toxicity

There is no significant cause for concern about leaking and leaching of toxic materials from solar site infrastructure.³⁵ Naturally occurring rain is adequate to generally keep the panels clean enough for good electricity production. If panels do need to be washed, the washing process requires nothing more than soap and water. Additionally, the materials used to build each panel provide negligible risk of toxic exposure to the soil, environment, or people in the community. Details about toxicity for aluminum and zinc are described below, and more information on the potential for human toxicity can be found in the [NCSU Health and Safety Impacts of Solar Photovoltaics white paper](#).

Aluminum

Aluminum is very common in soils around the world, including those common in North Carolina. In fact, the earth's crust is about 7% aluminum, and most soils are over 1% aluminum!³⁶ The aluminum is generally unavailable to plants as long as the soil pH is above about 5.5. In acidic soils many forms of aluminum become more bio-available to plants; this can be toxic to many plant species.³⁷ This effect is one of the major reason many plants do not tolerate very acidic soils. The use of aluminum building materials releases negligible amounts of aluminum during their useful life because the material is so corrosion resistant.³⁸ The aluminum frames of PV modules are anodized which adds a very thin hard coating of aluminum oxide to

the exterior of the aluminum that greatly improves aluminum's already-high resistance to corrosion. Therefore, any minute amount of aluminum that could be released by corrosion from aluminum construction materials during the life of a solar project will not materially add to the thousands or millions of pounds of aluminum naturally present in the soil of a typical N.C. solar facility. The common practice of liming soils to maintain appropriate soil pH for crop systems alleviates most, if not all, concerns about aluminum impacting crop growth in the future.

Zinc

Zinc from galvanized components, including support posts for solar panels, can move into the soil.³⁹ Zinc from building material stockpiles has been previously noted as a localized problem for peanut production in some North Carolina fields.⁴⁰ While it is difficult to predict in advance the degree to which this will occur, it is relatively simple to collect soil samples and monitor this situation in existing installations. Analysis of zinc is included in routine soil testing procedures used by the NC Department of Agriculture & Consumer Services Agronomic Services Division Laboratory. Awareness of zinc concentrations in the soil, and any spatial patterns noted with depth and distance from structures, should allow producers to determine if the field is adequate for desired crops as is. If zinc limitations exist, awareness of concentrations and spatial distribution patterns may indicate the potential for deep tillage, liming, or crop selection alternatives required for successful agricultural use. Of the agronomic crops grown in NC, peanuts are the most sensitive crop to zinc toxicity. Based on information from the N.C. Department of Agriculture and Consumer Services, there is risk of toxicity to peanuts when the zinc availability index(Zn-AI) is 250 or higher, particularly in low-pH situations. Risk increases with increasing soil test levels, especially if pH management through a liming program is not followed. For most other crops, zinc toxicity does not become problematic until the Zn-AI index reaches 2,000-3,000.⁴¹

Pollinators

Solar projects with appropriate vegetation can provide habitat for pollinators, as well as other wildlife.⁴² Rather than planting common turf grasses, some solar facilities are starting to use seed mixes of native grasses and pollinator-friendly flowering plants as ground cover in solar facilities.⁴³ This provides habitat for pollinators, which can be beneficial to neighboring farms. Minnesota passed the country's first statewide standards for "pollinator friendly solar" in 2016. According to Fresh Energy, a clean energy nonprofit in St. Paul, more than 2,300 acres of these plants took root near solar panels last year, according to Fresh Energy.⁴⁴ Solar facilities can also cooperate with commercial beekeepers to facilitate honey production, although this may conflict with providing habitat for wild pollinators.^{45,46} Pollinators provide benefits for agricultural production at nearby farms where insect-pollinated crops are grown⁴⁷

Decommissioning

If land used for a solar facility is to be returned to agricultural use in the future, it will be necessary to remove the solar equipment from the land. This process is known as decommissioning. Decommissioning is basically the construction process in reverse; it involves

removal of the solar panels, breakup of support pads, removal of access roads, replacement of any displaced soil, and revegetation.

Solar development often takes place on leased land, although it also occurs on land owned by solar companies. When leased land is involved, it must be determined whether the landowner or the solar developer bears responsibility for decommissioning. Responsibilities for decommissioning are lease-specific in North Carolina. It is important for landowners to consider decommissioning when setting lease terms, although landowners may choose in some cases to accept decommissioning responsibility themselves. Although state rules on solar decommissioning do not currently exist in North Carolina, local jurisdictions can choose to adopt regulations pertaining to decommissioning.

The materials recovered in the decommissioning process have significant economic value, which can help pay for the costs of decommissioning. Some engineering analyses have indicated that the salvage value of recovered materials is more than enough to pay for the removal of all the materials and to return the site to its pre-construction state.^{48,49,50,51}

NCSU has produced several resources that provide more information on decommissioning. They include:

- [Health and Safety Impacts of Solar Photovoltaics](#)⁵²
- [Template Ordinance for Solar Energy Development in North Carolina](#)⁵³
- [Working Paper: State Regulation of Solar Decommissioning](#)⁵⁴
- [Landowner Solar Leasing: Contract Terms Explained](#)⁵⁵

Summary

The purpose of this paper is to explore the extent to which competition exists between solar development and agriculture and the extent to which the agricultural productivity of land is affected by solar development. Discussion on this topic was divided into two sections: (1) Understanding the Context of Solar Development and Agriculture in North Carolina and (2) Weighing the Impact of PV Development on Agriculture. In these sections, information and tools were provided to aid in understanding the impact of solar development on agricultural land. Equipped with the information and tools provided by this paper, landowners may be able to better evaluate the viability of solar development on their land.

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Published by the N.C. Clean Energy Technology Center at N.C. State University



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Life Cycle Greenhouse Gas Emissions from Solar Photovoltaics

Over the last thirty years, hundreds of life cycle assessments (LCAs) have been conducted and published for a variety of residential and utility-scale solar photovoltaic (PV) systems. These LCAs have yielded wide-ranging results. Variation could be attributed to differences in technologies evaluated (i.e., differing system designs, commercial versus conceptual systems, system operating assumptions, technology improvements over time) and LCA methods and assumptions. The National Renewable Energy Laboratory (NREL) recently led the Life Cycle Assessment (LCA) Harmonization Project, a study that helps to clarify inconsistent and conflicting life cycle GHG emission estimates in the published literature and provide more precise estimates of life cycle GHG emissions from PV systems. Analysts developed and applied a systematic approach to review LCA literature, identify primary sources of variability and, where possible, reduce variability in life cycle GHG emissions estimates through a process called “harmonization.”

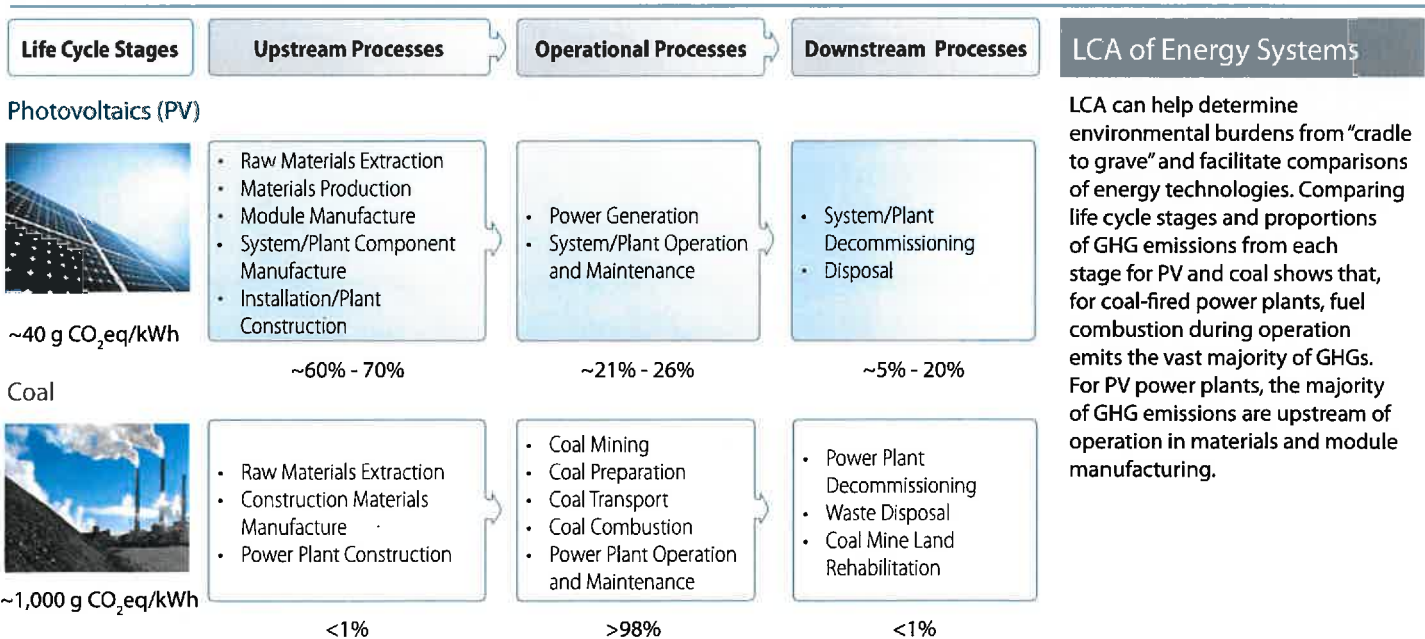
Published results from 400 studies of PV systems including crystalline silicon (c-Si) (mono-crystalline and multi-crystalline) and thin film (TF) (amorphous silicon [a-Si], cadmium telluride [CdTe], and copper indium gallium diselenide [CIGS]) were reviewed and screened. Seventeen studies passed the screening (providing 46 estimates of life cycle GHG emissions for these PV technologies)

Table 1. Harmonization Parameters

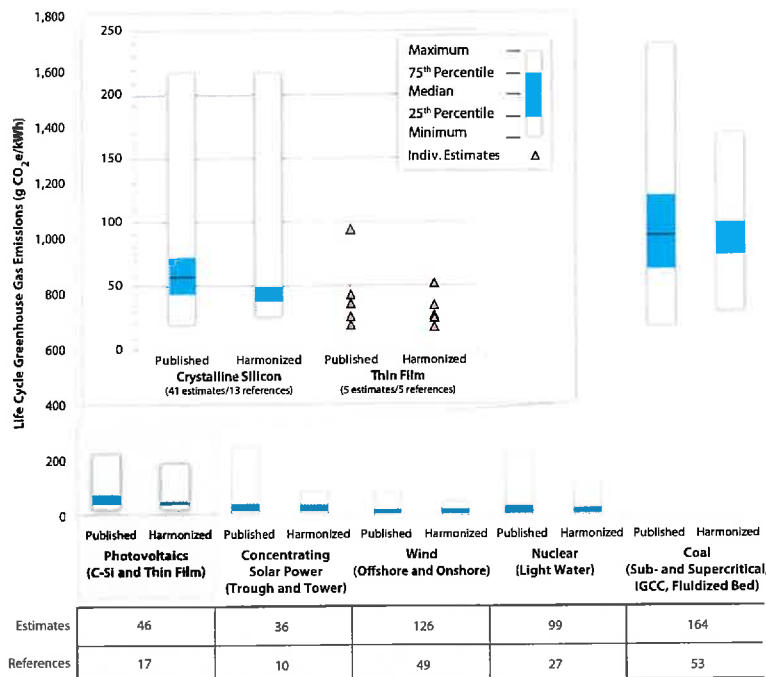
Parameter	Value
Solar Irradiation (kWh/m ² /yr)	1,700 2,400
System Lifetime	30 years
Crystalline Silicon Module Efficiency	
Mono-crystalline	14.0%
Multi-crystalline	13.2%
Thin Film Module Efficiency	
Amorphous silicon (a-Si)	6.3 %
Cadmium telluride (CdTe)	10.9%
Copper indium gallium diselenide (CIGS)	11.5%
Performance Ratio	
Ground-Mounted	0.80
Rooftop	0.75

and were included in this analysis. Harmonization was performed by adjusting published GHG emission estimates to achieve consistent values (Table 1) for these key technical parameters:

1. *Solar irradiation*, the average energy flux from the sun, in kilowatt-hours per square meter per year (kWh/m²/yr).
2. *Operating lifetime* of the PV system and components (years).
3. *Module efficiency*, the percentage of the solar energy converted to direct current electricity by the module.
4. *Performance ratio*, the ratio of alternating current electricity actually produced by the system, after accounting for losses, to



Source: Burkhardt et al. (2012) and Whitaker et al. (2012) Photos from iStock/19291390 and iStock/1627655, Top (left to right): Photo from iStock/13737597, NREL/PIX 18553, iStock/12123595, NREL/PIX 16933, NREL/PIX 18968, NREL/PIX 19163



Summary of results of the systematic review and harmonization of estimates of life cycle GHG emissions for selected electricity generation technologies, with a focus on PV technologies. See www.nrel.gov/harmonization for more information.

the electricity calculated based on the direct current-module efficiency and irradiation.

GHG emission estimates were also harmonized to a consistent system boundary, as well as global warming potentials for methane and nitrous oxide. Other potential sources of variability that were not considered in this study include silicon wafer thickness and silicon type for the c-Si PV system, and the upstream electricity mix used in manufacturing processes for both the c-Si and TF PV systems.

The life cycle GHG emissions for c-Si and TF PV power systems are compared with other electricity generation technologies in the figure on this page. These results show that:

- Total life cycle GHG emissions from solar PV systems are similar to other renewables and nuclear energy, and much lower than coal.
- Harmonization increases the precision of life cycle GHG emission estimates for c-Si and TF PV, reducing variability in the interquartile range (75th minus 25th percentile value) by 65%.
- Harmonization has a small effect on the central estimate for each technology, reducing the median by approximately 20%. Median values for both PV technologies are below 50 g CO₂e/kWh.

- Life cycle GHG emissions from c-Si and TF PV technologies appear broadly similar; the small number of estimates for TF technologies limits robust comparisons.

Of the harmonization parameters investigated, adjusting reported results to a consistent solar irradiation assumption had the greatest impact on reducing the variability in estimated GHG emissions from c-Si PV technologies. Solar irradiation directly influences the power generated from a PV system and varies by location and season, time of day, and weather. In the LCA literature on PV technologies, the assumed solar irradiation ranged from 900 to 2,200 kWh/m²/yr. When these values were adjusted to 1,700 kWh/m²/yr (typical for southern Europe), the variability in the interquartile range of life cycle GHG emissions for c-Si PV technologies was reduced by 48%. Using a higher irradiation estimate than 1,700 kWh/m²/yr (i.e., 2,400 kWh/m²/yr which is typical for the Southwestern U.S.) would result in proportionally lower GHG emissions.

Adjustment to a consistent operating lifetime is also a driving factor in decreasing the variability of the harmonized data. Additional analysis comparing mono-Si and multi-Si technologies suggest that these do not significantly differ in life cycle GHG emissions. In addition, no significant

differences in GHG emissions from ground-mounted and roof-mounted systems were observed for c-Si or TF PV technologies.

Given the large number of previously published life cycle GHG emission estimates for c-Si and TF PV systems and their narrow distribution after harmonization, the results of this research provide an initial estimate potentially useful for decision makers and investors. Additional studies on TF systems are needed to understand the key sources of variability in life cycle GHG estimates. LCAs of both c-Si and TF PV should continue as module and utilization efficiencies improve and as PV manufacturing locations shift. Future assessments should also consider the systems-level effects of integrating variable generation sources onto the existing grid to better understand the impacts on GHG emissions from conventional generation sources.

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NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.
NREL/FS-6A20-56487 • November 2012

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From: <hb206rap-support-request@virginia.edu> on behalf of Emily Piontek <emily@appvoices.org>
Reply-To: Emily Piontek <emily@appvoices.org>
Date: Friday, July 15, 2022 at 1:54 PM
To: "hb206rap-support@virginia.edu" <hb206rap-support@virginia.edu>
Subject: [hb206rap-support] Time-sensitive: resources to share with WG 5 (local control)

Hello,

I'm a member of the local control WG (#5) as a part of the HB206 SAP. Can you please share these resources with others on my team? They may help inform our initial recommendations by the July 22 deadline, and include:

- A guide to community benefits agreements for energy projects,
- A NY state example of a mitigation plan and evaluation process,
- An IL example of mitigation requirements for ag land, and
- A case study from Frederick Co. MD that seems applicable in Virginia as well.

Thanks!

--

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505 ILCS 147/15

Statutes current with legislation through P.A. 102-740, except for provisions of P.A. 102-700, 102-220, and 102-221 of the 2022 Session of the 102nd Legislature.

Illinois Compiled Statutes Annotated > Chapter 505 AGRICULTURE (§§ 5/1 — 150/99) > Renewable Energy Facilities Agricultural Impact Mitigation Act (§§ 147/1 — 147/99)

505 ILCS 147/15 Agricultural impact mitigation agreement.

(a) A commercial renewable energy facility owner of a commercial wind energy facility or a commercial solar energy facility that is located on landowner property shall enter into an agricultural impact mitigation agreement with the Department outlining construction and deconstruction standards and policies designed to preserve the integrity of any agricultural land that is impacted by commercial renewable energy facility construction and deconstruction. The construction and deconstruction of any commercial solar energy facility shall be in conformance with the Department's standard agricultural impact mitigation agreement referenced in subsection (f) of this Section. Except as provided in subsection (a-5) of this Section, the terms and conditions of the Department's standard agricultural impact mitigation agreement are subject to and may be modified by an underlying agreement between the landowner and the commercial solar energy facility owner.

(a-5) Prior to the commencement of construction, a commercial solar energy facility owner shall submit to the county in which the commercial solar facility is to be located a deconstruction plan. A commercial solar energy facility owner shall provide the county with an appropriate financial assurance mechanism consistent with the Department's standard agricultural impact mitigation agreement for and to assure deconstruction in the event of an abandonment of a commercial solar energy facility.

(b) The agricultural impact mitigation agreement for a commercial wind energy facility shall include, but is not limited to, such items as restoration of agricultural land affected by construction, deconstruction (including upon abandonment of a commercial wind energy facility), construction staging, and storage areas; support structures; aboveground facilities; guy wires and anchors; underground cabling depth; topsoil replacement; protection and repair of agricultural drainage tiles; rock removal; repair of compaction and rutting; land leveling; prevention of soil erosion; repair of damaged soil conservation practices; compensation for damages to private property; clearing of trees and brush; interference with irrigation systems; access roads; weed control; pumping of water from open excavations; advance notice of access to private property; indemnification of landowners; and deconstruction plans and financial assurance for deconstruction (including upon abandonment of a commercial wind energy facility).

(b-5) The agricultural impact mitigation agreement for a commercial solar energy facility shall include, but is not limited to, such items as restoration of agricultural land affected by construction, deconstruction (including upon abandonment of a commercial solar energy facility); support structures; aboveground facilities; guy wires and anchors; underground cabling depth; topsoil removal and replacement; rerouting and permanent repair of agricultural drainage tiles; rock removal; repair of compaction and rutting; construction during wet weather; land leveling; prevention of soil erosion; repair of damaged soil conservation practices; compensation for damages to private property; clearing of trees and brush; access roads; weed control; advance notice of access to private property; indemnification of landowners; and deconstruction plans and financial assurance for deconstruction (including upon abandonment of a commercial solar energy facility). The commercial solar energy facility owner shall enter into one agricultural impact mitigation agreement for each commercial solar energy facility.

(c) For commercial wind energy facility owners seeking a permit from a county or municipality for the construction of a commercial wind energy facility, the agricultural impact mitigation agreement shall be

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entered into prior to the public hearing required prior to a siting decision of a county or municipality regarding the commercial wind energy facility. The agricultural impact mitigation agreement is binding on any subsequent commercial wind energy facility owner that takes ownership of the commercial wind energy facility that is the subject of the agreement.

(c-5)A commercial solar energy facility owner shall, not less than 45 days prior to commencement of actual construction, submit to the Department a standard agricultural impact mitigation agreement as referenced in subsection (f) of this Section signed by the commercial solar energy facility owner and including all information required by the Department. The commercial solar energy facility owner shall provide either a copy of that submitted agreement or a copy of the fully executed project-specific agricultural impact mitigation agreement to the landowner not less than 30 days prior to the commencement of construction. The agricultural impact mitigation agreement is binding on any subsequent commercial solar energy facility owner that takes ownership of the commercial solar energy facility that is the subject of the agreement.

(d) If a commercial renewable energy facility owner seeks an extension of a permit granted by a county or municipality for the construction of a commercial wind energy facility prior to the effective date of this Act, the agricultural impact mitigation agreement shall be entered into prior to a decision by the county or municipality to grant the permit extension.

(e) The Department may adopt rules that are necessary and appropriate for the implementation and administration of agricultural impact mitigation agreements as required under this Act.

(f) The Department shall make available on its website a standard agricultural impact mitigation agreement applicable to all commercial solar energy facilities within 60 days after the effective date of this amendatory Act of the 100th General Assembly.

(g) Nothing in this amendatory Act of the 100th General Assembly and nothing in an agricultural impact mitigation agreement shall be construed to apply to or otherwise impair an underlying agreement for a commercial solar energy facility entered into prior to the effective date of this amendatory Act of the 100th General Assembly.

History

[2015 P.A. 99-132](#), § 15, effective July 24, 2015; [2018 P.A. 100-598](#), § 15, effective June 29, 2018.

Annotations

Notes

Amendment Notes

The 2018 amendment by P.A. 100-598, effective June 29, 2018, in (a), in the first sentence, substituted "renewable energy" for "wind energy" twice, and added "or a commercial solar energy facility that is," and added the second and third sentences; added (a-5); added "for a commercial wind energy facility," and "of a commercial wind energy facility" twice in (b); added (b-5) and (c-5); substituted "renewable energy" for "wind energy" in (d); substituted "may" for "shall" in (e); and added (f) and (g).

Illinois Compiled Statutes Annotated
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U.S. DEPARTMENT OF
ENERGY

Office of Economic
Impact and Diversity

Guide to Advancing Opportunities for Community Benefits through Energy Project Development



U.S. Department of Energy
Office of Minority Business & Economic Development

August 1, 2017

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Introduction: What is the energy landscape?

The American energy landscape is changing. The United States has become the world's leading producer of oil and natural gas. The composition of the nation's energy demand has also started to shift, and the use of natural gas and renewable energy has grown significantly. The United States is also undergoing an energy sector transformation, resulting from advances in energy technologies that are reducing the cost of renewable power generation and enabling the extraction of fossil fuel resources that were once uneconomical to produce. As highlighted in the EIA's Annual Energy Outlook 2017, the change has been dramatic and is poised to continue: since 2000, natural gas use in the electricity market has increased by 86% and is forecasted to account for 33% of total energy consumption by 2040, while renewable energy's share is forecasted to reach 14% in the same timeframe.

Across the country, energy transformation is fueling trillions of dollars in infrastructure investment. The type of development varies greatly, depending on local fuel resources, existing infrastructure, and/or the ability to export fuels to other markets. Significant energy investments will continue to be made as the energy mix evolves, including new natural gas, renewable, and nuclear power generation facilities, as well as potential export projects.

What is the community benefits approach?

Major energy development and infrastructure projects provide significant opportunities, as well as challenges, for local communities. Although they often create new jobs and economic growth, they do not automatically result in sustained, local economic benefits. Increasingly, state and local governments and communities are looking for tools that help build sustained benefits to host communities.

The DOE Office of Minority Business and Economic Development (MBED) supports the nation's energy goals by fostering entrepreneurship, innovation, and job creation for diverse communities in the high-growth energy sector and in DOE programs and research opportunities. MBED develops tools and resources to increase diverse participation in the energy economy, drive American innovation, and increase America's competitiveness.

These materials are intended to provide information to communities and state and local governments on Community Benefit Agreements (CBAs) and how to bring them to fruition. They can serve as an aid for these entities, especially where large-scale energy projects are being proposed. Realistic outcomes for a particular community to successfully negotiate and implement an agreement can depend on the specifics of each project, how organized the community is, the political context, and the program infrastructure in place.

What is a Community Benefit Agreement?

A CBA is an agreement signed by community benefit groups and a developer, identifying the community benefits a developer agrees to deliver, *in return for community support of the project*. Community benefit groups are coalitions comprised of neighborhood associations, faith-based organizations, unions, environmental groups and other stakeholders. They represent the interests of residents who will be impacted by proposed developments. CBAs can ensure that measurable, local benefits will be given to a community. They are enforceable, legally-binding contracts for all parties that stipulate community benefits and are the direct result of substantial community input.

What is the energy development context?

Most large-scale energy development projects involve a lengthy and complex negotiation between public entities and a developer. Often, these projects are subsidized by taxpayer dollars and require land-use approvals. Negotiations generally take place at the state or local government level. Community benefit strategies are most effective when a state or local government is participating in the development, providing a public subsidy in the form of a land-lease/land-use approval, or offering financial incentives for the project. Developers often seek public subsidies for large-scale projects, and this provides leverage for state and local governments and community groups to negotiate for community benefits. Under these circumstances, state and local governments and community coalitions play significant roles in shaping and providing input during negotiations on public subsidies.

The CBA process should begin while energy development is still being formulated by the project proponent. It is important to consider participation in proposed projects that have the potential to offer benefits and those that impact immediate and surrounding neighborhoods. Once a coalition is formed, the community should announce its formation, thereby making it easier for developers to communicate and foster cooperation. Developers should actively seek partnership with neighborhoods, as their support would raise the probability of state or local government approvals for zoning variances, state permits, and other regulatory approvals.

The CBA process should also begin before land-use negotiations take place. The public input process for land-use decisions largely consists of public hearings during planning commission meetings. This format does not lend itself well to the intensive negotiating process required between community representatives and developers. By the time a project reaches the land-use approval process, many of the details that could have been points of negotiation for CBAs may already be final. This contrasts with the economic development process. When public subsidies are considered in that context, the process is not limited by the same rules governing land-use approval. In the context of land use, the CBA process should begin as soon as possible.

Energy projects may have a connection to environmental issues and engender important community interest. As a result, community interest increases. CBAs can help facilitate public participation in the regulatory decision-making and approval processes associated with energy

projects. For example, the City of Richmond's Refinery Modernization Project developed a Community Investment Agreement that included measures to lower emissions and reduce energy use.

What values do CBAs promote?

According to the Partnership for Working Families, CBAs can greatly improve many state and local government approval processes by promoting these values: Inclusiveness, Enforceability, Transparency, Coalition-Building, Efficiency, and Clarity of Outcomes (Gross, Julian; Community Benefits Agreements: Making Development Projects Accountable; pgs. 21-22). The CBA process relies on collective action, which enhances communication and thereby positions communities and developers for success. The CBA process centralizes dispersed flows of information so developers and communities have a chance to proactively foster accord, which increases the probability of state or local government approvals. While it is clear communities benefit from CBAs, developers stand to gain just as much, albeit differently. CBAs *increase their chances of starting and sustaining projects*.

Inclusiveness. The CBA negotiation process ensures that community issues are heard and addressed. Historically-underrepresented community members are often missing in the development process. Public hearings are held at times and places that are not neighborhood-friendly. Having a negotiation process helps provide a forum for affected communities.

Enforceability. CBAs can ensure that developer and community promises regarding community benefits are legally enforceable. Sometimes, the promises developers make when pitching a project do not come to fruition. CBAs commit developers – in writing – to promises they make, thus simplifying enforcement. Depending on the CBA's language, enforcement can be a two-way street, if communities do not honor their commitments.

Transparency. CBAs help the public, community groups, state and local government officials, and news media monitor a project's outcome. Having all the benefits stipulated in one place allows everyone to understand and assess the specific commitments made by the developer and the community. They can then compare these benefits to those provided by similar projects in the past. Moreover, it is easier to compare, side-by-side, benefits being offered by competing developers.

Coalition-Building. The process of negotiating a CBA fosters new alliances among community groups that may care about different issues or have different constituencies. CBAs can foster political relationships between different but potential allies, bringing together labor, environmental, community and religious groups. Dissimilar stakeholders can be unified by socioeconomic potential and promise, with CBA discussions that highlight career pathways for disadvantaged workers, high-quality jobs, resources for environmental projects and even affordable housing.

Efficiency. CBAs encourage early negotiation between developers and a community, avoiding lengthy processes for local zoning and other necessary approvals. Without a CBA process,

community groups usually express their views at public hearings, when a project is up for local government approvals. At that point, there are generally three possible outcomes: 1) the local government can approve a project over neighborhood objections, leaving residents unhappy and leading to a project that fails to address some of the community's needs; 2) local government officials can reject the project completely, leaving the developer unhappy and the community without the benefits the project could have provided; or 3) the local government can delay the project, until the controversial issue(s) is resolved. This would leave the developer unhappy and delay community benefits. CBAs could help foster a cooperative relationship between potentially-adversarial parties and avoid conflict during the approval process, helping avoid delays in getting good projects approved.

Clarity of Outcomes. CBAs provide local governments the information they need to illustrate successful delivery of promised benefits, like job creation. Very few state or local economic development entities can easily quantify their outcomes when questioned by legislatures or the public about the success of programs or return on investment. CBAs are a vehicle to gather and maintain information that demonstrates jobs and other benefits actually materialize.

What are the benefits of a CBA?

CBAs are an excellent tool for supporting both communities and developers. They are negotiated between a developer and a community coalition and specify a particular project's contributions to a community, in exchange for community support for the proposed project. CBAs often include monitoring mechanisms to make sure the expectations of a community and developer performance goals are met.

Comprehensive public input is critical in determining priorities for a proposed project. Thus community coalitions should be broad and represent a cross-section of residents and other stakeholders in the impacted neighborhood or region. The negotiation process allows for more proactive and collaborative community engagement and can address a wider range of views than is possible in traditional land-use and economic development decision-making. Depending on state law, CBA terms can be enforced via inclusion in development agreements between local governments and developers; both developers and communities can benefit from this.

A. Potential Developer Benefits

- ✓ The Community Coalition agrees to support the project, with *public testimony and written statements*;
- ✓ Community support *reduces risk for developers*, by uniting community groups behind a project; and
- ✓ Developers more reliably get needed *state or local subsidies or approvals*.

B. Potential Community Benefits

- ✓ Local and targeted *hiring commitments*;
- ✓ Living wage and benefits;
- ✓ *Educational partnerships between developers and community schools*; and
- ✓ Support for local, small business.

How can you ensure benefits are measurable?

As the range of community benefits is delineated in an agreement, the community and the developer should ensure they establish clear and measurable commitments, not just aspirational standards. CBAs should describe expectations of project deliverables, include reporting requirements, and describe how reports will be publicly available. In addition, CBAs should clearly describe both roles and responsibilities – and how information will be furnished – in order to determine compliance. Furthermore, they should describe how noncompliance will be addressed.

Who negotiates a CBA?

According to the *Partnership for Working Families*, CBAs are negotiated between community group leaders and a developer, prior to government approval of a development project. In some cases, a state or local government agency will play an active role in CBA negotiations.

Community development advocates recognize the importance of coalition building to facilitate CBA development. Community-based organizations involved in CBA negotiations are usually formed by concerned citizens and may be built upon traditional community organizing structures, such as block clubs or church-based groups. These groups may coalesce with living wage campaigns, individual labor unions, and/or central labor councils.

Collective action is inherently difficult. As a result, community groups should get themselves properly organized as a Community Benefits Coalition. Organization can be informal, but there are benefits associated with more formal coalescing. For instance, a group could draft and agree to an operating agreement. Community groups are more successful in engaging with developers to promote community involvement and acceptance of development, when community support is necessary to realize a project. Usually, a representative from the developer, or the developer's attorney, will conduct negotiations on its behalf.

Local or state government staff may or may not be involved in CBA negotiations. While they and their attorneys are busy negotiating development agreements for projects, they sometimes leave community representatives to negotiate CBAs. In other cases, local government entities may be the developers of a project, while one or more other government entities have permitting authority. In such cases, the local or state government “developer” will be pivotal in negotiations and party to the CBA.

How can community engagement begin?

CBA negotiations usually require communities to organize a broad coalition of community interests. Community advocates – or local governments – need to bring community interests into the development process at the front end of discussions between developers and public entities, in order to understand community concerns and get input on their needs. Developers,

communities, and state and local governments can use the following strategies to get the most of the engagement.

Developers

- Identify stakeholders and build public trust. Stakeholders should represent a diverse group of community-based organizations and individuals.
- Engage community representatives, as well as coalitions, and communicate project benefits with open dialogue/transparency.
- Ensure stakeholder representatives are part of the project development team *early in the process* and align project goals and schedules with their understanding.
- **Initiate project briefings with key state and local government officials.**
- Train company project representatives about community outreach and CBAs.
- Educate stakeholders about the technical aspects of the development.

Communities

- Research development proposals in your region and identify any that have the potential to bring *important benefits* or *significant impacts* to the neighborhood(s) where they will be located.
- Organize a broad-based coalition of community interests and recruit stakeholder organizations.
- In order to *maximize turnout*, hold public meetings with assistance from identified leaders. Utilize multiple communication mechanisms to reach affected populations.
- Actively engage the developer(s) with sustainable community objectives, via open dialogue and transparency.

State and Local Governments

- Inform community coalitions of proposed developments.
- Encourage developers to enter good-faith negotiations with responsible coalitions.
- Inform developers of the benefits they can achieve through CBAs.
- Respect the negotiating process and honor community coalition agreements.
- Fold CBAs into public-private partnership (PPP) agreements – when and where appropriate – for added enforcement.

How are CBAs implemented?

How CBAs are implemented depends on each of the commitments made in the agreement. Implementation of a CBA may take years and involve a variety of issues. Usually, one local organization does not have the capacity to handle everything that is involved in the process. Members of CBA coalitions will likely work together for years to assure strong implementation of the commitments they negotiate. CBAs may establish oversight committees, which include community members who monitor the progress of delivery of benefits agreed upon.

In addition, for certain provisions, such as local hiring commitments, communities will need program infrastructure to successfully deliver benefits. For instance, a local or targeted hiring

provision will require support from multiple entities. CBA provisions may stipulate the sending of job opportunity notices by employers, as well as subsequent candidate interviews. The local community would need a central job center in place capable of conducting intake and screenings of prospective applicants and making referrals to employers. Local, programmatic infrastructure would need to exist for each key provision of the CBA, to enable the successful delivery of promised benefits.

What are examples of CBAs?

There are many different CBA examples and situations tailored for each community; no one experience or CBA is the same. Below are examples that resulted in strong community benefit commitments, with broad support from community stakeholders.

A. Town of Robbinston, Maine

Downeast LNG INC.'s Liquefied Natural Gas Import Terminal Project

The community of Robbinston, Maine and Downeast LNG Inc. developed a CBA for the permitting, construction, development and operation of a liquefied natural gas (LNG) import terminal, which would have been located within the town at Mill Cove. Although the import project did not proceed, the cooperation between the community and Downeast LNG Inc. is still instructive. The community recognized the significant economic and other benefits it would bring to the town, its residents, and the surrounding communities and wanted to support the project. The developer, recognizing the town's past and continuing support of the import terminal project, agreed to provide Robbinston, and its surrounding areas, with the following community benefits:

- ✓ Establishment of an annual *County Economic Trust Fund*;
- ✓ 5% *supplier goal* for local, qualified contractors;
- ✓ 60% recruitment of full-time operations workforce from the local county;
- ✓ Construction job training;
- ✓ School education support; and
- ✓ Road repair and transportation.

B. City of Richmond, California

Chevron U.S.A. Inc.'s Richmond Refinery Modernization Project

The city of Richmond, California and Chevron U.S.A. Inc.'s *Richmond Refinery Modernization Project* developed a Communities Investment Agreement – similar to a CBA – which is designed to protect the environment, enhance safety, reduce energy use and create 1,000 local construction jobs. Chevron's \$1 billion investment to modernize the refinery will replace some of the facility's oldest processing equipment with modern technology.

The main project components include replacing a 1960s hydrogen plant with modern technology. Chevron states that the new plant will process higher-quality hydrogen more

efficiently and reliably, and the upgrades will give the refinery flexibility to process *crude oil blends* and *gas oils*, while meeting environmental regulations.

Under the Communities Investment Agreement, Chevron has committed to investing \$30 million over 10 years in both Richmond and North Richmond, lowering greenhouse gas emissions and creating local green jobs. The agreement intends for the project to create 1,000 local construction jobs.

The Communities Investment Agreement also included:

- ✓ A scholarship program;
- ✓ Pre-apprenticeship construction skills training, with direct entry agreements with the local union;
- ✓ On-the-job training programs, which provide wage subsidies for businesses that hire Richmond residents and improve the skills and job-readiness of residents;
- ✓ Adult education and skills-building programs, to prepare Richmond residents to be productive members of the local labor force – with the goal of achieving full and meaningful employment;
- ✓ Youth employment and skills-building programs, designed to enhance the readiness of Richmond youth for employment in various technical areas, including the *petrochemical, renewable energy and emergency preparedness and response* sectors;
- ✓ Implementation of full-service community schools, especially elementary schools nearest to the facility;
- ✓ Community-based greenhouse gas reduction programs, including a Climate Action Plan, rooftop solar systems and utility-scale photovoltaic solar farms; and
- ✓ Local-hiring process and plan for construction and non-construction, including addition of a local-hire coordinator.

Are there resources for communities interested in the CBA process?

To successfully develop a Community Benefit Agreement (CBA), a powerful coalition must be built, area residents should be organized, extensive research needs to be carried out, and negotiations with a developer must occur. Research, communications, and legal navigation capacities are critical, and groups without these often find themselves at a serious disadvantage because they lack a strategic understanding of numerous hurdles, outright oppositional forces, and/or the financial structure of a proposed deal. Some groups have strong research capacities but, unfortunately, are hindered by poor organization.

To maximize the probability of success, a coalition should include members with experience in the abovementioned areas or access to such skills via partnerships and/or consultants. For this reason, many organizations with community benefit programs may reach out to organizations with experience in CBAs, such as the Partnership for Working Families, The Public Law Center at Tulane University, or the Los Angeles Alliance for a New Economy.¹

For more information, visit: <http://energy.gov/diversity/office-economic-impact-and-diversity>.¹

¹ The following are references used to create this document:

1. *U.S. Department of Energy QER Report, April 2015*
2. *The Partnership for Working Families, Community Benefits Law Center Website*
3. *Community Benefits Agreements, The Power, Practice, and Promise of a Responsible Redevelopment Tool, 2007, The Annie E. Casey Foundation, Baltimore, MD*
4. *Recent Developments in Land Use, Planning and Zoning Law, David A. Marcello, 2007*
5. *Michigan Planner, A Publication of the Michigan Chapter of the American Planning Association, Making Great Communities Happen, September/October 2014*
6. *Tulane University, The Public Law Center Website, Community Agreements*
7. *FERC Guidance, Suggested Best Practices for Industry Outreach Programs to Stakeholders, July 2015*
8. *Chevron Refinery Modernization Project Environmental and Community Investment Agreement Between the City of Richmond, California and Chevron Products Company, A Division of Chevron U.S.A. Inc., Bill Lindsay, City Manager*
9. *Community Benefit Agreement Between the Town of Robbinston, Maine and Downeast LNG INC, Tom Moholland, Town of Robbinston and Dean Girdi, Downeast LNG, INC.*

Appendix: Additional Resources

Other resources for CBAs can be found here:

➤ **Community Support**

Partnership for Working Families

<http://www.forworkingfamilies.org/campaigns/CBA>

Community Benefits Agreements – Making Projects Accountable

http://juliangross.net/docs/CBA_Handbook.pdf

Tulane University – The Public Law Center

<http://www.law.tulane.edu/tlscenters/PublicLawCenter/index.aspx?id=3906>

<http://www.law.tulane.edu/assets/0/260/262/719A253B-F54A-4A56-BBC4-7FDF754CCCAB.pdf>

Annie E. Casey Foundation – Community Benefits Agreements, The Power, Practice, and Promise of a Responsible Redevelopment Tool

<http://www.aecf.org/resources/community-benefits-agreements-the-power-practice-and-promise-of-a-responsib/>

Community Benefits Coordinating Council (CBCC), Washington, DC 20024

<http://www.seswcbcc.org/>

United States Army Corps of Engineers

<http://www.usace.army.mil/Missions/Environmental/BrownfieldsUrbanWaters/HelpingCommunities.aspx>

The University of Chicago, Social Service Administration

Community Benefits Agreements in the Political Economy of Urban Development

<http://ssa.uchicago.edu/community-benefits-agreements-political-economy-urban-development>

Columbia University Law School -Emerging Practices in Community Development Agreements

<http://ccsi.columbia.edu/files/2016/02/Emerging-practices-in-CDAs-Feb-2016-1-sml.pdf>

➤ **CBA Success Stories and Lessons Learned**

Jobs for the Future – Community Workforce Agreements, Pathway to Career Opportunities

http://www.jff.org/sites/default/files/publications/CommunityWorkforceAgreements_030413.pdf

Michigan American Planning Association – Community Benefit Agreements

http://www.planningmi.org/downloads/michigan_planner_cbas_2014.pdf

Steelhead LNG and Malahat First Nation Sign Mutual Benefits Agreement and Lease for LNG Project

<http://www.steelheadlng.com/steelhead-lng-and-malahat-first-nation-sign-mutual-benefits-agreement-and-lease-for-lng-project/>

➤ **Miscellaneous Guidance**

FERC Guidance on Best Practices for Stakeholder Outreach Programs for Natural Gas Projects

http://www.ferc.gov/media/news-releases/2015/2015-3/07-28-15.asp#.VumE_30rJMw

➤ **CBA Agreement Examples**

Town of Robbinston, Maine – LNG Import Project

<http://www.townofrobbinston.org/agreement2.pdf>

City of Richmond, California – Chevron U.S.A. Inc.'s Richmond Refinery Modernization Project

<http://www.ci.richmond.ca.us/DocumentCenter/View/30667>

Note: This is not an exhaustive list of CBA references. Parties interested in adding a resource to this list should email BusinessDiversity@hq.doe.gov with the organization name, website link, and a brief description of the resource.

ⁱ All images in this document are from Pixabay.com or belong to the U.S. Department of Energy.



Solar Facility Siting Guidance

- [Solar Facility Siting Guidance Home](#)
- [Overview of Review and Approval of Facilities](#)
- [Judicial and Administrative Decisions](#)
- [Assistance and Factors to Consider](#)
- [Case Studies](#)
 - [Caroline County](#)
 - [Frederick County](#)
 - [Kent County](#)
 - [Queen Anne's County](#)
 - [City of Cambridge](#)
 - [City of Annapolis landfill in Anne Arundel County](#)
 - [Panorama landfill in Prince George's County](#)

Solar Facility Siting Case Study: Frederick County

Local Solar Facility Siting Ordinances

Note: to access the county codes discussed in the following case study, we recommend that you access the Smart DG+ County Zoning Guide at dnr.maryland.gov/pprp/Pages/smartdg.aspx.

Solar Facility Siting Case Study

Jurisdiction: Frederick County

Type: Utility-Scale, Undeveloped Land

Zoning Used: Floating Zone

Process: Government-Driven

Description of Process:

Approximately six years ago, Frederick County created legislation to address the issue of regulating solar energy systems. The impetus for the zoning update came from the large number of applications for solar energy facilities, some of them for hundreds of acres, in Frederick's Priority Preservation Area (PPA) and other areas of prime agricultural soil. The stream of applications came in response to public concerns and an upcoming deadline on federal tax credits, which were later extended. The agricultural district at the time was also being considered for other commercial activities, including breweries, wineries and tasting rooms, medical marijuana, etc.

The County Executive ordered a moratorium on solar applications not already approved by the Board of Appeals. The president of the County Council and the legal staff drafted the zoning regulations. Public input came during the County Council's public hearing.

Farmers, including the Agricultural Business Council and the Farm Bureau, lined up on both sides of the zoning proposal, the main objection being that it was too restrictive. Representatives of the solar industry also found the new regulations too restrictive. As a result, the first draft of the statute was revised. Historic preservation advocates endorsed the prohibition on locating solar facilities on the Journey Through Hallowed Ground National Heritage Area on either side of Route 15. The general public generally has not been interested until they see a notice of a solar proposal in their neighborhood and then they have registered their opposition.

As for solar installations on other types of land uses, solar panels have not been installed in parking lots, except for a small installation at Mount St. Mary's University.

If the existing zoning is revised, the drafting would involve a variety of interests to prevent the bill from being tabled by the County Council after a public hearing. The goal would be to have consensus before getting to the public hearing; the

Currently, the County Council must approve a solar facility use by designating a floating zone and the specifics of the development are then processed through the site plan approval at the Planning Commission.

Best Practices Identified by Frederick County:

Restrictions on the use of prime soils; a development limit of 10% on individual properties; prohibition on solar panels in Rural Legacy Areas, Priority Preservation Areas, or on land under easement; a two-mile buffer from the centerline of the right-of-way of U.S. Route 15 in the Journey Through Hallowed Ground National Heritage Area.

Specifics Regarding Zoning Ordinance:

Zoning for solar collection facilities in Frederick County was contained in Bill #17-07, which became effective on July 15, 2017.

Accessory Solar Facilities Allowed in All Zoning Districts:

A "Solar Facility, **Accessory** is a permitted use in all zoning districts" and a "Solar Facility, **Community Energy Generating System**, is an accessory use in all zoning districts and the facility may be located on a different parcel of land than that of the subscribers..." [emphasis added].¹

Commercial Solar Facilities Allowed as Principal Use Only in Industrial Districts:

Commercial Solar facilities are allowed as principal permitted use subject to site development plan approval in the Limited Industrial (LI) District and General Industrial (GI) District.²



In a densely populated state such as Maryland, land is in demand for many reasons...

including the production of food and fiber for Marylanders.

- The minimum lot area is 20,000 sq. ft. in the LI District and one acre in the GI District. The following lot requirements apply to both zones: Lot Width, 200 feet; Front Yard, 50 feet; Side Yard, 50 feet; Rear Yard, 50 feet. Height: 30 feet.
- Justification for why the site was selected is required.
- A "[g]lint and glare analysis of... impacts on nearby properties, roadways, and airports" shall be provided.
- "The appearance and visual impact of the solar facility shall be minimized by the use of screening."
- The project must be compliant with all federal and state laws and regulations, including a CPCN, if required.
- "All solar facilities and panel disconnects must be mapped and registered with the Frederick County Division of Fire and Rescue Services."
- Approval of the facility terminates if it is inactive or disconnected from the grid for six months. The property owner must remove the facility within 90 days and "shall ensure the solar facility removal and disposal by posting an acceptable monetary guarantee with the County...plus a 15% contingency."

Commercial Solar Facilities Allowed on Rural Land as a Floating Zone:³

- The land must be zoned Agriculture and have an “agricultural/rural” land use designation in the comprehensive plan.
- The project cannot exceed 10% of the farm’s tillable acreage, or 75 acres; the minimum size of the tract or tracts is 10 acres and the maximum 750 acres. (Currently there is no countywide cap on the number of acres that can be used for solar projects.)
- It cannot sit on prime farm soils or be located in a Priority Preservation Area or Rural Legacy Area, or under easement;
- It cannot be contiguous to growth areas identified in Frederick County’s Comprehensive Plan.
- The site may not “be located within two miles of the centerline of the right-of-way of U.S. Route 15, outside the Frederick City limits from the Pennsylvania border to the Virginia border, that Route having been designated as part of the Journey Through Hallowed Ground National Heritage Area,” unless the applicant can show that the facility will not be visible from Route 15.
- The proposed project will be evaluated for impacts upon nearby properties and its compatibility with surrounding properties and views from public parks and roadways.
- The optimal site for a commercial solar project should be able to connect to the grid while minimizing “the visual impact of the project on surrounding properties and those traveling on public roadways.”
- “[T]he proposed project will be compatible with the existing and customary uses on adjoining and neighboring properties and in the Agriculture zone in terms of size, scale, style and intensity.”
- “A 25 foot deep buffering and screening area [which may be located with the setback areas] shall be provided along common property lines...and all adjoining residentially zoned property and along all adjacent roadways. The... area may include a combination of berms, predominantly evergreen species at least 5 feet in height...or fencing to be determined by the County Council...”
- The project must comply with all federal and state regulations, including CPCN (if required) and county forest resource and/or environmental regulations.
- “All solar facilities and panel disconnects must be mapped and registered with the Frederick County Division of Fire and Rescue Services.”
- Approval of the facility terminates if it is inactive or disconnected from the grid for six months. “The property owner must remove the facility within 90 days... [and] ensure...the solar facility removal and disposal by posting an acceptable monetary guarantee with the County...plus a 15% contingency.”
- Other conditions may apply “to protect the intent of the agricultural/rural land use designation.”
- “Prior to submitting an application...the applicant shall publicize the proposed application... including a map showing the site and a one-mile radius. The applicant shall hold a meeting [with]...members of the surrounding community regarding potential impacts of the project. Written notice of the meeting shall be provided to all abutting property owners and any homeowners/community associations within a one-mile radius of the property.”
- The required maps include a “vicinity map at a scale of one inch equals 2,000 feet or more...indicating the location of the property with respect to surrounding property and streets” and an “environmental features map of the property showing the existing surface of the land and the location of soil types and natural features such as streams, rock outcrops and wooded areas, at a minimum of 5 foot contour intervals, unless otherwise specified.”
- “A phasing schedule describing the timing and sequence of development.”
- “[C]lint and glare analysis of... impacts upon nearby properties, roadways, and airports”



Local zoning often allows home solar systems by right.

- "...[a] justification statement addressing each of the approval criteria as well as the following:
 - Relationship of uses within the project and with existing uses in the neighborhood;
 - The timing of the construction of the project as it relates to the provision of facilities and services;
 - A statement identifying all incidental accessory uses and activities associated with the primary use of the property including hours of operation, frequency of activity, and average number in attendance."
- The county does not require pollinator-friendly plants underneath solar installations under the current zoning ordinance; however, they are becoming the industry practice for community systems (which are less than two megawatt).

¹ These two provisions can be found in Part I: Frederick County Code, Chapter 1-19 Zoning, Article VIII: Specific Use Regulations, Division 2: Accessory Uses—205.4: Solar Facility, accessory and 2.5.5: Solar facility, community energy generating system, respectively.

² The information in this section's bullet points comes from Part I: Frederick County Code, Chapter 1-19 Zoning, Article VI: District Regulations, Division 1: Design Requirements and Modifications; and Article VIII: Specific Use Regulations, Division 4: Permitted Uses.

³ The zoning provisions in this section can be found in Part I: Frederick County Code, Chapter 1-19 Zoning, Article X: Optional Methods of Development, Division 7: Solar Facility, Commercial Floating Zone District



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NEW YORK STATE DEPARTMENT OF AGRICULTURE AND MARKETS

Guidelines for Solar Energy Projects - Construction Mitigation for Agricultural Lands (Revision 10/18/2019)

The following are guidelines for mitigating construction impacts on agricultural land during the following stages of a solar energy project: Construction, Post-Construction Restoration, Monitoring and Remediation, and Decommissioning. These guidelines apply to project areas subject to ground disturbance¹ within agricultural lands including:

- Lands where agriculture use will continue or resume following the completion of construction (typically those lands outside of the developed project's security fence);
- Lands where the proposed solar development will be returning to agricultural use upon decommissioning, (typically those lands inside of the developed project's security fence);
- Applicable Area under review pursuant to Public Service Law Article 10 Siting of Major Electric Facilities.

The Project Company will incorporate these Guidelines into the development plans and applications for permitting and approval for solar projects that impact agricultural lands. If the Environmental Monitor, hereafter referred to as EM, determines that there is any conflict between these Guidelines and the requirements for project construction that arise out of the project permitting process, the Project Company and its EM, will notify the New York State Department of Agriculture and Markets (NYSDAM), Division of Land and Water Resources, and seek a reasonable alternative.

Environmental Monitor (EM)

The Project Company (or its contractor) shall hire or designate an EM to oversee the construction, restoration and follow-up monitoring in agricultural areas. The EM shall be an individual with a confident understanding of normal agriculture practices² (such as cultivation, crop rotation, nutrient management, drainage (subsurface and/or surface), chemical application, agricultural equipment operation, fencing, soils, plant identification, etc.) and able to identify how the project may affect the site and the applicable agricultural practices. The EM should also have experience with or understanding of the use of a soil penetrometer for compaction testing and record keeping. The EM may serve dual inspection roles associated with other Project permits and/or construction duties, if the agricultural workload allows. The EM should be available to provide site-specific agricultural information as necessary for project development through field review and direct contact with both the affected farm operators and NYSDAM. The EM should maintain regular contact with appropriate onsite project construction supervision and inspectors throughout the construction phase. The EM should maintain regular contact with the affected farm operator(s) concerning agricultural land impacted, management matters pertinent to the agricultural operations and the site-specific implementation of agricultural resource mitigation measures. The EM will serve as the agricultural point of contact.

¹Ground Disturbance is defined as an activity that contributes to measurable soil compaction, alters the soil profile or removes vegetative cover. Construction activities that utilize low ground pressure vehicles that do not result in a visible rut that alters soil compaction, is not considered a Ground Disturbance. Soil compaction should be tested using an appropriate soil penetrometer or other soil compaction measuring device. The soil compaction test results within the affected area will be compared with those of the adjacent unaffected portion of the agricultural area.

² An EM is not expected to have knowledge regarding all of the listed agricultural practices, but rather a general understanding such that the EM is able to perform the EM function.

1. For projects involving less than 50 acres of agricultural land within the limits of disturbance (LOD),³ the EM shall be available for consultation and/or on-site whenever construction or restoration work that causes Ground Disturbance is occurring on agricultural land.
2. For projects involving 50 acres or more of agricultural land within the (LOD) (including projects involving the same parent company whether phased or contiguous projects), the EM shall be on site whenever construction or restoration work requiring or involving Ground Disturbance is occurring on agricultural land and shall notify NYSDAM of Project activity. The purpose of the agency coordination would be to assure that the mitigation measures of these guidelines are being met to the fullest extent practicable. The Project Company and the NYSDAM will agree to schedule inspections in a manner that avoids delay in the work. NYSDAM requires the opportunity to review and will approve the proposed EM based on qualifications or capacities.

Construction Requirements

- Before any topsoil is stripped, representative soil samples should be obtained from the areas to be disturbed. The soil sampling should be consistent with Cornell University's soil testing guidelines, and samples should be submitted to a laboratory for testing PH, percent organic material, cation exchange capacity, Phosphorus/Phosphate (P), and Potassium/Potash (K). The results are to establish a benchmark that the soil's PH, Nitrogen (N), Phosphorus/Phosphate (P), and Potassium/Potash (K) are to be measured against upon restoration. If soil sampling is not performed, fertilizer and lime application recommendations for disturbed areas can be found at https://www.agriculture.ny.gov/ap/agsservices/Fertilizer_Lime_and_Seeding_Recommendations.pdf.
- Stripped topsoil should be stockpiled from work areas (e.g. parking areas, electric conductor trenches, along access roads, equipment pads) and kept separate from other excavated material (rock and/or sub-soil) until the completion of the facility for final restoration. For proper topsoil segregation, at least 25 feet of additional temporary workspace (ATWS) may be needed along "open-cut" underground utility trenches. All topsoil will be stockpiled as close as is reasonably practical to the area where stripped/removed and shall be used for restoration on that particular area. Any topsoil removed from permanently converted agricultural areas (e.g. permanent roads, etc.) should be temporarily stockpiled and eventually spread evenly in adjacent agricultural areas within the project Limits of Disturbance (LOD) ; however not to significantly alter the hydrology of the area. Clearly designate topsoil stockpile areas and topsoil disposal areas in the field and on construction drawings; changes or additions to the designated stockpile areas may be needed based on field conditions in consultation with the EM. Sufficient LOD (as designated on the site plan or by the EM) area should be allotted to allow adequate access to the stockpile for topsoil replacement during restoration.
 - Topsoil stockpiles on agricultural areas left in place prior to October 31st should be seeded with Aroostook Winter Rye or equivalent at an application rate of three bushels (168 lbs.) per acre and mulched with straw mulch at rate of two to three bales per 1000 Sq. Ft.
 - Topsoil stockpiles left in place between October 31st and May 31st should be mulched with straw at a rate of two to three bales per 1000 Sq. Ft. to prevent soil loss.
- The surface of access roads located outside of the generation facility's security fence and constructed through agricultural fields shall be level with the adjacent field surface. If a level road design is not

³ The Limits of Disturbance (LOD) includes all project related ground disturbances and all areas within the project's security fencing.

feasible, all access roads should be constructed to allow a farm crossing (for specific equipment and livestock) and to restore/ maintain original surface drainage patterns.

- Install culverts and/or waterbars to maintain or improve site specific natural drainage patterns.
- Do not allow vehicles or equipment outside the planned LOD without the EM seeking prior approval from the landowner (and/or agricultural producer), and associated permit amendments as necessary. Limit all vehicle and equipment traffic, parking, and material storage to the access road and/or designated work areas, such as laydown areas, with exception the use of low ground pressure equipment.⁴ Where repeated temporary access is necessary across portions of agricultural areas outside of the security fence, preparation for such access should consist of either stripping / stockpiling all topsoil linearly along the access road, or the use of timber matting.
- Proposed permanent access should be established as soon as possible by removing topsoil according to the depth of topsoil as directed by the EM. Any extra topsoil removed from permanently converted areas (e.g. permanent roads, equipment pads, etc.) should be temporarily stockpiled and eventually spread evenly in adjacent agricultural areas within the project Limits of Disturbance (LOD); however not to significantly alter the hydrology of the area.
- When open-cut trenching is proposed, topsoil stripping is required from the work area adjacent to the trench (including segregated stockpile areas and equipment access). Trencher or road saw like equipment are not allowed for trench excavation in agricultural areas, as the equipment does not segregate topsoil from subsoil. Horizontal Directional Drilling (HDD) or equivalent installation that does not disrupt the soil profile, may limit agricultural ground disturbances. Any HDD drilling fluid inadvertently discharged must be removed from agricultural areas. Narrow open trenches less than 25 feet long involving a single directly buried conductor or conduit (as required) to connect short rows within the array, are exempt from topsoil segregation.
- Electric collection, communication and transmission lines installed above ground can create long term interference with mechanized farming on agricultural land. Thus, interconnect conductors outside of the security fence must be buried in agricultural fields wherever practicable. Where overhead utility lines are required, (including Point(s) of Interconnection) installation must be located outside field boundaries or along permanent access road(s) wherever possible. When overhead utilities must cross farmland, minimize agricultural impacts by using taller structures that provide longer spanning distances and locate poles on field edges to the greatest extent practicable.
- All buried utilities located **within** the generation facility's security fence must have a minimum depth of 18-inches of cover if buried in a conduit and a minimum depth of twenty-four inches of cover if directly buried (e.g. not routed in conduit).⁵
- The following requirements apply to all buried utilities located **outside** of the generation facility security fence:
 - In cropland, hayland, and improved pasture buried electric conductors must have a minimum depth of 48-inches of cover. In areas where the depth of soil over bedrock is less than 48-inches, the

⁴ low ground pressure vehicles that do not result in a visible rut that alters soil compaction.

⁵ Burial of electrical conductors located within the energy generation facility may be superseded by more stringent updated electrical code or applicable governing code.

electric conductors must be buried below the surface of the bedrock if friable/rippable, or as near as possible to the surface of the bedrock.

- In unimproved grazing areas or on land permanently devoted to pasture the minimum depth of cover must be 36-inches.
- Where electrical conductors are buried directly below the generation facility's access road or immediately adjacent (at road edge) to the access road, the minimum depth of cover must be 24-inches. Conductors must be close enough to the road edge as to be not subject to agricultural cultivation / sub-soiling.
- When buried utilities alter the natural stratification of soil horizons and natural soil drainage patterns, rectify the effects with measures such as subsurface intercept drain lines. Consult the local Soil and Water Conservation District concerning the type of intercept drain lines to install to prevent surface seeps and the seasonally prolonged saturation of the conductor installation zone and adjacent areas. Install and/or repair all drain lines according to Natural Resources Conservation Service conservation practice standards and specifications. Drain tile must meet or exceed the AASHTO M-252 specifications. Repair of subsurface drains tiles should be consistent with the NYSDAM's details for "*Repair of Severed Tile Line*" found in the pipeline drawing A-5 (<http://www.agriculture.ny.gov/ap/agsservices/Pipeline-Drawings.pdf>).
- In pasture areas, it may be necessary to construct temporary fencing (in addition to the Project's permanent security fences) around work areas to prevent livestock access to active construction areas and areas undergoing restoration. For areas returning to pasture, temporary fencing will be required to delay the pasturing of livestock within the restored portion of the LOD until pasture areas are appropriately revegetated. Temporary fencing including the project's required temporary access for the associated fence installations should be included within the LOD as well as noted on the construction drawings. The Project Company will be responsible for maintaining the temporary fencing until the EM determines that the vegetation in the restored area is established and able to accommodate grazing. At such time, the Project Company should be responsible for removal of the temporary fences.

Post-Construction restoration requirements applicable to continued use agricultural areas that suffered ground disturbance due to construction activities (typically lands outside of the developed project's security fence).

- All construction debris in active agriculture areas including pieces of wire, bolts, and other unused metal objects will need to be removed and properly disposed of as soon as practical to prevent mixing with any topsoil.
- Excess concrete will not be buried or left on the surface in active agricultural areas. Concrete trucks will be washed outside of active agricultural areas. Remove all excess subsoil and rock unearthed from construction related activities occurring in areas intended to return to agricultural use. On-site disposal of such material is not permissible in active agricultural lands. Designated spoil disposal locations should be specified in the associated construction plans. If landowner agreements, LOD boundary, or Project's land use approvals do not allow for on-site disposal, material must be removed from the site.⁶

⁶ Any permits necessary for disposal under local, State and/or federal laws and regulations must be obtained by the facility operator, with the cooperation of the landowner when required.

- Excess stripped topsoil shall not be utilized for fill within the project area. Any extra topsoil removed from permanently impacted areas (e.g. roads, equipment pads, etc.) should be evenly spread in adjacent agricultural project areas, however not to significantly alter the hydrology of the area.
- Regrade all access roads outside of the security fencing (as determined necessary by the EM), to allow for farm equipment crossing and restore original surface drainage patterns, or other drainage pattern incorporated into the design.
- Repair all surface or subsurface drainage structures damaged during construction as close to preconstruction conditions as possible, unless said structures are to be removed as part of the project design. Correct any surface or subsurface drainage problems resulting from construction of the solar energy project with the appropriate mitigation as determined by the Environmental Monitor, Soil and Water Conservation District and the Landowner.
- On agricultural land needing restoration because of ground disturbance, postpone any restoration practices until favorable (workable, relatively dry) topsoil/subsoil conditions exist. Restoration must not be conducted while soils are in a wet or plastic state of consistency. Stockpiled topsoil must not be regraded, and subsoil must not be decompacted until plasticity, as determined by the Atterberg field test, is adequately reduced. No permanent project restoration activities shall occur in agricultural areas between the months of October through May unless favorable soil moisture conditions exist.
- In all continued use agricultural land where the topsoil was stripped, subsoil decompaction shall be conducted prior to topsoil replacement. Following construction, all such areas will be decompacted to a depth of 18 inches with a tractor mounted deep ripper or heavy-duty chisel plow. Soil compaction results shall be no more than 250 pounds per square inch (PSI) throughout the decompacted 18 inches as measured with a soil penetrometer. Following decompaction, all rocks 4 inches and larger in size unearthed from decompaction will be removed from the surface of the subsoil prior to replacement of the topsoil. The topsoil will be replaced to original depth and the original contours will be reestablished where possible. All rocks 4 inches and larger from topsoil shall be removed from the surface of the topsoil. Subsoil decompaction and topsoil replacement must be avoided after October 1, unless approved on a site-specific basis by the landowner in consultation with NYSDAM. All parties involved must be cognizant that areas restored after October 1st may not obtain sufficient growth for stabilization⁷ to prevent erosion over the winter months. If areas are to be restored after October 1st, necessary provisions must be made to prevent potential springtime erosion, as well as restore any eroded areas in the springtime, to establish proper growth. Excess stripped topsoil shall be evenly spread in the adjacent project areas, or adjacent agricultural areas (within the LOD), however, not to significantly alter the hydrology of the area.
- In all continued use agricultural areas where the topsoil was not stripped, including timber matted areas, the EM shall determine appropriate activities to return the area to agricultural use. These activities may include decompaction, rock removal, and revegetation. Soil compaction should be tested in the affected areas and the affected area's adjacent undisturbed areas using an appropriate soil penetrometer or other soil compaction measuring device as soon as soils achieve moisture equilibrium with adjacent unaffected areas. Compaction tests will be made at regular intervals of distance throughout the affected areas, including each soil type identified within the affected areas. Soil compaction results shall be measured with a soil penetrometer not exceeding more than 250 pounds per square inch (PSI), by

⁷ Sufficient growth for stabilization should be determined by comparison with unaffected crop production. Annual crops restored after normal planting window (as determined by the landowner or associated producer) should be stabilized with Aroostook Winter Rye at the rate of 150/100 lbs. per acre (broad cast/drill seeder).

comparing probing depths of both the affected and unaffected areas. Where representative soil density of the affected area's collective depth measurements present compaction restrictions exceeding an acceptable deviation of no more than 20% from the adjacent undisturbed area's mean soil density, additional decompaction may be required to a depth of 18-inches with a tractor mounted deep ripper or heavy-duty chisel plow. Following decompaction, remove all rocks unearthed from decompaction activities 4 inches and larger in size from the surface. Revegetation shall be performed in accordance with the instructions below.

- Seed all agricultural areas from which the vegetation was removed or destroyed with the seed mix specified by the landowner/agriculture producer or as otherwise recommended in the Department's fertilizer, lime and seeding guideline: [\[https://www.agriculture.ny.gov/ap/agservices/Fertilizer_Lime_and_Seeding_Recommendations.pdf\]](https://www.agriculture.ny.gov/ap/agservices/Fertilizer_Lime_and_Seeding_Recommendations.pdf). Soil amendments should be applied as necessary so that restored agricultural areas' soil properties, at minimum, reasonably reflect the pre-construction soil test results or as otherwise agreed to by the involved parties to ensure continued agricultural use. All parties must be cognizant that areas restored after October 1st may not obtain sufficient growth to prevent erosion over the winter months. If areas are to be restored after October 1st, necessary provisions must be made to restore and/or re-seed any eroded or poorly germinated areas in the springtime, to establish proper growth.

Monitoring and Remediation

Project Companies shall provide a monitoring and remediation period of one complete growing season following the date upon which the desired crop is planted. All projects subject to NYS Public Service Law Article 10 will provide a monitoring period of two complete growing seasons following the date upon which the project achieves the establishment of the desired crop.

On site monitoring shall be conducted seasonally at least three times during the growing season (Spring, Summer, Fall). Monitoring is required to identify any remaining impacts directly associated with the construction of the project on agricultural lands proposed to remain or resume agriculture production, including the effects of climatic cycles such as frost action, precipitation and growing seasons to occur, from which various monitoring observations can be made. NYSDAM expects the Project Company (or its contractor) to retain the EM for follow-up monitoring and remediation (as needed) in agricultural areas. Monitoring is limited to the restored agricultural area. Non-project related impacts affecting the restored project area will be discussed with NYSDAM staff and considered for omission from future monitoring and remediation. The EM is expected to record the following observations from onsite inspections:⁸

- **Topsoil Thickness and Trench Settling** – The EM observations may require small hand dug holes to observe the percentage of settled topsoil in areas where the topsoil was stripped, or trenching was performed without stripping topsoil. Observations concerning depth of topsoil deficiencies shall require further remediation by re-appropriating additional topsoil. Acceptable materials for remediation are: known areas of native excess topsoil (according to records of project specific excess topsoil disposal spread within the original LOD) or imported topsoil free of invasive species that is consistent with the quality of topsoil on the affected site.

⁸ The activities that follow are not necessary for restored agricultural lands on which the farmer or landowner has commenced activities, including agricultural activities or other use that tend to reverse restoration or create conditions that would otherwise trigger restoration. Should NYSDAM contend upon inspection that conditions indicate that post-construction restoration activities were improperly performed or insufficient, NYSDAM may inform the project company and NYSERDA for further investigation and remediation.

- **Excessive Rock (>4-inches)** - Determined by a visual inspection of disturbed areas as compared to unaffected portions of the same field located outside the construction area. Observations concerning excess stone material in comparison to off-site conditions shall require further remediation including removal and disposal of all excess rocks and large stones.
- **Soil Compaction** - Project affected agricultural soils should be tested using an appropriate soil penetrometer or other soil compaction measuring device. Compaction tests will be made at regular intervals of distance throughout the access or work areas, including each soil type identified on the affected agricultural areas. Where representative soil density of the affected area exceeds the representative soil density of the unaffected areas, additional decompaction may be required. Consultation with NYSDAM staff and the agricultural producer(s) should be conducted prior to scheduling additional decompaction. If warranted, decompaction to a depth of 18-inches with a tractor mounted deep ripper or heavy-duty chisel plow. Restoration of displaced topsoil to original depth and re-establish original contours where possible. Decompaction deep shattering will be applied during periods of relatively low soil moisture to ensure the desired mitigation and to prevent additional soil compaction. Oversized stone/rock (Four-inches) material that is uplifted/unearthed to the surface as a result of the deep shattering will be removed.
- **Drainage** – The EM shall visually inspect the restored agricultural areas in search of pervasive stunted crop growth due to seasonal saturation, not previously experienced at the site and not resulting from the agricultural producer’s irrigation management or due to excessive rainfall. Identified areas of stunted crop growth shall be compared to the nearest undisturbed adjacent areas under a substantially equivalent terrain and crop management plan. Drainage observations should be evaluated to determine if the project affected surface or sub-surface drainage during construction or restoration. Project caused drainage issues affecting or likely to reduce crop productivity of the adjacent areas will have to be remediated via a positive surface drainage, sub-surface drainage repair or an equivalent.
- **Agriculture Fencing and Gates** – The EM shall inspect Project associated fencing and gates (installed, altered or repaired) within the Project’s LOD associated with agricultural activities for function and longevity. The Project Company is responsible during the Monitoring and Remediation Phase for maintaining the integrity of Project associated fencing and gates.

The Project Company (or its contractor) shall consolidate each applicable growing season’s observations into an annual report during the monitoring period and shall be provided upon request to NYSDAM. Annual reports should include date stamped photographs illustrating crop growth in comparison with unaffected portions the agricultural areas.

The EM shall record observations of the establishment of the desired crop and subsequent crop productivity within restored agricultural areas and shall be evaluated by comparing its productivity to that of the nearest adjacent undisturbed agricultural land of similar crop type within the same field. If a decline in crop productivity is apparent the Project Company as well as other appropriate parties must determine whether the decline is due to project activities. If project activities are determined to be the primary detrimental factor, the project EM will notify NYSDAM concerning unsuccessful restoration and to potentially schedule a NYSDAM staff field visit. If project restoration is determined to be insufficient, the Project Company will develop a plan for appropriate rehabilitation measures to be implemented. NYSDAM staff will review and approve said plan prior to implementation. Additional monitoring may be required depending on additional restoration activities needed.

The Project Company is not responsible for site conditions and/or potential damages attributable to the agricultural producer's land use management or others' land use management.

Decommissioning

If the operation of the generation facility is permanently discontinued, remove all above ground structures (including panels, racking, signage, equipment pad, security fencing) and underground utilities if less than 48-inches deep. All concrete piers, footers, or other supports must be removed to a minimum depth of 48-inches below the soil surface. The following requirements apply to electric conductors located at the respective range of depth below the surface:

- 48-inches plus: All underground electric conduits and direct buried conductors may be abandoned in place. Applicable conduit risers must be removed, and abandoned conduit must be sealed or capped to avoid a potential to direct subsurface drainage onto neighboring land uses.
- Less than 48-inches: All underground direct buried electric conductors and conductors in conduit and associated conduit with less than 48-inches of cover must be removed, by means of causing the least amount of disturbance as possible.

Access roads in agricultural areas must be removed, unless otherwise specified by the landowner. If access is to be removed, topsoil will have to be returned from recorded project excess native topsoil disposal areas, if present, or imported topsoil free of invasive species that is consistent with the quality of topsoil on the affected site. Restore all areas intended for agricultural production, according to recommendations by the current landowner or leasing agricultural producer, and as required by any applicable permit, the Soil and Water Conservation District, and NYSDAM.

Monitoring and restoration requirements in accordance to the prior sections of these guidelines, will be required for the decommissioning restoration. NYSDAM requires notice before the Project Company undertakes decommissioning.

Appendix 3: RAP Workgroup Proposals

Resources in this appendix include:

- I. Proposals Summary Table
- II. Qualtrics Survey format
 - a. RAP Members Survey
 - b. SMEs Survey Excerpt
- III. RAP member response from Qualtrics survey compilation

HB206 RAP: Proposals with Full Consensus/Close to Consensus

WG #	Proposal #	Proposal Topic	LEVEL OF CONSENSUS			Proposal Category
			GREEN fully support	YELLOW support with reservations: some concerns/ questions	RED cannot support	

Proposals with Consensus

1	WG-1	2	Expanding definition of "avoid"	21	11	0	Definitions
2	WG-4	1	Method for field verification	25	5	0	Verification/Analysis
3	WG-5	1	PBR and NOI timeline/steps	27	3	0	PBR Process/Notice
4	WG-5	5	Virginia Energy guidebook development	25	5	0	Education/Best Practices

Proposals Close to Consensus: Covered in Mtg #5, need more discussion to build agreement

1	WG-1	1.1	Expanding definition of "disturb"	18	10	4	Definitions
2	WG-1	1.2	Excluding from definition of "disturb"	19	7	6	Definitions
3	WG-1	6	Addressing determination of significant adverse impacts to prime agricultural soils and forest lands	22	9	1	Verification/Analysis
4	WG-2+3	1	Create a standardized checklist of functions and values	19	12	1	Functions & Values
5	WG-2+3	2	Scoring criteria should be included to easily value prime ag/forest soil	7	23	2	Functions & Values
6	WG-5	2	Encouraging earlier NOI submission	16	14	2	PBR Process/Notice
7	WG-5	3	Review results to localities	18	9	5	PBR Process/Notice
8	WG-5	4	PBR template requirements	23	7	2	PBR Process/Notice

10/14/22

HB206 RAP: Proposals without Consensus: Have wide differences & need significant discussion to build understanding

WG #	Proposal #	Proposal Topic	LEVEL OF CONSENSUS			Proposal Category
			GREEN fully support	YELLOW support with reservations: some concerns/ questions	RED cannot support	

Workgroup 1: Avoidance and Minimization

WG-1	3	Expanding definition of "minimize"	19	12	1	Definitions
WG-1	4	New criteria in mitigation plans	22	8	2	Mitigation Issues
WG-1	5	Adding impact analysis (beneficial & adverse) of prime agricultural soils and forest lands on natural resources	20	4	8	Verification/Analysis
WG-1	7	Adding to mitigation plan requirements	10	17	5	Definitions
WG-1	8	Exception to definition of "disturb"	6	16	10	Definitions
WG-1	9	Adding continuous purchasing to "minimize"	6	13	13	Definitions
WG-1	10	Analysis of impacts - prime ag soils and forestland	4	19	9	Verification/Analysis

Workgroup 2+3: Mitigation + In Lieu Mitigation

WG-2+3	3	Mitigation value calculated on net difference between current and post construction value	7	16	9	Mitigation Issues
WG-2+3	4	Criteria should be objective, simple, and fair	10	15	7	Mitigation Issues
WG-2+3	5	Mitigation required locally should be counted in state process	15	11	6	Mitigation Issues
WG-2+3	6	Credit should be given if activities will improve F+V	9	16	7	Mitigation Issues
WG-2+3	7	Mitigation should be allowed on and off site	20	3	9	Mitigation Issues
WG-2+3	8	Mitigation as similar duration to the duration of the impact	3	17	12	Mitigation Issues
WG-2+3	9	State mandated mitigation determined case-by-case	7	13	12	Mitigation Issues
WG-2+3	10	Payment in lieu	8	20	4	Mitigation Issues
WG-2+3	11	State should evaluate program effectiveness	17	14	1	Mitigation Issues
WG-2+3	12	Does not cover existing E&S and stormwater	21	6	5	Mitigation Issues
WG-2+3	13	Decommissioning as part of mitigation plan	6	14	12	Mitigation Issues
WG-2+3	14A	Water	6	10	16	Functions & Values
WG-2+3	14B	Nutrients	4	7	21	Functions & Values
WG-2+3	14C	Productivity	7	6	19	Functions & Values
WG-2+3	14D	Wildlife	7	8	17	Functions & Values
WG-2+3	14E	Riparian buffer	9	8	15	Functions & Values
WG-2+3	14F	Carbon	7	10	15	Functions & Values
WG-2+3	14G	Recreation	4	10	18	Functions & Values
WG-2+3	14H	Designated state of federal scenic value	5	9	18	Functions & Values
WG-2+3	14I	Rural economy	8	7	17	Functions & Values

Workgroup 4: Significant Impacts Less than 50, Less than 10

WG-4	2.1	Significant adverse impact definition: C1 cores	6	5	21	Definitions
WG-4	2.2	Significant adverse impact definition: C2 cores	6	4	22	Definitions

Workgroup 5: Local Control
none in this group

HB206 RAP: Types of Proposals: BY HIGH-LEVEL ISSUE AREA CATEGORIES

WG #	Proposal #	Proposal Topic	LEVEL OF CONSENSUS		
			GREEN fully support	YELLOW support with reservations: some concerns/ questions	RED cannot support
Definitions					
WG-1	1.1	Expanding definition of "disturb"	18	10	4
WG-1	1.2	Excluding from definition of "disturb"	19	7	6
WG-1	2	Expanding definition of "avoid"	21	11	0
WG-1	3	Expanding definition of "minimize"	19	12	1
WG-1	7	Adding to mitigation plan requirements	10	17	5
WG-1	8	Exception to definition of "disturb"	6	16	10
WG-1	9	Adding continuous purchasing to "minimize"	6	13	13
WG-4	2.1	Significant adverse impact definition: C1 cores	6	5	21
WG-4	2.2	Significant adverse impact definition: C2 cores	6	4	22
Education/Best Practices					
WG-5	5	Virginia Energy guidebook development	25	5	0
Functions & Values					
WG-2+3	1	Create a standardized checklist of functions and values	19	12	1
WG-2+3	2	Scoring criteria should be included to easily value prime ag/forest soil	7	23	2
WG-2+3	14A	Water	6	10	16
WG-2+3	14B	Nutrients	4	7	21
WG-2+3	14C	Productivity	7	6	19
WG-2+3	14D	Wildfire	7	8	17
WG-2+3	14E	Riparian buffer	9	8	15
WG-2+3	14F	Carbon	7	10	15
WG-2+3	14G	Recreation	4	10	18
WG-2+3	14H	Designated state of federal scenic value	5	9	18
WG-2+3	14I	Rural economy	8	7	17
Mitigation Issues					
WG-1	4	New criteria in mitigation plans	22	8	2
WG-2+3	3	Mitigation value calculated on net difference between current and post construction value	7	16	9
WG-2+3	4	Criteria should be objective, simple, and fair	10	15	7
WG-2+3	5	Mitigation required locally should be counted in state process	15	11	6
WG-2+3	6	Credit should be given if activities will improve F+V	9	16	7
WG-2+3	7	Mitigation should be allowed on and off site	20	3	9
WG-2+3	8	Mitigation as similar duration to the duration of the impact	3	17	12
WG-2+3	9	State mandated mitigation determined case-by-case	7	13	12
WG-2+3	10	Payment in lieu	8	20	4
WG-2+3	12	Does not cover existing E&S and stormwater	21	6	5
WG-2+3	13	Decommissioning as part of mitigation plan	6	14	12
PBR Process/Notice					
WG-5	1	PBR and NOI timeline/steps	27	3	0
WG-5	2	Encouraging earlier NOI submission	16	14	2
WG-5	3	Review results to localities	18	9	5
WG-5	4	PBR template requirements	23	7	2
Verification/Analysis					
WG-1	5	Adding impact analysis (beneficial & adverse) of prime agricultural soils and forest lands on natural resources	20	4	8
WG-1	6	Addressing determination of significant adverse impacts to prime agricultural soils and forest lands	22	9	1
WG-1	10	Analysis of impacts - prime ag soils and forestland	4	19	9
WG-2+3	11	State should evaluate program effectiveness	17	14	1
WG-4	1	Method for field verification	25	5	0

10/14/22

HB206 RAP: All Workgroup Proposals (in order by WG)

#	WG #	Proposal #	Proposal Topic	LEVEL OF CONSENSUS			Proposal Category
				GREEN fully support	YELLOW support with reservations: some concerns/ questions	RED cannot support	
Workgroup 1: Avoidance and Minimization							
1	WG-1	1.1	Expanding definition of "disturb"	18	10	4	Definitions
2	WG-1	1.2	Excluding from definition of "disturb"	19	7	6	Definitions
3	WG-1	2	Expanding definition of "avoid"	21	11	0	Definitions
4	WG-1	3	Expanding definition of "minimize"	19	12	1	Definitions
5	WG-1	4	New criteria in mitigation plans	22	8	2	Mitigation Issues
6	WG-1	5	Adding impact analysis (beneficial & adverse) of prime agricultural soils and forest lands on natural resources	20	4	8	Verification/Analysis
7	WG-1	6	Addressing determination of significant adverse impacts to prime agricultural soils and forest lands	22	9	1	Verification/Analysis
8	WG-1	7	Adding to mitigation plan requirements	10	17	5	Definitions
9	WG-1	8	Exception to definition of "disturb"	6	16	10	Definitions
10	WG-1	9	Adding continuous purchasing to "minimize"	6	13	13	Definitions
11	WG-1	10	Analysis of impacts - prime ag soils and forestland	4	19	9	Verification/Analysis
Workgroup 2+3: Mitigation + In Lieu Mitigation							
12	WG-2+3	1	Create a standardized checklist of functions and values	19	12	1	Functions & Values
13	WG-2+3	2	Scoring criteria should be included to easily value prime ag/forest soil	7	23	2	Functions & Values
14	WG-2+3	3	Mitigation value calculated on net difference between current and post construction value	7	16	9	Mitigation Issues
15	WG-2+3	4	Criteria should be objective, simple, and fair	10	15	7	Mitigation Issues
16	WG-2+3	5	Mitigation required locally should be counted in state process	15	11	6	Mitigation Issues
17	WG-2+3	6	Credit should be given if activities will improve F+V	9	16	7	Mitigation Issues
18	WG-2+3	7	Mitigation should be allowed on and off site	20	3	9	Mitigation Issues
19	WG-2+3	8	Mitigation as similar duration to the duration of the impact	3	17	12	Mitigation Issues
20	WG-2+3	9	State mandated mitigation determined case-by-case	7	13	12	Mitigation Issues
21	WG-2+3	10	Payment in lieu	8	20	4	Mitigation Issues
22	WG-2+3	11	State should evaluate program effectiveness	17	14	1	Verification/Analysis
23	WG-2+3	12	Does not cover existing E&S and stormwater	21	6	5	Mitigation Issues
24	WG-2+3	13	Decommissioning as part of mitigation plan	6	14	12	Mitigation Issues
25	WG-2+3	14A	Water	6	10	16	Functions & Values
26	WG-2+3	14B	Nutrients	4	7	21	Functions & Values
27	WG-2+3	14C	Productivity	7	6	19	Functions & Values
28	WG-2+3	14D	Wildlife	7	8	17	Functions & Values
29	WG-2+3	14E	Riparian buffer	9	8	15	Functions & Values
30	WG-2+3	14F	Carbon	7	10	15	Functions & Values
31	WG-2+3	14G	Recreation	4	10	18	Functions & Values
32	WG-2+3	14H	Designated state of federal scenic value	5	9	18	Functions & Values
33	WG-2+3	14I	Rural economy	8	7	17	Functions & Values
Workgroup 4: Significant Impacts Less than 50, Less than 10							
34	WG-4	1	Method for field verification	25	5	0	Verification/Analysis
35	WG-4	2.1	Significant adverse impact definition: C1 cores	6	5	21	Definitions
36	WG-4	2.2	Significant adverse impact definition: C2 cores	6	4	22	Definitions
Workgroup 5: Local Control							
37	WG-5	1	PBR and NOI timeline/steps	27	3	0	PBR Process/Notice
38	WG-5	2	Encouraging earlier NOI submission	16	14	2	PBR Process/Notice
39	WG-5	3	Review results to localities	18	9	5	PBR Process/Notice
40	WG-5	4	PBR template requirements	23	7	2	PBR Process/Notice
41	WG-5	5	Virginia Energy guidebook development	25	5	0	Education/Best Practices

HB206 Small Energy Project Proposals

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
HB 206 Small Renewable Energy Projects Regulatory Advisory Panel (RAP)
Facilitated by UVA Institute for Engagement & Negotiation (IEN)

Primary RAP Members Survey, August 2022

The Department of Environmental Quality, in consultation with the Department of Forestry, the State Corporation Commission, the Department of Energy, the Virginia Economic Development Partnership Authority, and other relevant stakeholders, have convened a RAP group to work towards the following shared goal:

Complete the work that the advisory group is directed to do under HB206.

For the full charge, please click [here](#).

This survey should be completed by primary RAP members only (i.e., one survey per organization should be completed. Alternates should not complete the survey unless it is on behalf of the primary member.) Before completing the survey, you should be consulting internally within your respective organizations for input to ensure that your responses reflect your organization's perspective.

Please submit the survey no later than **5:00 p.m. on Monday, September 12th**.

Proposals as drafted by each workgroup (by the end of the RAP meeting on August 23rd) are presented in this survey, along with relevant context and rationale/justification.

SURVEY INSTRUCTIONS:

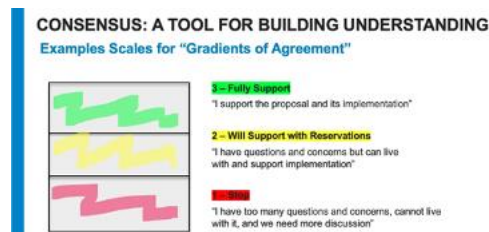
FOR THOSE PREPARING TO RESPOND TO THE SURVEY, this is how you will be expected to respond:

For each proposal, each primary RAP member will respond by indicating their level of support for the proposal:

3 = full support for the proposal (green),

2 = questions or concerns, but still able to support the proposal (yellow)

1 = too many questions or concerns, and unable to support the proposal (red)



If your response is a "2 = yellow" or "1 = red", you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization's support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a "3 = green," you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer "no".)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer "no".)

When providing this information, please reference numerals or other indicators in the proposal to clarify which part of the proposal you are referring to.

Following completion of the survey, responses will be synthesized by the UVA IEN facilitation team and shaped into a draft report that will be provided to the RAP for review prior to its final meeting on September 28. This report will then be revised to reflect the comments and discussion on September 28 and will be circulated for final comment to RAP members. After incorporating the RAP's final comments, the report will be submitted on behalf of the RAP to the DEQ. Following standard protocol, the DEQ will review and submit the report to the Governor's

Office in advance of the General Assembly.

IMPORTANT: Your response will **NOT BE RECORDED** unless it is submitted through the Qualtrics survey. This WORD version is provided to you to facilitate your consultation and collaboration with your organization in the preparation of your response, but then you must input your final answers into the Qualtrics survey.

For any questions about this survey, please contact the UVA IEN facilitation team at: hb206rap-support@virginia.edu.

Survey Begins

What is your name, email address, and organization?

Name: _____

Email Address: _____

Organization: _____

WORKGROUP 1: Avoidance + Minimization Proposals

Context/Rationale

WG-1 has reached consensus around Proposals 1-3 and most aspects of a proposed regulatory framework set forth in Proposals 4-7.

HB206 deems a small solar project seeking a permit by rule to have significant adverse impact if it would disturb more than 10 acres of prime agricultural soils or 50 acres of contiguous forest lands, or if it would disturb forest lands enrolled in a program for forestry preservation pursuant to subdivision 2 of § 58.1-3233.

However, “disturb” is not defined in HB206. Workgroup 1 determined that a definition of “disturb” is necessary to assess whether certain activities should or should not be counted in determining whether a “significant adverse impact” has occurred, as contemplated in HB206.

Workgroup 1 also determined that it was necessary to establish a scope of the meaning of “avoid” and “minimize” to assess avoidance and minimization practices and measures related to “prime agricultural soils” and “forest land” as those terms are defined by HB206. (Note: evaluation of compensation-based mitigation activities or measures, whether based on physical on-site or off-site activities or in-lieu fee/credit payments, are being addressed by a different work group.)

To these ends, Workgroup 1 has reached consensus around proposed definitions for “disturb,” “avoid,” and “minimize,” as set forth in Workgroup 1 Proposals #1, 2 and 3, respectively. To indicate how these definitions would integrate into key sections of the Small Renewable Energy Projects (Solar) Permit by Rule regulation (9VAC15-60), particularly into the processes for assessing significant adverse impacts and related mitigation plan elements, Workgroup 1 also reached consensus on most aspects of a proposed regulatory framework set forth in Workgroup 1 Proposals #4 through 7. Proposal #5 offers a suggested process for evaluating baseline conditions of prime agricultural soils and forest lands at project sites--similar to the approaches in the existing Permit by Rule regulation that are used for determining wildlife resources and cultural/historic resources at project sites.

These proposals are designed to reflect the mandated and goals of HB206 through balancing protection of prime agricultural soils and forest lands with the economic realities of solar project development. In addition, the proposed definitions are constructed to help incentivize developers to take steps that reduce overall impacts to “prime agricultural soils” and “forest lands” for a project, ultimately allowing these resources to be better preserved and while helping to lower mitigation compliance costs generally for a project.

Aspects of the definitions or their integration into the regulatory structure for which consensus

within Workgroup 1 could not be achieved (or for which additional analysis and research is needed to complete specific procedural recommendations) are noted.

Avoidance and Mitigation: Proposal 1, Part 1

Amend 9VAC15-60-[XX] to add the following definition of “disturb:”

1. “Disturb” means, for the purposes of determining “significant adverse impacts” to “prime agricultural soils” or “forest lands” any of the following: **

- a. to install new roads or widen existing roads;
- b. to install permanent parking lots;
- c. to create an open trench for installation of project internal cable distributions or for utility lines and connections;
- d. to place fill material, to excavate, or to move or relocate soils, so as to regrade the land contour over a portion or all of a Site, such as for installation of small solar project-related facilities;
- e. to excavate for or otherwise install a new stormwater detention or retention basin or to expand the existing surface area of such basin;
- f. to install permanent impervious surfaces associated with project facilities, such as concrete pads, substation pads, footings for buildings or structures, or gravel areas;
- g. to install pilings or structural posts for solar array panels;
- h. to grub stumps and other woody vegetation root mass;
- i. to compact the soil permanently due to heavy equipment operation or for structural operating plan pursuant to support purposes;
- j. and to convert forest lands to scrub-shrub, meadow, pasture use or impervious use.

[**Assumes the definitions of “prime agricultural soils” and “forest lands” are consistent with HB206 definitions of these terms.]

Please indicate your level of support on Proposal 1, Part 1

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

- 1. What concern(s) or question(s) do you have about this proposal?
- 2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?

3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
 2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)
-

Avoidance and Mitigation: Proposal 1, Part 2

2. Notwithstanding the foregoing, the following are excluded from the meaning of “disturb:”

- a. to continue the use of a portion of a Site for agricultural or forestry purposes;
- b. to reserve and plant a portion of the Site with meadow grasses or forest trees pursuant to a forestry management plan pursuant to a binding agreement, restrictive covenant, zoning or use permit condition, approved site plan, approved stormwater management plan, operating plan pursuant to 9VAC15-60-30.A.10, approved project decommissioning plan, or other instrument subject to enforcement by the applicable local government or the Department;
- c. to operate construction or facilities installation equipment and vehicles of a size and scale no greater than that of agronomic farming equipment or vehicles typically used in the soil and water conservation district [as established pursuant to Section 10.1-500 et seq. of the Code of Virginia] in which the project Site is located or an adjacent district, provided that such operation of equipment and vehicles is subject to conditions and practices set forth in the project operating plan prepared pursuant 9VAC15-60-30.A.10 that:
 - i. minimize the number of passes across the same soil during active construction or installation activities,
 - ii. would allow the existing soil profile to remain intact, and
 - iii. require temporary and permanent stabilization with vegetated cover consistent with applicable erosion and sediment control regulatory standards;
- d. to remove trees located on prime agricultural soils at the Site where (i) such removal occurs without grubbing the tree stumps and is incidental to construction of the project, and (ii) such trees are not otherwise considered part of forest lands;
- e. to conduct directional underground drilling;
- f. to install temporary silt fencing or other temporary erosion and sediment control measures provided the soil profile remains intact;
- g. Installation of fencing/fence posts;
- h. Maintenance of an existing utility pole or repair of existing utility poles or their replacement in the same hole; and
- i. selective harvesting of trees in forest lands subject to an approved forest management plan or the removal of dead, damaged, or diseased trees and other vegetation located in forest lands.

No part of the “disturbance zone” of a project shall be considered to be disturbed for purposes of determining significant adverse impacts of a project as defined to prime agricultural soils or forest lands unless one or more of the actions described above in Proposal 1, Part 1 will occur in connection with development of a project.

Note: “Disturbance zone” means the area within the site directly impacted by construction and operation of the solar energy project and within 100 feet of the boundary of the directly impacted area. 9VAC15-60-10.

Please indicate your level of support on Proposal 1, Part 2

- Fully support (green) (1)
 - Questions or concerns, but still able to support the proposal (yellow) (2)
 - Too many questions or concerns, and unable to support the proposal (red) (3)
-

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Avoidance and Mitigation: Proposal 2

Amend 9VAC15-60-[XX] to add the following definition of “avoid.”**

“Avoid” or “avoidance” means, for purposes of acceptable mitigation of “significant adverse impacts” to prime agricultural soils or forest lands, to design or plan for and to implement practices and measures as part of project development that would not cause significant adverse impacts to prime agricultural soils or forest lands, including either of the following practices or measures:

- i. Selecting parcels of land for a project that do not have prime agricultural soils or forest lands; or
- ii. Locating project facilities on parcels that do have prime agricultural soils and forest lands but in a way that does not disturb such prime agricultural soils or forest lands.

** NOTE: Assumes DEQ will define “prime agricultural soils” and “forest land” as they are defined in HB206.

Please indicate your level of support for this proposal

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Avoidance and Mitigation: Proposal 3

Amend 9VAC15-60-[XX] to add the following definition of “minimize:” **

“Minimize” or “minimization” means, for purposes of acceptable mitigation of “significant adverse impacts” to “prime agricultural soils” or “forest lands,” to design or plan for and to implement practices and measures as part of project development that would result in the reduction or lessening of the area or degree of potential significant impacts to prime agricultural soils or forest lands, including the following practices and measures:

Reducing or lessening the area of prime agricultural soils or forest lands disturbed at the Site; reducing or lessening the area or degree of permanent compaction of prime agricultural soils at the Site; reducing or lessening the volume or area of removal or movement of topsoil at the Site; reducing or lessening the placement of fill material or the excavation or regrading of prime agricultural soils at the Site; reduction of impervious surface area and erosion through election and use of ground cover vegetation at the Site, use of single-axis trackers and/or spacing of solar arrays pursuant to the operating plan; conserving areas of forest lands on the Site that are able to be put into productive use upon project decommissioning; replanting a portion of economically viable forest land in a manner that is also economically viable in the future; agrivoltaic practices, once deemed economically viable in Virginia; and reducing or lessening exposure of acid producing materials (APM).

** NOTE: Assumes DEQ will define “prime agricultural soils” and “forest land” as they are defined in HB206.

Please indicate your level of support for this proposal

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)

2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

Avoidance and Mitigation: Proposal 4

Amend 9VAC15-60-[XX] to reflect the criteria for assessing when a mitigation plan is required to reflect the new criteria related to assessing impacts to prime agricultural soils and forest lands. **Language from the existing regulation is reflected below, with the new proposed language in italics:**

8. In accordance with § 10.1-1197.6 B 8 of the Code of Virginia, furnishes to the department a mitigation plan pursuant to [9VAC15-60-60](#) that details reasonable actions to be taken by the owner or operator to avoid, minimize, or otherwise mitigate such impacts, and to measure the efficacy of those actions; provided, however, that the provisions of this subdivision shall only be required if the department determines, pursuant to [9VAC15-60-50](#), that the information collected pursuant to § 10.1-1197.6 B 7 of the Code of Virginia and [9VAC15-60-40](#) indicates that any of the following are likely:

(a) significant adverse impacts to wildlife or historic resources, or

(b) if a proposed project would disturb:

(i) more than 10 acres of prime agricultural soils,

(ii) more than 50 acres of contiguous forest lands, or

(iii) forest lands enrolled in a program for forestry preservation pursuant to subdivision 2 of § 58.1-3233 of the Code of Virginia.

A project will be deemed to have a significant adverse impact if it would disturb more than 10 acres of prime agricultural soils or more than 50 acres of contiguous forest lands, or if it would disturb forest lands enrolled in a program for forestry preservation pursuant to subdivision 2 of § 58.1-3233. The mitigation plan shall be an addendum to the operating plan of the solar energy project, and the owner or operator shall implement the mitigation plan as deemed complete and adequate by the department. The mitigation plan shall be an enforceable part of the permit by rule;

Please indicate your level of support for the italicized language above

- Fully support (green) (1)
 - Questions or concerns, but still able to support the proposal (yellow) (2)
 - Too many questions or concerns, and unable to support the proposal (red) (3)
-

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

Avoidance and Mitigation: Proposal 5

Amend 9VAC15-60-[XX] addressing analysis of the beneficial and adverse impacts on natural resources to reflect addition of new subsections C and D addressing evaluation of impacts to prime agricultural soils and forest lands. **Language from the existing regulation is reflected below, with the new proposed language in italics:**

A. Analyses of wildlife. To fulfill the requirements of § 10.1-1197.6 B 7 of the Code of Virginia, the applicant shall conduct preconstruction wildlife analyses. The analyses of wildlife shall include the following:

1. Desktop surveys and maps. The applicant shall obtain a wildlife report and map generated from DGIF's Virginia Fish and Wildlife Information Service web-based application (9VAC15-60-120 C 3) or from a data and mapping system including the most recent data available from DWR's subscriber-based Wildlife Environmental Review Map Service of the following: (i) known wildlife species and habitat features on the site or within two miles of the boundary of the site and (ii) known or potential sea turtle nesting beaches located within one-half mile of the disturbance zone.
2. Desktop map for avian resources in Coastal Avian Protection Zones (CAPZ). The applicant shall consult the "Coastal Avian Protection Zones" map generated on the department's Coastal GEMS geospatial data system (9VAC15-60-120 C 1) and determine whether the proposed solar energy project site will be located in part or in whole within one or more CAPZ.

B. Analyses of historic resources. To fulfill the requirements of § 10.1-1197.6 B 7 of the Code of Virginia, the applicant shall also conduct a pre-construction historic resources analysis. The analysis shall be conducted by a qualified professional meeting the professional qualification standards of the Secretary of the Interior's Standards for Archeology and Historic Preservation (9VAC15-60-120 B 2) in the appropriate discipline. The analysis shall include each of the following:

1. Compilation of known historic resources. The applicant shall gather information on known historic resources within the disturbance zone and within one-half mile of the disturbance zone boundary and present this information on the context map referenced in 9VAC15-60-70 B, or as an overlay to this context map, as well as in tabular format.
 2. Architectural survey. The applicant shall conduct a field survey of all architectural resources, including cultural landscapes, 50 years of age or older within the disturbance zone and within one-half mile of the disturbance zone boundary and evaluate the eligibility of any identified resource for listing in the VLR.
2. Archaeological survey. The applicant shall conduct an archaeological field survey of the disturbance zone and evaluate the eligibility of any identified archaeological site for

listing in the VLR. As an alternative to performing this archaeological survey, the applicant may make a demonstration to the department that the project will utilize non-penetrating footings technology and that any necessary grading of the site prior to construction does not have the potential to adversely impact any archaeological resource.

C. Analyses of prime agricultural soils. To fulfill the requirements of § 10.1-1197.6 B 7 of the Code of Virginia, the applicant shall conduct pre-construction analyses of the presence of prime agricultural soils at the proposed project Site. The analyses of prime agricultural soils shall include the following:

1. Desktop surveys and maps. The applicant shall (a) obtain a prime agricultural soils report and map for the project Site generated from either (a) the current map identifying prime agricultural soils as published by Virginia Cooperative Extension or (b) the current Web Soil Survey and associated NRCS Prime farmland soil state list for Virginia (which list is maintained by the NRCS State Soil Scientist); (b) determine based on such reports and maps any location(s) of prime agricultural soils on the project Site; and (c) overlay such locations on a project Site drawing showing the perimeters of the proposed disturbance zone for the project and the proposed directly impacted area within the proposed disturbance zone.

2. Field confirmation. The applicant may at its option also perform field verification of (a) the presence of prime agricultural soils within the proposed disturbance zone at the project Site, as indicated in the desktop surveys and maps, which field verification must be performed by a Virginia-licensed professional soil scientist; and (b) the degree of soil compaction within the proposed disturbance area of the project Site to determine the existing level of compaction and of root-limiting levels or conditions, which verification must be performed by a Virginia-licensed professional soil scientist or by a Virginia-licensed geologist or geo-technician.

[A new subsection D would be inserted here, but further information/research is needed for, and consensus has not been reached as to, the new subsection D language; see "WG1: Avoidance and Mitigation: Proposal 10" below for details.]

E. Analyses of other natural resources. To fulfill the requirements of § 10.1-1197.6 B 7 of the Code of Virginia, the applicant shall also conduct a pre-construction desktop survey of natural heritage resources within the disturbance zone.

F. Summary report. The applicant shall provide to the department a report presenting the findings of the studies and analyses conducted pursuant to subsections A, B, **C, D and E** of this section, along with all data and supporting documents. The applicant shall assess and describe the expected beneficial and adverse impacts, if any, of the proposed project on wildlife and historic resources identified by these studies and analyses

Please indicate your level of support for the addition of point C in the italicized language above

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

Avoidance and Mitigation: Proposal 6

Amend 9VAC15-60-[XX] addressing determination of likely significant adverse impacts to add a new subsections C and D for when the department shall find significant adverse impacts to prime agricultural soils and forest lands. **Language from the existing regulation is reflected below, with the new proposed language in italics:**

A. The department shall find that significant adverse impacts to wildlife are likely whenever the wildlife analyses prescribed in [9VAC15-60-40](#) A document that any of the following conditions exists:

1. State-listed T&E wildlife are found to occur within the disturbance zone or the disturbance zone is located on or within one-half mile of a known or potential sea turtle nesting beach.

2. The disturbance zone is located in part or in whole within zones 1, 2, 3, 4, 5, 10, 11, 12, or 14 on the Coastal Avian Protection Zones (CAPZ) map.

B. The department shall find that significant adverse impacts to historic resources are likely whenever the historic resources analyses prescribed by 9VAC15-60-40 B indicate that the proposed project is likely to diminish significantly any aspect of a historic resource's integrity.

C. The department shall find that significant adverse impacts to prime agricultural soils will occur whenever the prime agricultural soils analyses prescribed by [9VAC15-60-40](#) C indicate that the proposed project would disturb more than 10 acres of prime agricultural soils.

D. The department shall find that significant adverse impacts to forest lands will occur whenever the forest lands analyses prescribed by 9VAC15-60-40 D indicate that the proposed project would disturb either (1) more than 50 acres of contiguous forest lands, or (2) forest lands enrolled in a program for forestry preservation pursuant to subdivision 2 of § 58.1-3233.

Please indicate your level of support for the addition of points C + D above

- Fully support (green) (1)
 - Questions or concerns, but still able to support the proposal (yellow) (2)
 - Too many questions or concerns, and unable to support the proposal (red) (3)
-

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

Avoidance and Mitigation: Proposal 7

Amend 9VAC15-60-[XX] addressing mitigation plan requirements to add a new subsection D as follows to address demonstration of avoidance and minimization of significant adverse impacts to prime agricultural soils and forest lands that link back to definitions of “avoid” and “minimize.”

A. If the department determines that significant adverse impacts to wildlife or historic resources or both are likely, then the applicant shall prepare a mitigation plan.

B. Mitigation measures for significant adverse impacts to wildlife shall include:

1. For state-listed T&E wildlife, the applicant shall take all reasonable measures to avoid significant adverse impacts or shall demonstrate in the mitigation plan what significant adverse impacts cannot practicably be avoided and why additional proposed actions are reasonable. These additional proposed actions may include best practices to avoid, minimize, or offset adverse impacts to resources analyzed pursuant to 9VAC15-60-40 A or C.

2. For proposed projects where the disturbance zone is located on or within one-half mile of a known or potential sea turtle nesting beach, the applicant shall take all reasonable measures to avoid significant adverse impacts or shall demonstrate in the mitigation plan what significant adverse impacts cannot practicably be avoided, and why additional proposed mitigation actions are reasonable. Mitigation measures shall include the following:

a. Avoiding construction within likely sea turtle crawl or nesting habitats during the turtle nesting and hatching season (May 20 through October 31). If avoiding construction during this period is not possible, then conducting daily crawl surveys of the disturbance zone (May 20 through August 31) and one mile beyond the northern and southern reaches of the disturbance zone (hereinafter "sea turtle nest survey zone") between sunrise and 9 a.m. by qualified individuals who have the ability to distinguish accurately between nesting and nonnesting emergencies.

b. If construction is scheduled during the nesting season, then including measures to protect nests and hatchlings found within the sea turtle nest survey zone.

c. Minimizing nighttime construction during the nesting season and designing project lighting during the construction and operational phases to minimize impacts on nesting sea turtles and hatchlings.

3. For projects located in part or in whole within zones 1, 2, 3, 4, 5, 10, 11, 12, or 14 on the Coastal Avian Protection Zones (CAPZ) map, contribute \$1,000.00 per megawatt of rated

capacity, or partial megawatt thereof, to a fund designated by the department in support of scientific research investigating the impacts of projects in CAPZ on avian resources.

C. Mitigation measures for significant adverse impacts to historic resources shall include:

1. Significant adverse impacts to VLR-eligible or VLR-listed architectural resources shall be minimized, to the extent practicable, through design of the solar energy project or the installation of vegetative or other screening.

2. If significant adverse impacts to VLR-eligible or VLR-listed architectural resources cannot be avoided or minimized such that impacts are no longer significantly adverse, then the applicant shall develop a reasonable and proportionate mitigation plan that offsets the significantly adverse impacts and has a demonstrable public benefit and benefit for the affected or similar resource.

3. If any identified VLR-eligible or VLR-listed archaeological site cannot be avoided or minimized to such a degree as to avoid a significant adverse impact, significant adverse impacts of the project will be mitigated through archaeological data recovery.

D. Mitigation measures for significant adverse impacts to prime agricultural soils and forest lands shall include:

1. Practices and measures to avoid such significant adverse impacts, consistent with the definition of “avoid” set forth in [Insert relevant regulation citation].

2. Practices and measures to minimize significant adverse impacts, consistent with the definition of “minimize” set forth in [Insert relevant regulation citation].

3. Practices and measures to compensate for significant adverse impacts, consistent with _____.

Please indicate your level of support for the addition of point D in the italicized language above

Fully support (green) (1)

Questions or concerns, but still able to support the proposal (yellow) (2)

Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

The following proposal was considered by Workgroup 1 and did not achieve consensus. Your feedback will assist the group with further development of these ideas.

Avoidance and Mitigation: Proposal 8

Potential exception to definition of “disturb:” New utility poles with an aggregate area less than a certain surface area limit.

Please indicate your level of support for this proposal

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)

2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

The following proposal was considered by Group 1 and did not achieve consensus. Your feedback will assist the group with further development of these ideas.

Avoidance and Mitigation: Proposal 9

Addition of the following to the definition of “minimize:” Continuous purchasing from local agricultural or forest products industries for the operation and maintenance of the project and upkeep of the vegetation at the Site.

Please indicate your level of support for this proposal

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

The following proposal was considered by Group 1 and did not achieve consensus. Your feedback will assist the group with further development of these ideas.

Avoidance and Mitigation: Proposal 10

Amend 9VAC15-60-[XX] addressing analysis of the beneficial and adverse impacts on natural resources to reflect addition of new subsections C (see Avoidance and Mitigation: Proposal 5) and D (see below) addressing evaluation of impacts to prime agricultural soils and forest lands:

D. Analysis of forest lands.

1. Desktop surveys and maps. The applicant shall obtain a forest lands report and map for the project Site generated from [INSERT APPROPRIATE REFERENCE SOURCES], (ii) determine based on such reports and maps any location(s) of forest lands on the project Site, and (iii) overlay such locations on a project Site drawing showing the perimeters of the proposed disturbance zone for the project and the proposed directly impacted area within the proposed disturbance zone.

2. Field confirmation. The applicant may also perform field verification of the presence of forest lands within the proposed disturbance zone at the Site, as indicated in the desktop surveys and maps” which verification must be performed by [INSERT APPROPRIATE QUALIFIED PROFESSIONALS].

Please indicate your level of support for this proposal

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

WORKGROUP 2+3: Mitigation and In Lieu Mitigation Proposals

Proposal 1

a. The state shall make available a standardized checklist of functions and values, as determined by this RAP, and access to standardized data to allow developers to conduct an initial high-level desktop assessment to evaluate the potential of proposed the solar project.

The initial assessment would be as follows:

- (i) assessing the presence and current condition of prime agricultural soils and forest land;
- (ii) assessing the level of impacts of solar project on each;
- (iii) calculating the credits for avoidance and minimization efforts of solar developer; and
- (iv) establishing objective methods for determining a value proposition for mitigation with creditable, peer-reviewed methodologies.

Please indicate your level of support on this proposal

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Mitigation and In Lieu Mitigation: Proposal 2

In concept scoring criteria should be included in the short checklist so the various functions and values of prime agricultural and forest lands can be easily valued, upon objective data.

Please indicate your level of support for this proposal

- Fully support (green) (1)
 - Questions or concerns, but still able to support the proposal (yellow) (2)
 - Too many questions or concerns, and unable to support the proposal (red) (3)
-

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
 2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)
-

Page Break

Mitigation and In Lieu Mitigation: Proposal 3

Mitigation value should be calculated based on the net difference between current value and post construction value.

1. Current value
2. Post construction value
3. Note: the net difference could actually be positive or negative depending on circumstances

Please indicate your level of support for this proposal

- Fully support (green) (1)
 - Questions or concerns, but still able to support the proposal (yellow) (2)
 - Too many questions or concerns, and unable to support the proposal (red) (3)
-

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
 2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)
-

Page Break

Mitigation and In Lieu Mitigation: Proposal 4

The state-mandated mitigation criteria should be objective, simple, fair, and have a reasonably short checklist so a solar developer can quickly determine in preliminary due diligence upfront whether these state-mandated cost burdens will kill the solar project, or not.

Please indicate your level of support for this proposal

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

Mitigation and In Lieu Mitigation: Proposal 5

Mitigation required by the local zoning conditions and siting agreements that meets the state standards should be counted in the state-mandated mitigation process.

Please indicate your level of support for this proposal

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

Mitigation and In Lieu Mitigation: Proposal 6

Assuming that pre-development functions and values are fully assessed and valued, where post-construction activities will improve those functions and values, credit should be given. Similarly, where post-construction activities fail to fully mitigate, that should be reflected in the credit calculation.

Please indicate your level of consensus for this proposal

- Fully support (green) (1)
 - Questions or concerns, but still able to support the proposal (yellow) (2)
 - Too many questions or concerns, and unable to support the proposal (red) (3)
-

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
 2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)
-

Page Break

Mitigation and In Lieu Mitigation, Proposal 7

Mitigation by the solar developer shall be allowed on-site and/or off-site.

Please indicate your level of consensus for this proposal

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

Mitigation and In Lieu Mitigation: Proposal 8

Mitigation onsite and/or offsite should be of similar duration to the duration of the impact. (WG has no consensus on duration of the project or in perpetuity)

Please indicate your level of support for this proposal

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

Mitigation and In Lieu Mitigation, Proposal 9

State-mandated mitigation shall be determined on a case-by-case basis.

Please indicate your level of support for this proposal

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

Mitigation and In Lieu Mitigation, Proposal 10

In addition to mitigation practices, payment-in-lieu should be permitted.

Please indicate your level of support for this proposal

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

Mitigation and In Lieu Mitigation, Proposal 11

After a reasonable period of time, and no later than five years, the state should evaluate the program's effectiveness of mitigation practices and update the program to reflect lessons learned.

Please indicate your level of support for this proposal

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a "2 = yellow" or "1 = red", you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization's support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a "3 = green," you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer "no".)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer "no".)

Page Break

Mitigation and In Lieu Mitigation, Proposal 12

Through its existing E&S and stormwater programs DEQ regulates active and post-construction stormwater quality and quantity. Therefore, this RAP will focus only on issues that are not covered by these existing programs or regulations.

Please indicate your level of support for this proposal

- Fully support (green) (1)
 - Questions or concerns, but still able to support the proposal (yellow) (2)
 - Too many questions or concerns, and unable to support the proposal (red) (3)
-

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
 2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)
-

Page Break

Mitigation and In Lieu Mitigation, Proposal 13

Practices undertaken as part of decommissioning may be included and considered part of the “mitigation plan” and, if included, should be valued and added into the determination of credits

Please indicate your level of support for this proposal

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

Mitigation and In Lieu Mitigation, Proposal 14

Please respond to each of the following functions and values of forests and agricultural lands to indicate which you believe should be included and considered when calculating necessary mitigation for impacts from solar development.

Discussion comments and concerns raised during Workgroup 2-3's discussion are included below for the purpose of sharing what will be included in the report. If you have additional concerns or questions that need to be shared, please indicate in your responses below.

If your concerns are already covered by those noted below, then please indicate “no additional comments” in your response.

Mitigation and In Lieu Mitigation, Proposal 14 A - WATER

F&V include:

- Groundwater infiltration/ discharge
- Water Quality Protection

Concerns include:

- Functions and values of water are already fully addressed under multiple programs – probably the most so of all functions.
- Much of what folks are concerned about regarding water is covered elsewhere.
- Values that are already considered under other programs should be eliminated, but it would be okay to consider those that have not been addressed.

Please indicate your level of support for inclusion of WATER as a function of ag and forest lands that should be included in the assessment of impacts that need to be mitigated.

- Fully support (green) (1)
 - Questions or concerns, but still able to support the proposal (yellow) (2)
 - Too many questions or concerns, and unable to support the proposal (red) (3)
-

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization's support to increase to 2 = yellow or 3 = green?

3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Mitigation and In Lieu Mitigation, Proposal 14 B - NUTRIENTS

F&V include:

- Wet (and dry?), Nutrient Removal/ Transformation

Concerns include:

- Uncertain how a project would get a realistic profile of what the nutrient impacts would be

Please indicate your level of support for inclusion of NUTRIENTS as a function of ag and forest lands that should be included in the assessment of impacts that need to be mitigated.

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
 2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)
-

Mitigation and In Lieu Mitigation, Proposal 14 C - PRODUCTIVITY (Production export)

F&V include:

- Ability to produce food, fiber, etc. for humans or other living organisms.

Concerns include:

- Solar should not be responsible for food production.
- Who knows what products would be desired at end of project life

Please indicate your level of support for inclusion of PRODUCTIVITY as a function of ag and forest lands that should be included in the assessment of impacts that need to be mitigated.

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
 2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)
-

Mitigation and In Lieu Mitigation, Proposal 14 D - WILDLIFE

F&V include:

- Habitat
- Connectivity

Concerns include:

- HB 206 did not change anything on the wildlife provision.

Please indicate your level of support for inclusion of WILDLIFE as a function of ag and forest lands that should be included in the assessment of impacts that need to be mitigated.

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

Display This Question:

If Mitigation and In Lieu Mitigation, Proposal 14 D - WILDLIFE F&V include:Habitat Connectivity ... = Questions or concerns, but still able to support the proposal (yellow)

Or Mitigation and In Lieu Mitigation, Proposal 14 D - WILDLIFE F&V include:Habitat Connectivity ... = Too many questions or concerns, and unable to support the proposal (red)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

Mitigation and In Lieu Mitigation, Proposal 14 E - RIPARIAN BUFFER

F&V include:

- Habitat
- Water Quality Protection – although retention and establishment of buffers is also a practice the group considered this important.

Concerns include:

- Should not be in addition to mitigation for water quality.
- No agreement on specs of what constitutes a riparian buffer.

Please indicate your level of support for inclusion of RIPARIAN BUFFER as a function of *ag and forest lands that should be included in the assessment of impacts that need to be mitigated.*

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Mitigation and In Lieu Mitigation, Proposal 14 F- CARBON

F&V include:

- Carbon already stored in soils and vegetation.
- Annual increment of new sequestration.

Concerns include:

- Questions about accounting for avoided emissions resulting from solar development.

Please indicate your level of support for inclusion of CARBON as a function of ag and forest lands that should be included in the assessment of impacts that need to be mitigated.

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
 2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)
-

Mitigation and In Lieu Mitigation, Proposal 14 G- RECREATION

F&V include:

- Hunting
- Hiking / Wildlife Viewing, (likely a very small amount of this on private land)

Concerns include:

- Questions about importance of hunting as a value to DWR.

Please indicate your level of support for inclusion of RECREATION as a function of agricultural and forest lands that should be included in the assessment of impacts that need to be mitigated.

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
 2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)
-

Mitigation and In Lieu Mitigation, Proposal 14 G- DESIGNATED STATE OR FEDERAL SCENIC VALUE

F&V include:

- This applies only to already designated (not eligible for designation) scenic resources (e.g. scenic rivers, byways, national recreation areas)

Concerns include:

- Local scenic values should be determined by local governments;
- State agency should review to determine if there is impact;
- State agency would take into account conditions that were part of a permit at local level to determine if further mitigation is needed;
- Ag and forestry are connected to scenic values via pastoral landscapes and rural economies Concern that this sounds unpredictable and subjective;
- Concern that the connection to ag and forestry is not clear

Please indicate your level of support for inclusion of DESIGNATED STATE OR FEDERAL SCENIC VALUE as a function of ag and forest lands that should be included in the assessment of impacts that need to be mitigated.

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Mitigation and In Lieu Mitigation, Proposal 14 I- RURAL ECONOMY

F&V include:

Value chain created by the production, sale, and processing of what the land generates and the quality of the soils, Inequities created by economic transition.

Concerns include:

- Development pressures (including solar) can put pressure on ag/forestry and can push them out of that county, so preserving rural economy with ag/forestral uses is important;
- Reliance on associated industries at local level are significant (jobs (loggers-sawmills-foresters-fencing-etc), taxes, income); between harvesting are other uses/impacts (agroforestry, agritourism, etc.);
- Concerned that conversion to solar is not reversible if soils are compacted and not possible to return to rural economy; would also impact ability to attract new forest and ag industry as lands are “parcelized”;
- Could be considered an “opportunity cost” of disproportionate impact on rural communities/ EJ/ adding to or correcting historical wrongs/ as well as attributes of adding to resilience;
- Possible that there is a net plus to the local economies
- VA is about to experience one of largest conversions of land ever experienced in areas not anticipated or planned for, and state needs to at least be aware of trade-offs in push for alt energy and highlight that this is an unknown, and should be highlighted for GA to consider about how state can address impacts
- Concern about how the state would value or assess impacts of solar facility on rural economy: would not want solar to be responsible/ assessed for impacts of development;
- Solar wants to work with landowners to respect long-term property rights, viewsheds;
- DEQ or DOE should not be charged with trying to come up with mitigation for this;
- The PBR process needs to have an objective, simple and clear checklist to enable solar developers to make decisions
- Are there studies of land conversions in other parts of nation that could be useful for determining impacts; but what is occurring here will be far more rapid than other conversions (in shorter timeframe);
- Net positives would need to be accounted for as well in this accounting;
- DOE could look at this and track this issue in its reports going forward;
- Important to include in RAP report that would be important to tap into economic expertise in state agencies to better understand this issue

Please indicate your level of support for inclusion of RURAL ECONOMY as a function of ag and forest lands that should be included in the assessment of impacts that need to be

mitigated.

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

Mitigation & In-Lieu Mitigation, Parking Lot Proposal

There were a number of questions and issues that were not able to be discussed in the time given. These are examples of questions that will need to be resolved in future discussions.

WG 2-3 requests that you please add additional any additional questions that you believe should be included for future discussion.

- What would be the proposed sources and uses of funds in any such mitigation fund;
- What other parties would be required to contribute to this mitigation fund;
- What is the desired amount of annual cash flow;
- What should be the credits for solar environmental benefits;
- What should be the credits for solar improving site conditions, wildlife protection, buffers, preservation of prime agricultural soils and forest lands; improvement of water quality;
- What is the governance for making decisions about the compensatory mitigation fund;
- What else? Please add below

Do you have any comments, concerns, or suggestions in response to Workgroup 2+3's parking lot space?

End of Block: WG2+3

Start of Block: WG 4

**WORKGROUP 4: Define significant adverse impact for projects disturbing less than 10 acres of prime agricultural soils or less than 50 acres of contiguous forest
Proposals**

Context/Rationale

Stakeholders expressed many questions about how prime farmland is delineated and mapped by the US Department of Agriculture. It was the general sense of Workgroup 4, given these concerns, that it was appropriate to include within the PBR process an option for field verification to confirm the presence of prime agricultural soils was appropriate. Separate legislation passed during the 2022 General Assembly session (HB894) has tasked the Virginia Cooperative Extension with developing a state map or repository of prime farmland, and a stakeholder group has been convened to advise on this task. Rather than duplicate the discussion of prime farmland mapping, the HB206 ad hoc workgroup would, under this proposal, request that the HB894 workgroup develop and consider a clearly defined method for optional field verification of the presence of prime agricultural soils.

HB894 / 2022 Acts of Assembly Ch 488): <https://lis.virginia.gov/cgi-bin/legp604.exe?221+ful+CHAP0488+pdf>

Significant adverse impact <10 acres ag soil/50 acres forest: Proposal 1

Request that the workgroup convened to support Virginia Cooperative Extension with developing a map or repository of prime farmland (HB894 § 3 / 2022 Acts of Assembly Ch 488) propose and consider a clearly defined method for an optional field verification of the presence of prime agricultural soils.

Please indicate your level of support for this proposal

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?

3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

Significant adverse impact < 10 acres ag/ 50 acres forest land: Proposal 2

Context/Rationale With respect to identifying significant adverse impacts from projects disturbing less than 10 acres of prime agricultural soils or 50 acres of contiguous forestland, Workgroup 4 identified a number of goals, including (i) a clear threshold that solar developers can consider during the planning process to incentivize limiting impacts to prime soils and forested land;

(ii) consideration of the current ecological value and ecosystem services of the land to be disturbed, particularly if that land has been identified as having high ecological value; (iii) use of existing tools and consultation opportunities within the PBR process; and (iv) the ability to field verify or ground truth any maps or tools used. Based on these goals, Workgroup 4 singled out two state models that identify priority lands for conservation: the Natural Landscape Assessment (VaNLA) conducted by the Virginia Natural Heritage Program (VNHP) and the Forest Conservation Value (FCV) model.

VaNLA “is a landscape-scale geospatial analysis for identifying, prioritizing, and linking natural lands in Virginia.” Patches of natural land, or ecological cores, are mapped and prioritized based on the core’s ecological integrity score. “In general, larger, more biologically diverse areas are given higher scores. Scores are enhanced if the core or habitat fragment is part of a larger complex of natural lands. Scores also are increased for those cores and habitat fragments that contribute to water quality enhancement.” Scores are further “classified into five categories of ecological integrity: C1 - Outstanding; C2 - Very High; C3 - High; C4 - Moderate; and C5 - General.”

FCV “is a tool designed by the Virginia Department of Forestry (VDOF) to strategically identify the highest priority forestland for conservation in Virginia. The intent is to maximize the efficiency of limited resources by focusing conservation efforts on the highest quality, most productive, and most vulnerable forestland statewide.” The model considers 6 components (forested blocks; forest management potential; connectivity; watershed integrity; threat of conversion; and significant forest communities and diminished tree species) to rank forestland from 1 (lowest) to 5 (highest) in forest conservation value.

Workgroup 4 proposes to further define “significant adverse impacts” by presuming that projects disturbing less than 10 acres of prime agricultural soils and less than 50 acres of contiguous forest lands will, nevertheless, have a significant adverse impact if the project disturbs land identified as high value by the VaNLA or FCV models. The proposal allows for this presumption to be overcome if further analysis by VNHP or VDOF verifies that the land has since undergone permanent land conversion. Existing VNHP and VDOF analyses can be used for this verification: core impact analysis for ecological cores and environmental impact review for forest conservation values.

Both the VaNLA and FCV models can be viewed within the Natural Heritage Data Explorer.

Current maps of C-1 and C-2 cores have also been provided to the workgroup by VNHP. Based on comments received from the full ad hoc workgroup, Workgroup 4 proposes that the latest-in-time version of both models be used to ensure that the most up-to-date information regarding the ecological value of the land in question is employed, rather than referring to a specific, static iteration of either model.

Workgroup 4 offers two options for this proposal. **Option 1 limits the “significant adverse impact” definition to disturbance of land in level 5 “outstanding” forest lands or C-1 “outstanding” ecological cores. This option has consensus within Workgroup 4. Option 2 expands the definition to include disturbance of land in level 5 forests, C-1 “outstanding” cores or C-2 “very high” cores. While this option has not reached consensus at this time, Workgroup 4 was encouraged by our subject matter expert to consider the use of C-1 and C-2 cores for a number of reasons, including:**

- 1) the very high ecological value of C-2 cores which often contain habitats of rare species and are often associated with C-1 cores in complexes;
 - 2) almost 60% of C-1 cores are already conserved and cannot be developed, and there are very few C-1 cores east of the Blue Ridge Mountains;
 - 3) C-1 and C-2 cores, when added together, represent less than 3% of all ecological cores in Virginia; and
 - 4) the use of C-1 and C-2 cores together would be consistent with how the Department of Conservation and Recreation reviews development projects using an impact analysis with a standardized and documented methodology and an estimate of mitigation acres.
- Based on the recommendation received, Workgroup 4 chose to present both options for the full ad hoc workgroup’s consideration and reflection.

Resources:

Maps of C-1 and C-2 cores (see WKGP 4 folder)

Acreage numbers

Natural Heritage Data Explorer: <https://www.dcr.virginia.gov/natural-heritage/nhdeinfo>

Forest Conservation Value: <https://www.dcr.virginia.gov/natural-heritage/vaconvisforest>

Natural Landscape Assessment: <https://www.dcr.virginia.gov/natural-heritage/vaconvisvnl>

WG4: Significant adverse impact < 10 acres ag/ 50 acres forest land: Proposal 2, Option 1

If the proposed project disturbs less than 10 acres of prime agricultural soils and less than 50 acres of contiguous forest lands, the project will be presumed to have a significant adverse impact if the disturbance includes land identified by the Virginia Natural Heritage Program as within a C-1 “outstanding” ecological core or by the Virginia Department of Forestry as “outstanding” within the Forest Conservation Values model. This presumption can be overcome, for ecological cores, by a core impact analysis conducted by VNHP, OR, for forest conservation

values, by an environmental impact review conducted by the Department of Forestry, to verify permanent conversion of the land. Reference should be made to the most current Natural Landscape Assessment and Forest Conservation Value Model, not a specific iteration of the assessment or model. ***Please indicate your level of support for Proposal 2, Option 1***

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Significant adverse impact < 10 acres ag/ 50 acres forest land: Proposal 2, Option 2

If the proposed project disturbs less than 10 acres of prime agricultural soils and less than 50 acres of contiguous forest lands, the project will be presumed to have a significant adverse impact if the disturbance includes land identified by the Virginia Natural Heritage Program as within a C-1 “outstanding” or C-2 “very high” ecological core or by the Virginia Department of Forestry as “outstanding” within the Forest Conservation Values model. This presumption can be overcome, for ecological cores, by a core impact analysis conducted by VNHP, OR, for forest conservation values, by an environmental impact review conducted by the Department of Forestry, to verify permanent conversion of the land. Reference should be made to the most current Natural Landscape Assessment and Forest Conservation Value Model, not a specific iteration of the assessment or model.

Please indicate your level of support for Proposal 2, Option 2

- Fully support (green) (1)
 - Questions or concerns, but still able to support the proposal (yellow) (2)
 - Too many questions or concerns, and unable to support the proposal (red) (3)
-

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
 2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)
-

Page Break

Significant adverse impact < 10 acres ag/ 50 acres forest land:

Parking Lot Issue

The definition of disturbance should be clearly defined for the purposes of determining whether the 10 acre/50 acre thresholds have been reached OR if there is a disturbance that would otherwise be an adverse impact. - Workgroup 4 agreed that a clear definition of disturbance would be helpful but did not spend additional time preparing a proposal, recognizing Workgroup 1's intention of submitting one.

Do you have any comments, concerns, or suggestions in response to Workgroup 4's parking lot space?

End of Block: WG 4

Start of Block: WG 5

WORKGROUP 5: Local Control Proposals

Proposal 1

Context/Rationale for proposals

The subgroup determined to discuss the timing of engagement between solar developers and localities. Participants representing localities suggested that solar developers were notifying local officials too late, citing mainly two concerns:

- a) A landowner / developer may believe the site is appropriately zoned for solar development and begin the process of development, but planning department officials could have informed the parties the site could not be developed in accordance with the existing ordinance or comprehensive plan.
- b) Clearing vegetation in preparation for solar development may foreclose a desire from the county to have vegetative buffers or screening on the project site. The solar industry noted that many of these activities are not necessarily prompted by a particular developer; some landowners proactively reach out to solar developers to options for installing solar on their property. Furthermore, the solar industry articulated the importance of private property rights: a conversation between two parties should not have to be reported to a public entity.

Given that the workgroup was focused exclusively on the Permit by Rule process – and not on individual county permitting decisions – participants agreed to use the Notice of Intent (NOI) as a mechanism to encourage early communication between counties and the solar industry, and provide state resources to localities. Participants felt that providing the locality with the PJM Interconnection Queue number and memorandum of landowner agreements is sufficient information for staff to understand the nature of a potential solar site, yet does not contain

information that is not otherwise public. The proposal also satisfies a key concern from localities that state resources and expertise should help inform the local zoning process

Local Control: Proposal 1 No later than 90 days prior to filing a PBR application (which triggers the public comment period), applicant shall submit the Notice of Intent to DEQ, with a copy sent to the applicable locality's Chief Administrative Officer, which will include publicly available copies of 1) the memorandum(s) of land agreement and 2) associated interconnection queue number.

Please indicate your level of support for this proposal

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a "2 = yellow" or "1 = red", you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization's support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a "3 = green," you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer "no".)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer "no".)

Page Break

Local Control: Proposal 2

Context/Rationale

A mechanism to encourage submission of an NOI earlier in the process and to unlock resources from state agencies to assist localities and applicants.

Proposal 2 Upon receipt of the NOI and request by the locality, DEQ and its PBR sister agencies (DCR, DHR, DWG, VDOF, and VDACES) shall provide consultation of site characteristics relevant to an agencies purview to aid the locality in its review of solar projects. Such consultation may include a review of state resource databases, a site visit and a list of the applicable permits a solar project may be subject to prior to start of construction. *Please indicate your level of support for this proposal*

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

Local Control: Proposal 3

Context/Rationale

This proposal helps ensure that localities are equipped with information and analyses from state agencies that may inform local siting decisions. As these analyses are accessible by the Freedom of Information Act, the solar developer will not be disclosing proprietary information.

Proposal 3 NOI is required prior to request for analysis with any state agency. Any subsequent review results for a solar energy project completed by a state agency shall be provided to the Chief Administrative Officer of the locality(ies) in which the project is located.

Please indicate your level of support for this proposal

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

Local Control: Proposal 4

Context/Rationale

Siting agreements and CUP conditions may factor into any mitigation requirements under the PBR.

Proposal 4 The PBR template for the local governing body certification form shall require submission of the Siting Agreement or Conditional Use Permit (CUP) conditions, as applicable.

Please indicate your level of support for this proposal

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

Local Control: Proposal 5

Context/Rationale

Gives teeth to DOE to develop such a resource, agreement among members of WG that more information and clarity about solar development, from the scoping through permitting process, would be helpful, particularly for local governments.

Proposal 5 Virginia Department of Energy shall develop a guidebook to be distributed to localities relaying best practices related to solar development (from both the developers and localities side). This should include sample, existing siting agreements that have been signed between localities and developers, to shed light on why certain development standards were placed on the project based on its location, local impact and local input. This guidebook shall also provide a list of applicable permits that a given solar project may be required to obtain.

Please indicate your level of support on Proposal 5

- Fully support (green) (1)
- Questions or concerns, but still able to support the proposal (yellow) (2)
- Too many questions or concerns, and unable to support the proposal (red) (3)

If your response is a “2 = yellow” or “1 = red”, you will next be prompted to respond:

1. What concern(s) or question(s) do you have about this proposal?
2. Please provide the specific editorial strikeouts/ additions/ edits/ clarifications that would enable your/ your organization’s support to increase to 2 = yellow or 3 = green?
3. (Optional) Please provide a brief rationale/justification that would help the RAP understand how the change/s strengthen the proposal.

IF your response is a “3 = green,” you will be prompted to respond:

1. Do you have any additional points, data, resources to share, or suggestions to add that would further strengthen this proposal? (If not, answer “no”.)
2. Can you offer a specific rationale/justification that would help the legislature understand the importance of this proposal? (If not, answer “no”.)

Page Break

Local Control, Parking Lot Issue #1:

Ownership transfer of solar projects – how to track and enforce notification requirements.

Do you have any comments, concerns, or suggestions in response to Workgroup 5's parking lot space?

Local Control: Parking Lot Issue #2:

A recommended best practice for a locality would be to provide their solar overlay district/transmission “hot zone” map to their local DOF office. This would allow DOF to notify the locality each time a timber harvest notification is received by DOF for acreage in the overlay district/transmission hot zone - this would enable the locality to reach out to the landowner/developer very early in the clearing process to hopefully preserve buffers before entire parcels are completely cleared. This process is currently being employed in several Virginia localities to notify a locality when DOF observes practices that go beyond silviculture and convert the land to another use.

Do you have any comments, concerns, or suggestions in response to Workgroup 5's parking lot space?

End of Block: WG 5

Thank you for your time and effort! We very much appreciate the submittal of your response for the HB206 RAP survey!

For any questions about this survey, please contact the UVA IEN facilitation team at: hb206rap-support@virginia.edu.

SMEs - HB206 Small Energy Project Proposals

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
HB 206 Small Renewable Energy Projects Regulatory Advisory Panel (RAP)
Facilitated by UVA Institute for Engagement & Negotiation (IEN)

Primary RAP Members Survey, September 2022

The Department of Environmental Quality, in consultation with the Department of Forestry, the State Corporation Commission, the Department of Energy, the Virginia Economic Development Partnership Authority, and other relevant stakeholders, have convened a RAP group to work towards the following shared goal:

Complete the work that the advisory group is directed to do under HB206.

For the full charge, please click [here](#).

This survey should be completed by Subject Matter Experts only. SMEs are asked to weigh in on only those questions pertaining to your areas of expertise.

Please submit the survey no later than **COB on Monday, September 12th.**

Proposals as drafted by each workgroup (by the end of the RAP meeting on August 23rd) are presented in this survey, along with relevant context and rationale/justification.

SURVEY INSTRUCTIONS:

FOR THOSE PREPARING TO RESPOND TO THE SURVEY, this is how you will be expected to respond. For each proposal, SMEs will be asked to respond to two questions:

1. Without changing the substance or intent of the proposal, are there specific improvements in language that you would suggest to increase accuracy or clarity?
2. To ensure that the proposal is technically accurate and robust, is there anything that should be corrected?

When providing this information, please reference numerals or other indicators in the proposal to clarify which part of the proposal you are referring to.

Following completion of the survey, responses will be synthesized by the UVA IEN facilitation team and shaped into a draft report that will be provided to the RAP for review prior to its final

meeting on September 28. This report will then be revised to reflect the comments and discussion on September 28 and will be circulated for final comment to RAP members. After incorporating the RAP's final comments, the report will be submitted on behalf of the RAP to the DEQ. Following standard protocol, the DEQ will review and submit the report to the Governor's Office in advance of the General Assembly.

IMPORTANT: Your response will **NOT BE RECORDED** unless it is submitted through the Qualtrics survey. This WORD version is provided to you to facilitate your consultation and collaboration with your organization in the preparation of your response, but then you must input your final answers into the Qualtrics survey.

For any questions about this survey, please contact the UVA IEN facilitation team at: hb206rap-support@virginia.edu.

Survey Begins

What is your name, email address, and organization?

Name: _____

Email Address: _____

Organization: _____

WORKGROUP 1: Avoidance + Minimization Proposals

Context/Rationale

WG-1 has reached consensus around Proposals 1-3 and most aspects of a proposed regulatory framework set forth in Proposals 4-7.

HB206 deems a small solar project seeking a permit by rule to have significant adverse impact if it would disturb more than 10 acres of prime agricultural soils or 50 acres of contiguous forest lands, or if it would disturb forest lands enrolled in a program for forestry preservation pursuant to subdivision 2 of § 58.1-3233.

However, "disturb" is not defined in HB206. Workgroup 1 determined that a definition of "disturb" is necessary to assess whether certain activities should or should not be counted in determining whether a "significant adverse impact" has occurred, as contemplated in HB206.

Workgroup 1 also determined that it was necessary to establish a scope of the meaning of

“avoid” and “minimize” to assess avoidance and minimization practices and measures related to “prime agricultural soils” and “forest land” as those terms are defined by HB206. (Note: evaluation of compensation-based mitigation activities or measures, whether based on physical on-site or off-site activities or in-lieu fee/credit payments, are being addressed by a different work group.)

To these ends, Workgroup 1 has reached consensus around proposed definitions for “disturb,” “avoid,” and “minimize,” as set forth in Workgroup 1 Proposals #1, 2 and 3, respectively. To indicate how these definitions would integrate into key sections of the Small Renewable Energy Projects (Solar) Permit by Rule regulation (9VAC15-60), particularly into the processes for assessing significant adverse impacts and related mitigation plan elements, Workgroup 1 also reached consensus on most aspects of a proposed regulatory framework set forth in Workgroup 1 Proposals #4 through 7. Proposal #5 offers a suggested process for evaluating baseline conditions of prime agricultural soils and forest lands at project sites--similar to the approaches in the existing Permit by Rule regulation that are used for determining wildlife resources and cultural/historic resources at project sites.

These proposals are designed to reflect the mandated and goals of HB206 through balancing protection of prime agricultural soils and forest lands with the economic realities of solar project development. In addition, the proposed definitions are constructed to help incentivize developers to take steps that reduce overall impacts to “prime agricultural soils” and “forest lands” for a project, ultimately allowing these resources to be better preserved and while helping to lower mitigation compliance costs generally for a project.

Aspects of the definitions or their integration into the regulatory structure for which consensus within Workgroup 1 could not be achieved (or for which additional analysis and research is needed to complete specific procedural recommendations) are noted.

Avoidance and Mitigation: Proposal 1, Part 1

Amend 9VAC15-60-[XX] to add the following definition of “disturb:”

1. “Disturb” means, for the purposes of determining “significant adverse impacts” to “prime agricultural soils” or “forest lands” any of the following: **
 - a. to install new roads or widen existing roads;
 - b. to install permanent parking lots;
 - c. to create an open trench for installation of project internal cable distributions or for utility lines and connections;
 - d. to place fill material, to excavate, or to move or relocate soils, so as to regrade the land contour over a portion or all of a Site, such as for installation of small solar project-related facilities;
 - e. to excavate for or otherwise install a new stormwater detention or retention basin or to

- expand the existing surface area of such basin;
 - f. to install permanent impervious surfaces associated with project facilities, such as concrete pads, substation pads, footings for buildings or structures, or gravel areas;
 - g. to install pilings or structural posts for solar array panels;
 - h. to grub stumps and other woody vegetation root mass;
 - i. to compact the soil permanently due to heavy equipment operation or for structural operating plan pursuant to support purposes;
 - j. and to convert forest lands to scrub-shrub, meadow, pasture use or impervious use.
- [**Assumes the definitions of “prime agricultural soils” and “forest lands” are consistent with HB206 definitions of these terms.]

After reading **Proposal 1, Part 1** please consider the follow questions:

1. Without changing the substance or intent of the proposal, are there specific improvements in language that you would suggest to increase accuracy or clarity?

2. To ensure that the proposal is technically accurate and robust, is there anything that should be corrected?

HB206 Small Energy Project Proposals

COMMONWEALTH OF VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

HB 206 Small Renewable Energy Projects Regulatory Advisory Panel (RAP)

Facilitated by UVA Institute for Engagement & Negotiation (IEN)

The Department of Environmental Quality, in consultation with the Department of Forestry, the State Corporation Commission, the Department of Energy, the Virginia Economic Development Partnership Authority, and other relevant stakeholders, have convened a RAP group to work towards the following shared goal:

Complete the work that the advisory group is directed to do under HB206.

For the full charge, please click [here](#).

The following proposals were developed by the Workgroups, and the corresponding feedback was provided via survey by RAP primary members (or alternate members where applicable), as well as Subject Matter Experts (SMEs).

IEN has identified a **SHORTLIST of 8 proposals** which we believe might be close enough to consensus to benefit from discussion during the final RAP meeting on Sep 28. These are as follows (clicking on each proposal will move to that proposal in the PDF):

- WG1, Proposal 3 – Expanding definition of “minimize”
- WG1, Proposal 6 – Significant adverse impacts to prime agricultural soils and forest lands
- WG2+3, Proposal 1 – Create a standardized list of functions and values
- WG2+3, Proposal 2 – Scoring criteria to value prime ag/forests
- WG2+3, Proposal 11 – Program effectiveness
- WG4, Proposal 1 – VCE workgroup, map of prime ag land/method of field verification
- WG5, Proposal 1 – PBR and NOI timeline/steps
- WG5, Proposal 4 – PBR template requirements

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Workgroup 1: Avoidance and Minimization

Workgroup 2+3: Mitigation and In Lieu Mitigation Workgroup 4: Significant Impacts Less than 50, Less than 10

Workgroup 5: Local Control

Workgroup 1: Avoidance and Minimization

Proposal #	Proposal Topic	Consensus		
		GREEN	YELLOW	RED
1 pt 1	Expanding definition of "disturb"	18 (fully support)	10 (support with reservations)	4 (cannot support)
1 pt 2	Excluding from definition of "disturb"	19 (fully support)	7 (support with reservations)	6 (cannot support)
2	Expanding definition of "avoid"	21 (fully support)	11 (support with reservations)	0 (cannot support)
3	Expanding definition of "minimize"	19 (fully support)	12 (support with reservations)	1 (cannot support)
4	New criteria in mitigation plans	22 (fully support)	8 (support with reservations)	2 (cannot support)
5	Adding to analysis of benefits/adverse impacts	20 (fully support)	4 (support with reservations)	8 (cannot support)
6	Significant adverse impacts to prime agricultural soils and forest lands	22 (fully support)	9 (support with reservations)	1 (cannot support)
7	Adding to mitigation plan requirements	10 (fully support)	17 (support with reservations)	5 (cannot support)
8	Exception to definition of "disturb"	6 (fully support)	16 (support with reservations)	10 (cannot support)
9	Adding continuous purchasing to "minimize"	6 (fully support)	13 (support with reservations)	13 (cannot support)
10	Analysis of impacts - prime ag soils and forestland	4 (fully support)	19 (support with reservations)	9 (cannot support)

Workgroup 2+3: Mitigation + In Lieu Mitigation

Proposal #	Proposal Topic	Consensus		
		GREEN	YELLOW	RED
1	Create a standardized checklist of functions and values	19 (fully support)	12 (support with reservations)	1 (cannot support)
2	scoring criteria should be included to easily value prime ag/forest soil	7 (fully support)	23 (support with reservations)	2 (cannot support)
3	Mitigation value calculated on net difference between current and post construction value	7 (fully support)	16 (support with reservations)	9 (cannot support)
4	Criteria should be objective, simple, and fair	10 (fully support)	15 (support with reservations)	7 (cannot support)
5	Mitigation required locally should be counted in state process	15 (fully support)	11 (support with reservations)	6 (cannot support)
6	credit should be given if activities will improve F+V	9 (fully support)	16 (support with reservations)	7 (cannot support)
7	mitigation should be allowed on and off site	20 (fully support)	3 (support with reservations)	9 (cannot support)
8	mitigation as similar duration to the duration of the impact	3 (fully support)	17 (support with reservations)	12 (cannot support)
9	state mandated mitigation determined case-by-case	7 (fully support)	13 (support with reservations)	12 (cannot support)
10	payment in lieu	8 (fully support)	20 (support with reservations)	4 (cannot support)
11	state should evaluate program effectiveness	17 (fully support)	14 (support with reservations)	1 (cannot support)
12	does not cover existing E&S and stormwater	21 (fully support)	6 (support with reservations)	5 (cannot support)
13	decommissioning as part of mitigation plan	6 (fully support)	14 (support with reservations)	12 (cannot support)
14A	water	6 (fully support)	10 (support with reservations)	16 (cannot support)
14B	nutrients	4 (fully support)	7 (support with reservations)	21 (cannot support)
14C	productivity	7 (fully support)	6 (support with reservations)	19 (cannot support)
14D	wildlife	7 (fully support)	8 (support with reservations)	17 (cannot support)
14E	riparian buffer	9 (fully support)	8 (support with reservations)	15 (cannot support)
14F	carbon	7 (fully support)	10 (support with reservations)	15 (cannot support)
14G	recreation	4 (fully support)	10 (support with reservations)	18 (cannot support)
14H	designated state of federal scenic value	5 (fully support)	9 (support with reservations)	18 (cannot support)
14I	rural economy	8 (fully support)	7 (support with reservations)	17 (cannot support)

Workgroup 4: Significant Impacts Less than 50, Less than 10

Proposal #	Proposal Topic	Consensus		
		GREEN	YELLOW	RED
1	Method for field verification	22 (fully support)	6 (support with reservations)	4 (cannot support)
2, pt 1	Significant adverse impact definition - C1	6 (fully support)	5 (support with reservations)	21 (cannot support)
2, pt 2	Significant adverse impact definition - C2	6 (fully support)	4 (support with reservations)	22 (cannot support)

Workgroup 5: Local Control

Proposal #	Proposal Topic	Consensus		
		GREEN	YELLOW	RED
1	PBR and NOI timeline/steps	27 (fully support)	4 (support with reservations)	1 (cannot support)
2	Encouraging earlier NOI submission	16 (fully support)	14 (support with reservations)	2 (cannot support)
3	Review results to localities	18 (fully support)	9 (support with reservations)	5 (cannot support)
4	PBR template requirements	23 (fully support)	7 (support with reservations)	2 (cannot support)
5	Virginia Energy guidebook development	17 (fully support)	13 (support with reservations)	2 (cannot support)

Workgroup 1: Avoidance and Minimization

Proposals Achieving Consensus

WG-1 Avoidance and Minimization: Proposal 2

Amend 9VAC15-60-[XX] to add the following definition of “avoid:”**

“Avoid” or “avoidance” means, for purposes of acceptable mitigation of “significant adverse impacts” to prime agricultural soils or forest lands, to design or plan for and to implement practices and measures as part of project development that would not cause significant adverse impacts to prime agricultural soils or forest lands, including either of the following practices or measures:

- i. Selecting parcels of land for a project that do not have prime agricultural soils or forest lands; or
- ii. Locating project facilities on parcels that do have prime agricultural soils and forest lands but in a way that does not disturb such prime agricultural soils or forest lands.

** NOTE: Assumes DEQ will define “prime agricultural soils” and “forest land” as they are defined in HB206.

Consensus results: 21 (fully support) - 11 (support with reservations) – 0 (cannot support)

SME comments: None

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Support the concept of this proposal but want to be sure this doesn't alter the definition of "significant adverse impact" contained in HB 206
- Revise Proposal 2. ii. to read “Locating project facilities on parcels that do have prime agricultural soils and forest lands but in a way that does not disturb 10 contiguous acres of more of such prime agricultural soils or greater than 50 contiguous acres of forest lands. By adding the 10/50 acre thresholds it makes it clear that avoidance can still be demonstrated by large utility-scale projects that may find 0 acres of prime agricultural soils and/or forest impacts not practicable.

It may not be possible to avoid all impacts to prime agricultural soils and/or forests, but if the project impacts are below the 10/50 acre thresholds, the project should still get credit for avoidance if avoidance efforts can be demonstrated.

- The definition of prime agricultural should be consistent with the findings and results of the HB894 workgroup that is studying this topic.
- SEIA recommends that the BLM manual on compensatory mitigation for definition of avoid/minimize: https://www.blm.gov/sites/blm.gov/files/docs/2021-10/IM2021-046_att1_0.pdf Within this manual, "avoidance" is defined as Avoiding the impact altogether by not taking a certain action or parts of an action and "minimize" is defined as minimizing impacts by limiting the degree or magnitude of the action and its implementation. Consistent with SEIA's comments above, these definitions seem overly specific
- We support this in concept, but want to ensure that this definition does not in some way alter the definition of significant adverse impact that is already contained in HB 206.
- Clearing of Forested areas should be "avoided."
- 1. Additional clarification needed 2. Specific suggested edit: Revise "...to design or plan for and to implement practices and measures as part of project development that would not cause significant adverse impact to prime agricultural soils or forest lands..." to say "...to design or plan for and to implement practices and measures as part of project development that would not DISTURB prime agricultural soils or forest lands..." 3. This ties the definition of "avoid" to the definition of "disturb" developed in the previous section.
- I am concerned by the second part allowing for facilities that do not "disturb" the resource to be granted an exemption. This concern stems back to the redefining of disturb (partial list?) of proposal one.
- We support the concept of this proposal but not comfortable with the wording that this doesn't alter the definition of significant adverse impact contained in HB206
- Assuming definition of disturb as contained in previous responses, and that the definition of significant adverse impact as contained in HB206 is not muddled or confused, we can conceptually support proposal pending greater detail.
- soils not un ag use, identified via desktop as prime but in the course of field survey degraded to not prime should also mean prime ag was avoided (based on actual site conditions)

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- MAREC Action supports these definitions, but we want to emphasize strongly that solar development should under no circumstances be subject to blanket avoidance (in other words, exclusion) of prime ag soils or forested lands as defined in HB206. There should always be regulatory options for projects to minimize or mitigate impacts because there are relatively few locations suitable for utility-scale solar (access to transmission capacity being one of the biggest constraints) and the total potential scope of solar development under the Virginia Clean Economy Act represents significantly less than one percent of Virginia's total landmass if fully developed. Furthermore, we again wish to highlight that the legislation inappropriately singles out land conversions for solar for mitigation on prime ag soils and forested lands, even though solar has relatively small and less permanent impacts than other major land conversions (housing, roadways, industrial/warehouse use).

Proposals Not Achieving Consensus

WG-1 Avoidance and Minimization: Proposal 1 Part 1

Amend 9VAC15-60-[XX] to add the following definition of “disturb:”

1. “Disturb” means, for the purposes of determining “significant adverse impacts” to “prime agricultural soils” or “forest lands” any of the following: **

- a. to install new roads or widen existing roads;
 - b. to install permanent parking lots;
 - c. to create an open trench for installation of project internal cable distributions or for utility lines and connections;
 - d. to place fill material, to excavate, or to move or relocate soils, so as to regrade the land contour over a portion or all of a Site, such as for installation of small solar project-related facilities;
 - e. to excavate for or otherwise install a new stormwater detention or retention basin or to expand the existing surface area of such basin;
 - f. to install permanent impervious surfaces associated with project facilities, such as concrete pads, substation pads, footings for buildings or structures, or gravel areas;
 - g. to install pilings or structural posts for solar array panels;
 - h. to grub stumps and other woody vegetation root mass;
 - i. to compact the soil permanently due to heavy equipment operation or for structural operating plan pursuant to support purposes;
 - j. and to convert forest lands to scrub-shrub, meadow, pasture use or impervious use.
- [**Assumes the definitions of “prime agricultural soils” and “forest lands” are consistent with HB206 definitions of these terms.]

Consensus results: 18 (fully support) - 10 (support with reservations) - 4 (cannot support)

SME Comments:

- The language should clarify whether or not solar panel area coverage is or is not included as a ‘disturbance’. If solar panels are excluded then the language should say so in Proposal 1 Part 2. It is ambiguous as written now and will be a common question. Perhaps relate this to DEQ's updated language on the treatment of solar panels for stormwater regulations.

- Is area of array considered too? no ground contact, but can have ground effects, is this area included as disturbance? distinguishing between "permanent" and temporary (definitions needed?) (e.g., "permanent impervious surfaces")

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Why not use existing definitions of disturb such as those found in Title 62?
- 1. Dominion agrees that an appropriate definition of disturbance is critical to the implementation of this bill. Further consideration should be given to what constitutes interruption of functions and values associated with prime agricultural soils or forest lands that are not already addressed by other regulatory programs so that a definition of disturbance can truly reflect those aspects of solar development that eliminate those functions and values. Consideration should be given to creation of two definitions of disturbance, one for prime agricultural soils and one for forested area. While there may be some overlap, the functions and values of these two resources and what constitutes a disruption to those functions and values are not always the same. A balanced definition will recognize that, unlike conventional development, solar development is not only is unique in the opportunity to return the land to pre development use after decommissioning, but also can be less intensive in impacts to the landscape during construction and operations. There are many opportunities for the solar facility to operate while maintaining the function of the pre developed landscape. In addition, giving developers the opportunity to construct the facility using means and methods that avoid disturbance will incentivize those methods of development that maintain ecosystem services within the surrounding environment. Developers should also be given the opportunity to identify innovative technologies that are beneficial to the environment overall (ex. biochar application) and exclude areas where beneficial technologies are used from disturbed area. Without opportunities to avoid disturbance and employ innovative solutions, mitigation requirements are more likely to result in insurmountable financial burdens. 2. Further discussion of items 1.c and 1.h is needed in the context of prime agricultural soils. Technical definitions of prime farmland acknowledge the need for infrastructure improvements such as ditching, drain tiles, and irrigation. Woody vegetation removal is also a element of conventional farming practices. Practices associated with solar development that are substantially consistent with activities conducted as part of conventional farming practices should be recognized as such. Further discussion is needed on item 1.j. Even if trees are temporarily removed from a forested area, if the area is not intensively managed (and allowed to develop as meadow, scrub shrub, or other successive environment) many of the functions and values will be

maintained. Failing to recognize this reduces incentives for developers to minimize conversion to impervious cover. Specific suggested edits include: 1. a - strike "or widen existing roads" 1.c - strike in entirety 1.h - strike in entirety 1. j - strike "scrub shrub, meadow, pasture use or".

- I agree that the items on the list are measures that should meet the definition of disturb. But we would want to make clear that the list may not be exhaustive. We would prefer that, at a minimum, the listed measures would be considered disturbance reserving the right to add others as this discussion proceeds to regulatory development. In addition, the agency (DEQ) should highlight areas where "redefining" disturbance may be in conflict/differ with other regulations or guidance related to environmental protection so that RAP members are aware. Without that clarity from DEQ, we would not support the proposal as written.
- Both Virginia code and regulation already sufficiently define what constitutes a land disturbance or land disturbing activity. One example are stormwater regulations, which can be found at 9VAC25-870-10. Understanding that there is a need for disturbance to be defined, we would recommend a slightly modified definition of what can be found in SWM regs: "'disturb' means a manmade change to the land surface that potentially changes its characteristics including clearing, grading, or excavation, except that the term shall not include those exemptions specified in § 62.1-44.15:34(C)(2) of the Code of Virginia." Inclusion of this proposal would move our organization from a 3 to a 1.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Add to the list "harvesting of forest crops unless the land on which harvesting occurs is reforested artificially or naturally in accordance with the provisions of Chapter 11 (10.1-1100 et seq.)
- Add to the list a bullet regarding harvesting of forest crops, unless the area on which harvesting occurs is reforested in accordance with the provisions of (§ 10.1-1100 et seq.).
- I assume the definitions of "prime agricultural soils" and "forest lands" are consistent with HB206 definitions of these terms. We believe that the following should be added to list: "harvesting of forest crops unless the area on which harvesting occurs is reforested artificially or naturally in accordance with the provisions of Chapter 11 (§ 10.1-1100 et seq.)"
- 1) 1.a. Widening existing roads results in the lowest amount of environmental impacts and should be encouraged over constructing new roads. 1.i the statement "or for structural operating plan pursuant to support purposes" doesn't make sense and should be stricken out; 2) Revise section 1.a. to read: to install new roads; (by striking out "or widen existing roads") Revise section 1.i to read:

to compact the soil permanently due to heavy equipment operation (by striking out “or for structural operating plan pursuant to support purposes”);

- Agricultural industry performs many of the items listed as disturbance during typical farming practices, but is not subject to regulatory oversight. Disturbance that takes place during typical farming use should not be considered disturbance for solar development.
- 1. AES CE has concerns regarding Part 1(c) and Part (1d) with regard to prime agricultural soils – While these activities may be considered disturbance, to consider them disturbance with a significant adverse impact seems to be inflammatory. 2. AES CE recommends the removal of 1(c) and revising 1(d) “to place fill material or to excavate soil from a portion or all of a Site, such as for installation of small solar project-related facilities”. 3. AES CE thinks that 1(c) should not be used in reference to prime agricultural soils as the creation of a trench for installation of cables/utility lines will be backfilled and typically regraded to pre-construction conditions which does not constitute a significant adverse impact; and open trenching in forest lands would be covered under 1(j) for forest conversion to account for the maintenance of the cable/utility corridor. Therefore, AES CE recommends the removal of 1(c). AES CE recommends modifying 1(d) to only include fill material or excavations and remove the reference to regrading. Regrading prime agricultural soils does not constitute a significant adverse impact to these soils as these soils are typically manipulated and disturbed during agricultural practices and 1(i) covers compaction of these soils. Regrading does not change the composition of soils to where future agricultural practices are unfeasible and therefore, this should be reconsidered.
- The way this provision is structured raises questions. The provision specificity of Part 1 along with the language in Part 2 suggesting only these activities will be considered "disturbance" renders Part 2 somewhat moot. SEIA recommends a broader definition of disturbance that would include all these activities in part 1, along with a list of activities that are not considered disturbance would make more sense.
- CBF has concerns with the use of the term "permanent" in subpart (i) related to soil compaction and believes deletion of this term is necessary because even when compaction is mitigated there are still negative impacts from compaction.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- Compaction of soil, even temporarily, is a disturbance and should be included within the definition. Efforts to mitigate the compaction after the fact can be taken into account during mitigation assessment or planning. I am also concerned with an overly prescriptive definition of "disturbance" that would require much to be known about the design of a site early on in the PBR process. This does not seem to be feasible in practice. A broad definition of disturbance that allows for greater flexibility in site design would make more sense.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- MAREC Action believes these definitions of disturbance to prime ag soils and forest lands represent a reasonable balance between resource conservation and solar development concerns.
- Recommend including any land covered under an Erosion and Sediment Control Permit (ESC).
- To 1(j) above: One CHESSA member raised a question about whether scrub-scrub and meadow should be included since any owner of forests can currently do this at any time, without it being considered a disturbance, and this practice is regularly used for deer management. 1. CHESSA agrees with ACP that believes that this definition of disturbance appropriately balances the concerns across stakeholders represented in the regulatory process.
- Avoidance and mitigation, Proposal 1, Part 1: Part 1(h) and 1(j) define disturbance of forest if stubs/root mass are grubbed or terrain is converted to scrub-shrub, meadow, pasture, or impervious use. Concerned about providing a loop hole for clear cutting so long as the stumps/roots are not removed.
- ACP believes that this definition of disturbance appropriately balances the concerns across stakeholders represented in the regulatory process, ACP also recommends clearly delineating between temporary impacts and permanent impacts to ensure construction and operational impacts are appropriately analyzed.

WG-1 Avoidance and Minimization: Proposal 1, Part 2

2. Notwithstanding the foregoing, the following are excluded from the meaning of “disturb:”

a. to continue the use of a portion of a Site for agricultural or forestry purposes;

b. to reserve and plant a portion of the Site with meadow grasses or forest trees pursuant to a forestry management plan pursuant to a binding agreement, restrictive covenant, zoning or use permit condition, approved site plan, approved stormwater management plan, operating plan pursuant to 9VAC15-60-30.A.10, approved project decommissioning plan, or other instrument subject to enforcement by the applicable local government or the Department;

c. to operate construction or facilities installation equipment and vehicles of a size and scale no greater than that of agronomic farming equipment or vehicles typically used in the soil and water conservation district [as established pursuant to Section 10.1-500 et seq. of the Code of Virginia] in which the project Site is located or an adjacent district, provided that such operation of equipment and vehicles is subject to conditions and practices set forth in the project operating plan prepared pursuant 9VAC15-60-30.A.10 that:

- i. minimize the number of passes across the same soil during active construction or installation activities,
- ii. would allow the existing soil profile to remain intact, and
- iii. require temporary and permanent stabilization with vegetated cover consistent with applicable erosion and sediment control regulatory standards;

d. to remove trees located on prime agricultural soils at the Site where (i) such removal occurs without grubbing the tree stumps and is incidental to construction of the project, and (ii) such trees are not otherwise considered part of forest lands;

e. to conduct directional underground drilling;

f. to install temporary silt fencing or other temporary erosion and sediment control measures provided the soil profile remains intact;

g. Installation of fencing/fence posts;

h. Maintenance of an existing utility pole or repair of existing utility poles or their replacement in the same hole; and

i. selective harvesting of trees in forest lands subject to an approved forest

management plan or the removal of dead, damaged, or diseased trees and other vegetation located in forest lands.

No part of the “disturbance zone” of a project shall be considered to be disturbed for purposes of determining significant adverse impacts of a project as defined to prime agricultural soils or forest lands unless one or more of the actions described above in Proposal 1, Part 1 will occur in connection with development of a project.

Note: “Disturbance zone” means the area within the site directly impacted by construction and operation of the solar energy project and within 100 feet of the boundary of the directly impacted area. 9VAC15-60-10

Consensus results: 19 (fully support) – 7 (support with reservations) – 6 (cannot support)

SME comments:

- Re (h): would the developer/owner control the repair/relocation of utility pole "in the same hole"? Wouldn't there be a utility easement, and then the utility would have the right to move/install new poles within that easement? Would the utility's action of relocating a pole into a new hole trigger any kind of DEQ state review? If not, should this item should be amended to apply to any utility repair or pole relocation within an established easement? If you are referring to utility poles that are not within an easement, and the owner has the ability to decide whether to maintain them in the same hole or not, then this language makes sense.
- There is no agency or locality etc. identified to approve a forest management plan. Approval of a forest management plan is an uncommon in most instances.
- If solar panels are excluded from the "disturb" area then it would be beneficial to note that here.
- It should be noted while these exceptions to disturb may factually meet the need of "no disturbance to prime ag soils and/or forestland", some of the activities excepted from the definition of "disturb" may result in disturbance, impacts upon, wildlife. Also, we need to be clear that avoidance and minimization must be met prior to considering mitigation. They are not the same.
- For 2b above, the language should make it clear that such areas that are being "reserved" are not being "disturbed" per the definitions in Part 1. Taken as is, an area that was actually disturbed, but was covered by an approved site plan and/or an approved stormwater plan would be exempt from being "disturbed". If that is the intent here, I disagree.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Consistent with previous response, a definition of disturbance in line with what exists in current code and regulation should likewise include similar exemptions as currently defined. "'disturb' means a manmade change to the land surface that potentially changes its characteristics including clearing, grading, or excavation, except that the term shall not include those exemptions specified in § 62.1-44.15:34(C)(2) of the Code of Virginia." Exemption language: "Clearing of lands specifically for agricultural purposes and the management, tilling, planting, or harvesting of agricultural, horticultural, or forest crops, livestock feedlot operations, or as additionally set forth by the Board in regulations, including engineering operations as follows: construction of terraces, terrace outlets, check dams, desilting basins, dikes, ponds, ditches, strip cropping, lister furrowing, contour cultivating, contour furrowing, land drainage, and land irrigation; however, this exception shall not apply to harvesting of forest crops unless the area on which harvesting occurs is reforested artificially or naturally in accordance with the provisions of Chapter 11 (§ 10.1-1100 et seq.) or is converted to bona fide agricultural or improved pasture use as described in subsection B of § 10.1-1163." This change would move our organization to full support.
- Agrovoltatics or sheep grazing within project boundaries (aka within limits of disturbance) should mean no disturbance since the site is not taken out of agriculture
- Same concerns as the first proposal. We are wondering if DEQ really needs additional direction on what would constitute disturbance. Since this proposal contains the statement that the list from proposal one would dictate the determination of disturb (as an exhaustive list) by the agency, we can not support this proposal as drafted.
- CBF has concerns that this exclusion section undermines components of the definition of disturb articulated in Proposal 1, Part 1. These exclusions, taken collectively, could cumulatively have significant impacts and therefore we recommend, at a minimum, a threshold above which these activities would be considered disturbances.
- 1. Dominion agrees that articulating those activities that are excluded from the definition of disturbance is appropriate. However, Further consideration should be given to activities that should be exempted from the definition of disturbance.
2. Specific suggested edits include: 2.c - Revise to read: to operate construction or facilities installation equipment and vehicles of a size and scale typical of agronomic farming equipment and/or timber harvesting equipment practices.
2.d - strike "without grubbing the tree stumps and"
2.h - revise to read: Maintenance of an existing utility pole or repair or replacement of existing utility

poles; and 2.i - revise to read: selective harvesting of trees in forest lands or the removal of dead, damaged, or diseased trees and other vegetation located in forest lands in a manner consistent with typical forest management practices. 3. Item 2c acknowledges that (similar to the existing definition of regulated land disturbance) conducting activities consistent with agricultural practices should not be considered an activity that would be inconsistent with the presence of prime agricultural soils. This item should be clarified to allow any typical agricultural practice (the details of which would be outlined in the application) rather than requiring a demonstration of equivalency with equipment used in a specific SWCD. This exclusion should also be expanded to provide a similar exclusion for activities/equipment associated with forestry practices. This could be accomplished as a clarification in item 2.i. Flexibility should also be given in 2.i to demonstrate that proposed activities are consistent with conventional forestry practices without requiring operation under an approved forestry management plan. Item 2d should be revised to allow grubbing of stumps in this scenario as such activity would be consistent with agricultural practice if clearing/maintaining an area for agricultural use. Item 2h acknowledges that maintenance of utility poles is not likely to measurably disturb the overall function of an area containing prime agricultural soils. This item should be updated to allow for replacement of poles in a location adjacent to an existing hole as is common practice. This is also consistent with item 2g which acknowledges that installation of posts for fencing would not measurably disturb the overall function of an area of prime agricultural soils.

- Why use a vague/unclear definition when code already defines disturbance in title 62?

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Language should be included to require the use of construction mats on entrance and roads internal to the project.
- We believe there should be an addition to 2.c. - see below [ii]: i. minimize the number of passes across the same soil during active construction or installation activities, ii. [Add] utilizes construction mats on entrances and internal to the project ii. would allow the existing soil profile to remain intact, and iii. require temporary and permanent stabilization with vegetated cover consistent with applicable erosion and sediment control regulatory standards;
- Add language to require the use of construction mats on entrances/exits and internal areas of the project where large equipment may be traveling to prevent soil compaction. This could be added as an additional bullet in the list under Point C.
- If the site originally was forested, converting to meadow grass is disturbance. Could support: b. to reserve and plant a portion of the a previously agricultural

site with meadow grasses or forest trees, or to plant a previously forested site with forest trees, pursuant to a forestry management plan . . .

- For Proposal 1 Part 2 2. b. Concerned about the direction of how to address this in the Stormwater Management requirements. How will stormwater treat this? Managed Turf? Construction/Open Space? Impervious Cover? In the stormwater context, conservation as a stormwater management practice shifts inspection and restoration requirements to the local government—unfunded mandate.
- VMDEAC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- Fencing within forest lands, even if the trees are maintained, would disturb wildlife corridor connectivity and habitat contiguity. This should be considered a "disturbance." Again, I think it would be more appropriate to use a "disturbance zone" definition that look at the broader borders of the project, rather than carving out areas where certain activities may not take place. It would be difficult to know what the final site will ultimately look like so early in the PBR process. The PBR process should inform site design.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- It is important to clearly exclude certain activities from the definition of disturbance in order to encourage best practices.
- It's important to note that typical farming practices (which can be similar to solar development practices) are not considered land disturbance.
- MAREC Action underscores that the proposal 1 framework defining a "disturbance" for prime ag soils and forest lands does not work if the concept of a "disturbance zone" is applied. We strongly agree with proposal 1, part 2, that clarifies only direct disturbances (as outlined in Proposal 1, Part 1) should be factored into calculations of total disturbed acreage. MAREC Action also suggests adding into proposal 1, part 2, that any activity not specifically listed as a disturbance—that does not remove, permanently compact, or otherwise create erosion problems—is not a disturbance. As for our rationale: The proposal 1, part 2, clarifications to what does not constitute a "disturbance" of prime ag soils and forest lands encourage solar developers to make economic decisions to implement construction and operations practices that do not disturb prime ag soils and forests. Some of these practices are not business as usual for solar developers, but they present an economic alternative to reasonable minimization and mitigation measures.
- Subsection "e" references directional underground drilling, but this is not considered a "disturbance" as defined in Part 1. Clarification is needed on whether underground directional drilling is defined as a disturbance

- It's important that future regulations give a nod to (as these definitions presented do) the fact that ag and forestry do disturb and compact land to some degree, and solar should not be penalized for that equivalent base level of activity.
- 1. CHESSA agrees with ACP that the exclusions encourage the clean energy industry to ensure a solar project provides valuable ecosystem services to the surrounding environment, without excessively burdening projects with excessive mitigation requirements.
- The exclusions encourage the clean energy industry to ensure a solar project provides valuable ecosystem services to the surrounding environment, without excessively burdening projects with excessive mitigation requirements.
- Including the aforementioned items as a disturbance would be prohibitive for solar development and inhibit our ability to meet clean energy goals.

WG-1 Avoidance and Minimization: Proposal 3

Amend 9VAC15-60-[XX] to add the following definition of “minimize:” **

“Minimize” or “minimization” means, for purposes of acceptable mitigation of “significant adverse impacts” to “prime agricultural soils” or “forest lands,” to design or plan for and to implement practices and measures as part of project development that would result in the reduction or lessening of the area or degree of potential significant impacts to prime agricultural soils or forest lands, including the following practices and measures:

Reducing or lessening the area of prime agricultural soils or forest lands disturbed at the Site; reducing or lessening the area or degree of permanent compaction of prime agricultural soils at the Site; reducing or lessening the volume or area of removal or movement of topsoil at the Site; reducing or lessening the placement of fill material or the excavation or regrading of prime agricultural soils at the Site; reduction of impervious surface area and erosion through election and use of ground cover vegetation at the Site, use of single-axis trackers and/or spacing of solar arrays pursuant to the operating plan; conserving areas of forest lands on the Site that are able to be put into productive use upon project decommissioning; replanting a portion of economically viable forest land in a manner that is also economically viable in the future; agrivoltaic practices, once deemed economically viable in Virginia; and reducing or lessening exposure of acid producing materials (APM).

** NOTE: Assumes DEQ will define “prime agricultural soils” and “forest land” as they are defined in HB206.

Consensus results: 19 (fully support) – 12 (support with reservations) - 1 (cannot support)

SME comments:

- What does "once deemed economically viable" mean? This phrase should be removed and it should refer to agrivoltaic practices, period. And "lessening exposure of APM" ?? I assume there are best practices to doing so that would result in "minimization" of significant impact? * How will to be determined that something is able to be put into "productive use"? Re: "...conserving areas of forest lands on the Site that are able to be put into productive use upon project decommissioning.." * "...reduction of impervious surface area .." Since panels themselves are considered impervious, is this the best language choice? It might be interpreted to apply to reducing the number of panels installed.

- This section mentions agrivoltaics as well as conserving areas of forest lands and replanting forest land. In Proposal 1, Part 2 (a.), it says “to continue the use of a portion of a Site for agricultural or forestry purposes;” is excluded as being classified as a disturbance. There may be some overlap between what is classified as being excluded as a disturbance and what counts as a minimization activity. More distinction is necessary between what agriculture/forestry activities are minimization versus those that are not classified as a disturbance.
- Soil compaction and associated limitations and effects also occur on forested sites in addition to prime agricultural lands. As is, portions of the detailed language here appears only applicable to prime ag lands? Suggest initial language be changed to make it clear that practices like lessening compaction applies to both.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Would prefer it reads: “Minimize” or “minimization” means, for purposes of acceptable mitigation of “significant adverse impacts” to “prime agricultural soils” or “forest lands,” to design or plan for and to implement practices and measures as part of project development that would result in a reduction to the degree of impact to the associated resources. Everything after that should be struck and discussed during regulation development. Further, DEQ should begin identification of best management practices for a future conversation with the RAP. The section sometimes confuses avoidance measures with minimization. It also includes broad terms without providing specific measures (agrivoltaics, etc.) that may be credited.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Add as a recommendation in guidance that any topsoil removed at the site must be stockpiled on the site for future use in decommissioning.
- Agrovoltaics, as a minimization practice, shouldn’t be limited by economically viability. “once deemed economically viable in Virginia” should be stricken.
- CBF again has concerns with the focus only on permanent soil compaction rather than all forms of soil compaction. CBF also has concerns that a concept like “once deemed economically viable in Virginia” is inappropriate for use in regulation.

- It should be made clear that solar owners and developers that lease land for their projects are not responsible or liable for any minimization activities after a project has been successfully decommissioned. Separately, the references to “economically viable” and “productive use” in the proposal reflect the view of some non-solar stakeholders that displaced farming or forestry practices at a solar project site should be compensated for under HB206. MAREC Action questions that rationale and need to minimize or mitigate for voluntary changes to the economic use of a private parcel. In a free market economy, landowners respond to market signals to determine how to make revenue from their land. If a landowner leases their land (in this context, prime ag soil or forest land) to be developed for solar, it means that they weighed the value of the solar lease revenue to be greater than the revenue they would glean from farming or forestry. We would support this proposal as long as it is made clear that no minimization requirements will extend beyond project decommissioning. The vast majority of utility-scale solar projects lease land for development, rather than owning it directly.
- 1. AES CE recommends providing reference to conserving areas of prime agricultural soil areas or utilizing prime agricultural soils for dual beneficial use such as pollinator plantings. Additionally, the reference to “reducing or lessening the volume or area of removal or movement of topsoil at the Site” alludes to the possibility that if the project retains all topsoil, that may be considered avoidance, because there would be no removal of topsoil. Additional clarification is necessary for these mitigating measures. 2. AES CE recommends adding the following “conserving areas of prime agricultural soils on the Site that are able to be put into productive use upon project decommissioning or utilizing prime agricultural soil areas for pollinator or vegetative screening plantings”.
- (1) Clarification needed re: acceptable mitigation practices. We need to clarify that “... replanting a portion of economically viable forest land in a manner that is also economically viable in the future” applies only to disturbance on lands that had been previously forested. (2) Re: acceptable mitigation practices, the clause “... agrivoltaic practices, once deemed economically viable in Virginia” needs workshopping. I think many stakeholders can probably agree that agrivoltaics should be incentivized -- but the phrase, “once deemed economically viable” seems overly vague to me. How can we clarify how that designation (of economic feasibility) should be made, so that agrivoltaics are fostered in a timely manner? Who will be making that designation (of economic feasibility)?
- Needs to be a significant reduction. Seems to be muddling retaining areas in forest cover during the life of the project with reforestation after the project. This needs to be clarified.
- In the guidance: Something should be included regarding topsoil--rather than taking the topsoil offsite, developers should save it onsite to then use on that same land upon decommissioning.

- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- 1. This definition should not unintentionally limit the minimization measures available to developers to lessen their impact. 2. Suggestion to add language in capital letters: " "Minimize" or "minimization" means, for purposes of acceptable mitigation of "significant adverse impacts" to "prime agricultural soils" or "forest lands," to design or plan for and to implement practices and measures as part of project development that would result in the reduction or lessening of the area or degree of potential significant impacts to prime agricultural soils or forest lands, including BUT NOT LIMITED TO the following practices and measures:" 3. Further consideration should be given to what activities might constitute minimization of impacts to prime agricultural soils or forest lands. Suggest clarification that the list of minimization measures presented may not be exhaustive. This will allow for (and incentivize) creativity, advances in technology, and other methods for projects to identify opportunities for minimization that would reduce mitigation requirements
- [Not comfortable with these options and wonder if all of these examples are better in the guidance document - I put in quotes the words that we question because I could bold them] • conserving areas of forest lands on the Site that are able to be "put into productive use upon" project decommissioning • replanting a portion of "economically viable forest" land in a manner that is also economically viable in the future; • agrivoltaic practices, once deemed "economically viable in Virginia" Would like this added to the listed practices: "If any topsoil is removed then it must be stockpiled on site for future decommissioning of the facility." A solution to the list is to simplify the definition: "Minimize" or "minimization" means, for purposes of acceptable mitigation of "significant adverse impacts" to "prime agricultural soils" or "forest lands," to design or plan for and to implement practices and measures as part of project development that would result in the reduction of the degree of potential significant impact or lessening of the area or degree of potential significant impacts. to prime agricultural soils or forest lands. In any case, if any topsoil is removed then it must be stockpiled on site for future decommissioning of the facility.
- As with disturb, a simplified definition of minimize or minimization is necessary. Further delineation of practices is unnecessary and may preclude potential site-specific mitigation measures that offer greater practicality, efficiency, and/or effect. See below. "Amend 9VAC15-60-[XX] to add the following definition of "minimize:" ** 'Minimize' or 'minimization' means, for purposes of acceptable mitigation of "significant adverse impacts" to 'prime agricultural soils' or 'forest lands,' to design or plan for and to implement practices and measures as part of project development that would result in the reduction of the degree of impact." NOTE: The practices, as proposed here, would be helpful as BMPs contained guidance documents published by the Department for the purposes of compliance. But it is not appropriate for regulatory language.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Unsure of who will determine and/or when it will be determined that agrivoltaic practices will be deemed economically viable in Virginia.
- SEIA suggests that the provision regarding loosening or lessening of prime agricultural soils or forest soils may be better suited to a best practices manual, rather than an overarching regulation.
- Could you provide a table that provides enforceable threshold by the acreage?
- 1. Clear definition and identification protocol for prime agricultural soils and forest land

WG-1 Avoidance and Minimization: Proposal 4

Amend 9VAC15-60-[XX] to reflect the criteria for assessing when a mitigation plan is required to reflect the new criteria related to assessing impacts to prime agricultural soils and forest lands. **Language from the existing regulation is reflected below, with the new proposed language in italics:**

8. In accordance with § 10.1-1197.6 B 8 of the Code of Virginia, furnishes to the department a mitigation plan pursuant to [9VAC15-60-60](#) that details reasonable actions to be taken by the owner or operator to avoid, minimize, or otherwise mitigate such impacts, and to measure the efficacy of those actions; provided, however, that the provisions of this subdivision shall only be required if the department determines, pursuant to [9VAC15-60-50](#), that the information collected pursuant to § 10.1-1197.6 B 7 of the Code of Virginia and [9VAC15-60-40](#) indicates that any of the following are likely:

(a) significant adverse impacts to wildlife or historic resources, or

(b) if a proposed project would disturb:

(i) more than 10 acres of prime agricultural soils,

(ii) more than 50 acres of contiguous forest lands, or

(iii) forest lands enrolled in a program for forestry preservation pursuant to subdivision 2 of § 58.1-3233 of the Code of Virginia.

A project will be deemed to have a significant adverse impact if it would disturb more than 10 acres of prime agricultural soils or more than 50 acres of contiguous forest lands, or if it would disturb forest lands enrolled in a program for forestry preservation pursuant to subdivision 2 of § 58.1-3233. The mitigation plan shall be an addendum to the operating plan of the solar energy project, and the owner or operator shall implement the mitigation plan as deemed complete and adequate by the department. The mitigation plan shall be an enforceable part of the permit by rule;

Consensus results: 22 (fully support) – 8 (support with reservations) - 2 (cannot support)

SME comments:

- (b) This pertains to lands only enrolled in "land use" taxation programs, "and lands of a population of 5,000 per square mile, for any real estate in any county operating under the urban county executive form of government, or the unincorporated Town of Yorktown chartered in 1691, the governing body may by ordinance prescribe that land devoted to open-space uses consist of a minimum of one quarter of an acre. The minimum acreage requirements for special classifications of real estate shall be determined by adding together the total area of contiguous real estate excluding recorded subdivision lots recorded after July 1, 1983, titled in the same ownership. However, for purposes of adding together such total area of contiguous real estate, any noncontiguous parcel of real property included in an agricultural, forestal, or an agricultural and forestal district of local significance pursuant to subsection B of § 15.2-4405 shall be deemed to be contiguous to any other real property that is located in such district. For purposes of this section, properties separated only by a public right-of-way are considered contiguous;" (LIS VA Law, <https://law.lis.virginia.gov/vacode/title58.1/chapter32/section58.1-3233/#:~:text=%C2%A7%2058.1%2D3233.-,Determinations%20to%20be%20made%20by%20local%20officers%20before%20assessment%20of,1.>, retrieved Sept. 12, 2022.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Is point (ii) part of the legislation? this seems like a new addition This should apply to contiguous prime agricultural soils. A project should not be considered to have adversely impacted prime agricultural soils if small soil mapping units scattered across a site add up to 10 acres of prime agricultural soils. There should be a practical management unit concept applied to the prime agricultural soils so that areas of contiguous prime agricultural that could realistically be managed as a farming unit are what is considered for the purposes of HB206. Scattered bits of prime agricultural soils don't add up to a workable farm outside of the PBR process and shouldn't be treated differently here. Insert "contiguous" to 8.b.i. more than 10 contiguous acres of prime agricultural soils. Insert "contiguous" to the last paragraph: A project will be deemed to have a significant adverse impact if it would disturb more than 10 contiguous acres of prime agricultural soils.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- We support this proposal within the context of this RAP, however, MAREC Action fundamentally disagrees with the underlying legislation HB206 that singles out solar for regulation, when other land conversions are not regulated in this way. We also object to the statutory presumption of significant adverse impacts on prime ag soils and forest lands. As it relates to forest lands, we would like to see further clarification of what “contiguous” means. We believe that large stands of forest trees that are disconnected other than by a thin line of trees (such as a roadside buffer) should not be considered contiguous.
- 1. AES CE would like additional information on how impact acreage thresholds were determined to trigger a mitigation plan requirement. Additionally, there are no mitigation measures provided in this section and it may be beneficial to list those measures under this section. Are acreages below these thresholds exempt? 2. AES CE has no specific revisions, but just requests additional clarification needed on impact threshold determinations and mitigation measures anticipated.
- Would like to see clarification that solar development lands would no longer be eligible for forestry preservation program cited in this language.
- Wondering if in some areas, or regions, the acreage of forested land should be a lower amount, like 30 acres. Especially in areas that have limited old growth forest.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- ACP encourages clarification on the the definition of "contiguous" in reference to forest lands. Is “contiguous” defined elsewhere? Multiple areas connected by wind breaks or other minimal tree lines could add up to the threshold much more quickly. Our understanding is that the definition referenced in HB206 from existing VA code language for “forested land” would refer to larger 2D areas since “forest trees” need to be part of a “stand” to constitute a larger area considered “forest land”. So this concern of multiple connected areas is likely covered by the definition if only “forest trees” can make two “forest land” areas determined to be “contiguous”.
- To the extent that "significant adverse impact" is defined to include projects that disturb equal to or less than 10 acres of prime agricultural soils or 50 acres of forest land, as proposed by Workgroup 4, I would like to see this framework updated.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Seems to say the same thing twice? Why?
- 1. One CHESSA member raised a question about prime agricultural soils that are under forest land and stated that if it were economic to farm these particular prime agricultural soils, someone would be already doing it.) Another CHESSA member made the following observations: Address the definition of "contiguous" in reference to forest lands. Is "contiguous" defined elsewhere? Multiple areas connected by wind breaks or other minimal tree lines could add up to the threshold much more quickly. My understanding is that the definition referenced in HB206 from existing VA code language for "forested land" would refer to larger 2D areas since "forest trees" need to be part of a "stand" to constitute a larger area considered "forest land". So this concern of multiple connected areas is likely covered by the definition if only "forest trees" can make two "forest land" areas determined to be "contiguous". In addition, should heavily managed timber lands be excluded from the environmental mitigation for habitat and other environmental services?
- While I agreed I still have reservations with timber areas that are timbered regularly being listed here. I strongly feel they should not be included as contiguous forest. Also concerned that contiguous definition is not clearly defined and might lead to many more forest lands involved than are presently contemplated by using small strands of trees (in a fence line for example) to link up other forested parcels to create 50 acres.
- I would like for it to acknowledge that nothing impacts Department authority to determine a significant impact at thresholds below the stated values in code.

WG-1 Avoidance and Minimization: Proposal 5

Amend 9VAC15-60-[XX] addressing analysis of the beneficial and adverse impacts on natural resources to reflect addition of new subsections C and D addressing evaluation of impacts to prime agricultural soils and forest lands. **Language from the existing regulation is reflected below, with the new proposed language in italics:**

A. Analyses of wildlife. To fulfill the requirements of § 10.1-1197.6 B 7 of the Code of Virginia, the applicant shall conduct preconstruction wildlife analyses. The analyses of wildlife shall include the following:

1. Desktop surveys and maps. The applicant shall obtain a wildlife report and map generated from DGIF's Virginia Fish and Wildlife Information Service web-based application (9VAC15-60-120 C 3) or from a data and mapping system including the most recent data available from DWR's subscriber-based Wildlife Environmental Review Map Service of the following: (i) known wildlife species and habitat features on the site or within two miles of the boundary of the site and (ii) known or potential sea turtle nesting beaches located within one-half mile of the disturbance zone.
2. Desktop map for avian resources in Coastal Avian Protection Zones (CAPZ). The applicant shall consult the "Coastal Avian Protection Zones" map generated on the department's Coastal GEMS geospatial data system (9VAC15-60-120 C 1) and determine whether the proposed solar energy project site will be located in part or in whole within one or more CAPZ.

B. Analyses of historic resources. To fulfill the requirements of § 10.1-1197.6 B 7 of the Code of Virginia, the applicant shall also conduct a pre-construction historic resources analysis. The analysis shall be conducted by a qualified professional meeting the professional qualification standards of the Secretary of the Interior's Standards for Archeology and Historic Preservation (9VAC15-60-120 B 2) in the appropriate discipline. The analysis shall include each of the following:

1. Compilation of known historic resources. The applicant shall gather information on known historic resources within the disturbance zone and within one-half mile of the disturbance zone boundary and present this information on the context map referenced in 9VAC15-60-70 B, or as an overlay to this context map, as well as in tabular format.
2. Architectural survey. The applicant shall conduct a field survey of all architectural resources, including cultural landscapes, 50 years of age or older within the disturbance zone and within one-half mile of the disturbance zone boundary and evaluate the eligibility of any identified resource for listing in the

VLR.

1. Archaeological survey. The applicant shall conduct an archaeological field survey of the disturbance zone and evaluate the eligibility of any identified archaeological site for listing in the VLR. As an alternative to performing this archaeological survey, the applicant may make a demonstration to the department that the project will utilize non-penetrating footings technology and that any necessary grading of the site prior to construction does not have the potential to adversely impact any archaeological resource.

C. Analyses of prime agricultural soils. To fulfill the requirements of § 10.1-1197.6 B 7 of the Code of Virginia, the applicant shall conduct pre-construction analyses of the presence of prime agricultural soils at the proposed project Site. The analyses of prime agricultural soils shall include the following:

1. Desktop surveys and maps. The applicant shall (a) obtain a prime agricultural soils report and map for the project Site generated from either (a) the current map identifying prime agricultural soils as published by Virginia Cooperative Extension or (b) the current Web Soil Survey and associated NRCS Prime farmland soil state list for Virginia (which list is maintained by the NRCS State Soil Scientist); (b) determine based on such reports and maps any location(s) of prime agricultural soils on the project Site; and (c) overlay such locations on a project Site drawing showing the perimeters of the proposed disturbance zone for the project and the proposed directly impacted area within the proposed disturbance zone.

2. Field confirmation. The applicant may at its option also perform field verification of (a) the presence of prime agricultural soils within the proposed disturbance zone at the project Site, as indicated in the desktop surveys and maps, which field verification must be performed by a Virginia-licensed professional soil scientist; and (b) the degree of soil compaction within the proposed disturbance area of the project Site to determine the existing level of compaction and of root-limiting levels or conditions, which verification must be performed by a Virginia-licensed professional soil scientist or by a Virginia-licensed geologist or geo-technician.

[A new subsection D would be inserted here, but further information/research is needed for, and consensus has not been reached as to, the new subsection D language; see "WG1: Avoidance and Mitigation: Proposal 10" below for details.]

E. Analyses of other natural resources. To fulfill the requirements of § 10.1-1197.6 B 7

of the Code of Virginia, the applicant shall also conduct a pre-construction desktop survey of natural heritage resources within the disturbance zone.

*F. Summary report. The applicant shall provide to the department a report presenting the findings of the studies and analyses conducted pursuant to subsections A, B, **C, D and E** of this section, along with all data and supporting documents. The applicant shall assess and describe the expected beneficial and adverse impacts, if any, of the proposed project on wildlife and historic resources identified by these studies and analyses*

Consensus results; 20 (fully support) – 4 (support with reservations) - 8 (cannot support)

SME comments:

- Part C 2 makes field confirmation "optional"? My recollection of the conversation with this WG is that it would be required? If required, I suggest that language be added that would allow for other licensed or certified professional soil scientists from neighboring states (e.g. MD or NC) and/or the national Professional Soil Scientists (ARCPACS) registry be allowed to conduct this work.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Recommend striking language in 2(b) regarding the degree of soil compaction.
- The following would need to be deleted in Number 2: (b) the degree of soil compaction within the proposed disturbance area of the project Site to determine the existing level of compaction and of root-limiting levels or conditions, which verification must be performed by a Virginia-licensed professional soil scientist or by a Virginia-licensed geologist or geotechnician.
- The language in this section related to prime agricultural soils appears to conflict with the clear language in the statute that the U.S. Department of Agriculture is the arbiter of prime agricultural soils.
- The soil is either prime agricultural soil or it isn't. The measure related to compaction is not necessary as it relates to determining if the resource exists.
- 1. Note that, due to the long lead time inherent in the PBR process, detailed construction means and methods may not be known at the time of PBR application submittal. An applicant may be forced to make conservative assumptions about where prime agricultural soils and forested lands on site will be impacted (disturbed). The final regulatory language should include guidance

on how changes to impacted area (increase or decrease) should be handled both during the application process and after the PBR authorization has been issued from a procedural perspective and as any changes relate to mitigation obligations. Also note that consensus was not reached regarding how impacts to forested lands would be determined. This is a significant gap in the existing proposal and further discussion is needed to determine how reliable information can be accessed or developed. This proposal should also be updated to include an expectation for development of technical guidance related to field verification of both prime agricultural soils and forested areas. 2. Editorial suggestions would require further development.

- Would like to see localities provided with the necessary authority to require the field confirmation in C(2).
- Make sure that A.1. Desktop surveys and maps includes the new prime agricultural soils definitions being developed concurrently to this RAP by a different group. Certified Professional Soil Scientists accredited by the Soil Science Society of America (SSSA) should also be permitted to perform the analysis. The licensing exam in Virginia is the exam developed and implemented by the Soil Science Society of America, so professionals accredited in other states by the Soil Science Society of America have demonstrated the same level of expertise in their field since licensed soils scientists in Virginia take the same SSSA exam. According to the Virginia Department of Professional and Occupational Regulation there are fewer than 200 licensed professional soil scientist in Virginia and that list includes state employees who are not able to be contracted to perform the soil evaluations for field confirmation. We need to make sure that there is an adequate workforce to perform the field verification. Add Certified Professional Soil Scientists accredited by the Soil Science Society of America to C.2.a and C.2.b. Adding Certified Professional Soil Scientists accredited by the Soil Science Society of America will expand the pool of qualified professionals available to perform the soil evaluations while maintaining the same standard of professional experience and proof of capability by having passed the same examinations. Technically, many of the Virginia -licensed soil scientists were grandfathered under the old DPOR exam system (one test, shorter and more simple) and have never taken the more extensive series of examinations required by the Soil Science Society of America.
- B. Analyses of historic resources. Concern that DHR might not have as robust a historical database on the site that a local historian or society may have. If so historical assets might be missed and forever lost. Coordination with local historical resources might be needed. C. Under Analyses. 2. Field Confirmation. The applicant may at its option. Why an option? Should be a must.

Concerns/question(s), edits or clarifications needed to move your organization yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- I suggest amending the last sentence of the first paragraph of Section C as follows: "The analyses of prime agricultural soils shall include at least ONE of the following:" In Section C.1, suggest changing the numbering to (a)(i) and (a)(ii) rather than repeating letters. Also depends on Subsection D language.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- I am still not comfortable with this description and so, would suggest deleting it: (b) the degree of soil compaction within the proposed disturbance area of the project Site to determine the existing level of compaction and of root-limiting levels or conditions, which verification must be performed by a Virginia-licensed professional soil scientist or by a Virginia-licensed geologist or geo-technician.
- VFA does not have a position on this proposal as it does not contain language specific to forestry. Comment reserved for Proposal 10.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Important to consider beneficial impacts to prime agricultural soils from potentially removing from intensive row crop production for the life of the solar project. I agree that existing compaction should be assessed if compaction will be considered disturbance during development.
- We note that the USDA prime agriculture soil maps alone do not provide enough data granularity to form the basis for regulation, as a result, the optional field verification aspect of this proposal is critical.
- SEIA seeks clarification on whether Section "C" of proposal 6 includes already disturbed prime agricultural soils and/or agri-voltaic operations.

WG-1 Avoidance and Minimization: Proposal 6

Amend 9VAC15-60-[XX] addressing determination of likely significant adverse impacts to add a new subsections C and D for when the department shall find significant adverse impacts to prime agricultural soils and forest lands. **Language from the existing regulation is reflected below, with the new proposed language in italics:**

A. The department shall find that significant adverse impacts to wildlife are likely whenever the wildlife analyses prescribed in [9VAC15-60-40](#) A document that any of the following conditions exists:

1. State-listed T&E wildlife are found to occur within the disturbance zone or the disturbance zone is located on or within one-half mile of a known or potential sea turtle nesting beach.

2. The disturbance zone is located in part or in whole within zones 1, 2, 3, 4, 5, 10, 11, 12, or 14 on the Coastal Avian Protection Zones (CAPZ) map.

B. The department shall find that significant adverse impacts to historic resources are likely whenever the historic resources analyses prescribed by 9VAC15-60-40 B indicate that the proposed project is likely to diminish significantly any aspect of a historic resource's integrity.

C. The department shall find that significant adverse impacts to prime agricultural soils will occur whenever the prime agricultural soils analyses prescribed by [9VAC15-60-40](#) C indicate that the proposed project would disturb more than 10 acres of prime agricultural soils.

D. The department shall find that significant adverse impacts to forest lands will occur whenever the forest lands analyses prescribed by 9VAC15-60-40 D indicate that the proposed project would disturb either (1) more than 50 acres of contiguous forest lands, or (2) forest lands enrolled in a program for forestry preservation pursuant to subdivision 2 of § 58.1-3233.

Consensus results: 22 (fully support) – 9 (support with reservations) - 1 (cannot support)

SME comments:

- How will they quantify acreage of disturbance? Would the site plans be required to delineate undisturbed areas, and any area NOT in the undisturbed area would be considered subject to disturbance (ex: compaction from equipment traffic,

removal of tree stumps?) If not, is there a methodology to quantify the area of disturbance for every thing that isn't exempt? Ex: what is the area of disturbance involved in relocating one utility pole that is less than 2' wide in diameter? Or the total area disturbed removing one stump?

- D. Pertains only to lands in land use taxation program. Determine further that real estate devoted solely to (i) agricultural or horticultural use consists of a minimum of five acres, except that for real estate used for agricultural purposes, for purposes of engaging in aquaculture as defined in § 3.2-2600, or for purposes of raising specialty crops as defined by local ordinance, the governing body may by ordinance prescribe that these uses consist of a minimum acreage of less than five acres; (ii) forest use consists of a minimum of 20 acres; and (iii) open-space use consists of a minimum of five acres or such greater minimum acreage as may be prescribed by local ordinance, except that for real estate adjacent to a scenic river, a scenic highway, a Virginia Byway or public property in the Virginia Outdoors Plan or for any real estate in any city, county or town having a density of population greater than 5,000 per square mile, for any real estate in any county operating under the urban county executive form of government, or the unincorporated Town of Yorktown chartered in 1691, the governing body may by ordinance prescribe that land devoted to open-space uses consist of a minimum of one quarter of an acre. The minimum acreage requirements for special classifications of real estate shall be determined by adding together the total area of contiguous real estate excluding recorded subdivision lots recorded after July 1, 1983, titled in the same ownership. However, for purposes of adding together such total area of contiguous real estate, any noncontiguous parcel of real property included in an agricultural, forestal, or an agricultural and forestal district of local significance pursuant to subsection B of § 15.2-4405 shall be deemed to be contiguous to any other real property that is located in such district. For purposes of this section, properties separated only by a public right-of-way are considered contiguous; (LIS VA Law, retrieved, Sept. 12, 2022
- I am ok with this language. However, I think that questions will continue as to whether or not the process of logging off forested sites with typical brush removal, stump pulling, etc. will fall into "disturbance"? I am not advocating for that, but the question remains....

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- 2.C should apply to contiguous prime agricultural soils. A project should not be considered to have adversely impacted prime agricultural soils if small soil mapping units scattered across a site add up to 10 acres of prime agricultural soils. There should be a practical management unit concept applied to the prime agricultural soils so that areas of contiguous prime agricultural that could realistically be managed as a farming unit are what is considered for the purposes of HB206. Scattered bits of prime agricultural soils don't add up to a workable farm outside of the PBR process and shouldn't be treated differently here. Insert "contiguous" to 2.C. The department shall find that significant adverse impacts to prime agricultural soils will occur whenever the prime agricultural soils analyses prescribed by 9VAC15-60-40 C indicate that the proposed project would disturb more than 10 acres of contiguous prime agricultural soils.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Recommend language be included that clarifies nothing shall limit DEQ's authority to determine significant adverse impacts for forested land under 50 acres.
- Fine as far as it goes, but regulation will have to address impacts from smaller projects as well.
- In concept support this, but we would like to see something that states that nothing here shall limit the authority of DEQ to determine a significant adverse impact for forest land under 50 acres.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- Our concern is largely based on where field verification measures conversation. We support the language being added. But we wanted to flag that previous proposals, if accepted as drafted, would be a cause for concern/weaken the proposal in question.
- We don't believe this is covered so a statement should be added: "Nothing shall limit DEQ authority to determine significant adverse impact for forest land under 50 acres."
- Can support this proposal so long as significant adverse impacts can additionally be determined on prime agricultural soils of less than 10 acres, forest lands of less than 50 acres, or forest lands not enrolled in a program for forestry preservation pursuant to subdivision 2 of 58.1-3233.

- See earlier comments regarding expanded definition of Significant Adverse Impacts and Workgroup 4. This assumes a section "D." is worked out in the future, and we aren't able to see or consider that at this time. It would also be great if the actual admin code section were designated at the beginning instead of 9VAC15-60-xx.
- is C meant to factor in results from field delineation? e.g. if desktop maps identify prime agriculture soils but field verification indicated severe deterioration or different classification- will impacts not be considered adverse and requiring mitigation?

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Aligns with the charge of HB206.
- We should specify that nothing in this proposal will limit DEQ's authority to determine a significant adverse impact at levels below the 10 and 50 acre thresholds.

WG-1 Avoidance and Minimization: Proposal 7

Amend 9VAC15-60-[XX] addressing mitigation plan requirements to add a new subsection D as follows to address demonstration of avoidance and minimization of significant adverse impacts to prime agricultural soils and forest lands that link back to definitions of “avoid” and “minimize.”

A. If the department determines that significant adverse impacts to wildlife or historic resources or both are likely, then the applicant shall prepare a mitigation plan.

B. Mitigation measures for significant adverse impacts to wildlife shall include:

1. For state-listed T&E wildlife, the applicant shall take all reasonable measures to avoid significant adverse impacts or shall demonstrate in the mitigation plan what significant adverse impacts cannot practicably be avoided and why additional proposed actions are reasonable. These additional proposed actions may include best practices to avoid, minimize, or offset adverse impacts to resources analyzed pursuant to 9VAC15-60-40 A or C.

2. For proposed projects where the disturbance zone is located on or within one-half mile of a known or potential sea turtle nesting beach, the applicant shall take all reasonable measures to avoid significant adverse impacts or shall demonstrate in the mitigation plan what significant adverse impacts cannot practicably be avoided, and why additional proposed mitigation actions are reasonable. Mitigation measures shall include the following:

a. Avoiding construction within likely sea turtle crawl or nesting habitats during the turtle nesting and hatching season (May 20 through October 31). If avoiding construction during this period is not possible, then conducting daily crawl surveys of the disturbance zone (May 20 through August 31) and one mile beyond the northern and southern reaches of the disturbance zone (hereinafter "sea turtle nest survey zone") between sunrise and 9 a.m. by qualified individuals who have the ability to distinguish accurately between nesting and non-nesting emergences.

b. If construction is scheduled during the nesting season, then including measures to protect nests and hatchlings found within the sea turtle nest survey zone.

c. Minimizing nighttime construction during the nesting season and designing project lighting during the construction and operational phases to minimize impacts on nesting sea turtles and hatchlings.

3. For projects located in part or in whole within zones 1, 2, 3, 4, 5, 10, 11, 12, or 14 on the Coastal Avian Protection Zones (CAPZ) map, contribute \$1,000.00 per megawatt of rated capacity, or partial megawatt thereof, to a fund designated by the department in support of scientific research investigating the impacts of projects in CAPZ on avian resources.

C. Mitigation measures for significant adverse impacts to historic resources shall include:

1. Significant adverse impacts to VLR-eligible or VLR-listed architectural resources shall be minimized, to the extent practicable, through design of the solar energy project or the installation of vegetative or other screening.
2. If significant adverse impacts to VLR-eligible or VLR-listed architectural resources cannot be avoided or minimized such that impacts are no longer significantly adverse, then the applicant shall develop a reasonable and proportionate mitigation plan that offsets the significantly adverse impacts and has a demonstrable public benefit and benefit for the affected or similar resource.
3. If any identified VLR-eligible or VLR-listed archaeological site cannot be avoided or minimized to such a degree as to avoid a significant adverse impact, significant adverse impacts of the project will be mitigated through archaeological data recovery.

D. Mitigation measures for significant adverse impacts to prime agricultural soils and forest lands shall include:

- 1. Practices and measures to avoid such significant adverse impacts, consistent with the definition of “avoid” set forth in [Insert relevant regulation citation].***
- 2. Practices and measures to minimize significant adverse impacts, consistent with the definition of “minimize” set forth in [Insert relevant regulation citation].***
- 3. Practices and measures to compensate for significant adverse impacts, consistent with _____.***

Consensus results: 10 (fully support) – 17 (support with reservations) - 5 (cannot support)

SME comments:

- I am not sure what was intended to be filled in for Part D 3 above?

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Support is contingent on Workgroups 2 and 3
- Unable to support this now, until all of the mitigation workgroup's work is agreed upon, including the list of functions and values.
- We agree that this clarity in the regulation is needed. But the details are sorely lacking. Those would need to be agreed to before we could support the measure.
- 1) There is a mitigation hierarchy that requires avoidance, minimization, and offsets to occur in that order. This sequence needs to be more clear. 2) The practices used have to actually achieve avoidance, minimization or compensation - we can't support general language that does not specify practices.
- What is meant by "utility poles"? Are these transmission lines? What is meant by certain surface area limit (for example, ESC permits are required for any disturbance of 10,000 square feet or greater - 2,500 in Bay Act localities)?

Concerns/question(s), edits or clarifications needed to move your organization yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- There are too many unanswered questions about compensation required under D.3. There shouldn't be any blank lines. It should at least say something along the lines of "Practices and measures to compensate for significant adverse impacts, as approved by the Department."
- D. 3. is covered under the work of separate workgroup, which has many independent proposals. It may be too difficult to capture the result of WG2+3 in this proposal.
- MAREC Action agrees with this framework generally, although Workgroup 2+3 did not have time to develop the mitigation/compensation proposals and we cannot make a final determination of support without understanding how Avoidance and Minimization would mesh with Mitigation in practice.
- 1. AES CE supports the general concept of providing mitigation measures but cannot fully support without understanding what mitigation measures are being

proposed. 2. AES CE requires additional information of proposed mitigation measures under part D (3).

- SEIA is supportive of CHESSA's comment's regarding unanswered questions about compensation to be in favor. Additionally, SEIA recommends that Section B, Subsection 1 be amended from "all reasonable measures" to "all reasonable, cost-effective, and technologically feasible measures"
- Depends on language of D.3 (currently a blank space).
- Support the framework but lacking sufficient detail to evaluate support of compensation section.
- 1. CHESSA believes that there are too many unanswered questions about the compensation to be in favor. See further comments in the responses to Proposals from Work Groups 2 and 3.
- This proposal is still not well flushed out. Proposed mitigation, and especially compensation, for significant adverse impacts pose significant questions that are not resolved in this proposal. These need to be answered before I can vote my approval.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- 1. Reservations on this item are related to remaining questions/concerns articulated in proposals for avoidance, minimization, etc. that will be referenced here. 2. Editorial suggestions included in proposals related to items that will be referenced in this section.
- Support is contingent of the other workgroups 2 & 3 proposals and contingent upon avoid in proposal 2 disturb in proposal 1, part 1 & 2 with modifications and minimize proposal 3.
- Based on the outcome of Workgroup 2/3, ACP has many reservations about fully agreeing to part (d) without further information. There is no clarity on who is the recipient of mitigation monies, or how that money and will be used. It is unclear whether DEQ will purchase prime farmland, conservations lands, or how that land will be managed. Will the Department of Forestry do the same with forested lands? How much will the amount of compensation be determined?
- Additional discussion needed
- 1. Work is needed to clarify how to pass through the "avoidance and minimization" phase of review in cases where unavoidable impacts exceed identified thresholds (10 acres prime ag. and 50 acres forest). Impact and Compensation metrics are unclear and much too subjective and potentially unrealistic to assess and measure.
- Can support this proposal if: 1) Previous definitions of "disturb," "avoid," and "minimize" suggested in our earlier responses, and 2) Contingent upon agreement of specific recommendations from Workgroup 2&3.
- Cannot be fully comfortable until I see how the definition pieces and this framework fit together.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- N/A

The following proposal was considered by Group 1 and did not achieve consensus. Your feedback will assist the group with further development of these ideas.

WG-1 Avoidance and Minimization: Proposal 8

Potential exception to definition of “disturb:” New utility poles with an aggregate area less than a certain surface area limit.

Consensus results: 6 (fully support) – 16 (support with reservations) - 10 (cannot support)

SME comments:

- Linear infrastructure and their associated disturbance can disturb significant forest ecological functions. Consider looking at area of disturbance in sq ft., acres etc. and the impacts to forest cores.
- "New utility poles with an aggregate area less than a certain surface area limit." not sure I understand this, or what the "certain" limit would be.
- I would consider this potential exception a disturbance.
- Ok, but "area" etc. will need to be tied down?

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Why is this needed?
- Cannot support. These holes are several feet deep, and as was noted during one of Subgroup 1's meetings, there could be 10 of these (or more) on a site. Those are an integral part of the solar facility and should no way be exempted from the definition of "disturb." It does not stand to reason that "install[ing] pilings or structural posts for solar array panels" counts as a disturbance, but creating a much larger hole for utility poles does not. No edits could enable support.
- We don't understand why this is necessary to include as an exemption.
- Still not clear why this is necessary.
- As with previous responses, simplified existing definitions of disturb and exceptions are recommended. No further exceptions are necessary.
- These are a disturbance and should be treated as such. The disturbance acreage threshold is high enough that these sorts of carveouts seem unnecessary.

- That is not an exemption we could support. No changes would allow for us to move on this question.
- Do not support more utility poles or incentivizing more poles.
- Proposal 8: This would exempt new utility poles with an unspecified aggregate area from the definition of disturb. Proposal 1, Part 1, already provides that other than permanent compaction and impervious surfacing are excluded from a disturbance so installation activities are already largely insulated from impacts. This could create additional loopholes for utility poles from the definition of a disturbance.
- How is this tracked, accounted and enforced?

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- The concept of exempting utility poles being is good, but needs to be defined. Consider exempting utility pole impacts less than 1 acre. New utility poles with an aggregate area less than 1 acre are exempt.
- Strike the words "with an aggregate area less than a certain surface area limit."
- Seems as though utility poles, not matter the aggregate area, would disturb where they are located, including the actual pole circumference area and any required ROW.
- 1. AES CE requires clarification as new poles in forested land will require conversion of forested land to place poles within a corridor so this is contradictory with the disturbance definition. 2. AES CE recommends clarifying that the exemption references new poles within prime agricultural soils or removing this exemption as this contradicts the conversion of forest lands.
- Seems a reasonable exception, but what "certain surface area limit" are we talking about? Who would make that determination?
- SEIA is supportive of CHESSA's comments regarding exempting utility poles from the definition of "disturb".
- Probably a de minimus impact with negligible benefit to the developer or the land and a fuss to quantify. Not worth strenuously objecting to and not worth supporting.
- Support the general concept of the exemption, but would need clarification on the surface area limit.
- Without minimum threshold identified, cannot meaningfully weigh in on this potential exception.
- 1. CHESSA supports the concept of exempting utility poles being exempt but the devil is in the details. One CHESSA member observed as follows: Dominion

builds power poles in right of ways all the time through forest to service new customers therefore why should generation be penalized for something which load is allowed to do. The surface limit should be fairly small but on a per acre basis. A Dominion distribution ROW is 30' wide and has poles about every 300 ft, with each pole's permanent disturbance about 2 SF, for a total of approximately 20 SF per acre of distribution line. This should therefore be exempted from the definition of "disturbed" set out above. For transmission lines the ROW is 200' but the pole sizes tend to be much larger than distribution and therefore it more difficult to do an analysis.

- While we generally support exempting utility poles we don't think it should be the only exemption. But in addition this need to significantly address existing practices and more investigation is needed to understand transmission ROW impacts.
- 1. Installation of new utility poles should be exempt from the definition of disturbance. Existing regulatory programs (Erosion and Sediment Control, Stormwater, CBPA) acknowledge the critical and precise nature of this activity and the limited impact on the land surface and surrounding ecosystem. The impact of this activity is limited by its nature and does not require a land area limit. 2. Revise to state that Potential exception to the definition of disturb: Installation of new utility poles.
- ACP notes the Chesapeake Solar & Storage Association's on current exemptions related to utility poles, and supports an approach that does not require generation resources to mitigate in instances where load is exempt.
- Additional discussion needed
- 1. Placement of Utility poles should be unconditionally exempt from the definition of disturbance.
- Hard to agree or disagree with this proposal without the size of surface area defined.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Generally, new power lines within a project fence line will be buried. If overhead lines are used, the installation of new utility poles (in and of itself) is unlikely to create any meaningful disturbance to prime ag soils or forested lands.
- This is an important exclusion in the definition of "disturb" as there are countless farm and forest lands in the state with utility easements running across them, and this is no different.

The following proposal was considered by Group 1 and did not achieve consensus. Your feedback will assist the group with further development of these ideas.

WG-1 Avoidance and Minimization: Proposal 9

Addition of the following to the definition of “minimize:” Continuous purchasing from local agricultural or forest products industries for the operation and maintenance of the project and upkeep of the vegetation at the Site.

Consensus results: 6 (fully support)- 13 (support with reservations) - 13 (cannot support)

SME comments:

- Would agrivoltaics be included in this?
- Not sure of intent. Need more information. Is the intent here is to say that minimizing the impacts to the forest or agricultural products still allows for merchantability?
- This requires extensive economic modeling and analysis to understand the viability of these decisions that need to be addressed in a separate report. Needs to be connected to recommendations from other workgroups. Also need to think about if this should be addressed separately or if this is actually a focus of this HB 206 process.
- I do not consider that appropriate minimization. Perhaps a mitigatory effort?
- Ok, with me. No idea how this would be quantified?

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- WG-2+3 were to determine economic impacts. This proposal only mitigates a portion of value of one resource - a temporary offset that is not permanent. Question of "what is local" (in the county of project; adjacent counties?). Further, what types of materials would qualify? How would DEQ track this?
- Lots of questions about this--first of all, what would the time frame be? How would these purchases actually be continuous? Also, who defines what "local" is? Would these purchases actually make up for lost revenue by local ag and forestry suppliers? The idea of the local agriculture economy is something that

came up in the mitigation workgroup, and that may be a better place to address something like this.

- Workgroup of 2 and 3, they were supposed to work what was economic impact. While we appreciate the concept, this only mitigates a portion of value of one resource so it should be if included a temporary offset and not permanent. Much more discussion around defining local, type of supplies needed and how this could be monitored.
- While the sentiment is appreciated and the impact needs to be addressed, this is an impractical way to address the concern of the long-lasting impact this will have on local forest products economy. Workgroup 2&3 proposals may better address this question.
- This is potentially too many steps removed from mitigating the natural resources impacts particular to the project.
- How would such a requirement/condition be enforced? Outside the scope of local government.
- Clarification that it MAY offset a portion of economic value. This does not address any other impact to functions and values for the resources in question. Further it is likely a temporary offset, given the facility may not return to ag use largely as a result of disturbance that may have occurred during construction.
- SEIA is concerned that this additional definition may be impossible to apply in some cases, and that there remain too many unanswered questions regarding the ability of developers to purchase local agricultural and forest products to support ongoing operations and maintenance. While SEIA is supportive of projects that in turn support local agricultural industries, this addition to the definition of “minimize” as a condition of project development is too
- Language is not clear and it is not immediately evident what the project would need to be purchasing from ag and forest industries. Also, what impact would this minimize?
- need more information to understand request
- Shouldn't field confirmation be required?
- Seems unduly burdensome; are other industries (like real estate) required to continue such purchasing?

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- The concept of providing credit for solar projects supporting the local agricultural or forest products industries is good but needs to be more clearly defined.
- MAREC Action questions the justification and need to minimize or mitigate for voluntary changes to the economic use of a private parcel. In a free market economy, landowners respond to market signals to determine how to make

revenue from their land. If a landowner leases their land (in this context, prime ag soil or forest land) to be developed for solar, it means that they weighed the value of the solar lease revenue to be greater than the revenue they would glean from farming or forestry. HOWEVER, if economic changes are factored into avoidance, minimization, and mitigation, we support this proposal as a way to recognize the benefits of a solar project to the local economy above and beyond lease payments and local tax or payments in lieu of tax.

- 1. AES CE needs additional details on this proposal for example how this action would be quantified to be considered an offset of the impacts to resources within a project site. 2. AES CE requires additional details.
- What this proposal actually means is vague and unclear from this wording. Needs more detail.
- Generally support the concept, but would depend on any thresholds/trigger levels for such purchasing.
- 1. CHESSA believes the devil is in the details and there are too many unanswered questions at this point. We support the concept of providing credit for solar projects supporting the local agricultural or forest products industries. We believe solar projects will continue to support rural and ag in the community.
- We fully support solar projects receiving benefit for supporting ag and forest industries, but this proposal needs a great deal more work to flush out the details and answer many lingering questions.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- While ACP supports this in concept, it is unclear what would qualify as continuous purchases, and how much those purchases would need to qualify.
- Concern is that this only mitigates a portion of the value of one resource so it would only qualify as a temporary offset and not permanent. We also need to better define local.
- Additional discussion needed
- 1. Too much uncertainty is created by this language altogether. As proposed, the regulation will drive industry to pursue alternative permitting approach through the CPCN process.
- I don't believe we can mandate where the products will be purchased. If this were to be adopted we would need to define local, maintenance, which products, which vegetation etc.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Support the concept, but may be too difficult to document/monitor.
- Efforts to support local agricultural and forest industries should be recognized as minimization measures. These efforts will help support and sustain these

industries locally over the life of the project such that an opportunity return to these practices after the project is decommissioned (if desired by the landowner) is further assured.

- Proposal allows local forest/ag interests to benefit and partake from the minimization process, accomplishing the minimization goal and supplying additional economic benefit to the county.

The following proposal was considered by Group 1 and did not achieve consensus. Your feedback will assist the group with further development of these ideas.

WG-1 Avoidance and Minimization: Proposal 10

Amend 9VAC15-60-[XX] addressing analysis of the beneficial and adverse impacts on natural resources to reflect addition of new subsections C (see Avoidance and Mitigation: Proposal 5) and D (see below) addressing evaluation of impacts to prime agricultural soils and forest lands:

D. Analysis of forest lands.

1. Desktop surveys and maps. The applicant shall obtain a forest lands report and map for the project Site generated from [INSERT APPROPRIATE REFERENCE SOURCES], (ii) determine based on such reports and maps any location(s) of forest lands on the project Site, and (iii) overlay such locations on a project Site drawing showing the perimeters of the proposed disturbance zone for the project and the proposed directly impacted area within the proposed disturbance zone.

2. Field confirmation. The applicant may also perform field verification of the presence of forest lands within the proposed disturbance zone at the Site, as indicated in the desktop surveys and maps” which verification must be performed by [INSERT APPROPRIATE QUALIFIED PROFESSIONALS].

Consensus results: 4 (fully support) – 19 (support with reservations) - 9 (cannot support)

SME comments:

- D. 1. insert Conserve Virginia Forest Conservation Values Layer, Ecological Cores. D. 2. suggestion of "performed by" code section § 10.1-1181.8
- I would suggest that WG1 or the RAP conveners get in touch with Dr. Mike Aust at VT (waust@vt.edu) to determine appropriate input on this. He was a listed SME for this RAP.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Does DoF have adequate field staff to fulfill what is proposed? Could licensed consulting foresters perform field visits?
- We would like to see something like this done by VDOF rather than some sort of list of sources or professionals.
- I have changed the Analysis of forest lands with the following word changes denoted by "x".. 1. Desktop surveys and maps. The applicant shall obtain a forest lands report and map for the project Site generated "by the Virginia Department of Forestry" (ii) determine based on such reports and maps any location(s) of forest lands on the project Site, and (iii) overlay such locations on a project Site drawing showing the perimeters of the proposed disturbance zone for the project and the proposed directly impacted area within the proposed disturbance zone. 2. Field confirmation. The applicant "shall" also perform field verification by a forester employed by DOF of the presence of forest lands within the proposed disturbance zone at the Site, as indicated in the desktop surveys and maps."
- Can move to full support with these changes: "D. Analysis of forest lands. 1. Desktop surveys and maps. The applicant shall obtain a forest lands report and map for the project Site generated by the Virginia Department of Forestry, (ii) determine based on such reports and maps any location(s) of forest lands on the project Site, and (iii) overlay such locations on a project Site drawing showing the perimeters of the proposed disturbance zone for the project and the proposed directly impacted area within the proposed disturbance zone. 2. Field confirmation. The applicant shall perform field verification of the presence of forest lands within the proposed disturbance zone at the Site, as indicated in the desktop surveys and maps" which verification must be performed by the Virginia Department of Forestry."
- Would like to know more about the discussion, why this didn't reach consensus, and what resources or professionals were put forward as options for identification and verification.
- Absence of Dept. of Forestry. #1 DOF should develop the reference material. #2 should be a SHALL and require state forester to verify. DOF should be empowered.
- 1. Dominion agrees that an expectation for determining the location of forested lands at proposed project sites is needed. However, further discussion on how appropriate resources would be generated and what the sources of that information would be is critical. This will need to be a resource explicitly developed using appropriate criteria to identify lands regulated under this bill and with the purpose of implementing this regulatory program. Implementation of this section will also require development of criteria for field identifying forested lands regulated under this bill. 2. Unable to provide proposed language as appropriate resource does not exist.
- This appears to be addressing the presence of forest land. It does not address the impacts to the functions and values of forest land the project would have.

Landcover maps are publicly available in VA, so a much simpler criterion would be land that is or had been in forest cover within a certain period from the date of the NOI. HB 206 addresses pre-clearing: 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 § 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.

- Shouldn't field confirmation be required?

Concerns/question(s), edits or clarifications needed to move your organization from yellow or green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Solar developers should be able to use desktop surveys to assess whether the state mandated mitigation will render a solar project unviable. That necessitates sufficient data (available online) in order to make these due diligence determinations early in the development process. Clarification is needed of what governmental resources will be funded and operational in order to perform these desktop surveys, and what costs the solar developer will be responsible for. There should be a prescribed 30-day timeframe for responses from government agencies. "Reference sources" and "appropriate qualified professionals" need to be defined.
- Would like to see expanded local authority to require field confirmation in D(2).
- We request SME input on which reference sources and which qualified professionals are appropriate to assess forest land resources at early stages of project development.
- This seems similar to the manner in which prime agricultural soils would be analyzed. A certified Arborist would be a qualified professional.
- Likely to be supportive, but would want clarity around how / who will generate the maps and conduct site reviews. I would assume DOF.
- SEIA is supportive of comments by CHESSA and ACP that solar developers should be able to use desktop surveys to assess whether the state mandated mitigation will result in the inability of a solar development to proceed. Availability, maintenance, and accuracy of data provided by government or public entities is currently unclear, as is the cost to solar developers to access and utilize this data.
- More clarity on what "forest maps" would be referenced and how a forest would be analyzed in the field would be helpful, as right now these are less defined than the prime ag soils analysis counterpart.
- Generally support the concept, but would need confirmation on the reference sources in D.1 and field confirmation resources in D.2.

- Proposal lacks sufficient detail of sources or appropriate qualifications to allow meaningful evaluation.
- 1. CHESSA agrees with ACP that solar developers should be able to use desktop surveys to assess whether the state mandated mitigation will kill a solar project upfront. That necessitates sufficient available online data in order to make these due diligence determinations upfront. We need clarification of what upfront governmental resources will be funded and operational in order to perform these desktop surveys, and what costs will be assessed to the solar developer? What will be the time frame for responses from government agencies? One CHESSA member requested further clarification on "reference sources" and "appropriate qualified professionals" would be helpful.
- This has potential and we generally support using desktop surveys for due diligence. However, many items like funding these surveys, costs of obtaining these surveys, who are qualified professionals, etc. still need to be answered.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- ACP would like clarification on the reference sources on forested lands, and how those sources have changed and may change over time. Furthermore, it is unclear how much solar developers will be charged to use resources, how long it will take to generate a report and if they will be accessible to the public. Finally, ACP requests clarity on "reference sources" and "appropriate qualified professionals" would be helpful. Would these be state officials or certified contractors?
- This seems like a good idea, as long as the "reference sources" selected are accurate and up to date. Do we have any idea what these might be? We should get the SME's opinion on that, and on who the appropriate professionals would be to field verify in subsection (D)(2).
- Just need more information to fully support.
- Additional discussion needed
- Too much uncertainty is created by this language.
- Difficult to agree or disagree without specification regarding who the reference source or qualified professional should be.
- what is the purpose of field confirmation? what results are expected?

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Suggest "which verification can be confirmed with recent site photographs".
- 1. AES CE recommends Part 1 include the forest conservation mapping application by VDCR and land coverage by USGS. Part 2 should just require professionals familiar with vegetation identification in Virginia. There should be

no need to have a highly restrictive qualification to identify and characterize forest stands. 2. No

- Field confirmation. The applicant may also perform field verification of the presence of forest lands within the proposed disturbance zone at the Site, as indicated in the desktop surveys and maps” which verification must be performed by [Licensed Engineer]. Applicants must use forest land mapping tools and “may” perform field verification. Similar to wetland studies, some level of mandatory field verification may be advisable by a licensed professional. This could also potentially be beneficial to both stakeholders as field studies might contradict the mapping tool assumptions/data or could back it up.

Workgroup 2+3: Mitigation + In Lieu Mitigation

Proposals Achieving Consensus: None

Proposals Not Achieving Consensus

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 1

a. The state shall make available a standardized checklist of functions and values, as determined by this RAP, and access to standardized data to allow developers to conduct an initial high-level desktop assessment to evaluate the potential of proposed the solar project. The initial assessment would be as follows:

- (i) assessing the presence and current condition of prime agricultural soils and forest land;
- (ii) assessing the level of impacts of solar project on each;
- (iii) calculating the credits for avoidance and minimization efforts of solar developer; and
- (iv) establishing objective methods for determining a value proposition for mitigation with creditable, peer-reviewed methodologies.

Consensus results: 19 (fully support) - 12 (support with reservations) - 1 (cannot support)

SME Comments:

- Would there be a variance process (to get credit for innovative things not accounted for in the checklist) or appeals process? Who would be the arbiter?
- Ok with this assuming "functions and values" get adequately defined and referenced somewhere.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- The state, not the applicant, should be fully in charge of assessing the presence and condition of the resources. All state agencies involved should be listed in the steps.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Ensure appropriate state agencies are included in assessment.

- Support the concept of the standardized checklist, however, I am concerned about the number of variables that would have to be considered and over-complicating this process. Lets not lose sight of the fact that the PBR process was designed to provide a streamlined process for siting solar responsibly in Virginia.
- It should be clear that the high-level analysis is not binding and does not limit the final calculations and requirements as the project is refined throughout the PBR process.
- Would depend on the content of the checklist. Also, who establishes object methods for determining a value proposition in subsection (iv).
- 1. Dominion agrees that a simple development checklist is needed. However, because detailed construction means and methods may not be known in the early stages of development, identifying areas of disturbance, avoidance, and minimization measures will be challenging. Taking a conservative approach to this evaluation may result in a financial evaluation that prevents further project development.
- Generally support this, but need more detail. This should be available to localities as well.
- As significant adverse impact is defined by HB206, there is no need for an assessment of the condition of forest land. We do agree that solar developers should have a checklist to assess potential costs prior to undertaking project. We would be in full support of the proposal with the following changes: "a. The state shall make available a standardized checklist of functions and values, as determined by this RAP, and access to standardized data to allow developers to conduct an initial high-level desktop assessment to evaluate the potential of proposed the solar project. The initial assessment would be as follows: (i) assessing the level of impacts of solar project on prime agricultural soils and forest land; (ii) calculating the credits for avoidance and minimization efforts of solar developer; and (iii) establishing objective methods for determining a value proposition for mitigation with creditable, peer-reviewed methodologies."
- Need more detail to better understand this proposal.
- This seems like a good concept. See criticisms of different functions and values (Proposals 14A-14I).
- Consistent with desktop survey language above but would need to be combined with it in the regulation. Term "value proposition" is not clear and a different term should be used. We interpret this to mean the cost to the project?
- Delete (i) from this list, and add "on prime agricultural soils and forest land" to the end of (ii). This should be done by the appropriate state agency as well.
- The initial assessment would be as follows [i] should be deleted and changes to [ii] denoted in "x": (i) [Deleted] assessing the presence and current condition of prime agricultural soils and forest land; (ii) assessing the level of impacts of solar project on "prime agricultural soils and forest land" ;

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Site specific info and potential cost to avoid/minimize/mitigate must be easily understood up front in checklist form.

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 2

In concept scoring criteria should be included in the short checklist so the various functions and values of prime agricultural and forest lands can be easily valued, upon objective data.

Consensus results: 7 (fully support) - 23 (support with reservations) - 2 (cannot support)

SME comments:

- Yes, and how should a project be treated if the objective data and criteria change during the review process? Don't want projects to get held up if new data or criteria are pending, or be expected to change design after checklist submittal (ex: avoid what happened when DEQ did not initially give a grace period and projects that were mid-review were asked to re-engineer.)
- This calculation should take into context functions and values of the forestland and loss of prime agricultural lands.
- Same comment, functions and values must be defined.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Functions and values of contiguous prime agricultural soils and forest lands need to be clearly defined for rapid scoring. Credits should also be clearly defined for the positive environmental benefits that can result from solar projects and the additional management and engineering controls that are used to mitigate impacts.
- While we understand industry's desire to have the mitigation process be short and simple, the actual function of mitigation is to avoid, minimize, or offset a loss of some function and value. We can't support a process that is simple or perceived by industry as fair but does not reasonably do that. Additionally, if by scoring criteria we mean valuing some functions and values over others, then that needs much more detailed discussion. Valuation of functions and values here appears to refer to the cost of mitigation. It may not be possible for the state to provide reliable pricing for all mitigation actions, and prices may vary based on the land values in the geography within which the project is being developed.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Need further clarification on functions and values.
- Calculations on functions and values must be very clear and succinct. May be too difficult for this RAP and/or DEQ.
- Generally support the concept, but need more information on the scoring criteria details.
- Change "valued" to "calculated." Also, this is contingent on the final list of functions and values that the WG decides
- Change from: ...prime agricultural and forest lands can be easily valued, upon objective data. To: ...prime agricultural and forest lands can be easily CALCULATED, upon objective data In concept scoring criteria should be included in the short checklist so the various "functions and values" of prime agricultural and forest lands can be easily "calculated", upon objective data. I am not in agreement on functions and values and would need ongoing conversations. Also, I object to the use of the value and changed it to "calculated."
- 1. AES CE requires additional details in regard to concept scoring criteria to fully support this proposal. 2. AES CE requires additional details. 3. AES CE recommends the RAP review the NYSERDA agricultural technical working group's January 2022 preparation of a scoring criteria - <https://static1.squarespace.com/static/60a2bb02f009ad6b9f6a15f9/t/61e5b380ff063f1e1498ad51/1642443651498/Scorecard-ATWG+1.14.22.pdf>
- Need more detail to better understand this proposal.
- SEIA believes that there remain too many unanswered questions regarding this provision to fully support.
- MAREC Action has many, many questions, including how scoring criteria will be determined, what functions and values will be assessed, and what data will be gathered and presented. We are open to the concept of scoring criteria, pending further details.
- My concern here is that limiting scoring to "objective data" could limit use of empirical evidence (obtained by a site visit, for example) that reflects on-the-ground realities. I would not want this scoring data to be used as anything other than an initial screening tool (i.e., not prohibitive of solar development based on the resulting score alone).

- Seems like a good concept, but what "criteria?" And what "objective data" is being used to value the functions and values of prime agricultural and forest lands?
- Would like more information regarding what "objective" means as far as values.
- Concerned that subjectivity will continue to be a factor in any checklist.
- It should be made very clear that any initial assessments is just a planning tool and not to be used as an exclusionary zoning tool.
- Additional discussion needed
- Too much uncertainty is created by this requirement
- Not enough detail in this proposal to offer full support.
- It is unclear how a positive net difference for mitigation value would be utilized. Mitigation should be required where there is a negative net difference and each project should be evaluated independently. Additional details needed.
- 1. CHESSA believes the devil is in the details and there are too many unanswered questions. We believe that having a checklist would be very helpful, but there are way too many questions about that checklist.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- Support this concept. Note that this is one aspect of a very high level framework that will require significant work to implement. Additional detail on how this aspect of the mitigation program would be implemented would be needed to fully support this proposal.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Regardless of how objective the scoring criteria may be, there should be a challenge and/or check process to confirm applicant submittals of the value of prime agricultural or forest lands.

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 3

Mitigation value should be calculated based on the net difference between current value and post construction value.

1. Current value
2. Post construction value
3. Note: the net difference could actually be positive or negative depending on circumstances

Consensus results: 7 (fully support) - 16 (support with reservations) - 9 (cannot support)

SME comments:

- clarity is needed in what we are we to "value". Is it site productivity? Ecological value? Ecosystem services?
- How you calculate mitigation depends upon the goal of mitigation. Are we are trying to achieve "no net loss" ? If so, then mitigation cannot be 1:1 as this only results in compensation for lost values on site above the threshold, but does not account for losses below 10/50 acres, or losses from other activities, meaning there will be a net loss of functions and values across the Commonwealth.
- Same comment, functions and values must be defined.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal

- Additional details needed for how positive net difference would be considered
- Must include values of HB 206 enactment clause 2.
- This really should include a reference to HB 206's second enactment clause, which lays out exactly the factors which should be considered: "(v) the impact on the local agricultural or forestry economy when such soils or lands are displaced; (vi) the loss of ecosystem benefits; (vii) noncompliance with Virginia's Watershed Implementation Plan III goals on the Chesapeake Bay TMDL; and (viii) noncompliance with other water quality criteria and standards"
- 1. Current value "calculated based on factors in HB206 enactment clause 2 iv-viii"
" 2. Post construction value "calculated based on factors in enactment clause 2 ivviii"
3. Note: the net difference could actually be positive or negative depending on circumstances For reference here are HB206 enactment clause 2 iv-viii: (v) the impact on the local agricultural or forestry economy when such soils or lands are displaced; (vi) the loss of ecosystem benefits; (vii) noncompliance with Virginia's Watershed Implementation Plan III goals on the Chesapeake Bay TMDL; and (viii) noncompliance with other water quality criteria and standards.

- Need more information. How is current and post-construction value determined? Who calculates the value? This is a local function currently that should not be supplanted, eroded or undermined by regulations.
- This needs language that makes very clear "value" refers to functions and values, not economic value only. Required mitigation should be calculated on the net difference between the functions and values of the resources vs functions and values of those resources post construction.
- This should be reworded with changes in "x" and other words deleted but not able to show strike throughs in this format. "Required" Mitigation "should be calculated" on difference between current function and values provided by the resources "verses the post construction value of the site"
- This also needs to take decommissioning activities into consideration. 1. Current value, 2. Post construction value, and 3. Post-decommissioning value.
-

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Net value should be considered for each individual type of natural resources benefit or impact, not aggregated across all impacts.
- Current values and post-construction values must be determined from factors as defined in enactment clause 2 of HB206, including: (v) the impact on the local agricultural or forestry economy when such soils or lands are displaced; (vi) the loss of ecosystem benefits; (vii) noncompliance with Virginia's Watershed Implementation Plan III goals on the Chesapeake Bay TMDL; and (viii) noncompliance with other water quality criteria and standards.
- If solar delivers a net benefit to some function or value, how would the solar project owner be compensated for that benefit? It is not appropriate to require mitigation if there is a net loss generated by solar without also compensating solar for a net benefit.
- 1. AES CE does not feel there are not enough details provided on scoring criteria regarding current value versus post construction value to fully support this proposal. 2. AES CE requires additional details.
- What values are included in the post construction value? Is this value strictly based on site qualities, or does it include other elements, such as off site benefits of the project to a county, to the utility, etc.
- While SEIA is generally supportive of a mitigation value concept, it is unclear how this valuation could be completed objectively given the above proposed calculation. Further clarification on this concept is needed before SEIA is able to fully support.
- ACP supports this proposal contingent on how the values are calculated.
- Seems like a good concept, but when is the post-construction value measured? And who is qualified/permitted to make that valuation? If post-construction value is measured at the end of project life, should it be tied to inflation?
- What if future values change in wrong direction and mitigation costs are undervalued? Who makes up the difference?

- Absolutely agree in concept but the key is value of what? We will need to work through specific examples.
- 1. CHESSA supports the concept here as the solar industry proposed this language. At the same time, CHESSA is concerned about the value proposition which will drive this determination.
- We agree with the proposal that mitigation amounts should consider differences between current and post construction values, but there are many unanswered questions.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- Support this concept. Note that this is one aspect of a very high level framework that will require significant work to implement. Additional detail on how this aspect of the mitigation program would be implemented would be needed to fully support this proposal.
- Additional discussion needed
- Completely unclear what is intended or how to calculate

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Several benefits of solar (fewer fertilizer and pesticide applications; deep-rooted permanent ground cover; pollinator habitat, etc.) would contribute to a positive value of a project.
- Regardless of how objective the scoring criteria may be, there should be a challenge and/or check process to confirm applicant submittals of the value of prime agricultural or forest lands.

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 4

The state-mandated mitigation criteria should be objective, simple, fair, and have a reasonably short checklist so a solar developer can quickly determine in preliminary due diligence upfront whether these state-mandated cost burdens will kill the solar project, or not.

Consensus results: 10 (fully support) - 15 (support with reservations) - 7 (cannot support)

SME comments:

- consider modifying to more neutral language (and more descriptive with regards to "reasonably short")
- Suggest change "kill" to "prevent" or some other term.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Strike "simple, fair" and "quickly" and add language that links feasibility to the project ON THAT SITE.
- The criteria should be objective. Strike short fair and simple. While it may end up as such, the goal should be objective. As well the the wording at the conclusion is offensive and should be modified, replacing with: ...whether the required mitigation would render the project not feasible at the site in question.
- This statement should be reworded with specific words deleted and new words in "x". The state-mandated mitigation criteria should be objective and have a reasonable checklist so a solar developer can determine in preliminary due diligence upfront whether these state-mandated cost burdens will "make the solar project feasible at this location, or not."
- This language is inappropriate for use in regulation.
- This needs to be rewritten. I cannot agree to a statement regarding "state-mandated burdens killing solar projects." This assessment is looking at whether the significant adverse impacts are so significant that mitigation would not be feasible.
- Mitigation criteria should include credits for the positive environmental benefits that can result from solar projects and the additional management and engineering controls that are used to mitigate impacts. Decommissioning should be considered part of mitigation since it is possible to return solar projects to agricultural or forest uses following decommissioning.
- This should reference the specific impacts on prime ag soils and forest lands on the site, not just other requirements that a locality may impose or agreements they have come to with a developer.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Strike and replace with: "Mitigation criteria should be objective, simple, and have a checklist so that a solar developer may quickly determine potential costs and actions of siting at that location in preliminary due diligence."
- Replace "will kill the solar project, or not" with "will make the project economically not feasible".
- There should be no mitigation requirement that "kills" a project. Mitigation costs should be reasonable enough to be affordable to the project, and provide off-setting benefit to the determined impacts.
- This information should be made available to localities. Funding for state-mandated mitigation should not reduce any financial or other benefit provided to localities.
- Support idea that it should be relatively easy for a developer to estimate the mitigation cost of a project in order to avoid committing to a financially non-viable project. Support idea that list should be reasonably simple but don't want to be bound to brevity if that would prevent effective mitigation from taking place. Not sure what simple or fair means in this context, but the mitigation criteria should be designed to avoid, minimize and offset the impacts from the project.
- MAREC Action agrees with the direction of this proposal, but we would need to see specific criteria for mitigation before supporting.
- 1. AES CE does not feel there are not enough details provided on scoring criteria regarding current value versus post construction value to fully support this proposal. 2. AES CE requires additional details.
- Need more info to better understand this proposal.
- SEIA believes that there remain too many unanswered questions regarding this provision to fully support.
- Generally support the concept, but need more info on the specifics.
- CHESSA and the solar industry requested this proposal, but the devil is in the details, so we cannot fully support this proposal at this time.
- Same response as in proposal 3. Still too many questions to be answered.
- Support this concept. Note that this is one aspect of a very high level framework that will require significant work to implement. Additional detail on how this aspect of the mitigation program would be implemented would be needed to fully support this proposal.
- ACP agrees with the concept but the association's support is contingent on how these values will be determined.
- Seems like a good concept, but it is pretty abstract.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Simplicity and brevity are paramount for reducing potential regulatory burden

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 5

Mitigation required by the local zoning conditions and siting agreements that meets the state standards should be counted in the state-mandated mitigation process.

Consensus results: 15 (fully support) - 11 (support with reservations) - 6 (cannot support)

SME Comments:

- What happens if the local definitions or accepted mitigation practices/plans do not meet the definitions or requirements for state? Who arbitrates whether it counts as mitigation?

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Mitigation should apply only to site improvements that address farm/forest loss. Other contributions to the locality in the siting agreement that have nothing to do directly with site impacts shouldn't count towards mitigation of farm/forest loss.
- We can only support with these changes to the wording: Mitigation required by the local zoning conditions and siting agreements that "address the specific impact to the functions and value of prime ag soils and forest land and not other proffers to the locality that are not made on the site" should be counted in the state-mandated mitigation process.
- Who is valuing/assessing? Based on what criteria? Will also need to consider an appeals/dispute resolution process.
- This should reference the specific impacts to the prime ag soils and forest land on the site, not any other requirements by the locality or agreement they have come to with a solar developer.
- Needs more detail. Once again, industry language about state mandates not appreciated. State standards need to be tied back to mitigation requirements pertaining to this section. Finally, change to read: Mitigation required by the local zoning conditions and siting agreements that address the required mitigation under this regulation, should be counted in the state mitigation process.
- Virginia is a Dillon Rule state. This regulation, therefore, must preempt local zoning conditions and siting agreements with respect to significant adverse impacts on prime farmland and forest land as defined in HB206. Credit should only be applicable as envisioned by this regulation and not local agreements.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- any mitigation on local level should replace state-level mitigation to avoid double-mitigation
- MAREC Action agrees that any mitigation required by localities should count toward state-required mitigation, however we would need to see a more detailed proposal to fully support. Companies should not incur redundant or duplicative burdens between the state and local permitting processes.
- 1. AES CE agrees that the local and state process should not duplicate efforts but there needs to be clearly defined details of state standards and roles of the state versus the local where the processes overlap. 2. AES CE requires additional details.
- In concept, I agree; my worry is that some localities may est. mitigation requirements that kill all projects out of hand or are totally prohibitive of solar. I suppose that is a locality's prerogative (insofar as any such conditions/siting agreements don't impede state energy goals). Just flagging as a concern. Perhaps can be addressed via the addendum: "Mitigation required by the local zoning conditions and siting agreements that EXCEEDS the state standards will NOT be counted in the state-mandated mitigation process, but will remain enforceable by localities" (or something along those lines, language needs workshopping).
- Concern this is a way around local standards if the developer feels that the zoning is too restrictive. It might be local standards are that way due to conditions unique to the area and the state version does not take that into account.
- Fully agree with idea, but with no state standards yet we are concerned we might face double jeopardy if state and local require same actions.
- More detail is needed to understand how to apply this metric to the state decision making. The PBR was supposed to remove "discretionary" permitting requirements, yet most of the proposed language associated with HB 206 adds discretionary language to the requirements. This seems to be a fundamental disconnect that may have the un-intended consequence of driving industry away from utilizing the PBR process for State Authorization.
- 1. CHESSA and the solar industry requested this proposal, but the devil is in the details, so we cannot fully support this proposal at this time. We cannot agree to state standards that have not yet been determined. CHESSA agrees with ACP that companies should not incur redundant or duplicative burdens between the state and local permitting process.
- SEIA believes that there remain too many unanswered questions regarding this provision to fully support. As CHESSA points out, state standards regarding mitigation are yet to be determined, thus supporting these requirements prior to the adoption of standards would be akin to "putting the cart before the horse".
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal. However, the question arises as to what those state standards are before agreeing to them.

- Dominion supports the notion that developers do not incur redundant or duplicative burdens between the state and local permitting process. Note that this is one aspect of a very high level framework that will require significant work to implement. Additional detail on how this aspect of the mitigation program would be implemented would be needed to fully support this proposal.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- I recommend adding federal requirements. Solar projects and the companies that develop them should not incur duplicative burdens between local, state, and federal permitting or mitigation requirements.
- Agree, but terms of siting agreements and SUP conditions will not be known until a later stage of development.
- This is a must, and will allow localities to be informed of impacts prior to approval of local zoning or siting agreement.
- Any actions that avoid, minimize, or offset impacts should count as mitigation.
- ACP supports the notion that companies do not incur redundant or duplicative burdens between the state and local permitting process.
- The state should not force developers to repeat mitigation that has already occurred -- this would be burdensome and confusing.

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 6

Assuming that pre-development functions and values are fully assessed and valued, where post-construction activities will improve those functions and values, credit should be given. Similarly, where post-construction activities fail to fully mitigate, that should be reflected in the credit calculation.

Consensus results: 9 (fully support) - 16 (support with reservations) - 7 (cannot support)

SME comments:

- I think credit should only be given for activities above and beyond restoring the site to previous condition.
- The language in the first sentence is difficult. How can you "value values"? Again, this all gets back to appropriate and understood definition of those terms.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- This should not allow excess improvements in one function or value to be credited toward impacts of a different function or value, i.e. Carbon offsets.
- This should not allow for excess improvement toward one function or value to be credited toward impacts to a different different value. As well, to many details missing to support this as written.
- We believe that is should made clear that this should not allow for excess improvement for one function or value and to be credited toward impacts to a different function or values (i.e. carbon). See revised wording: Assuming that pre-development functions and values are "accurately counted, where post-construction activities "will improve those functions and values," credit should be given only "for excess improvement for one function or value not credited toward impacts to a different function or values (i.e. carbon)" Similarly, where post-construction activities fail to fully mitigate, that should be reflected in the credit calculation.
- In this case, credit should only be awarded to those specific mitigation activities that apply to corresponding functions and values. For example, excess mitigation of one function or value should not be counted toward mitigating for other functions and values.
- This appears to be redundant with Proposal 3 but much less clear. If, for example, a site was delivering significant nutrients and sediments to streams per-construction but post construction would no longer do so it can get credit. But this language is rather sloppy and Proposal 3 is better framework.

- Lacks sufficient detail of what post-construction activities would improve functions and values to provide a response.
- Reiterating that values should be based on functions as defined in enactment clause 2 of HB206: "(v) the impact on the local agricultural or forestry economy when such soils or lands are displaced; (vi) the loss of ecosystem benefits; (vii) noncompliance with Virginia's Watershed Implementation Plan III goals on the Chesapeake Bay TMDL; and (viii) noncompliance with other water quality criteria and standards." Further, any credit that would be given within a defined value should remain within that value, not not be permitted to cover potential deficiencies across other values. Trees have co-benefits. Solar panels do not.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- The period of time needs to be considered when assessing impacts from solar projects. Many solar projects are intended for 40 years and are required to develop decommissioning plans to return the land to forest or farming uses. such factors must be considered and impacts should not be treated as permanent if they are temporary. The potential environmental benefits that can result from solar energy need to be fully credited. These including but are not limited to, reductions in pesticide and herbicide use, reductions in nutrient runoff, reduced tillage and erosion and sedimentation, and reduced water use compared to conventional agriculture. By considering both impacts and benefits, the regulations will capture the net effects of a solar project on the land and environment, as well as solar encourage developers to adopt beneficial practices as part of a vegetation management plan.
- If a project fails to "fully" mitigate, does that mean the emphasis shifts to in-lieu-of mitigation (payments) or something else? Not entirely clear what is being proposed. Solar projects should absolutely receive credit in areas where they create benefits over the status-quo.
- Needs to be as tightly prescribed as mitigation banks in Title 62 or transfer of development rights in 15.2-3316.2
- Generally supportive of this, but additional details are needed. To whom is the credit given and by what means? Is it transferrable?
- What is meant by credit? Any mitigation, including in lieu payments, should fully mitigate the calculated impacts. Again, the pre-development functions and values should be considered separately in this calculus.
- 1. AES CE requires additional details regarding the pre-development and post-construction criteria scoring. AES CE believes that pre-construction and post-construction functions and values will be nuanced and this scoring criteria needs

to be fully fleshed out before we can fully support. 2. AES CE requires additional details.

- Need more detail to better understand this proposal.
- Again, SEIA has concerns on whether these values would be able to be determined in an objective manner, thus we cannot fully support until further clarification is made.
- Generally support the concept, but need more details on how functions and values are assessed and valued.
- 1. CHESSA and the solar industry requested this proposal, but the devil is in the details, so we cannot fully support this proposal at this time. CHESSA is concerned about the value proposition which will drive this determination. CHESSA agrees with ACP that throughout the legislative discussion on HB 206, it became apparent that many stakeholders are unaware of the potential ecosystem services benefits provided by solar energy, including but not limited to, reductions in pesticide and herbicide use, nutrient runoff, tillage, and water use compared to conventional agriculture. By considering impacts and benefits alike, the regulations will capture the net effects of a solar project on the land, as well as solar encourage developers to adopt beneficial practices as part of a vegetation management plan.
- Once again we fully support the idea, but it is very clear that solar benefits have not been fully articulated and/or understood by many in this process. We need to make sure all benefits (like BMPs where none now exist) are fully recognized first.
- ACP supports the concept but cannot agree to values that have yet to be determined. Throughout the legislative discussion on HB 206, it became apparent that many stakeholders are unaware of the potential ecosystem services benefits provided by solar energy, including but not limited to, reductions in pesticide and herbicide use, nutrient runoff, tillage, and water use compared to conventional agriculture. By considering impacts and benefits alike, the regulations will capture the net effects of a solar project on the land, as well as solar encourage developers to adopt beneficial practices as part of a vegetation management plan.
- This process needs to be fully thought out and clear for all to understand.
- Additional discussion needed
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- Further work is needed to address the impact and compensation calculus.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- As mentioned previously, several aspects of solar compared to ag or timber operations will result in a net positive value, and should be counted accordingly.
- Throughout the legislative discussion on HB206, it became apparent that many stakeholders are unaware of the potential ecosystem service benefits provided by solar energy, including but not limited to, reductions in pesticide and herbicide use, nutrient runoff reduction, tillage, and water use compared to conventional agriculture and enhanced erosion and sediment control compared to conventional agricultural and timbering practices. By considering both impacts and benefits of solar development, the regulations will capture the net effects of a solar project on the land, as well as encourage developers to adopt beneficial practices for both construction and long term operations of their facilities. This is also an opportunity to recognize the unique nature of solar development, unlike conventional development, that allows the possibility of a return to predevelopment conditions.
- Fully support. I don't think this is likely, but what if post-construction activities improve the functions and values beyond the initial level? Should also clarify that excess improvement regarding one value should not be credited towards impacts to a different value.
- In the case of some agricultural lands, solar development may reduce nutrient runoff or erosion or water use. Mitigation requirements need to fairly balance benefits and burdens of solar development on ecosystem services.

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 7

Mitigation by the solar developer shall be allowed on-site and/or off-site.

Consensus results: 20 (fully support) - 3 (support with reservations) - 9 (cannot support)

SME comments:

- Will there be guidance about how offsite should be valued versus onsite?
- There could be limits placed on where the mitigation can occur in order to maintain ecosystem function in a given area. Examples include within XX distance of the site, within watershed, within VA etc. This is not defined.
- is this true in all cases?
- this is fine
- The question of whether or not on- vs. offsite mitigation is preferable should be addressed.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- How is the end of the duration of an impact established? When the land returns to prior use as a prime agricultural soil or forest? Unclear.
- Offsite is in lieu of. Nothing can get us to agree bc we believe the monetary in lieu of is covered in another section. Mitigation and in lieu mitigation should be kept separate.
- We do not support off-site mitigation. Mitigation should be allowed on-site. Off-site mitigation should be limited to in-lieu fees. In the event there is off-site mitigation, in the event there is a conversion of working forest lands, any additional conserved lands MUST be working forests and allow for forest management.
- Proposal 7: This provision permits mitigation on or offsite. Should there be specificity as to the proximity of the offsite mitigation proposed to the project to ensure local benefits?
- Needs more detail. We support in concept. Onsite mitigation should occur prior to allowance for offsite/in lieu mitigation. We would also like clarification on language that would, where practicable, direct benefit to the impacted community based on location of offsite/in lieu mitigation. This is important for many reasons including environmental justice concerns expressed during the RAP.
- Here is the wording: Mitigation treated separately by the solar developer shall be allowed on-site.
- Too many unknowns at this time to support.

- I need more detail about when, where and how mitigation off-site would be acceptable.
- No

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Where can/will the offsite mitigation take place?
- Mitigation within the locality should be incentivized, perhaps with the following addendum, " ... on-site and/or off-site, preferably within the locality where the disturbance is to occur, where feasible."
- Additional guardrails are needed here to ensure off-site mitigation occurs in relative proximity to the project.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Solar siting opportunities are limited to areas with access to transmission infrastructure, requiring on-site mitigation exclusively would impact the economy of scale for some projects and cause them to fail.
- 1. CHESSA also concurs with ACP's comments on this proposal.
- The siting of solar facilities relies on several factors largely outside of a developer's control. First, facilities are largely constrained by the availability of transmission infrastructure: a project must be located near a high voltage transmission line, and this line must have sufficient injection capacity to enable the solar project to be financially viable. Furthermore, site topography, landowner interest, and ecological factors – such as the presence of endangered species, wetlands, or other sensitive habitat are critical factors. Offsite mitigation for prime soils or forested land, ensures developers have greater flexibility to navigate the myriad of other siting constraints that restrict clean energy deployment.
- The siting of solar facilities relies on several factors largely outside of a developer's control. First, facilities are largely constrained by the availability of transmission infrastructure: a project must be located near a high voltage transmission line, and this line must have sufficient injection capacity to enable the solar project to be financially viable. Furthermore, site topography, landowner interest, and ecological factors – such as the presence of endangered species, wetlands, or other sensitive habitat – can make or break a project. Offsite mitigation for prime soils or forested land – which together total nearly twenty million acres in Virginia – ensures developers have greater flexibility to navigate the myriad of other siting constraints that restrict clean energy deployment. ACP also recommends the proposal note that a combination of on-site and off-site mitigation be acceptable.

- It would be impossible for numerous reasons for all solar mitigation to occur on site. Especially if parties with land impact concerns would prefer for solar to be sited near existing transmission lines, so as to minimize new transmission line construction when possible, there must be reasonable expectations for mitigation given the amount of available land that is available for solar when constrained by transmission line adjacency, flatness, proximity to wetlands or endangered species, and so forth.

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 8

Mitigation onsite and/or offsite should be of similar duration to the duration of the impact. (WG has no consensus on duration of the project or in perpetuity.)

Consensus results: 3 (fully support) - 17 (support with reservations) - 12 (cannot support)

SME comments:

- I think this depends on the nature of the impacts and the resources impacted. It might be necessary to provide mitigation for longer, depending on the temporal aspects of the project and mitigatory efforts,
- No comment on this one. Some impacts will certainly occur with site decommissioning if that occurs and will also require mitigation at the end that would need to continue for several years?

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Rationale for why timing is of such great importance; priority focus should be quality and efficacy of mitigation.
- There is no working definition of "duration of impact." This proposal could lead to enormous uncertainty about the extent of mitigation requirements for any given project.
- it should be tied to the duration of the project
- Dominion proposes that duration of mitigation should be commensurate with the duration of the impact (i.e. the life of the facility). The vast majority of projects are required to return the property to the pre development condition at the time of decommissioning. At that point the future use of the property and the extent to which predevelopment conditions are maintained are no longer the responsibility of the project owner to mitigate for.
- I need more information to better understand this proposal?
- Needs more discussion.
- Proposal is too vague to support and appears to undermine checklist. Non-starter. -
- Consistent with the prior question.
- Too many concerns to address. But one of the main issues is a fundamental disagreement with industry on the duration of impacts of this conversion and whether the construction that occurred will likely preclude the parcel remaining ag or forestal at the end of a project's useful life.

- We cannot agree as this needs much more discussion.
- too many unknowns.
- This requires further discussion among stakeholders. Cannot agree with this concept as drafted.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- "Duration of impact" is too vague and subjective: mitigation should run with the project, since all projects are required to have a decommissioning plan to return them to the current land use. At that time, mitigation is no longer pertinent.
- It is unreasonable to require solar projects to implement mitigation beyond the life of a project, especially because many projects are built on leased land and mitigation beyond the duration of a project would unduly burden private landowners with obligations beyond the term of their lease agreement. MAREC Action believes we could support this proposal to the extent that it means mitigation requirements do not extend beyond project decommissioning. A MAREC Action member company raised a question about whether duration of impact would be differentiated between construction impacts, which would be greater but of short duration, and impacts during operation, which are much less since solar generation is a passive use, but endure for the life of the project.
- We feel strongly that mitigation only lasts for the length of the project life. We can't afford mitigation in perpetuity when projects have a definite lifetime. Finally we think some allowance should be made for relatively short duration of disturbance (construction only) and follow on operations are relatively benign.
- Additional discussion needed. Is "duration of impact" intended to mean "duration of project"?
- It is unclear how a "duration of impact" would be calculated and enforced. This proposal stands in contrast to Proposal 4 of this working group, which stipulates that mitigation measures must be simple and clear. It is important this process focus on the original intent of the legislation: prime ag soils and forested land by asking, can the property can returned to its previous use of agriculture or forested land?
- Depending on the impact, the duration of that impact may require mitigation in perpetuity.
- the following language should be added: "where the impact is perpetual, the mitigation shall also be perpetual." Also, the use of the term "similar duration" appears to indicate that mitigation could be less than the impact; suggest substituting "at least greater than" the duration of the impact.
- While reasonable, this seems problematic. What happens to the offsite mitigation at the end of the project and can it be applied to another project immediately? Is duration of impact assumed to be the life of the solar project until decommissioning?

- 1. AES CE agrees that mitigation should offset the impacts of the project; however, mitigation in perpetuity, especially without having mitigation measures defined, would likely deter all solar project developers from utilizing the PBR process. Mitigation measures would need to be proposed first to determine a reasonable mitigation duration. 2. AES CE needs additional details.
- 1. CHESSA feels strongly that on-site and off-site mitigation should be limited to the duration of the project. In perpetuity is a complete non-starter for the solar industry. CHESSA also concurs with ACP's comments on this proposal. One CHESSA member raised a question about whether duration of impact would be differentiated between construction impacts, which would be greater but of short duration, and impacts during operation, which are much less since solar generation is a passive use, but over the life of the project.
- SEIA agrees with CHESSA and other comments that some type of reasonable timeframe should be applied to this provision, whether that be during the duration of the project or some other timeline that stakeholders have reached consensus on. As written, the current language is non-specific, and any language regarding mitigation "in perpetuity" would represent a major disincentive to develop projects in Virginia.
- It is essential that whatever compensatory mitigation action is taken that it be in effect at least as long as the duration of the impact, however it is not reasonable to assume that all or even the majority of solar projects being built today will not end up being re-powered rather than returning to their pre-development land use. In all other regulatory schemes, the impact is assumed to be permanent, and the regulation may have to make that presumption as well, perhaps with an off ramp for the developer if the project is actually decommissioned and not rebuilt.
- If mitigation is allowed off site it should have limitations and qualifiers.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- Mitigation onsite and/or offsite should be of a similar duration to the duration of the project. Could not support mitigation in perpetuity; that would effectively foreclose these places for solar development.
- 1. The impact and compensation process needs to be transactional and completed as part of the the authorization. Temporal impact and compensation considerations should be a "one time event" transacted at the permit application review and authorization phase.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Mitigation should be limited to the duration of the project, regardless of whether it is on-site or off-site. Mitigation should be in-kind and should not be greater (longer) than the impact. Mitigation in perpetuity is completely inappropriate for temporary impacts such as impacts resulting from a 40-year solar project that returns the land to forest or agricultural uses after decommissioning.

- If project is required to be decommissioned and land returned to pre-development condition, then project should not be responsible for perpetual impact.

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 9

State-mandated mitigation shall be determined on a case-by-case basis.

Consensus results: 7 (fully support) - 13 (support with reservations) - 12 (cannot support)

SME comments:

None

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Onsite mitigation shall be determined on a case by case basis, based on the characteristics of the particular site.
- As worded, proposal 9 is unclear. The process for calculating required mitigation should be consistent across all projects. However, the amount of mitigation required will be different for each project.
- MAREC Action does not have enough information to support this brief proposal. To the extent mitigation is determined on a project-by-project basis there should be guidelines as suggested in WG 2+3's Proposal 4.
- The brevity and vagueness make it unclear what this proposal intends, and it appears to be in contrast to other proposals from this workgroup that mitigation be simple and clear.
- Too vague and undermines checklist. Non-starter.
- This seems in conflict with proposals requiring specificity, checklists, and the ability to predict cost.
- This should read that onsite mitigation should be determined on a case-by-case basis, based on the characteristics and needs of the specific site.
- We support in concept. But not as written. State-mandated term needs removal. Should be changed to read Onsite mitigation shall be determined...based on the characteristics and needs of the site
- [Deleted] State-mandated mitigation shall be determined on a case-by-case basis. [and replaced with] Onsite mitigation shall be determined on a case by case basis based on the characteristics needs of the site.
- Need to understand proposal.
- This flies in the face of a stated intent to have a standardized checklist. Can move to full support with following amendment: "On-site mitigation shall be determined on a case-by-case basis based on the needs and characteristics of the site."

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Each site should be evaluated independently, however, the process should be standardized and as simple as possible. Counterintuitive to Proposal #4 from WG 2+3.
- Generally agree, but it should be based on a prescriptive criteria.
- 1. AES CE believes this proposal is inconsistent with the majority of the proposals included in this document. If this proposal was to be implemented, what criteria would be used to determine case-by-case mitigation be mandated? This proposal requires additional detail. 2. AES CE requires additional detail.
- Would seem to strain state resources and delay development, but also, seems to run in contrary to Mitigation & In Lieu Mitigation Proposal 5. What's the point of standardizing mitigation requirements, only to then return to case-by-case determinations? Can those be left to localities, based on local conditions? Could rewrite: "State-mandated mitigation THAT EXCEEDS STATE STANDARDS shall be determined on a case-by-case basis."
- SEIA believes that there remain too many unanswered questions regarding this provision to fully support.
- N/A
- 1. CHESSA agrees with ACP's comments on this proposal. In addition, a goal of the solar industry is to have simple, objective....See WG 2 and 3 Proposal #4, which seems inconsistent with Proposal #9.
- Way too many questions with a case by case basis opening up specific projects to more scrutiny than others depending simply on opposition.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- Support this concept. Note that this is one aspect of a very high level framework that will require significant work to implement. Additional detail on how this aspect of the mitigation program would be implemented would be needed to fully support this proposal.
- It is unclear what this proposal is seeking to achieve without further explanation or background. ACP did not participate in this subgroup, and the notes do not clearly show how this proposal was put forth.
- Additional discussion needed
- This language creates too much uncertainty, which is counter to the Founding Principal of the Permit by Rule.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal: None

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 10

In addition to mitigation practices, payment-in-lieu should be permitted.

Consensus results: 8 (fully support) - 20 (support with reservations) - 4 (cannot support)

SME comments:

- is this true in all cases?
- Assuming there is an appropriate in-lieu fee program in place that is directed to meet the mitigatory needs of this program.
- Same comment about preference for this vs. direct local on/offsite efforts.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Payment-in-lieu should only be permitted if it is handled completely by a state-agency like DCR. Payment-in-lieu funds should be applied to the highest value conservation lands first. The state should not outsource the management and processing of funds for payment-in-lieu by third parties such as non-governmental organizations.
- Proposal 10: Who will benefit from payments in lieu of mitigation measures? If the mitigation is done at the border with West Virginia, how does that help King George?
- Agree in concept, but only after all onsite measures are exhausted. We also have concerns about mitigation near the impact. Impacted communities deserve to have mitigation in proximity to where the impact occurred where practicable.
- Need to understand proposal.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- In addition to in lieu mitigation, payment in lieu MAY be permitted depending on the impact on site for functions and values.
- MAREC Action supports the concept of payment-in-lieu being authorized in addition to on-site and off-site mitigation practices. We cannot fully support this proposal as we have several remaining questions about which functions and values would be mitigated for, as well as how on-site and off-site mitigation would

interact with in-lieu payments. Flexibility to use multiple methods of mitigation in combination, or in isolation, is strongly preferable.

- 1. AES CE supports the option of payment-in-lieu as a mitigation option but additional details would be necessary. Would this apply to both agricultural prime soils and forest land conservation? If so, could all mitigation for a project come from payment-in-lieu? How would these values vary? Will a mitigation preference hierarchy be developed and where do in-lieu fee programs fit into that hierarchy?
- 2. AES CE needs additional details.
- Who makes the decision to accept payment in lieu of mitigation? We would need to know which entity is authorized to make such a determination (state agencies? the locality? both bodies?)
- SEIA is supportive of CHESSA's comments regarding this proposal. SEIA believes that there remain too many unanswered questions regarding this provision to fully support.
- Will continue to monitor.
- This should probably depend on what the impact onsite is to the specific functions and values of that site. Also, this is pretty clear in the statute, so not sure it's needed to spell out here.
- Agree with concept of using payment-in-lieu but it should be in a hierarchy of mitigation preferences with on-site mitigation, then off-site mitigation, and then payment-in-lieu mitigation.
- 1. CHESSA supports the concept of payment-in-lieu being authorized in addition to on-site and off-site mitigation practices. CHESSA and the solar industry requested this proposal, but the devil is in the details, so we cannot fully support this proposal at this time. CHESSA is concerned about the value proposition which will drive this determination. One CHESSA member raised the question about how a total mitigation package of on-site, off-site and pay-in-lieu would be handled. Would there be a difference in scoring and value proposition? Another set of unanswered questions.
- Generally agree, but more details are needed before we can support this.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- Is this needed? It is clear in the statute. Below are some edits that would make it helpful if determined this is necessary. In addition to "in lieu" mitigation, payment-in-lieu "may" be permitted depending on the impact onsite for functions and "values."
- ACP would fully support the proposal provided it is made clear payment-in-lieu should be reasonable and consistent.
- Can developers escape all mitigation requirements through payment-in-lieu? Because if so, payment-in-lieu will be all that happens and mitigation of these resources probably won't occur. What about a cap on how much payment-in-lieu can be permitted?
- Additional discussion needed. "In addition" and "payment-in-lieu" may be considered contrary statements.

- I support an In-Lieu payment process, there just needs to be more work put into the impact assessment and compensation metrics at this stage, and more clarity on the In-Lieu mechanics.
- Support, but recognizing need for standardization regarding the scale of payment for a project of any given size or affecting X acres of prime ag or forest.
- HB206 requires this, so unsure if it needs to be included. But payment-in-lieu should be permitted.
- In addition to mitigation practices, payment-in-lieu should be permitted after reasonable efforts are made to maximize avoidance and on/off site mitigation. Payment should not be the first choice,
- I would like to see a requirement that avoidance, minimization, and other mitigation opportunities have been fully explored and maximized before turning to in lieu mitigation.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- The siting of solar facilities relies on several factors largely outside of a developer's control. First, facilities are largely constrained by the availability of transmission infrastructure: a project must be located near a high voltage transmission line, and this line must have sufficient injection capacity to enable the solar project to be financially viable. Furthermore, site topography, landowner interest, and ecological factors – such as the presence of endangered species, wetlands, or other sensitive habitat are critical factors. Payment-in-lieu of mitigation for prime soils or forested land, ensures developers have greater flexibility to navigate the myriad of other siting constraints that restrict clean energy deployment.

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 11

After a reasonable period of time, and no later than five years, the state should evaluate the program's effectiveness of mitigation practices and update the program to reflect lessons learned.

Consensus results: 17 (fully support) - 14 (support with reservations) - 1 (cannot support)

SME Comments:

- Will need to define measures of success= what does "effectiveness" mean, and how to determine if the program has been effective. Will need stakeholder buy-in on the definition of effectiveness?
- Evaluation of the site too soon, may not produce the desired results. Suggest defining "reasonable period of time".
- no
- Ok with this, but "mitigation practices" will need to be defined and potentially constrained to some extent?

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- The industry needs consistency and the ability to plan for projects in the future. If the state determines that changes are necessary then they should pursue such changes through the legislative process.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Re-evaluating the process is ok, as long as the agency can not impose additional requirements on a particular project that is already in operation.
- Program evaluation is generally a good thing, as long as it is not retroactive (thereby opening up mitigation agreements for projects that are already under construction or operating). We cannot fully support without understanding the context of an evaluation.
- 1. AES CE supports the program conducting their own internal evaluations and updates, but this should not be applicable to the project that has already conducted pre-construction and post-development evaluations and acquired their permit. This proposal reads as though program changes may be applicable to an existing permit holder and it should be made clear that existing permit holders

are grandfathered in by their existing permit conditions. 2. AES CE requires additional details and clarification regarding this evaluation of the mitigation practices and program updates.

- SEIA believes that there remain too many unanswered questions regarding this provision to fully support. As CHESSA has noted, once a reevaluation is conducted does this trigger an ability to amend these practices? If they are amended, does it impact currently operating developments? Do these amendments have any impact on the values determined in previous iterations of mitigation valuation practices? This is unclear and SEIA needs more clarification in order to fully support.
- Very important to be able to assess the efficacy of mitigation actions and to learn from what works and what does not.
- Need more details on frequency of evaluation and update process. What are the standards against which the program is evaluated?
- 1. CHESSA is concerned about an open-ended study after mitigation is put in place. Does the government have a right to come back after the fact and require additional mitigation? Does the government have a right to change the value propositions after the fact? The devil is in the details and there are too many unanswered questions.
- Too much investment will have been made to have the state come by years later and require new mitigation with what could be brand new requirements not considered earlier.
- Earlier is better. But agree an accounting of the success of general measures, as well as those specific to individual sites, is in order.
- ACP concurs with CHESSA's concerns on open-ended mitigation and the definition of "reasonable," and cannot support without those questions answered.
- Need more information to understand proposal fully.
- Additional discussion is needed. Would this require a separate legislated mandate?
- 1. This just needs clarification that this requirement is a "Program" check up and not an investigation of Project Specific Mitigation effectiveness that would have any project specific implications on applicants.
- Five years is too long. Should be three or even two in view of the speed at which the projects are being done.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Perhaps change "after a reasonable amount of time" to "after a reasonable number of solar projects have been developed" -- given that the efficacy of these mitigation protocols will not be understood until projects have fully gone through the process (or are at least well on their way).
- Fully support, but just curious why 5 years was settled on? Why not 3?

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 12

Through its existing E&S and stormwater programs DEQ regulates active and post-construction stormwater quality and quantity. Therefore, this RAP will focus only on issues that are not covered by these existing programs or regulations.

Consensus results: 21 (fully support) - 6 (support with reservations) - 5 (cannot support)

SME Comments:

- Should consider overall impact of downstream water quantity and quality for project duration. Aquatic habitat, drinking water supply etc outside of site.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- What is the concern being raised here?
- If land disturbing activities is defined more narrowly than in Title 62 then it should not count.
- Existing E&S and stormwater programs do not adequately address all functions and values associated with water quality and quantity; the existing regulations are out of date and have not yet been updated to current standards and it is unclear when that update will be complete.
- Stormwater and Water Quality should always be addressed.
- Stormwater-related impacts to local water quality and Virginia's Chesapeake Bay WIP goals should be considered, but I recognize that we are out of time within this particular workgroup.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- The RAP reserves the right to pull in any storm water measures for credit after they are implemented.
- N/A
- We would want to reserve the right to incorporate future requirements and guidance...
- Through its existing E&S and storm water programs DEQ regulates active and post-construction storm water quality and quantity. Therefore, this RAP will focus only on issues that are not covered by these existing programs or regulations.

[ADD] "The RAP reserves the right to pull in any storm water measures for credit after they implemented."

- We need to make sure all these different programs work together and everyone understands process.
- Requirements must be aligned with one another.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- The existing E&S and stormwater programs are adequate and there is no need to duplicate effort under HB206 or the PBR process.
- 1. CHESSA concurs with ACP's comments.
- Throughout the RAP, the solar industry raised several concerns about "scope creep," as other stakeholders routinely brought up issues not covered by the legislative directive of the RAP, covered by existing regulations/regulatory programs, or currently being addressed in other regulatory forums. It is important to clarify that guidance related to stormwater management and erosion and sediment control is currently being drafted by the Department of Environmental Quality – with the solar industry in mind – thus it would be redundant to cover this issue in the RAP.
- Throughout the RAP, the solar industry raised several concerns about "scope creep," as other stakeholders routinely brought up issues not addressed in the legislation, or currently being addressed in other regulatory forums. It is important to clarify that guidance related to stormwater management and erosion and sediment control is currently being drafted by the Department of Environmental Quality – with the solar industry in mind – thus it would be redundant to cover this issue in the RAP.
- Fully support, and the RAP should reserve the right to incorporate future requirements and guidance.
- Duplicative requirements are self-evidently burdensome.

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 13

Practices undertaken as part of decommissioning may be included and considered part of the “mitigation plan” and, if included, should be valued and added into the determination of credits.

Consensus results: 6 (fully support) - 14 (support with reservations) - 12 (cannot support)

SME Comments:

- is there a need to describe on what time-basis these values will be referenced to? (e.g., net present value, etc.)
- i disagree. i think credits should be given for activities only above and beyond site restoration upon decommissioning.
- Per my comment earlier, I assume that certain practices will have to occur at the end of the project life and would need to be documented as part of the overall mitigation plan.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- This determination needs more fleshing out. Mitigation at the end of the project is not equal to upfront mitigation because there is no way to count them appropriately. This question is being considered by the SCC Decommissioning study.
- Decommissioning practices are separate and distinct from development impacts and the need to avoid, minimize, and mitigate them.
- Need for information to better understand this proposal.
- It is unclear when or under what circumstances decommissioning will occur. Who would control this process and how?
- We're not sure that we can assume that decommissioning of the project is going to reverse the impacts to the site. Still too many unknowns here, especially with the timeframes we are dealing with.
- Mitigation should occur up front, not only after the lifetime of the project. This proposal fails to account for the impacts occurring during the lifespan of the project, prior to decommissioning.
- In concept this may make sense. But there are too many details to agree to this statement as drafted. There would need to be a full accounting of the decommission practice(s) and the level of expected credit before we could agree. At present, there appears to be a disconnect between parties on the level to which a specific site could be restored.
- This determination needs a lot more detail. Mitigation at the end of the project is not equal to upfront mitigation because how do you ensure they will be counted

appropriately. Also, this discussion would be informed with the results of the SCC study.

- Need more information to understand proposal.
- There cannot be a presumption that a site will ultimately be decommissioned. The SCC study on the subject should be conducted prior to any determination made by this RAP.
- Practices undertaken as part of decommissioning may be included and considered part of the “mitigation plan” and, if included, should be valued and added into the determination of credits. The decommissioning will take place decades in the future possibly after numerous change of owners and may not be done well, if at all. The mitigation benefits should accrue concurrently with the project financial benefits. No credits should be given for something so far in the future and so uncertain.
- Any consideration of decommissioning agreements should not be credited against natural resources impacts that occur during the life of the project.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Support the concept of decommissioning requirements being considered in the value proposition discussion, however, the functions and value determinations are concerning, especially when decommissioning plans are typically not finalized until a late stage of development when final design of the solar facility has been achieved.
- Does this mean that impacts that are reversed or otherwise mitigated by decommissioning receive full credit for mitigation? Would those impacts that are fully reversible even be considered a disturbance to begin with? We support the direction of this proposal but would need more details to sign off on it.
- 1. AES CE needs additional details on the scoring criteria of how these practices and functions are being valued before we can fully support this proposal. 2. AES CE needs additional details.
- SEIA believes that there remain too many unanswered questions regarding this provision to fully support. As written, it is unclear when and for what reason credits would be allocated to a company for “practices undertaken as part of a decommissioning”. More clarity on when these credits would be applied or assessed is needed.
- Proposal is reasonable but will require more specificity.
- N/A
- 1. CHESSA supports this concept but again CHESSA is concerned about the value propositions because it will drive the deal.

- This needs to be better fleshed out. Decommissioning could be 30 years in the future. What's mitigated in 2022 can be quite different than what is needed in 2053.
- Generally support, but once again too many details have not been worked out.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- Support this concept. Note that this is one aspect of a very high level framework that will require significant work to implement. Additional detail on how this aspect of the mitigation program would be implemented would be needed to fully support this proposal.
- ACP's support is contingent upon how these values are determined.
- We're going to give up front credit for decommissioning activities that won't take place for another 30 years? What if the developer goes bankrupt? Who is required to ensure that those decommissioning activities take place.
- This concept is supported, but I am not sure this adds any value to the permitting process or impact/compensation as de-commissioning is so far into the future and we're trying to achieve permit authorization in the present.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Management practices and land restoration activities performed or planned as part of decommissioning should be included and fully considered as part of the "mitigation plan" and should be valued and added into the determination of credits.
- Mitigation occurring at any stage of the project should be counted in the mitigation plan.

FUNCTIONS AND VALUES

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 14A Water

F&V include:

- Groundwater infiltration/ discharge Water Quality Protection

Concerns include:

- Functions and values of water are already fully addressed under multiple programs – probably the most so of all functions.
- Much of what folks are concerned about regarding water is covered elsewhere.
- Values that are already considered under other programs should be eliminated, but it would be okay to consider those that have not been addressed.

Consensus results: 6 (fully support) - 10 (support with reservations) – 16 (cannot support)

SME comments:

- This is very general and poorly written. See earlier comments about necessity of defining functions and values. It also appears that basic infiltration/runoff partitioning is being specifically excluded here? However, that probably ties back to the earlier proposal to just stay out of the SWM plans?

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Groundwater infiltration/ discharge and Water Quality Protection are functions and values that are already being addressed as part of the erosion and sediment control and stormwater management programs. There's no need to address them under HB206 and the PBR process.
- Water is already regulated for solar projects and should not be double counted through the HB206 regulations.
- 1. AES CE feels that the function and value of water (1) is addressed under several other state regulatory programs and (2) is not something easily available to evaluate via a desktop assessment or field assessment. 2. AES CE does not feel this needs to be included within this regulatory regimen.

- Water functions are well-covered under existing state regulation, and solar projects are considered land disturbance from a stormwater perspective and follow all of the most stringent regulations in that realm.
- General Comments: CHESSA is concerned that the functions and values computations will be way too complex and makes it nearly impossible to make a “desktop” assessment or even a field assessment to determine how much state-mandated mitigation will be required on any given solar project. In every other state-mandated mitigation program, there is an easy calculation, like in Senator Marsden’s legislation for local government tree ordinance mandates, which had a 10 to 1 ratio: If you take down 10 trees, the developer can be mandated to preserve or plant one tree. As such, while CHESSA recognizes that some of the functions and values are relevant to consider when it come to the impact of a solar project, feels it cannot support the use of the functions and values table to as a metric to impose a cost burden on a solar project through on-site, off-site or pay-in-lieu mitigation through HB 206. CHESSA would also observe no other developer of real property of any kind would be required to assume this type or detailed level of cost burden. There are too many unanswered questions like off-the-wall things like whether Virginia stays in RGGI, or not, and how that would affect the function and values on carbon discussion. The recreational value of hunting is a private decision of a private landowner, as another example. In terms of the value of hunting, landowners often receive \$5 or less per acre from hunt clubs, and leases are regularly handwritten, for one year at a time. So, CHESSA will not be able to support any of the functions and values listed in this table being used to determine the cost burdens to a solar project. CHESSA therefore declines to make individual comments with respect to this proposal under each subproposal.
- Proposal 14: value/benefit of existing ag and forest should include ground water and water quality benefits. Even if other regulatory provisions reduce impacts related to water, this is a significant and justifiable concern of local governments and citizens. As only prime ag is considered for careful analysis, it should be noted that disturbances to other than prime are not subject to the same level of regulation.
- Too complicated, unknown and unanswered questions to agree.
- ACP shares the concerns listed above: this is duplicative to existing policy and inappropriate to address as part of this RAP.
- Need to understand proposal better.
- Additional discussion needed
- Would conflict with prior proposal that mitigation requirements not cover territory already covered by existing regulation.
- agreed- water quantity and quality are managed by separate regulations and programs; inclusion in PBR would create two different standards for handling the same resource with added burden on project development but also possibly creating confusion and conflict between different regulations and programs

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Concerns should not be included in this report to DEQ without further discussion/explanation.
- Quality and quantity of water is already evaluated through other programs. Developers are required to mitigate as needed based on stormwater permitting requirements. Global statement on WG2+3 Proposal 14 A-I: The value assessment for all of the functions and values listed is concerning due to the complexity and subjective nature of assigning values to a specific function of a specific piece of property. This process will be too complex and there are simply too many unknown variables in early stage solar development. I do not support the use of a cost functions and value metric as a way to drive up costs on solar developers and over complicate the process. Lets not lose sight of the purpose of the PBR process, to provide a streamlined process for siting solar responsibly in Virginia. A process this costly and complicated will limit solar energy development, energy independence, and affect electric rate payers across the Commonwealth.
- While I agree that the functions and values of water are already fully addressed under multiple programs, they are not done so effectively so far.
- I agree with this bullet: "Values that are already considered under other programs should be eliminated, but it would be okay to consider those that have not been addressed. "
- SEIA is supportive of CHESSA's comments on this matter. Given the various uncertainties on Workgroup 2+3's subject matter, SEIA declines to comment further on each proposal below ,except in specific instances as noted.
- We support the inclusion of water as a function. However, the concerns should not be listed unless there is some further explanation or discussion. There are also several benefits of including water as a function.
- Water Quantity should be added as a function and value. Disagree with these functions and values already being fully addressed under multiple programs. Even existing programs fail to adequately address these functions and values, such as failing to account for the impacts of climate change.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- Concerns consistent with those listed
- Problem with "concerns" are only listed. "Concerns" should not be included in the report to DEQ without further explanation and discussion.

- Can support but agree with concern #3: "[v]alues that are already considered under other programs should be eliminated, but it would be okay to consider those that have not been addressed."
- This is all too subjective, unnecessary and creates too much uncertainty
- Water impacts unique to the scale of land use change occurring at these sites may not be fully anticipated and covered by existing programs.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- This is absolutely a function of forests that needs to be mitigated for. E and S rules only protect water quality, therefore the function of infiltration will still need to be addressed.
- The list of concerns about what is covered under other programs does not answer whether the functions or values of the resources have been fully mitigated by the requirements of our regulations.
- Concerns have been stated without any statement as to the benefits of this value. The concerns should not be included in the report to DEQ without further explanation of the benefits.
- Water should be included or explain where they are addressed elsewhere.

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 14B Nutrients

F&V include:

- Wet (and dry?),
- Nutrient Removal/ Transformation

Concerns include:

- Uncertain how a project would get a realistic profile of what the nutrient impacts would be

Consensus results: 4 (fully support) - 7 (support with reservations) – 21 (cannot support)

SME comments:

- Not enough context to comment.
- Ok with this; assume it applies primarily to N and P forms?

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Don't understand the proposal.
- Many of the nutrient concerns are already addressed by the erosion and sediment control and stormwater management programs. In this proposal, nutrients are undefined and it is uncertain how a project developer would get a realistic determination of what the nutrient impacts would be. This could be a very costly and time consuming process.
- Considered elsewhere. Global statement on WG2+3 Proposal 14 A-I: The value assessment for all of the functions and values listed is concerning due to the complexity and subjective nature of assigning values to a specific function of a specific piece of property. This process will be too complex and there are simply too many unknown variables in early stage solar development. I do not support the use of a cost functions and value metric as a way to drive up costs on solar developers and over complicate the process. Lets not lose sight of the purpose of the PBR process, to provide a streamlined process for siting solar responsibly in Virginia. A process this costly and complicated will limit solar energy development, energy independence, and affect electric rate payers across the Commonwealth.
- Solar projects with vegetation management plans generally have a positive impact on many aspects of soil health, it isn't clear exactly what this proposal would be measuring. For an example of solar benefits, compared with agriculture uses, see Watson et al. "Modeling the ecosystem services of native vegetation

management practices at solar energy facilities in the Midwestern United States” which finds that solar projects planted with “turfgrass” and “native grassland” improve pollinator supply, carbon storage, sediment export, and water retention compared with agriculture. Link to study:

<https://www.sciencedirect.com/science/article/pii/S2212041620301698>

- 1. AES CE feels that the function and value of nutrients (1) falls under other state regulatory programs and (2) this information is not easily ascertainable from a desktop assessment or field survey. 2. AES CE does not feel this needs to be included within this regulatory regimen.
- Are other industries that cause a land-use change subject to similar requirements? Seems difficult to measure, unduly burdensome.
- SEIA is supportive of CHESSA’s comments on this matter. Given the various uncertainties on Workgroup 2+3’s subject matter, SEIA declines to comment further on each proposal below ,except in specific instances as noted.
- Nutrients, like water, are covered under current DEQ regulations and need not be duplicated.
- Need more details.
- This is too broad of a topic--I don't think we can support its inclusion or comment further without additional discussion.
- 1. One CHESSA member observed that solar projects would likely maintain a higher level of nutrients than when the soils were used for covered crops.
- Proposal 14(B): any impacts to nutrient values result in water quality mitigation hurdles for local governments in the Chesapeake Bay watershed or with other impaired waterways.
- Too complicated, unknown and unanswered questions to agree.
- Concerns consistent with those listed. In addition, if included, this item should be expected to result in a “credit” for solar facilities generally based on a decrease in nutrient runoff from solar sites compared to conventional agricultural or silvicultural sites.
- We support in concept. But we would want the specifics for any proposal. All farms do not use same level of nutrients just as some forests may be better equipped than others at their removal. More work needed.
- Don’t understand the proposal so can’t comment on how to fix it.
- Need to understand proposal better
- Additional discussion needed
- Too subjective, unnecessary and creates uncertainty
- Covered under DEQ stormwater regulations.
- same here, it is already addressed by different permits and regulations required for solar

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Difficult to quantify, but important for Bay TMDL goals.

- Really tending more toward red, but could live with this if others felt they had to have it. Nutrients are a water quality impact, which above we agree not to duplicate. Also, nutrient removal and transformation is a significant function of wetlands, but not of ag lands and not as much of upland forests either and therefore may not be relevant.
- Current nutrient retention by ag and forest lands should be a function and value relative.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- It is unclear which nutrients will be considered, and how. However, ACP acknowledges this is an important consideration of ecological importance, and without further detail on how nutrient impact will be determined, cannot support the proposal. It is important to note that solar would maintain soil nutrients at higher levels than if the land were in production, as nutrient loading in the soil would be higher with cover crops used in solar projects.
- Agreed in theory, but "nutrients" is too broad a category; specific nutrients should be named in regulation.
- Unsure if nutrient falls under ecosystem service benefits as function.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Have the SMEs been asked about "how a project would get a realistic profile of what the nutrient impacts would be?"

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 14C Productivity (Production Export)

F&V include:

- Ability to produce food, fiber, etc. for humans or other living organisms.

Concerns include:

- Solar should not be responsible for food production.
- Who knows what products would be desired at end of project life

Consensus results: 7 (fully support) - 6 (support with reservations) – 19 (cannot support)

SME comments:

- Should be able to consider loss of productivity due to soil removal, uplifted or compacted soils, or water table impacts due to subsoil ripping, water diversion structures sediment ponds/dam removals on a site. All of which could have a negative impact on soil productivity, not necessarily food production.
- Not sure what the bullets on concerns really mean?

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- in the same manner- are we going to distinguish between ag soils in existing use vs not in production?
- Food production seems to be a national, if not worldwide, concern which does not need to clutter-up this PBR. It is too vague and amorphous and will not have clear guidelines.
- This is a non-starter recommendation. In what other case does an industry have to pay for the absence of the prior industry making use of the land?
- Disagree with these concerns.
- € Very difficult to quantify. Global statement on WG2+3 Proposal 14 A-I: The value assessment for all of the functions and values listed is concerning due to the complexity and subjective nature of assigning values to a specific function of a specific piece of property. This process will be too complex and there are simply too many unknown variables in early stage solar development. I do not support the use of a cost functions and value metric as a way to drive up costs on solar developers and over complicate the process. Lets not lose sight of the purpose of the PBR process, to provide a streamlined process for siting solar responsibly

in Virginia. A process this costly and complicated will limit solar energy development, energy independence, and affect electric rate payers across the Commonwealth.

- € Energy, especially carbon-free energy, is equally important to society as food, fiber, etc. In fact, some farm and forest land is used to produce energy (corn ethanol and timber products). The free market will determine the most productive use of land in a given area. Furthermore, HB206 singles out solar and doesn't apply this burden to other sources of land conversion.
- € 1. AES CE finds flaw in making a comparison between the production of energy and the production of agricultural and/or forest products as providing energy to the grid is also a demand provided for human consumption. 2. AES CE does not feel this needs to be included within this regulatory regimen.
- € Solar industry should not be responsible for providing food for people
- € Too vague to support. Uncertain how this would be measured.
- € General Comments: CHESSA is concerned that the functions and values computations will be way too complex and makes it nearly impossible to make a "desktop" assessment or even a field assessment to determine how much state-mandated mitigation will be required on any given solar project. In every other state-mandated mitigation program, there is an easy calculation, like in Senator Marsden's legislation for local government tree ordinance mandates, which had a 10 to 1 ratio: If you take down 10 trees, the developer can be mandated to preserve or plant one tree. As such, while CHESSA recognizes that some of the functions and values are relevant to consider when it come to the impact of a solar project, feels it cannot support the use of the functions and values table to as a metric to impose a cost burden on a solar project through on-site, off-site or pay-in-lieu mitigation through HB 206. CHESSA would also observe no other developer of real property of any kind would be required to assume this type or detailed level of cost burden. There are too many unanswered questions like off-the-wall things like whether Virginia stays in RGGI, or not, and how that would affect the function and values on carbon discussion. The recreational value of hunting is a private decision of a private landowner, as another example. In terms of the value of hunting, landowners often receive \$5 or less per acre from hunt clubs, and leases are regularly handwritten, for one year at a time. So, CHESSA will not be able to support any of the functions and values listed in this table being used to determine the cost burdens to a solar project. CHESSA therefore declines to make individual comments with respect to this proposal under each subproposal.
- € Too complicated, unknown and unanswered questions to agree.
- € Concerns consistent with those listed
- € Disagree with the "concerns" because in 2050 there will be a global food shortage so it should be considered. These concerns present a very one sided picture.
- € ACP is unaware of other industries that are required for mitigating economic impacts from land use changes. Should a landowner growing hay for animal feed, who decides to switch to corn for ethanol use, be required to mitigate for impacts to the livestock industry? It is also worth noting that in addition to food

and fiber, "fuel" is often included when considering the types of production from agriculture. Historically, this has referenced ethanol or biomass production. It is notably absent from this proposal, as solar deployment represents an energy source.

- € Need to understand proposal better.
- € Additional discussion needed
- € Too arbitrary, objective and un-scientific

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- This needs to be better defined. The ability to produce food, fiber, etc. for humans or other living organisms is open to interpretation.
- Food production in and of itself causes disturbance by the nature of its means of production, thus it does not seem reasonable to include it as a means of mitigation and presents it in conflict with other provisions in this proposal.
- This is an understandable metric to pursue, but solar is a considerable "producer" as well. We would fully support this proposal if the production value of solar was also considered and weighed against other "production value."
- Agree that this is a function of ag and forest lands, but valuing it would be very difficult and there may not be standard methods to do so.
- We support this as a function but disagree with the concerns listed. Land productivity is a huge issue as the industry attempts to ensure that global food demand can be met with increasing population.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- Support, but a farm's productivity will be impacted. See Lee Daniels presentation (noting that even with considerable work and soil amendments post-development, the soil will not return to 100% productivity). So, it doesn't really matter "what products would be desired at end of project life." The difference in productivity should be modeled, and the developer should mitigate for that difference.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Productivity is related to how well the site supports vegetation? It is not always food or fiber that we need to consider as it relates to productivity. Prime ag soils

may mean it is especially suited for crops. But it is more to reflect the underlying soil health.

- Conceptual agreement. Continued concerns about listing of concerns in DEQ report without outlining benefits. Local economic values must be included as part of enactment clause 2 in HB206.
- Solar is not responsible for food production, but the decision to make lasting impacts to what may be Virginia's most productive lands should be taken into consideration.

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 14D Wildlife

F&V include:

- Habitat Connectivity

Concerns include:

- HB 206 did not change anything on the wildlife provision.

Consensus results: 7 (fully support) - 8 (support with reservations) – 17 (cannot support)

SME comments:

- No, although I would love to make changes to the wildlife section.
- I am ok with this.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Wildlife Habitat is already evaluated by the PBR program and it is unclear how HB206 or this proposal would change anything.
- Already considered in PBR process. Global statement on WG2+3 Proposal 14 A-I: The value assessment for all of the functions and values listed is concerning due to the complexity and subjective nature of assigning values to a specific function of a specific piece of property. This process will be too complex and there are simply too many unknown variables in early stage solar development. I do not support the use of a cost functions and value metric as a way to drive up costs on solar developers and over complicate the process. Lets not lose sight of the purpose of the PBR process, to provide a streamlined process for siting solar responsibly in Virginia. A process this costly and complicated will limit solar energy development, energy independence, and affect electric rate payers across the Commonwealth.
- Wildlife is already considered under the PBR process and should not be “double-counted” under the forest land portion of this regulation. Furthermore, to the extent that wildlife or conservation functions and values are considered for forest lands, heavily managed timber lands and mono-cultures should not be considered to have meaningful wildlife/habitat values unless there is peer-reviewed science to support it.
- 1. AES CE is concerned about the fact that state listed species are already reviewed under the existing PBR process analysis of wildlife and the amount of questions this raises in regard to how it fits into the mitigation and payment-in-lieu structure. How would a cost be determined and assigned to habitat connectivity? Is this habitat for all species regardless of listing status or only state

protected species? What about the implementation of other required wildlife benefits like wildlife corridors? Would those be considered an offset for mitigation? There are too many questions associated with this topic.

- No
- Wildlife is covered by separate, existing provisions in the PBR.
- Uncertain how to evaluate.
- 1. Just recently, there was an article in the Virginian-Pilot Newspaper quoting the Virginia Department of Wildlife Resources supporting federal legislation that would add almost 900 new species of wildlife to a protected list. This article is attached to these responses. Is every solar developer required to do a desktop survey for these 900 additional species on each solar project? And, even if a solar developer could do that analysis, how does the state mandated mitigation program even begin to apply a value proposition and determine the cost burden to the solar project? Finally, how long does that process take? As we all know, the PBR was intended by the General Assembly to be a streamlined process in the first place?
- Fully covered in other regs.
- Concerns consistent with those listed. Wildlife impacts and mitigation are clearly addressed elsewhere in the PBR regulation. In addition, impacts to protected wildlife are addressed by other laws and regulatory programs.
- ACP agrees with the concepts listed above. The legislature explicitly did not amend the wildlife provision of the permit by rule process in HB206. This is another example of potential "scope creep" from the RAP.
- Cannot support. Agree with the concern that "HB 206 did not change anything on the wildlife provision." So, developers will still have to do that analysis.
- Need to understand proposal better.
- Additional discussion needed
- arbitrary, subjective and creates uncertainty
- Wildlife considerations are already included in the existing PBR process.
- this seems to extend past the intent of HB206; there is a separate PBR amendment proposed which addresses wildlife habitat impacts

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- While HB 206 did not charge us with impacts on wildlife, solar projects without question have an impact on wildlife and their habitat and movement patterns.
- This is somewhat already addressed in the existing PBR regulations.
- Habitat is absolutely a function of forests that should be offset and the existing language is very restrictive. In particular we support mitigation for impacts to

high conservation value forest habitats such as C1 and C2 cores. There is language in the draft regulation published in 2020 but not adopted that speaks to this.

- N/A
- This is likely already being impacted by the loss of prime ag soils or forest land.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- "Concerns included" is not necessary to state and would not support it being included in the report. We believe that the wildlife functions and values may have been additional impacted as a result of the loss of prime agriculture soils and forest land.
- Uncertain that what is contained in previous regulation re: wildlife, the full function and value with respect to corridors and other habitat considerations are not be included.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- The current regulation does not provide for the full range of function and values as it relates to the resources in question.

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 14E Riparian Buffer

F&V include:

- Habitat Water Quality Protection – although retention and establishment of buffers is also a practice the group considered this important.

Concerns include:

- Should not be in addition to mitigation for water quality. No agreement on specs of what constitutes a riparian buffer.

Consensus results: 9 (fully support) - 8 (support with reservations) – 15 (cannot support)

SME comments:

- Riparian forest buffers serve as traffic corridors, roosting and nesting sites as well as temperature control for water. Suggest using "Virginia's Forestry Best Management Practices for Water Quality" Technical guide 2011 for guidance and clarification of what constitutes a riparian buffer and its value and function.
- A robust riparian buffer should be of at least 100' on either side of the water feature (larger if unique wildlife resources included) and comprised of native vegetative cover, preferably native trees.
- I am ok with this; buffers also have considerable esthetic values as well.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Already considered in wetland delineation and permitting process. Global statement on WG2+3 Proposal 14 A-1: The value assessment for all of the functions and values listed is concerning due to the complexity and subjective nature of assigning values to a specific function of a specific piece of property. This process will be too complex and there are simply too many unknown variables in early stage solar development. I do not support the use of a cost functions and value metric as a way to drive up costs on solar developers and over complicate the process. Lets not lose sight of the purpose of the PBR process, to provide a streamlined process for siting solar responsibly in Virginia. A process this costly and complicated will limit solar energy development, energy independence, and affect electric rate payers across the Commonwealth.
- Watershed issues are covered by other regulations.
- 1. AES CE is concerned about the state regulating and considering mitigation for "riparian buffer" which is not defined and no clear definition for how to qualify and quantify this resource. These buffers are typically regulated in specific localities

(i.e. tidewater Virginia under the CBPA). There is not enough information to support this proposal.

- One note, the Colorado Oil and Gas Conservation Commission (COGCC) addresses riparian buffers in the following document:
<https://cogcc.state.co.us/documents/reg/Rules/LATEST/1200%20Series%20-%20Protection%20of%20Wildlife%20Resources.pdf>
- Support mitigation of impacts to hydrologic functions but believe that riparian buffer is redundant with first water quality function and value. Could live with it if people had to have it but don't think its just extra work and we have enough on our plates already.
- N/A
- 1. General Comments: CHESSA is concerned that the functions and values computations will be way too complex and makes it nearly impossible to make a “desktop” assessment or even a field assessment to determine how much state-mandated mitigation will be required on any given solar project. In every other state-mandated mitigation program, there is an easy calculation, like in Senator Marsden’s legislation for local government tree ordinance mandates, which had a 10 to 1 ratio: If you take down 10 trees, the developer can be mandated to preserve or plant one tree. As such, while CHESSA recognizes that some of the functions and values are relevant to consider when it come to the impact of a solar project, feels it cannot support the use of the functions and values table to as a metric to impose a cost burden on a solar project through on-site, off-site or pay-in-lieu mitigation through HB 206. CHESSA would also observe no other developer of real property of any kind would be required to assume this type or detailed level of cost burden. There are too many unanswered questions like off-the-wall things like whether Virginia stays in RGGI, or not, and how that would affect the function and values on carbon discussion. The recreational value of hunting is a private decision of a private landowner, as another example. In terms of the value of hunting, landowners often receive \$5 or less per acre from hunt clubs, and leases are regularly handwritten, for one year at a time. So, CHESSA will not be able to support any of the functions and values listed in this table being used to determine the cost burdens to a solar project. CHESSA therefore declines to make individual comments with respect to this proposal under each subproposal.
- Proposal 14(E): Although as of yet no consensus on riparian buffers, buffering is a significant and justifiable concern of local governments and citizens.
- Too complicated, unknown and unanswered questions to agree.
- Concerns consistent with those listed. In addition riparian buffers and associated F&V are covered under existing regulatory programs.
- This is redundant to existing regulatory policy enforced by the DEQ, including stormwater management, erosion and sediment control, as well as the wildlife provision of the permit by rule program.
- Need to understand proposal better.
- Additional discussion needed

- Feel this is unnecessary to the permit process at this stage of the development. These considerations are better handled at the final design and review stage with actual water quality and quantity metrics based on actual science are evaluated.
- Numerous regulations that solar is already party to cover water quality impacts.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Riparian buffering should be counted towards water quality and not an offset to mitigation for prime farm soil and forestland. There is general agreement on what constitutes a riparian buffer, and then trend is to increase the buffer to 75 to 100 feet.
- Riparian buffers need to be clearly defined, whether they extend 100 feet from the outer edge of perennial streams and 50 feet from intermittent streams, and 25 feet from ephemeral streams. There should be an option for no riparian buffer from ephemeral streams in certain circumstances. Ditches should be clearly excluded.
- What is the impact of monocultured crops (particularly on ag lands) in providing habitat and / or food for wildlife? Given pesticide and herbicide use, and frequent working of ag lands, this seems like a minimal function. We would likely be more supportive of habitat connectivity as a F&V for forested, rather than agricultural lands. Need more information. Riparian buffers should be included (though they may already be given other water quality protection requirements).
- We would support this proposal if credit was given from the numerous other sources of buffers - T&E species, CBPA, etc. all impose their own buffers for other functions. These should be counted towards credit for project buffering and impact reduction.
- These concerns should not be listed in the report unless there is some additional discussion and agreement. This should be included under water quality rather than a mitigation practice to offset the loss of prime ag soils and forest land. Also, there is general agreement on what constitutes a good riparian buffer--75-100 feet.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- Again, we opposed including "Concerns include:" • [DISAGREE and OPPOSE] Should not be in addition to mitigation for water quality. Reason: These acreages should be counted under water quality and not an offset to mitigation for prime agricultural soils and forest land. • [FALSE STATEMENT] No agreement on specs of what constitutes a riparian buffer. Reason: There are

numerous proposals to understand the specifications for a riparian buffer. The trend is to increase these to 75 to 100 ft.

- no opinion

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Supportive of this, but most local land use approvals include stipulations to protect riparian buffers around wetlands, creeks, rivers, and other water bodies, so actual impacts to riparian buffers are likely to be minimal.
- Existing riparian buffers and their value should be considered.
- Riparian buffers are a well understood concept that provide benefits beyond water quality. Needs to included.
- Should absolutely be included as a value. With respect to expressed concerns, DCR and DEQ have standards on what constitutes a riparian buffer. Riparian buffers are a mitigation tool for water quality.

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 14F Carbon

F&V include:

- Carbon already stored in soils and vegetation.
- Annual increment of new sequestration.

Concerns include:

- Questions about accounting for avoided emissions resulting from solar development.

Consensus results: 7 (fully support) - 10 (support with reservations) – 15 (cannot support)

SME comments:

- Cradle to grave assessment of carbon emissions for solar would help.
- This is really vague and does not address current issues with quantification of actual site disturbance impacts on soil OM/C storage and how you actually can quantify C-sequestration rates.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Very difficult to quantify. Global statement on WG2+3 Proposal 14 A-I: The value assessment for all of the functions and values listed is concerning due to the complexity and subjective nature of assigning values to a specific function of a specific piece of property. This process will be too complex and there are simply too many unknown variables in early stage solar development. I do not support the use of a cost functions and value metric as a way to drive up costs on solar developers and over complicate the process. Lets not lose sight of the purpose of the PBR process, to provide a streamlined process for siting solar responsibly in Virginia. A process this costly and complicated will limit solar energy development, energy independence, and affect electric rate payers across the Commonwealth.
- Greenhouse gas emissions reductions from renewable energy are comparatively easy to calculate and account for (by taking the average carbon intensity of electricity generation on a power grid and calculating the avoided emissions impact of replacing that generic electricity generation mix with carbon-free renewable sources). Greenhouse gas accounting for soil and forests is much more difficult to monitor and track, as greenhouse gases that are captured by forests and soils can be reversed. Further, additionality of soil and forest carbon sequestration is difficult to prove (does retaining forest land for carbon purposes in Virginia simply result in another forest, inside or outside of Virginia, being

removed?). Forest and soil carbon sequestration has its place. However, given the urgency needed to address climate change, the permanence and clear accounting of zero-emissions renewable energy should be valued above less certain and reversible carbon emissions reduction measures. Furthermore, it is absurd to force solar projects to mitigate potential losses in forest or soil carbon when fossil fuel producers are allowed to strip mine and burn carbon intensive fuels with no mitigation of the prime ag soils or forest lands they disrupt. Separately, we could support solar project contributions to avoided greenhouse gas emissions as a way to reduce the overall mitigation cost for a project. This requires more detailed discussion.

- 1. AES CE feels that the function and value of carbon sequestration is not easily ascertainable from a desktop assessment or field survey. 2. AES CE does not feel this needs to be included within this regulatory regimen.
- 1. General Comments: CHESSA is concerned that the functions and values computations will be way too complex and makes it nearly impossible to make a “desktop” assessment or even a field assessment to determine how much state-mandated mitigation will be required on any given solar project. In every other state-mandated mitigation program, there is an easy calculation, like in Senator Marsden’s legislation for local government tree ordinance mandates, which had a 10 to 1 ratio: If you take down 10 trees, the developer can be mandated to preserve or plant one tree. As such, while CHESSA recognizes that some of the functions and values are relevant to consider when it come to the impact of a solar project, feels it cannot support the use of the functions and values table to as a metric to impose a cost burden on a solar project through on-site, off-site or pay-in-lieu mitigation through HB 206. CHESSA would also observe no other developer of real property of any kind would be required to assume this type or detailed level of cost burden. There are too many unanswered questions like off-the-wall things like whether Virginia stays in RGGI, or not, and how that would affect the function and values on carbon discussion. The recreational value of hunting is a private decision of a private landowner, as another example. In terms of the value of hunting, landowners often receive \$5 or less per acre from hunt clubs, and leases are regularly handwritten, for one year at a time. So, CHESSA will not be able to support any of the functions and values listed in this table being used to determine the cost burdens to a solar project. CHESSA therefore declines to make individual comments with respect to this proposal under each subproposal.
- Too complicated, unknown and unanswered questions to agree.
- The emissions displacement from solar generation compared to fossil fuels far outweighs the carbon storage lost due to vegetation removal for solar construction. The order of magnitude of this displacement is in the 100,000s MT of CO₂ over the typical lifespan of a typical utility scale solar project. This data can be validated using existing information such as the EPA AVERT tool along with regional carbon storage estimation methodology published by USFS. Any inclusion of this parameter in the mitigation program should be expected to result in a “credit” to the solar facility based on the CO₂ emissions displaced.
- need to understand proposal better

- Additional discussion needed
- This is unnecessary and adds no value to the permitting decision

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Concern is for the finite amount of acreage - we will need forests to meet the net zero requirements. Solar panels will not store carbon or sequester carbon from the atmosphere.
- The carbon function/value needs to account for avoided emissions as a benefit of solar energy production.
- No additional comment
- We would fully support this proposal if the replaced carbon of solar electricity generation is included as a positive value of the project.
- No position
- Our main concern is that forests and farmland sequester carbon, where solar panels do not. We want to ensure we don't lose sight of the role of these landscapes in meeting our net zero carbon goals. This could be included as a function and value, but we also want to ensure that just using carbon values does not mean that other values loss must not be mitigated for.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- Solar is already getting credit for reduced carbon from generation; that needs to offset by the carbon sequestration that is disrupted by the construction and operations. The commonwealth's net zero goal requires adding natural carbon offsets in addition to those emissions that are avoided. Lastly, we object to using carbon offset to meet impacts for other functions and values.
- Solar panels will not store carbon or sequester carbon out of the atmosphere. This should not be utilized as a credit to fill mitigation requirement for prime agriculture soils and forest land. There is only a finite amount of acreage. We will need additional forest lands for other goals set by the Commonwealth.
- It is unclear whether the carbon avoided from solar energy generation is included in this proposal. If not, ACP opposes this proposal.
- We need to eliminate emissions AND conserve the carbon sinks we have. Not eliminate emissions and carbon sinks at the same time.
- Avoided carbon emissions must be included in mitigation calculations in order for CCAN to support this proposal.
- Would need more detail about how carbon would be factored in.
- Dr. Kurt Thelen, Michigan State University Department of Plant, Soil, and Microbial Sciences professor who oversaw recent research into this topic provides the following insight: The study found that one acre of corn can capture 36,000 pounds of carbon per year. The fine print:
 - This figure represents absorption (NOT sequestration) at a single point in time during growing season, when biomass accumulation is at its peak. In other words, this figure does not represent absorption over the entire crop lifecycle.
 - Carbon absorption is short

term, while sequestration is long term. Of the 36,000 pounds, much of it will be released back into the atmosphere during decomposition, consumption, or burning for biofuel purposes. • Corn is often a net emitter. Total emissions produced by corn can be reduced by advanced agricultural practices such as no-till, cover crops, etc. However, as Jordan Macknick, analyst at the National Renewable Energy Laboratory, explains, even when these practices are used, corn can sequester only one ton of carbon per acre. Thus, even with no-till and cover crops, the total carbon sequestration potential of corn is severely limited compared to solar use, especially when considering the ultimate environmental benefit of generating electrical energy without producing greenhouse gas emissions.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- This is a key F&V value. While accounting is less than perfect, it's an important exercise and worth mitigating.
- Carbon sequestration is a critical function of forests and the maintenance of the lands ability to offset carbon emissions is essential to Virginia's ability to achieve net zero carbon goals. Because the impact is the loss of the land's ability to sequester carbon during the life of the project, the calculation of carbon impacts should not be reduced by an estimate of CO2 emissions would have been emitted from a similar amount of fossil generation. Maps of carbon stocking on the landscape as well as estimates of sequestration between 2010 and 2040 can be seen here:<https://maps.tnc.org/resilientland/> Underlying calculations can be made available to all developers to formulate their own estimates of what carbon sequestration would have been but for the project using site specific data on forest type.
- Simply put: this regulation is about the conversion of a finite land resource from one use to another. While solar is undoubtedly important in carbon AVOIDANCE, reducing reliance on fossil fuels for energy generation, solar panels do not capture carbon or store carbon. Once a forest resource is removed, sequestration of carbon is not possible for the duration of the project until decommissioning.

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 14G Recreation

F&V include:

- Hunting
- Hiking / Wildlife Viewing, (likely a very small amount of this on private land)

Concerns include:

- Questions about importance of hunting as a value to DWR.

Consensus results: 4 (fully support) - 10 (support with reservations) – 18 (cannot support)

SME comments:

- Suggest contacting DWR for statistics and advice.
- We have been hearing from our constituents that they are losing lands currently available for recreation (hunting, fishing, wildlife viewing, hiking, etc) to solar. DWR is supportive of opening lands to access for ethical, legal hunting, where appropriate.
- I am ok with this.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Global statement on WG2+3 Proposal 14 A-I: The value assessment for all of the functions and values listed is concerning due to the complexity and subjective nature of assigning values to a specific function of a specific piece of property. This process will be too complex and there are simply too many unknown variables in early stage solar development. I do not support the use of a cost functions and value metric as a way to drive up costs on solar developers and over complicate the process. Lets not lose sight of the purpose of the PBR process, to provide a streamlined process for siting solar responsibly in Virginia. A process this costly and complicated will limit solar energy development, energy independence, and affect electric rate payers across the Commonwealth.
- This is another instance where the work group is attempting to single out solar for mitigation as a response to free market decisions by private landowners to lease their land for solar above other economic activities. If the recreation activities have more value to a landowner than the solar project, they won't lease the land. No other industry is subject to these kinds of comparisons or mitigation. Solar projects already benefit the entire community by paying into local tax coffers or by making payments in lieu of taxes. Sometimes this funds go to recreation facilities or activities, if that's what the community chooses to spend the money on.

- 1. AES CE feels that the function and value of recreation is (1) this information is not easily ascertainable from a desktop assessment or field survey (hunting leases are not public knowledge) and (2) if it is private land, how does that recreational value equate as mitigation due to the state? 2. AES CE does not feel this needs to be included within this regulatory regimen.
- How much hunting is happening in prime ag lands? Or on forested land that is being farmed for timber? Would be more likely to support hunting / recreation / wildlife viewing as a F&V for forested lands, but not for agricultural lands.
- This is a private property rights question, and landowners are the first ones that need to be on board for a solar project. It is their discretion whether to hunt their land, or produce solar energy on it.
- General Comments: CHESSA is concerned that the functions and values computations will be way too complex and makes it nearly impossible to make a “desktop” assessment or even a field assessment to determine how much state-mandated mitigation will be required on any given solar project. In every other state-mandated mitigation program, there is an easy calculation, like in Senator Marsden’s legislation for local government tree ordinance mandates, which had a 10 to 1 ratio: If you take down 10 trees, the developer can be mandated to preserve or plant one tree. As such, while CHESSA recognizes that some of the functions and values are relevant to consider when it come to the impact of a solar project, feels it cannot support the use of the functions and values table to as a metric to impose a cost burden on a solar project through on-site, off-site or pay-in-lieu mitigation through HB 206. CHESSA would also observe no other developer of real property of any kind would be required to assume this type or detailed level of cost burden. There are too many unanswered questions like off-the-wall things like whether Virginia stays in RGGI, or not, and how that would affect the function and values on carbon discussion. The recreational value of hunting is a private decision of a private landowner, as another example. In terms of the value of hunting, landowners often receive \$5 or less per acre from hunt clubs, and leases are regularly handwritten, for one year at a time. So, CHESSA will not be able to support any of the functions and values listed in this table being used to determine the cost burdens to a solar project. CHESSA therefore declines to make individual comments with respect to this proposal under each subproposal.
- Proposal 14(G): scenic value should be a consideration within reason. Viewshed from conservation, historic, and coasts/waterways are particularly significant.
- Too complicated, unknown and unanswered questions to agree.
- The vast majority of solar projects are developed on private land that is not open to the public for recreational purposes. Individual landowners have authority over their decisions on how to use the land or whether to lease or sell it to others. The Solar industry is not responsible for private landowner decisions.
- The public is not entitled to recreate on private land therefore it should not have to be mitigated if no longer allowed. Private land is not equal to public land, which the public is entitled to. If a private landowner decides to allow hunters on their property, and then chooses to develop their property for solar energy, the impact

on the hunters – who do not own the land nor rely on it for their livelihood - should be mitigated by the solar developer? This notion is absurd on its face.

- Need to understand proposal better.
- Additional discussion needed
- unnecessary
- The value of a land for hunting or scenic quality is too subjective to be included in what needs to be a standardized set of mitigation requirements.
- Hunting and hiking on private property is a use that the property owner chose to give up for the benefits of the income from selling or leasing the property. The PBR should have no input on this issue.
- this should only apply to non-private lands

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Agree with F & V since DWR can value hunting impacts to the habitat and local economy (hunting licenses, etc.) should add camping along with hunting and hiking.
- The Recreation function/value (Hunting, Hiking / Wildlife Viewing) needs to be limited to the public as a user. Trying to account for public access to privately-owned land is inappropriate in this context.
- Questions as to how this would be quantified.
- No
- Would actually prefer that this not be included. Most lands are private and not open for recreation. Accommodations for continued use by hunt clubs are already a standard practice. We don't think this is necessary.
- N/A
- This should be included as a function and value--DWR does have values assigned to hunting. The value of hunting, camping, etc is high to local economies. Agritourism has also become a very important value in this sense as well.
- no
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- We agree with including the F&V since DWR does have a value of hunting. We should add an impact to agritourism as well as camping.
- We agree with the value, but camping must be added to the list. With respect to the concern expressed, DWR absolutely has a value associated with hunting not just on local economies (surrounding retailers, restaurants, etc.), but for the Department itself in terms of fees for hunting and fishing.
- Would like more information about how this would be factored in/mitigated.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- This needs a more robust list of individual contributors to functions and values.
- Have seen a couple of solar sites with hunt clubs established on the land. Developers should work to allow hunting activities to resume if at all possible.

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 14H Designated State of Federal Scenic Value

F&V include:

- This applies only to already designated (not eligible for designation) scenic resources (e.g. scenic rivers, byways, national recreation areas)

Concerns include:

- Local scenic values should be determined by local governments;
- State agency should review to determine if there is impact;
- State agency would take into account conditions that were part of a permit at local level to determine if further mitigation is needed;
- Ag and forestry are connected to scenic values via pastoral landscapes and rural economies
- Concern that this sounds unpredictable and subjective;
- Concern that the connection to ag and forestry is not clear

Consensus results: 5 (fully support) - 9 (support with reservations) – 18 (cannot support)

SME comments:

- Question? why pertaining only to areas already designated? Scenic Values change. As an area is impacted by different types of land use, value, aesthetics and importance can evolve.
- I am ok with this.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Global statement on WG2+3 Proposal 14 A-I: The value assessment for all of the functions and values listed is concerning due to the complexity and subjective nature of assigning values to a specific function of a specific piece of property. This process will be too complex and there are simply too many unknown variables in early stage solar development. I do not support the use of a cost functions and value metric as a way to drive up costs on solar developers and over complicate the process. Lets not lose sight of the purpose of the PBR process, to provide a streamlined process for siting solar responsibly in Virginia. A process this costly and complicated will limit solar energy development, energy independence, and affect electric rate payers across the Commonwealth.
- Visual impacts are completely subjective and should not be subject to mitigation. This is a question for local planning and zoning.

- 1. AES CE feels that the function and value of scenic value (1) falls under local regulatory programs and (2) how would an associated mitigation cost be assigned? 2. AES CE does not feel this needs to be included within this regulatory regimen.
- No additional comment
- I don't think that "scenic value" can be adequately and objectively defined - it will always be within the eye of the beholder.
- Not a local function and should not prevent or preclude locals from having conditions.
- General Comments: CHESSA is concerned that the functions and values computations will be way too complex and makes it nearly impossible to make a "desktop" assessment or even a field assessment to determine how much state-mandated mitigation will be required on any given solar project. In every other state-mandated mitigation program, there is an easy calculation, like in Senator Marsden's legislation for local government tree ordinance mandates, which had a 10 to 1 ratio: If you take down 10 trees, the developer can be mandated to preserve or plant one tree. As such, while CHESSA recognizes that some of the functions and values are relevant to consider when it come to the impact of a solar project, feels it cannot support the use of the functions and values table to as a metric to impose a cost burden on a solar project through on-site, off-site or pay-in-lieu mitigation through HB 206. CHESSA would also observe no other developer of real property of any kind would be required to assume this type or detailed level of cost burden. There are too many unanswered questions like off-the-wall things like whether Virginia stays in RGGI, or not, and how that would affect the function and values on carbon discussion. The recreational value of hunting is a private decision of a private landowner, as another example. In terms of the value of hunting, landowners often receive \$5 or less per acre from hunt clubs, and leases are regularly handwritten, for one year at a time. So, CHESSA will not be able to support any of the functions and values listed in this table being used to determine the cost burdens to a solar project. CHESSA therefore declines to make individual comments with respect to this proposal under each subproposal.
- Too complicated, unknown and unanswered questions to agree.
- ACP shares the concerns listed above. Federal, state, and local jurisdictions cannot designate private land as a scenic resource, limiting the land owner's ability to develop it or sell it. That encroaches on private property rights. Again, the value of looking at a field of soybeans vs. field of solar panels is subjective.
- Don't designated state and federal scenic resources already have protections? If we're talking about "designated state or federal scenic value," why is local scenic value relevant? Agree with the last two concerns: "connection to ag and forestry is not clear" and "concern that this sounds unpredictable and subjective."
- need more information to understand
- Additional discussion needed
- unnecessary
- Same concerns as prior proposal -- to subjective to be included in what must be a standardized checklist of requirements.

- concern over subjectivity; this usually also gets addressed on local level
- Concerns consistent with those listed

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Don't think the concerns should be included.
- This needs to be more clearly defined. Consider the following: This applies only to resources that are already designated (not eligible for designation) state and federal scenic resources (e.g. scenic rivers, byways, national recreation areas) and not nearby areas that are themselves not designated scenic resources.
- No
- Support but very complex to do, especially since expectations of scenery tend to shift over time.
- N/A
- We do not agree with the concerns raised, and they should not be included in the final report without further discussion and agreement.
- Inclusion of certain values will depend on how mitigation overall is determined, i.e. whether scenic value mitigation could be used for impairments to water quality values.
- Have issue with term already issued. The process can be time consuming and tedious for designation. A viewshed could be important but not designated yet. Needs to be a reasonable middle ground here.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- Don't agree with concerns or including the "Concerns include."
- Trees are the answer.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- State responsible to state and or federally recognized resources.

WG-2+3 Mitigation and In Lieu Mitigation: Proposal 14I Rural Economy

F&V include:

- Value chain created by the production, sale, and processing of what the land generates and the quality of the soils, Inequities created by economic transition.

Concerns include:

- Development pressures (including solar) can put pressure on ag/forestry and can push them out of that county, so preserving rural economy with ag/forestral uses is important;
- Reliance on associated industries at local level are significant (jobs (loggers-sawmills-foresters-fencing-etc), taxes, income); between harvesting are other uses/impacts (agroforestry, agritourism, etc.);
- Concerned that conversion to solar is not reversible if soils are compacted and not possible to return to rural economy; would also impact ability to attract new forest and ag industry as lands are “parcelized”;
- Could be considered an “opportunity cost” of disproportionate impact on rural communities/ EJ/ adding to or correcting historical wrongs/ as well as attributes of adding to resilience;
- Possible that there is a net plus to the local economies;
- VA is about to experience one of largest conversions of land ever experienced in areas not anticipated or planned for, and state needs to at least be aware of trade-offs in push for alt energy and highlight that this is an unknown, and should be highlighted for GA to consider about how state can address impacts
- Concern about how the state would value or assess impacts of solar facility on rural economy: would not want solar to be responsible/ assessed for impacts of development;
- Solar wants to work with landowners to respect long-term property rights, viewsheds;
- DEQ or DOE should not be charged with trying to come up with mitigation for this;
- The PBR process needs to have an objective, simple and clear checklist to enable solar developers to make decisions;
- Are there studies of land conversions in other parts of nation that could be useful for determining impacts; but what is occurring here will be far more rapid than other conversions (in shorter timeframe);
- Net positives would need to be accounted for as well in this accounting;
- DOE could look at this and track this issue in its reports going forward;
- Important to include in RAP report that would be important to tap into economic expertise in state agencies to better understand this issue

Consensus results: 8 (fully support) – 7 (support with reservations) – 17 (cannot support)

SME comments:

- DOE is not recommended as best practice to refer to the Virginia Department of Energy. The full name or 'Virginia Energy' is preferable.
- I am ok with this being considered within F&V; best of luck in getting any level of consistency and compromise on "concerns".

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- This proposition is inappropriate and would be too complicated to implement. There is no way to rapidly or reliably assess the impact to the rural economy.
- Too many variables to quantify. Global statement on WG2+3 Proposal 14 A-I: The value assessment for all of the functions and values listed is concerning due to the complexity and subjective nature of assigning values to a specific function of a specific piece of property. This process will be too complex and there are simply too many unknown variables in early stage solar development. I do not support the use of a cost functions and value metric as a way to drive up costs on solar developers and over complicate the process. Lets not lose sight of the purpose of the PBR process, to provide a streamlined process for siting solar responsibly in Virginia. A process this costly and complicated will limit solar energy development, energy independence, and affect electric rate payers across the Commonwealth.
- MAREC Action questions the rationale and need to minimize or mitigate for voluntary changes to the economic use of a private parcel. In a free market economy, landowners respond to market signals to determine how to maximize revenue from their land. If a landowner leases their land (in this context, prime ag soil or forest land) to be developed for solar, it means that they weighed the value of the solar lease revenue to be greater than the revenue they would glean from farming or forestry. No other industry, to our knowledge, has to compensate for the economic activity it displaces on private land.
- 1. AES CE feels that the function and value of rural economy falls under local regulatory programs and addressed through the state 2232 process for localities.
2. AES CE does not feel this needs to be included within this regulatory regimen.
- SEIA notes that "value chain" is not an appropriate area for regulation as described, and may be better suited to separate regulation or investment. Additional comments are as follows: i) SEIA is unaware of any fact-based evidence for the claim that solar pressures other uses in the same area. Without this evidence SEIA suggests that this concern be struck. ii) If "opportunity cost"

should be considered for solar projects, than SEIA suggests that it should also include existing EJ impacts due to existing energy production (fossil, biofuels, etc.) iii) As many stakeholders have demonstrated, there is significant evidence in other states what the “trade-offs” might be to states and communities that develop clean energy. This is not an “unknown”.

- While rural economy is a very important value, it will be extremely difficult to assess. We suggest that the complexities of impact to local economy might best be addressed at the local level rather than as part of the PBR.
- General Comments: CHESSA is concerned that the functions and values computations will be way too complex and makes it nearly impossible to make a “desktop” assessment or even a field assessment to determine how much state-mandated mitigation will be required on any given solar project. In every other state-mandated mitigation program, there is an easy calculation, like in Senator Marsden’s legislation for local government tree ordinance mandates, which had a 10 to 1 ratio: If you take down 10 trees, the developer can be mandated to preserve or plant one tree. As such, while CHESSA recognizes that some of the functions and values are relevant to consider when it come to the impact of a solar project, feels it cannot support the use of the functions and values table to as a metric to impose a cost burden on a solar project through on-site, off-site or pay-in-lieu mitigation through HB 206. CHESSA would also observe no other developer of real property of any kind would be required to assume this type or detailed level of cost burden. There are too many unanswered questions like off-the-wall things like whether Virginia stays in RGGI, or not, and how that would affect the function and values on carbon discussion. The recreational value of hunting is a private decision of a private landowner, as another example. In terms of the value of hunting, landowners often receive \$5 or less per acre from hunt clubs, and leases are regularly handwritten, for one year at a time. So, CHESSA will not be able to support any of the functions and values listed in this table being used to determine the cost burdens to a solar project. CHESSA therefore declines to make individual comments with respect to this proposal under each subproposal.
- Too complicated, unknown and unanswered questions to agree.
- Concerns consistent with those listed
- ACP shares the concerns listed above. These considerations are taken into account by the host locality.
- The concern "that conversion to solar is not reversible if soils are compacted and not possible to return to rural economy" isn't entirely correct. Lee Daniels noted in his presentation that while prime ag lands don't return to 100% productivity, they can be brought back to around 75% productivity with significant work and soil amendments. With the increase in tax revenue and the up-front payments that a lot of these projects offer, it is possible that there is a net plus to local economies. What then? This category seems like a hard one to quantify, regulate, and mitigate. The PBR process does need to have an objective, simple and clear checklist to enable solar developers to make decisions.
- too many unknowns, need more information
- Additional discussion needed

- borderline ridiculous
- Listed concerns reflect CCAN's position on this issue. The locality already has the power to make a determination on the relative value of a given solar project vis a vis other potential economic uses.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Don't agree with the concerns.
- No additional comments
- This proposal really needs a lot of objective, agreed-upon criteria to be supported. Solar brings a lot of diffuse jobs as an industry, not just to one site (very similar to forestry.)
- N/A
- We agree with this as a function and value--switching one form of economic activity for another absolutely impacts a local economy. However, we disagree with the list of concerns that are stated here.
- This should be linked to the local agricultural or forestal economy, not the broader term of rural economy. In other words, donation to local fire department of a rural locality doesn't necessarily support the ag or forest economy.
- [Add to F&V]: The impact on the local agricultural or forestry economy when such soils or lands are displaced Don't agree with including the "concerns include" statements. This function and value on the forestry side is flooding the market with timber or residual materials which will impacting pricing of lumber and residual materials.
- Enactment clause 2 of HB206 requires mitigation for: "(v) the impact on the local agricultural or forestry economy when such soils or lands are displaced." For forestry, there are both short and long term concerns. In the short term, the harvesting of trees for solar development at its current pace is creating a glut of wood available for purchase in existing markets, depressing the price for wood fiber. Long term, there is concern about the availability of fiber from working forest lands and prospective economic and employment impacts in local, rural communities.
- agreed in general although concerned about implementation

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- This is a long range concern that should absolutely included.

- I agree that this is an important function and value to consider. I also agree that there need to be clear limits to it's calculation to keep the exercise manageable for all involved.

Parking Lot Proposal

There were a number of questions and issues that were not able to be discussed in the time given. These are examples of questions that will need to be resolved in future discussions. Group 2-3 requests that you please add any additional questions that you believe should be included for future discussion.

- What would be the proposed sources and uses of funds in any such mitigation fund;
- What other parties would be required to contribute to this mitigation fund;
- What is the desired amount of annual cash flow;
- What should be the credits for solar environmental benefits;
- What should be the credits for solar improving site conditions, wildlife protection, buffers, preservation of prime agricultural soils and forest lands; improvement of water quality;
- What is the governance for making decisions about the compensatory mitigation fund;
- What else?

SME comments:

- What is the goal of mitigation (no net loss)? How do we draw the line between avoidance and minimization VS. mitigation?
- How would such a fund be structured and managed? How much added resource would that require for the empowered agency(s)?

Do you have any comments, concerns, or suggestions in response to Workgroup 2+3's parking lot space?

- Payment-in-lieu should only be permitted if it is handled completely by a state-agency like DCR. Payment-in-lieu funds should be applied to the highest value conservation lands first; Virginians should get the most bang for their buck. The state should not outsource the management and processing of funds for payment-in-lieu by third parties such as non-governmental organizations or not-for-profit organizations. The state should hire additional staff in the agencies that review PBR applications for the purpose of supporting the PBR program.
- Global statement on WG2+3 Proposal 14 A-I: The value assessment for all of the functions and values listed is concerning due to the complexity and subjective nature of assigning values to a specific function of a specific piece of property. This process will be too complex and there are simply too many unknown

variables in early stage solar development. I do not support the use of a cost functions and value metric as a way to drive up costs on solar developers and over complicate the process. Lets not lose sight of the purpose of the PBR process, to provide a streamlined process for siting solar responsibly in Virginia. A process this costly and complicated will limit solar energy development, energy independence, and affect electric rate payers across the Commonwealth.

- No specific comments, but clearly the entire purview of Workgroup 2+3 (mitigation) needs more discussion. This was probably the most complex work group, and we think the work group members did what they could given the time available to them in the RAP.
- What is the proposed mitigation preference hierarchy? (on-site, off-site, in-lieu-fee programs, etc.)
- The questions above are significant and important - this topic needs to be further studied and expounded upon before advancing into legislation. We would propose to delay the implementation and iron out these details.
- We agree that there will need to be an in lieu fee fund and there have to be rules for it. (What is the governance for making decisions about the compensatory mitigation fund) Also it will be critically important for there to be verified practices for mitigation (i.e. carbon impacts) to ensure that impacts actually are being offset.
- Air quality should be discussed as a function and value. The forestry sustainability fund should be included as a potential place to deposit funds.
- As stated previously, CHESSA is concerned that the functions and values computations will be way too complex and makes it nearly impossible to make a “desktop” assessment or even a field assessment to determine how much state-mandated mitigation will be required on any given solar project. CHESSA will not be able to support any of the functions and values listed in this table being used to determine the cost burdens to a solar project.
- One question would be how is the locality and resident protected at the end of life or if a problem occurs?
- We need significantly more information to answer this.
- Comment on overall concerns related to Mitigation Proposals: The RAP workgroup was able to formulate the reasonable beginnings of a mitigation program framework. However, the establishment of a robust, reliable program that can be depended upon for making critical business decisions will take significantly more work. Under the wetlands mitigation program, for example, four years of deliberation and public input were required to establish a final regulation around equivalent standards and criteria for mitigation banks, in-lieu fee programs and permittee responsible mitigation. Additional discussion, evaluation, research, and development is required before a regulation can be established and implemented to ensure a balanced program and that the development community will have an appropriate level of certainty around the impact of these requirements.
- We believe that air quality as a value not discussed and needs to be. A place that the mitigation in lieu funding could be deposited into the Forestry Sustainability Fund or the Reforestation of Timberlands fund or the Hardwood Initiative fund.

- Wouldn't the funds for the mitigation fund be paid by the developer? Why would other parties be required to contribute to this fund, which is specific to solar developers? The desired annual cash flow seems like it will be dependent on the annual impact to farms/forests.
- Additional discussion needed
- Two additional notes: 1) MISSING VALUE: Air quality is NOT contained in the proposed ecosystem service values and MUST be. This includes cleaning particulate matter, ambient temperature reduction, and oxygen production. 2) The newly created Forest Sustainability Fund could serve as a mitigation fund for forest loss resulting from solar development.
- The proposed sources would be the solar projects and any similar energy projects. The uses of funds in any such mitigation fund should be determined by the legislature. Other parties required to contribute to this mitigation fund would be other similar energy projects. Cash flow depends on the number of approved projects and the values applied. (What should be the credits for solar improving site conditions, wildlife protection, buffers, preservation of prime agricultural soils and forest lands; improvement of water quality) Moot question because that would in fact be already included in the mitigation plan.
- There should be a strong nexus between the use of funds and the impact being mitigated through in lieu payments.

Workgroup 4: Significant Adverse Impact Under 50/10

Proposals Achieving Consensus: None

Proposals Not Achieving Consensus

WG-4 Significant Adverse Impact: Proposal 1

Request that the workgroup convened to support Virginia Cooperative Extension with developing a map or repository of prime farmland (HB894 § 3 / 2022 Acts of Assembly Ch 488) propose and consider a clearly defined method for an optional field verification of the presence of prime agricultural soils.

Consensus results: 22 (fully support) - 6 (will support with reservations) – 4 (cannot support).

SME comments:

- As currently convened, the HB 894 workgroup does not have the technical expertise for the task of designing a field verification process. That is outside the scope of the HB 894 workgroup. Instead, recommend additional staff at VDACS or other state agencies to design a field verification process.
- Per WG 1, this is best confirmed onsite by an appropriate state or national certified or licensed professional soil scientist.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Nothing mentioned about forests.
- There is nothing about forests included here--it only talks about prime ag soils.
- Very concerned that nothing is included about forests Significant adverse impact <10 acres ag soil/50 acres forest or [refer back to HB206 language] "not enrolled in a forest land use assessment program": Proposal 1 Request that the

workgroup convened to support Virginia Cooperative Extension with developing a map or repository of prime farmland (HB894 § 3 / 2022 Acts of Assembly Ch 488) propose and consider a clearly [Covered in Workgroup 1] defined method for an optional field verification of the presence of prime agricultural soils

- Specific to this proposal: it contains nothing about forests or forest mitigation.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- There should be a lower limit of 1 acre such that impacts less than 1 acre are not assessed. The field assessment needs to be clearly defined so that results can be duplicated. In other words, a solar developer should theoretically be able to hire a consulting firm to perform the site evaluation and later hire a different consultant and get similar results because the process and procedures are clearly defined. The field assessment needs to be something that can be performed relatively quickly
- MAREC Action supports the field verification method proposed in Avoidance and Minimization Proposal 5. USDA prime farmland maps, by themselves, do not have the level of data granularity necessary for the purposes of HB206.
- Deferring to the study is innocuous, but PBR SWAG does not have the authority to direct that group to do anything.
- concern that this proposed language is inconsistent with the clear statutory text making USDA the arbiter of prime ag soils.
- Dominion agrees that a technical guidance for field verification of the presence of prime agricultural soils is critical to the implementation of these requirements. However, this should be a tool associated with overall identification of the location of prime agricultural soils on the project site and where those soils will be disturbed rather than an effort associated with projects under the thresholds for significant adverse impact. The establishment of a workgroup to define when significant adverse impacts occur to prime agricultural soils and forested areas under the thresholds defined by the regulation extends beyond the scope of the regulatory mandate. The concept of defining impact thresholds below which impacts are considered “de minimus” is very common throughout regulatory programs. Projects that are able to maintain impacts below the applicable thresholds should not be required to perform additional analysis. This will incentivize projects to reduce impacts to levels below regulatory thresholds and reduce the regulatory burden on smaller projects that are most likely to be able to stay under thresholds. These small projects are often most vulnerable to the additional cost burden associated with mitigation.
- This was also discussed in other workgroups. Please see related comments. But in general, field verification should be limited to a determination if the resource is

present and should be conducted or verified by the state agency or using state agency protocols.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Fully support, but will they have adequate time to do this? They need to submit their report by December 1, 2022. Could we seek an extension for that group from the legislature?

WG-4 Significant Adverse Impact: Proposal 2, Option 1

Context/Rationale With respect to identifying significant adverse impacts from projects disturbing less than 10 acres of prime agricultural soils or 50 acres of contiguous forestland, Workgroup 4 identified a number of goals, including (i) a clear threshold that solar developers can consider during the planning process to incentivize limiting impacts to prime soils and forested land;

(ii) consideration of the current ecological value and ecosystem services of the land to be disturbed, particularly if that land has been identified as having high ecological value; (iii) use of existing tools and consultation opportunities within the PBR process; and (iv) the ability to field verify or ground truth any maps or tools used. Based on these goals, Workgroup 4 singled out two state models that identify priority lands for conservation: the Natural Landscape Assessment (VaNLA) conducted by the Virginia Natural Heritage Program (VNHP) and the Forest Conservation Value (FCV) model.

VaNLA “is a landscape-scale geospatial analysis for identifying, prioritizing, and linking natural lands in Virginia.” Patches of natural land, or ecological cores, are mapped and prioritized based on the core’s ecological integrity score. “In general, larger, more biologically diverse areas are given higher scores. Scores are enhanced if the core or habitat fragment is part of a larger complex of natural lands. Scores also are increased for those cores and habitat fragments that contribute to water quality enhancement.” Scores are further “classified into five categories of ecological integrity: C1 - Outstanding; C2 - Very High; C3 - High; C4 - Moderate; and C5 - General.”

FCV “is a tool designed by the Virginia Department of Forestry (VDOF) to strategically identify the highest priority forestland for conservation in Virginia. The intent is to maximize the efficiency of limited resources by focusing conservation efforts on the highest quality, most productive, and most vulnerable forestland statewide.” The model considers 6 components (forested blocks; forest management potential; connectivity; watershed integrity; threat of conversion; and significant forest communities and diminished tree species) to rank forestland from 1 (lowest) to 5 (highest) in forest conservation value.

Workgroup 4 proposes to further define “significant adverse impacts” by presuming that projects disturbing less than 10 acres of prime agricultural soils and less than 50 acres of contiguous forest lands will, nevertheless, have a significant adverse impact if the project disturbs land identified as high value by the VaNLA or FCV models. The proposal allows for this presumption to be overcome if further analysis by VNHP or VDOF verifies that the land has since undergone permanent land conversion. Existing VNHP and VDOF analyses can be used for this verification: core impact analysis for ecological cores and environmental impact review for forest conservation values.

Both the VaNLA and FCV models can be viewed within the Natural Heritage Data Explorer. Current maps of C-1 and C-2 cores have also been provided to the workgroup by VNHP. Based on comments received from the full ad hoc workgroup, Workgroup 4 proposes that the latest-in-time version of both models be used to ensure that the most up-to-date information regarding the ecological value of the land in question is employed, rather than referring to a specific, static iteration of either model.

Workgroup 4 offers two options for this proposal. **Option 1 limits the “significant adverse impact” definition to disturbance of land in level 5 “outstanding” forest lands or C-1 “outstanding” ecological cores. This option has consensus within Workgroup 4. Option 2 expands the definition to include disturbance of land in level 5 forests, C-1 “outstanding” cores or C-2 “very high” cores. While this option has not reached consensus at this time, Workgroup 4 was encouraged by our subject matter expert to consider the use of C-1 and C-2 cores for a number of reasons, including:**

- 1) the very high ecological value of C-2 cores which often contain habitats of rare species and are often associated with C-1 cores in complexes;
- 2) almost 60% of C-1 cores are already conserved and cannot be developed, and there are very few C-1 cores east of the Blue Ridge Mountains;
- 3) C-1 and C-2 cores, when added together, represent less than 3% of all ecological cores in Virginia; and
- 4) the use of C-1 and C-2 cores together would be consistent with how the Department of Conservation and Recreation reviews development projects using an impact analysis with a standardized and documented methodology and an estimate of mitigation acres.

Based on the recommendation received, Workgroup 4 chose to present both options for the full ad hoc workgroup’s consideration and reflection.

Resources:

Maps of C-1 and C-2 cores (see WKGP 4 folder)

Acreage numbers

Natural Heritage Data Explorer: <https://www.dcr.virginia.gov/natural-heritage/nhdeinfo>

Forest Conservation Value: <https://www.dcr.virginia.gov/natural-heritage/vaconvisforest>

Natural Landscape Assessment: <https://www.dcr.virginia.gov/natural-heritage/vaconvisvnl>

If the proposed project disturbs less than 10 acres of prime agricultural soils and less than 50 acres of contiguous forest lands, the project will be presumed to have a significant adverse impact if the disturbance includes land identified by the Virginia Natural Heritage Program as within a C-1 “outstanding” ecological core or by the Virginia Department of Forestry as “outstanding” within the Forest Conservation Values model. This presumption can be overcome, for ecological cores, by a core impact analysis conducted by VNHP, OR, for forest conservation values, by an environmental impact review conducted by the Department of Forestry, to verify permanent conversion of the land. Reference should be made to the most current Natural Landscape Assessment and Forest Conservation Value Model, not a specific iteration of the assessment or model.

Consensus results: 6 (fully support) – 5 (will support with reservations) – 21 (cannot support).

SME comments:

- The FCV and VaNLA models need to be more consistently described. These are both geospatial layers used for modeling priority lands. As currently written the explanation of both models is not clear and consistent. The description needs to be clearer in explaining that the recommendations intend on relying on geospatial layers to assess the impacts to project sites.
- Support the SME's recommendations.
- This needs to be harmonized with WG 1 definitions of significant disturbance and avoidance, etc. The evaluation of prime farmland status needs to be done by NRCS and/or appropriately qualified soil scientists and not VNHP etc.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Proposal should include high value.
- Unsure why there is a need to define impact less than the 10/50 threshold, when that is what the HB206 language specifies. The proposal is doable if necessary, but I don't agree that its necessary.
- I support including C-2 cores, so option 2.
- 1. AES CE disagrees with the inclusion of this proposal as the previous proposals were written as though the threshold for significant adverse impacts requiring a mitigation plan would be greater than 10 acres of impact to prime

agriculture soils and/or 50 acres of forest land. This is now introducing a completely separate and new impact affecting projects that were considered to be exempt if below the previously discussed thresholds.

- need more information to better understand this proposal
- Does not include C-2 "very high" ecological core values, as the SME recommended we consider.
- Uncertain of alignment with and impact on work group charge.
- How many acres of outstanding ecological core must be disturbed? An acre? Five acres? A square foot?
- Still just have lots of questions and need further discussion.
- Prefer option 1; what other tools were considered, such as conserve Virginia?
- As stated below, CHESSA believes Proposal 2, Option 1 is not within the authority of HB 206.
- We need quite a few more details before supporting.
- Dominion objects to the concept of requiring additional evaluation of projects where disturbance of prime agricultural soils and forested lands remain below the regulatory thresholds. However, it is also important to note that the DCR and DOF models were not developed as tools for implementation of regulatory programs. These models were designed as a guide for agencies or land conservation groups to use in working with interested landowners and/or localities to protect high priority areas under formal conservation agreements. If lands proposed as part of a Project have been protected via conservation measures based on ecological merit and uniqueness by any governmental or non-governmental entities, those lands will likely have protections and require additional coordination outside of the PBR process. Tools used to determine the location and impacts to prime agricultural soils and forested areas under this regulation should be developed based on appropriate criteria specific to that purpose.
- The FCV model should include "high" ranking.
- ACP agrees with CHESSA's comments that the 10 acre and 50 acre thresholds were intended by the General Assembly to be EXEMPTIONS from the state mandated mitigation, at least that is the way the language in the legislation is written. Should the legislature determined otherwise, it should specify in a subsequent session of the General Assembly.
- Do not support this option, do support option 2 (below).
- Additional discussion needed
- Too much uncertainty is created
- With respect to the Forest Conservation Value Model, we believe that "Outstanding," "Very High," and "High" value lands should be included as significant adverse impacts for less than 50 acres/not enrolled in forest conservation program as defined in HB206.
- Support option 2

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- There already is a proposed amendment to PBR that captures ecological cores
- Consider other classes outside of outstanding. We would want a further conversation with SMEs to ensure that mitigation considerations and thresholds are set appropriately.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- Workgroup 4 recommendation regarding mapping and field verification of prime ag: for reasons stated above as to Avoidance and mitigation.
- There should be a lower limit of 1 acre such that impacts less than 1 acre are not assessed. Impacts should not be automatically considered permanent and the review should consider how the site will be developed and the land restoration components of the deaccessioning plan.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Even though HB206 does not presume any significant adverse impact below 50 acres of contiguous forest lands, MAREC Action supports this precautionary approach to high value C-1 cores.
- Impacts to these high conservation value forests absolutely need to be mitigated for.

WG-4 Significant Adverse Impact: Proposal 2, Option 2

If the proposed project disturbs less than 10 acres of prime agricultural soils and less than 50 acres of contiguous forest lands, the project will be presumed to have a significant adverse impact if the disturbance includes land identified by the Virginia Natural Heritage Program as within a C-1 “outstanding” or C-2 “very high” ecological core or by the Virginia Department of Forestry as “outstanding” within the Forest Conservation Values model. This presumption can be overcome, for ecological cores, by a core impact analysis conducted by VNHP, OR, for forest conservation values, by an environmental impact review conducted by the Department of Forestry, to verify permanent conversion of the land. Reference should be made to the most current Natural Landscape Assessment and Forest Conservation Value Model, not a specific iteration of the assessment or model.

Consensus results: 6 (fully support) – 4 (will support with reservations) – 22 (cannot support).

SME comments:

- At what point in the permitting process will a project be grandfathered when/if data/maps are updated mid-review?
- First, I would request that my agency, DCR, be identified in the report instead of the “Virginia Natural Heritage Program,” which is a division of DCR. 1. My comments as SME, which were requested by the workgroup and provided to them via email on August 16, 2022, and which were subsequently distributed to the entire RAP, were slightly misrepresented in the summary provided in support of Proposal 2, Option 2. For Reason #2 listed above, my original comment stated “few” not “very few.” I am fine with the workgroup choosing to use “very few,” as the categorization is subjective, but I just wanted to make clear that those were not my exact words. That said, it also depends on whether we are considering few in terms of area or number, which probably should be made clear by the workgroup. For Reason #3 listed above, my original comment stated: “C1 and C2 cores together would represent less than 3.5% (873) of all the cores and habitat fragments in Virginia (25,289). The workgroup possibly didn’t copy the number correctly or it rounded the number down (note: before rounding, my original estimate was 3.452%).”
- Support SMEs recommendations

- Same comments as above. Not appropriate for determination of impacts to prime ag lands. NRCS or soil scientists need to do that.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- C2 cores should not be included. There should be a lower limit of 1 acre such that impacts less than 1 acre are not assessed. Impacts should not be automatically considered permanent and the review should consider how the site will be developed and the land restoration components of the deaccessioning plan.
- Unnecessary to add further restrictions for projects impacting less than 10/50 acres.
- HB206 does not presume that disturbing less than 50 acres of forested land in a C-2 core (or even a C-1 core) would result in significantly adverse ecological impacts. Absent statutory authority, we believe a blanket presumption represents regulatory overreach—especially because this legislation singles out solar and does not apply to any other form of land conversion. Even so, we are willing to support the approach in Option 1.
- 1. AES CE disagrees with the inclusion of this proposal as the previous proposals were written as though the threshold for significant adverse impacts requiring a mitigation plan would be greater than 10 acres of impact to prime agriculture soils and/or 50 acres of forest land. This is now introducing a completely separate and new impact affecting projects that were considered to be exempt if below the previously discussed thresholds.
- Need more information to better understand this proposal.
- Uncertain of alignment with and impact on work group charge.
- How many acres of outstanding or very high ecological core must be disturbed? An acre? Five acres? A square foot?
- Still just have lots of questions here and need further discussion.
- As stated below, CHESSA believes Proposal 2, Option 2 is not within the authority of HB 206. CHESSA believes that the 10 acre and 50 acre thresholds were intended by the General Assembly to be EXEMPTIONS from the state mandated mitigation, at least that is the way the language in the legislation is written. Therefore, in CHESSA's opinion, the HB 206 SAG does not have the lawful authority to consider imposing across the board state mandated mitigation on solar projects less than each of these thresholds. As a result, CHESSA is

opposed to these two proposals. Like historic and wildlife resources, as part of the PBR process, if there is determined to be a significant adverse impact to prime agricultural soils, as defined, or forest land, as defined, DEQ will request that the applicant submit provisions in its mitigation plan, just like the PBR process was handled through June 30, 2022.

- We are not sure why these smaller thresholds are being considered as the General Assembly already made these amounts exempt.
- Dominion objects to the concept of requiring additional evaluation of projects where disturbance of prime agricultural soils and forested lands remain below the regulatory thresholds. However, it is also important to note that the DCR and DOF models were not developed as tools for implementation of regulatory programs. These models were designed as a guide for agencies or land conservation groups to use in working with interested landowners and/or localities to protect high priority areas under formal conservation agreements. If lands proposed as part of a Project have been protected via conservation measures based on ecological merit and uniqueness by any governmental or non-governmental entities, those lands will likely have protections and require additional coordination outside of the PBR process. Tools used to determine the location and impacts to prime agricultural soils and forested areas under this regulation should be developed based on appropriate criteria specific to that purpose.
- The FCV model should include "high."
- It was unclear why a subject matter expert proactively advocated for a particular policy position, especially without providing an assessment of how solar development may impact ecological cores. Second, it was never determined that disturbing less than 50 acres of forested land in a C-2 core would result in significantly adverse ecological impacts. Without data to support this position, ACP opposes Option 2.
- Need more information to understand proposal
- Additional discussion needed
- Too much uncertainty
- This is outside of the scope of this workgroup which should cover per HB206 only over 10 acres of prime ag and 50 acres of prime forest.
- With respect to the Forest Conservation Value Model, we believe that "Outstanding," "Very High," and "High" value lands should be included as significant adverse impacts for less than 50 acres/not enrolled in forest conservation program as defined in HB206.
- isn't the legislation stating impacts are deemed if more than 10 / 50 acres are impacted? why is less than this threshold included in the mitigation?

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Generally support this option but unclear what other tools were evaluated.
- Consider other classes outside of outstanding. We would want a further conversation with SMEs to ensure that mitigation considerations and thresholds are set appropriately.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- There are many C2 cores in the Piedmont and Coastal Plain which makes them very hard to avoid, and a lot of these are managed pine plantation. There needs to be more discussion about the ecological impact of disturbing less than 50 acres of a C2 core.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Fully support this more protective option, which seems to have been encouraged by the group's subject matter expert.
- Better option.
- Based on the very high importance of both C-1 and C-2 cores, the high percentage of C-1 cores permanently protected already, the location of C-2 cores in areas where significant solar development is anticipated and the need to understand the impact to the cores from that development, and the fact that DCR's Natural Heritage Program already has the ability and regularly considered both C-1 and C-2 cores in similar analyses, I think it makes sense to include both sets of cores.

WG-4 Significant Adverse Impact: Parking Lot Issue

The definition of disturbance should be clearly defined for the purposes of determining whether the 10 acre/50 acre thresholds have been reached OR if there is a disturbance that would otherwise be an adverse impact. - Workgroup 4 agreed that a clear definition of disturbance would be helpful but did not spend additional time preparing a proposal, recognizing Workgroup 1's intention of submitting one.

Do you have any comments, concerns, or suggestions in response to Workgroup 4's parking lot space?

SME comments:

- WG 1 has accomplished this.

Stakeholder feedback:

- There should be a lower limit of 1 acre such that impacts less than 1 acre are not assessed.
- MAREC Action generally supports Workgroup 1's effort to define disturbance, please see our responses in that section for more detail.
- Workgroup 1 worked on and has in-depth proposals regarding the definition of disturbance, so this makes sense.
- Definition of disturbance submitted should work fine.
- CHESSA believes that the 10 acre and 50 acre thresholds were intended by the General Assembly to be EXEMPTIONS from the state mandated mitigation, at least that is the way the language in the legislation is written. Therefore, in CHESSA's opinion, the HB 206 SAG does not have the lawful authority to consider imposing across the board state mandated mitigation on solar projects less than each of these thresholds. As a result, CHESSA is opposed to these two proposals. Like historic and wildlife resources, as part of the PBR process, if there is determined to be a significant adverse impact to prime agricultural soils, as defined, or forest land, as defined, DEQ will request that the applicant submit provisions in its mitigation plan, just like the PBR process was handled through June 30, 2022.
- ACP supports Workgroup 4's decision to recognize the process that Workgroup 1 undertook to define disturbance.

- We believe the definition of disturb offered in our previous responses (Workgroup 1 - Proposal 1 & 2) is adequate.

Workgroup 5: Local Control

Proposals Achieving Consensus: None

Proposals Not Achieving Consensus

WG-5 Local Control: Proposal 1

No later than 90 days prior to filing a PBR application (which triggers the public comment period), applicant shall submit the Notice of Intent to DEQ, with a copy sent to the applicable locality's Chief Administrative Officer, which will include publicly available copies of 1) the memorandum(s) of land agreement and 2) associated interconnection queue number.

Consensus results: 27 (fully support) – 4 (will support with reservations) – 1 (cannot support).

SME comments:

- The Cooper Center has done research ("Smoothing the Path to Solar" by Kevin Woram, 2021) on the permitting process/timeline of major solar projects across the state. The data shows that the majority of the time, developers submitted the DEQ NOI way after they get local certification, and in most cases more than 90 days before the PBR anyway. I support Workgroup 5's proposals 1-4 because they do increase state/local communication and transparency and will make state resources available earlier in the process, however I am not aware of any evidence that supports the concept that these proposals would result in localities learning about projects earlier, or, that it will result in such an incentive that the state agency reports will be made available to localities for their consideration during the review of local applications. Also, remember that this process only applies to those projects that choose the PBR over the SCC process. I suggest that the workgroup consider proposing a locality best practice (for the guidebook that is proposed) that localities request/require the developer submit the DEQ NOI at/before the local application. That way, the locality has the opportunity to coordinate a site visit with state agencies prior to the local public hearing being scheduled.
- I am ok with this.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- 1. It should be noted that the local permitting process would typically precede the initiation of the PBR application process. Submittal of all memorandums of land agreement could be administratively burdensome based on the number and size of those documents. Additionally, these documents may contain confidential information. If required, a list of parcels could be provided, which would allow the locality to access any publicly available information associated with those properties. 2. Specific edit includes a suggestion that "memorandums of land agreement" be replaced with "A list of parcels included in any existing land agreements"

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- Would require a change to the statute?
- Would help if it specified the publicly available memorandum(s) of land agreements that are available at the time.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- This is useful but does not address concerns by localities that notice from an applicant should come much earlier. Many localities have no idea of the leasing occurring within their boundaries until much later, when an application is filed. Early awareness would better assist localities and allow for earlier consultation with state agencies about considerations.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- I support this but also am supportive of a greater time requirement (>90 days).
- Checklists, Resources Guides and more notice earlier a must.
- Fully support, assuming that the 90 day timeline is reasonable and workable from the developer standpoint.

- This approach is consistent with the 90 day NOI requirement in the PBR storage regs.

WG-5 Local Control: Proposal 2

A mechanism to encourage submission of an NOI earlier in the process and to unlock resources from state agencies to assist localities and applicants. Proposal 2 Upon receipt of the NOI and request by the locality, DEQ and its PBR sister agencies (DCR, DHR, DWG, VDOF, and VDACES) shall provide consultation of site characteristics relevant to an agencies purview to aid the locality in its review of solar projects. Such consultation may include a review of state resource databases, a site visit and a list of the applicable permits a solar project may be subject to prior to start of construction.

Consensus results: 16 (fully support) – 14 (will support with reservations) – 2 (cannot support).

SME comments:

- See comments for Proposal 1
- Our data are publicly available and should be used to scope projects. We recommend that applicants request pre-application meetings.
- NRCS soil scientists should be involved at some point?

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- State agencies are currently overburdened. Additional workload may cause additional delay in existing processes. Agencies listed are all part of the review of the project through the PBR process and other regulatory programs as applicable. Additional involvement from these agencies on the local level may result in redundant requirements/reviews.
- 1. AES CE is concerned about how the inclusion of the state in the local process is going to affect review and approval timelines. This intervening of the state agencies with the local process seems redundant. Most local permitting process require a public meeting, environmental impact review, and several other conditions to gain local land use approval and if the state is going to be providing consultation during the local process (which is typically done prior to or concurrently with the state process), there appears to be no reason to hold these as separate processes.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- This is unnecessary
- Generally supportive as a means to provide additional assistance to localities but additional discussion on the potential impacts to project timing is needed
- Only question or concern is how quickly and easily this coordination happens in practice? That is a lot of agencies weighing in and I have no idea how long that will take.
- ACP' understands – and was part of – this workgroup that sought to ensure local governments have sufficient resources to assess a solar project before issuing conditions or negotiating a siting agreement. That said, the association is concerned that state agencies will not have sufficient resources to provide fast, consistent and reasonable reviews of solar projects. It is also concerned localities may use these reviews to point to unanswered questions and effectively halt solar deployment.
- State should provide a full list of minimization techniques (BMPs) to better assist localities with the development of conditions for their permitting purposes.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- This proposal threatens to cancel a project once a good deal of investment has been made. Too many unanswered questions.
- CHESSA is concerned that this proposal could gum up the approval processes and result in a solar developer spending large sums of money upfront. Today, a solar developer applies to the locality for land use approval BEFORE that solar developer applies for PBR approval. What would happen if every local government requested each state agency to do a detailed review of various aspects of a solar project before that locality even considers the land use case? Do the state agencies have the staff and resources to do that? That answer would be no. Could the locality use the state agencies and study requirements on the solar developer to effectively oppose any solar project because of “unanswered” questions. No other developer of any kind of real property is subjected to a requirement like that to completely engineer their whole project before the local government even makes a land use decision. CHESSA cannot support this proposal at this time and may not ever to be able to do so.
- Generally support the concept, but this consultation should not add any time to the PBR process once the application is submitted.
- Maybe red? Not sure . . . Who will pay for agency time to do this consultation? Much of this is public information localities should be able to get for themselves or from the developer.
- SEIA is supportive of CHESSA's comments regarding workload, approval process slowdowns, and unknown capital expenses or fees regarding this proposal.
- MAREC Action can support this proposal as long as it does not create an undue burden for the regulating agencies resulting in slow-downs during the PBR process. To the extent possible, state regulatory support for localities considering solar should be aligned with the level of regulatory support provided for other land use permit types in Virginia.
- May over-complicate local/state processes. Better to be independent of each other.

- This proposal shouldn't slow down the process of obtaining a PBR and may be too complicated and time consuming to implement.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- "Proposal 2: Sharing of subject matter expertise and resources by the state to local governments would be welcomed."
- Did not want to require the site review, given (i) capacity of state agencies, and (ii) understanding that not all county governments are prepared to go above / beyond

WG-5 Local Control: Proposal 3

NOI is required prior to request for analysis with any state agency. Any subsequent review results for a solar energy project completed by a state agency shall be provided to the Chief Administrative Officer of the locality(ies) in which the project is located.

Consensus results: 18 (fully support) – 9 (will support with reservations) – 5 (cannot support).

SME comments:

- See comments for Proposal 1
- NOI are publicly available on DEQ Renewable energy GIS mapper.
- Ok with this

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Existing agency review/coordination requirements are conducted under other regulatory programs. Tying those existing processes to the PBR process has the potential to create inefficiencies.
- Solar developers should be able to approach state agencies for preliminary consultation before filing a NOI.
- This proposal infringes on the competitive landscape of solar and lacks any definition of "analysis," which will be problematic with so many state agencies involved. The 90-day notice proposal is a much clearer bar to set.
- AES CE is concerned about how this inclusion of the state in the local process is going to affect review and approval timelines. This intervening of the state agencies with the local process seems redundant. Most local permitting process require a public meeting, environmental impact review, and several other conditions to gain local land use approval and if the state is going to be providing consultation during the local process (which is typically done prior to or concurrently with the state process), there appears to be no reason to hold these as separate processes.
- This proposal should only be optional if specifically requested by the county.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- This is unnecessary
- Generally supportive of this proposal but additional discussion is needed to understand whether the use of the word "any" is too restrictive on agency/locality/developer consultations, and how this would be put into practice in conjunction with Proposal #2.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- Same comments as #2.
- There is a concern that localities have to make decisions on projects before all the information is gathered or garnered. Localities should have shared resources as the process moves on or another bite of the apple, with some rules concerning this, or parameters.
- CHESSA has similar comments to Proposal #3 as in Proposal #2.
- Seems like overkill. If a solar project receives some analysis from a state agency, they can give it to the CAO if they want. Shouldn't be an obligation of the state agency
- See comments on Proposal 2, above.
- Does this mean the locality must receive a NOI before they can request state agency report? If so, we agree and can support the proposal.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

N/A

WG-5 Local Control: Proposal 4

The PBR template for the local governing body certification form shall require submission of the Siting Agreement or Conditional Use Permit (CUP) conditions, as applicable.

Consensus results: 23 (fully support) – 7 (will support with reservations) – 2 (cannot support).

SME comments:

- Solar PBR is based upon MW, not acres.
- This overlaps with other language from WG 2+3 and needs to be harmonized.

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- 1. Submittal of full siting agreements and CUP conditions is redundant as those are already available to the locality and may be burdensome administratively depending on the size of the documents. In addition, the full contents of these document does not warrant review as part of the PBR process. Only those aspects of the documents being used to satisfy requirements under the PBR approval process should be provided.
- 2. Suggested edit is to revised the proposal to read: The PBR template for the local governing body certification form shall require submission of any Siting Agreement or Conditional Use Permit (CUP) conditions, that are being proposed to satisfy mitigation requirements for impacts to prime agricultural soils or forest lands."
- The Siting Agreement or Conditional Use Permit (CUP) conditions may not be complete at the time an PBR application is filed.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- "Unsure of the intended impact. County notification must happen sooner...perhaps as soon as leases are being negotiated. Also reiterating: mitigation should be done according to this regulation and in accordance with what is contained in HB206 and no credits shall be allowed for mitigation through local siting agreements or the Conditional Use Permit. "

- "[Change] Don't believe the order of the current items is correct and "or" should be "and" The PBR template for the local governing body certification form shall require submission of the Conditional Use Permit (CUP) conditions and Siting Agreement, as applicable. [Add - see reason] any other documents that contain provisions or conditions that would be considered under the mitigation calculation. [Reason] Localities must know that the project is going to be proposed earlier and this proposal doesn't go far enough"
- Add any agreed upon list of conditions OR PROFFERS (some are rezonings) addressing conditions or measures that may be considered for the purposes of mitigation calculation.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- Maybe green. It seems like DEQ would need this to verify what actions already committed to can be counted toward mitigation.
- Clarify that we support the ability of localities to have siting agreements and CUP conditions.
- Should add language that requires submission of any other relevant documents at the local level that contain provisions or conditions that would be considered under the mitigation calculation.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- Need to reconcile with proposal #5 on page 28.
- We need to reconcile this with Proposal #5 in Workgroups #2 and #3 (page 28).

WG-5 Local Control: Proposal 5

Virginia Department of Energy shall develop a guidebook to be distributed to localities relaying best practices related to solar development (from both the developers and localities side). This should include sample, existing siting agreements that have been signed between localities and developers, to shed light on why certain development standards were placed on the project based on its location, local impact and local input. This guidebook shall also provide a list of applicable permits that a given solar project may be required to obtain.

Consensus results: 17 (fully support) – 13 (will support with reservations) – 2 (cannot support).

SME comments:

- I support this proposal with some changes: I would recommend the guidebook be required to be developed with input from stakeholders. (Extent and scope of Input can be defined by DOE). I would not explicitly require the guidebook include "sample, existing siting agreements" for many reasons outlined in research that has been completed by UVA. Instead, I would suggest requiring "guidance related to siting agreements..."
- Please do not use DOE to refer to the Virginia Department of Energy. Also, Virginia Energy already is planning to design a solar siting guidebook and looks forward to including recommendations and best practices from this workgroup as the resource is designed.
- Ok with this

Concerns/question(s), edits or clarifications needed to move your organization from red to yellow, rationale that would help the RAP understand how the changes strengthen the proposal:

- Proposal 5 is not an appropriate requirement of HB206. The guidebook to be prepared by the Dept. of Energy is not clearly defined. The guidebook to be prepared by the Dept. of Energy is not clearly defined.
- This is not part of the reg, although it may be a good idea for DOE to do this. It shouldn't be part of this RAP's process.

Concerns/question(s), edits or clarifications needed to move your organization from yellow to green, rationale that would help the RAP understand how the changes strengthen the proposal:

- DOE should not be involved in shaping siting agreements and/or negotiations.
- SEIA remains concerned that further clarification is needed before we are able to support this proposal.
- CHESSA believes the devil is in the details and there are too many unanswered questions at this time.
- Still too many questions and details unanswered.
- VMDAEC takes no position on this proposal. The selection of yellow does not indicate support or aversion to the subject proposal.
- 1. Additional detail would need to be shared to ensure that such a document would be clear, balanced, and drafted such that any recommendations could be appropriately applied to individual projects on a case-by-case basis. 2. Suggest inserting language in capital letters: Virginia Department of Energy, WITH INPUT FROM A BALANCED GROUP OF TECHNICALLY QUALIFIED STAKEHOLDERS, shall develop a guidebook to be distributed to localities relaying best practices related to solar development (from both the developers and localities side).
- Details - what would be included.
- ACP recommends that the legislature consider additional funding to the Department of Energy to create this resource, which was universally supported by members of the workgroup, and would like further clarification on the contents of the guidebook.
- How will this guidebook be developed? Through another stakeholder process? Some common tools/resources may help combat misinformation or confusion at the local level, but the process for developing this guide matters.
- Generally supportive of this proposal, but additional discussion on the content and selective publication of certain siting agreements is warranted
- This is unnecessary
- Not certain that information described for guidebook contains all of the information that it should.

Additional data points that strengthen the proposal, or rationale to help the legislature understand the importance of this proposal:

- It is important that the solar industry, through various trade groups, is consulted in development of this best practices guidebook.
- Localities would benefit from additional resources to evaluate the relative value of solar projects.

Parking Lot Issues

WG-5 Local Control: Parking Lot Issue #1

Ownership transfer of solar projects – how to track and enforce notification requirements.

Do you have any comments, concerns, or suggestions in response to Workgroup 5's parking lot space?

SME comments:

- This is a concern, but may be best addressed outside of this RAP process.

Stakeholder feedback:

- Localities can, do, and should address the ownership/transfer issue in their CUP.
- Notifications to the specific county staff can be included as a permit condition. The county should designate a specific staff member and provide that person's contact information.
- Local ordinances can specify how notifications should be handled. Put into CUP conditions.
- MAREC Action would weigh in on a proposal for ownership transfer notification, but it is unclear what the specific proposal is here or how it relates to HB206.
- It's not clear to me that ownership of a given solar project is within the purview of DEQ to regulate. Perhaps that is something that can be addressed by localities under the terms of any siting agreement entered into with a developer. Insofar as that goes, then perhaps a recommendation for transfers of ownership to be made known to localities could be included in the guidebook (per Local Control, Proposal #5).
- In general, the PBR program needs significantly more enticement on ownership and operational notification. If facility owners were incentivized to keep this information up-to-date, the state would have far better resources and data, and be able to make sure PBR requirements are implemented.
- Not sure what problems are intended to be addressed here. Further clarification would be helpful. If ownership is transferred, the lender would record the transfer of a real property lease (or fee simple title) either by recording a deed of trust in the land records of the Circuit Court Clerk of that locality. If ownership is

being transferred by sale of ownership in the business entity (LLC), the lender would record a UCC Financing Statement with the SCC.

- Parking Lot Issue #1: Ownership transfer of solar projects may be beyond the scope of this advisory process; however, obligations required by Avoidance and mitigation: Proposal 1, Part 2 (forestry or stormwater plan), mitigation, and decommissioning should clearly run with the land.
- Note that 9VAC1560-100 outlines the requirements for transfer of ownership under the PBR regulations. Seems beyond the scope of this workgroup.
- DEQ should require the applicant to notify the locality if a transfer or change occurs.
- Unclear how this would work.
- There needs to be some kind of notification since ownership changes many times on solar projects.
- Support notices of ownership transfer being shared with both DEQ (as per PBR regs) and localities.

WG-5 Local Control: Parking Lot Issue #2

A recommended best practice for a locality would be to provide their solar overlay district/transmission “hot zone” map to their local DOF office. This would allow DOF to notify the locality each time a timber harvest notification is received by DOF for acreage in the overlay district/transmission hot zone - this would enable the locality to reach out to the landowner/developer very early in the clearing process to hopefully preserve buffers before entire parcels are completely cleared. This process is currently being employed in several Virginia localities to notify a locality when DOF observes practices that go beyond silviculture and convert the land to another use.

Do you have any comments, concerns, or suggestions in response to Workgroup 5's parking lot space?

SME comments:

- Most localities do not have a solar overlay district identified (per Virginia Solar Survey results); I am not clear on what "hot zone" map this is referring to, or if most localities have one. Did the Workgroup examine/explore whether to recommend as a best practice that localities to address solar/renewable energy as a land use in their comp plans, to assist in planning for siting of such facilities in appropriate and preferred locations. Included in that land use planning could be outlining the importance and preference to maintain buffers, and other

attributes related to timber forest conversion, etc, (Make the preferences publicly known and adopted as policy, so in part to avoid the need for the locality and DOF office to "catch" projects as they are being conceived.)

- Consider changing the language "clearing process to hopefully preserve buffers" to something more general. To ensure adherence to local CUP guidelines etc.

Stakeholder feedback:

- Fully support this proposal.
- Preserving forested buffers is a good practice.
- We would need to review a more detailed, formal proposal to weigh in on this parking lot issue.
- This practice appears to go beyond simple reporting and permitting, to presumption that private property owners (who have rights to use their land as they see fit) are "automatically" installing solar when something as simple as timber cutting is happening. This is unfair and targeted.
- This looks like a good idea "this would enable the locality to reach out to the landowner/developer very early in the clearing process to hopefully preserve buffers before entire parcels are completely cleared."
- Instead of having a locality notify DOF, require DOF to post a timber harvest notification on the DOF website. That way, a locality, if interested, can obtain the information from the DOF website. Many localities do not have solar overlay districts.
- Could be quite helpful.
- ACP is concerned this creates a watchdog type requirement that would result in landowners who want solar being harassed.
- This sounds like a good idea.
- Support transparency in those instances that a solar overlay district is created by a locality
- This should be a requirement, not a best management practice.

Appendix 4: Meeting Summaries

Resources in this appendix include:

- I. Meeting summary from Meeting #1
- II. Meeting summary from Meeting #2
- III. Meeting summary from Meeting #3
- IV. Meeting summary from Meeting #4
- V. Meeting summary from Meeting #5

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
SMALL RENEWABLE ENERGY PROJECTS; IMPACT ON NATURAL RESOURCES,
REPORT. (HB 206)

REGULATORY ADVISORY PANEL MEETING SUMMARY, MEETING #1

MEETING LOCATION:
WORKFORCE DEVELOPMENT AND CONFERENCE CENTER
J. SARGEANT REYNOLDS COMMUNITY COLLEGE CAMPUS
1651 E. PARHAM RD, SUITE 108
RICHMOND, VA 23228

Tuesday, June 28, 2022

Members Present (including primaries, alternates, and Subject Matter Experts SMEs):

In Attendance (Last, First):

Allmond, Josephus	Fogel, Jonah	Rolband, Mike
Anderson, Meade	Gordon, Chris	Rovner, Nikki
Aust, Mike	Hammond, Drew	Sanner, Margaret Peggy
Belville-Marrion, Jenny	Harbin, John	Schmidt, Kevin
Berryhill, Aaron	Hawk, Chris	Seward, Susan
Binder, Cathy	Higgins, Victoria	Shreve, Kyle
Boschen, Amelia	Holmes, Dan	Sili, Jeff
Brumberg, Sam	Howe, Kevin	Sims, Jessica
Cizenski, Michael	Ignosh, John	Sink, Dominika
Connors, Corey	Jacobs, Zach	Skiffington, Michael
Corradi, Rob	Jesensky, Kenny	Smiley, Mitchell
Crenshaw, Walter	Killius, Anna	Sydnor, Cutter
Davenport, Melanie	Lasher, Terry	Thomas, Rick
Dicks, III, Chip	Lerch, Joe	Utt, Tyson
Dodson, Chris	Marshall, Elizabeth	Vaughan, Evan
Drazenovich, Rick	Martin, Amy	Weber, Joe
Dreiling, Michael	Martin, James	Westcott, Jr., David
Dunscob, Judy	Moore, Martha	Wilder, Joe
Ericson, Jason	Murray, David	
Farrelly, Kevin	Orrell, Jim	
Flavin, Andrew	Pollard, Speaker	

Members Absent:

Amores, Jon	Flowers, Todd	McDonald, Christopher
Bolthouse, Julie	Giese, Will	Newton, Jacob
Clark, Hilary	Green, Charles	Norris, Ben
Crockett, Robert	Guthrie, Joe	Piontek, Emily
Coggeshall, Charlie	Hammond, Jeff	Saunders, Ben
Crum, Katie	Hearne, Carrie	Seaford, Kevin
Daniels, Lee	Joshiyura, Neil	Sundstrom, Craig
Fanning, Patrick	Kane, Stephanie	Wortzel, Andrea

Department of Environmental Quality – Renewable PBR Program:

Dowd, Michael	Meyer, Elena M.	Tripp, Susan
Egghart, Chris	Thompson, Tamera	
Foster, Amber		

Facilitators, Institute for Engagement & Negotiation (IEN), University of Virginia:

Denckla Cobb, Tanya	Oliva, Michelle	Rizk, Sarah
	Montserrat	

Meeting Purpose

This regulatory advisory panel (RAP) has been established to advise and assist in developing regulations to mitigate the impacts of small solar projects on forest lands and prime agricultural soils. This group was formed in accordance with and to satisfy the requirements put forth in HB 206. The purpose of this meeting was to establish consensus surrounding a draft goal of the group, as well as to provide all RAP participants with tools for informed decision making and orient them to consensus building. Lastly, it was the goal of the meeting to establish workgroups to fulfill the charge of HB206 and move the process forward.

Introductions

To orient the participants to the meeting, Michael Dowd, Director of Air and Renewable Energy Division, DEQ, introduced HB 206, the anticipated meeting process, and the UVA facilitation team members. He also introduced Freedom of Information Act (FOIA) requirements for the group and encouraged awareness and compliance with FOIA. Tanya Denckla Cobb then introduced herself and Michelle Montserrat Oliva as facilitation co-leads for the RAP process. The facilitators explained the roles of primaries, alternates, and subject matter experts, and the consensus process that the group will utilize. In lieu of formal introductions, primary participants were asked to use three words that described their hope for the future of solar energy. The results can be summarized as an equitable process that aims to protect the ecosystems, the citizens, and the localities, while also contributing to responsible renewable energy production. A full list of responses can be found in the master notes.

Introducing Consensus for a Shared Goal

Consensus is achieved when everyone can live with the final agreements without compromising issues of fundamental importance. Individual portions of the agreement may be less than ideal for some members, but participants find the overall package is worthy of support, and participants will work to support the full agreement and not just the parts they like best.

Between ½-¾ of the room indicate they have worked with consensus processes before.

Testing for consensus happens at the beginning of the process and says anyone has the ability to call for a test of consensus at any time. The goal is to develop as many proposals by consensus, because the more consensus there is, the easier it goes through the legislature. The power of consensus is that any one individual can object and have their voice heard, and this equalizes the power. One person representing interest can hold as much power.

The group practiced consensus by voting on the statement goal below, which was drafted by the planning team.

“To draft proposals (where possible, consensus proposals) to assist in the development of regulations for reasonable mitigation strategies for prime agricultural soils and forest lands pertaining to small renewable energy projects.”

RAP members shared their concerns with the proposed shared goal. A number of iterations were suggested and tests for consensus were done. Most concerns revolved around the language of the bill and the task at hand, the impacts on land and possible regulations for mitigation of strategies, and the decommissioning of solar panels. It was agreed upon that decommissioning is already part of a separate legislative task. It was also agreed upon that as these concerns were being considered, it was also paramount to consider what the charge of HB206 is. With that in mind, the RAP members were able to reach consensus for a revised goal.

The new goal is as follows:

“Complete the work that the advisory group is directed to do under HB206”

Presentations and DEQ Director Remarks

Five presentations were given to provide background knowledge on the following subjects:

- solar permit-by-rule process,
- the Virginia Clean Economy Act and how renewables fit into that legislation,
- key concerns about impacts on forest lands,
- key concerns with impacts on prime soils, and
- key concerns from localities' perspectives (acknowledging that different localities may have different needs and concerns)

In order of subject matter above, these presentations were given by Susan Tripp (Department of Environmental Quality), Michael Skiffington (Department of Energy), Terry Lasher (Department of Forestry), Kevin Schmidt (Department of Agriculture and Consumer Services), and Joe Lerch (Department of Agriculture and Consumer Services).

Susan Tripp spoke about the history of permit-by-rule (≥ 150 watts) and local government approval, where interconnection studies are not required but desired. DEQ helps to push cultural, wildlife, and natural heritage resource assessments, but relies on the expertise of sister agencies, like DCR, DWR, and DHR. There were 69 issued permits, and 60 potential NOI. This translates to 40,899 issued acres and 30,694 potential acres.

Michael Skiffington spoke on the siting agreement HB1675 (Hodges), which allows localities to establish ordinance a revenue share of up to \$1400 per megawatt for projects >5 MW. Wind, solar, and other renewable resources to be public interest, and must consider the social cost (no disproportionate impact). He recommends that the General Assembly should permanently repeal the ability to obtain certificate of public convenience and necessity for any electric generating unit that emits carbon, though the report does not recommend it at this time.

Terry Lasher spoke on the number of acres of forested land being impacted by solar and emphasized the need to evaluate impacts equally to determine the real cost. This includes the true value of trees—air, water, reduced temperatures, etc. Virginia ranks 4th in the nation in solar generating capacity and is 62% forested. The issue is where the facilities are placed as to whether the impacts are deemed acceptable. Conservation model measures the types of forest, from moderate to outstanding, and findings are that we are impacting significant high-outstanding forested lands.

Kevin Schmidt spoke on agricultural and consumer protection issues related to solar. The mission is to promote Virginia agriculture, consumer protection, and promote sustainable development.

Joe Lerch spoke on the question of returning land back to forestry and agriculture after it is decommissioned as one of the major questions of localities. Additionally, the leasing of land is a big issue for farmers because they have to know where urban growth areas are, but with utility scale solar they will not be able to from a land use perspective. Quantifying the impact on local agriculture is a challenge. Citizen concerns are also about transmission lines, location, and noncompliance with water impacts.

- *As part of this presentation, there was conversation between state and local level regarding the timing of the siting agreement and approval process. There is disagreement about how the process actually works on the ground. Conclusion from facilitators is that issues like this will need to be discussed in the workgroup and that more information regarding siting agreement legislation is required.*

Lastly, Michael Rolband, Director of DEQ offered remarks regarding expectations to the RAP and answered a variety of questions from the RAP members. He expressed

gratitude for their willingness to give time to this issue, his eagerness to see the outcome of this work, and recognized there are an abundance of issues to work on. He also discussed issues relating to forthcoming stormwater guidance documents and answered questions regarding them because of their impact on solar. The guidance document will be available soon, with the goal to publish by August.

RAP Process

Michelle Montserrat Oliva reviewed the stakeholder process, RAP Workgroups, and Issues Matrix. This was followed by discussions about the issues outlined by the legislative charge. Workgroups were interested in setting up meetings between now and the next RAP due to concerns about the logistics of asynchronous work. It was decided that provided the meetings were FOIA compliant, they would be allowed. FOIA compliance in this instance includes, but is not limited to, finding their own public space, as well as providing the information to the public. It was noted that the functions and values of ecosystems, mitigation, and practices need to be agreed upon. It was suggested that this should be consistent on-site and off-site.

Proposals from each workgroup will be submitted to the DEQ/IEN planning team to be compiled before the next RAP meeting. Co-leads will be responsible for ensuring that all views are being covered in the proposals. FOIA compliance as part of this process is also reviewed.

Formation of Workgroups

Five interest group stations were placed along the perimeter of the room and RAP members were asked to join their primary interest group that best represented each member. The interest groups were solar developers, environmental groups/environmental justice, subject matter experts, and local government representatives.

Interest group members were then given time to discuss how they each would best represent their members across the five workgroups. The five workgroups were: (1) Avoidance and Minimization, (2) Mitigation, (3) In Lieu of Mitigation, (4) Significant Adverse Impact Less than 10 acres Agricultural and 50 acres Forested Land, and (5) Local Control.

These groups were given some time to agree on how to best represent their members across the different workgroups. They then broke into workgroup stations and as workgroups were able to make decisions regarding their future work and meetings, as well as identifying co-leads. There was some discussion about creating two workgroups, one for agriculture and one for forest that would discuss the adverse impacts, but it was decided that this would not accomplish the goal because most farms also contain forested land. After more discussion about the formation of the workgroups, it was decided by the RAP members that Workgroups 2 and 3 would merge, making there a total of 4 workgroups. The final workgroups are as follows:

1. Avoidance and Minimization
2. Mitigation and In-Lieu of Mitigation
3. Significant Adverse Impacts to land less than 10 acres for agricultural land and 50 acres for forested land
4. Local Control

Future Meetings

Meeting 2 - **Tue Aug 2** (9:30 – 3:30): Issues Rapid Scan

Location: Richmond (Workforce Development and Conference Center)

Meeting 3 - **Fri Aug 19** (9:30 – 3:30): Building Consensus (Day 1)

Location: Charlottesville – Hillsdale Conference Center, 550 Hillsdale Drive, Charlottesville, VA 22901

Meeting 4 - **Tue Aug 23** (9:30 – 3:30): Building Consensus (Day 2)

Location: Richmond (Workforce Development and Conference Center)

Meeting 5 - **Wed Sep 28** (9:30 – 3:30): Wrap Up

Location: Charlottesville – Hillsdale Conference Center, 550 Hillsdale Drive, Charlottesville, VA 22901

Consensus Recommendations and Areas for Continued Discussion

At this time, members decided that having both agriculture and forestry members were pertinent to each working group. They also decided that for those who did not want to inclusively work asynchronously online, they would meet in person provided they abided by the requirements of FOIA. There are 4 workgroups who will set forth proposals for the rapid scan meeting on Tuesday August 2. Many RAP members indicated that in the next meeting they would like time to discuss their proposals with their workgroups before doing a rapid scan.

The goal to complete the work that the advisory group is directed to do under HB206 received consensus from the group. Consensus recommendations and areas for continued discussion will emerge as part of the next meeting.

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
SMALL RENEWABLE ENERGY PROJECTS; IMPACT ON NATURAL RESOURCES,
REPORT. (HB 206)

REGULATORY ADVISORY PANEL MEETING MINUTES, MEETING #2

MEETING LOCATION:
WORKFORCE DEVELOPMENT AND CONFERENCE CENTER
J. SARGEANT REYNOLDS COMMUNITY COLLEGE CAMPUS
1651 E. PARHAM RD, SUITE 108
RICHMOND, VA 23228

Tuesday, August 2nd, 2022

Members (including primaries, alternates, and SMEs):

In Attendance (Last, First):

Allmond, Josephus	Flavin, Andrew	Marshall, Elizabeth
Belville-Marrion, Jenny	Gordon, Chris	Martin, James
Berryhill, Aaron	Hammon, Jeff	Martin, Amy
Binder, Cathy	Hammond, Drew	McDonald, Christopher
Boschen, Amelia	Harbin, John	Piontek, Emily
Brumberg, Sam	Hearne, Carrie	Seaford, Kevin
Clark, Hilary	Higgins, Victoria	Seward, Susan
Crockett, Robert	Holmes, Dan	Shreve, Kyle
Crum, Katie	Ignosh, John	Sili, Jeff
Daniels, Lee	Jacobs, Zach	Sink, Dominika
Dicks III, Chip	Jamison, Dan	Smiley, Michelle
Drazenovich, Rick	Jesensky, Kenny	Sydnor, Cutter
Dunscumb, Judy	Killius, Anna	Utt, Tyson
Fanning, Patrick	Lasher, Terry	Vaughan, Evan
Farrelly, Kevin	Lerch, Joe	Weber, Joe

Members Absent:

Amores, Jon	Dreiling, Michael	Howe, Kevin
Anderson, Meade	Egghart, Chris	Joshiyura, Neil
Bolthouse, Julie	Ericson, Jason	Kane, Stephanie
Coggeshall, Charlie	Flowers, Todd	Moore, Martha
Connors, Corey	Fogel, Jonah	Murry, David
Corradi, Rob	Giese, Will	Newton, Jacob
Crenshaw, Walter	Green, Charles	Norris, Ben
Davenport, Melanie	Guthrie, Joe	Orrell, Jim
Dodson, Chris	Hawk, Chris	Pollard, Speaker

Rovner, Nikki
Sanner, Peggy
Saunders, Ben
Schmidt, Kevin

Sims, Jessica
Skiffington, Michael
Sundstorm, Craig
Thomas, Rick

Westcott Jr, David
Wheeler, Lauren
Wilder, Joe
Wortzel, Andrea

Department of Environmental Quality:

Foster, Amber
Meyer, Elena M.
Thompson, Tamera M.

Tripp, Susan
Dowd, Michael (absent)
Rolband, Mike (absent)

Facilitators, Institute for Engagement & Negotiation (IEN), University of Virginia:

Altizer, Kelly
Denckla Cobb, Tanya
Oliva, Michelle Montserrat
Rizk, Sarah

The meeting began at approximately **9:35 am EST**.

Meeting Purpose: This regulatory advisory panel (RAP) convened for Meeting #2 with the purpose of giving the four workgroups time to further refine and clarify their proposals and with the hopes of getting a sense of consensus, both within the workgroups and with the full RAP. As originally intended, this meeting was to present each workgroup's proposals to the full RAP for a rapid scan, however as determined in Meeting #1, more time was needed to further the proposals.

Review of Shared Goal, Development of Working Session Goals, and Logistical Review:

Ms. Denckla Cobb introduced and reviewed shared goals statement:

Complete the work that the advisory group is directed to do under HB206.

Ms. Denckla Cobb opened the floor for requests for productive conversations to create a shared list for the full RAP, and proposed to add to the list that all perspectives are welcome. RAP members agreed that productive conversations are ones that are on task and focused, welcome all perspectives, are curious and inquisitive, and do not make assumptions. When there are no additional comments from the group, Ms. Denckla Cobb suggested adding to the list later if any additional ideas come to mind.

Ms. Olivia gave a brief FOIA requirements review to the group.

- If there are any additional workgroup meetings, they will need to be advertised at least 7 days in advance
- 1:1 conversations okay

There was a question about communication between co-leads, primaries, and their alternates. This is not allowed under FOIA. However, if you want to consult with more than one other member within your organization, that is allowed.

Presentation by Dr. Lee Daniels:

Dr. Daniels (T.B. Hutcheson Jr. Professor of Environmental Soil Science at Virginia Tech) gave a presentation to the full RAP about soils, primarily focusing on soil conservation and restoration concerns for solar installations. This presentation highlighted the potential for post-disturbance soil restoration, such as pH adjustments, soil amendments, and mechanical tillage. However, he also cautioned against promising landowners a 100% return to prior usage for solar installations, especially for prime agricultural soils.

Each disturbance is unique because of different land forms. Soil disturbance can vary widely from < 10% to regrading of the majority of the site. Major disturbances include roads, trenches, and stormwater basins, as well as local compaction. Often, under topsoil is acidic and requires lime, phosphorus, and additional organic matter.

Dr. Daniels noted that he has no doubts that we can re-soil and re-vegetate soil sites, however, you need to deal with topsoil and layer below. Given appropriate access to soil amendments, it can be revegetated, but we also need to recognize that depending on site conditions there could be wide disturbance. We also need to recognize that VA has already been heavily eroded (any point you see red soils)

Compaction is the dominant disturbance. No matter what site you're dealing with, you will have compaction as the most common ubiquitous problem to face. Any given site may have widely variable soil conditions. While low pH and fertility are relatively easy to deal with, compaction is not and needs physical remediation. More than 4-6 inches of compaction is very difficult to remedy. Compaction causes a multitude of problems, including the direct impedance of rooting, widely fluctuating wet and dry conditions, and poor infiltration that leads to increased local runoff.

To combat issues, Dr. Daniels recommended to save, properly store, and reapply soil, use liberal amounts of organic matter on both exposed subsoils and returned topsoil layers, apply tillage, and be sure to anticipate a second round of remedial actions needed when old infrastructure is removed in 20 to 30 years. Even so, topsoil replacement can't be fully effective if there is significant compaction. Even with remediation, you'll probably have ~25% reduction in productivity and it will require multiple tillage events. Heavily disturbed sites may need to be pasture or forests, not maximum productivity.

However, Dr. Daniels was adamant that you can successfully and restabilize sites, by considering three key stages:

1. Limiting short-term sediment losses during construction and keep initial erosion from happening
2. Managing existing soil and plant systems over time to minimize runoff
3. What will it take to return the land to the levels acceptable to the individual leasing the land?

Dr. Daniels addressed many of the group's questions. Many questions were very similar, asking how to best remediate while the solar panels are in use. Answers to this include keeping the site well vegetated and acknowledging it will likely require tillage. Lastly, every site is unique, but even so addressing impacts like compaction generally in walking site tours with the developer and addressing these things early on, can save money over time. Any significant disturbance from the planning phase and on, needs to be decided how to be mitigated. There should be a site assessment step about what soil is there (soil maps and soil survey should not be the only tool to assess). All mining permits and other wetland creation sites, you need to have to plan for site installation, management, and decommissioning. It's important to consider how to get back to its land use.

Other resources available on soil quality include the memo from Dr. Daniels available in Sharepoint, as well as Landrehab.org.

Overview of Workgroup Process:

Ms. Oliva and Ms. Denckla Cobb gave an overview of the workgroup process before giving the workgroups time to refine their proposals.

Members should have received an email to access the Sharepoint folder the night prior from Ms. Oliva and she indicated that if they have not, they should check their spam folder. Lastly on the technical side, there is one live document for each work group. Members should be careful that there are not multiple versions. Ms. Oliva then shifted to discuss the wealth of knowledge available in the RAP resources folder available to the participants.

Ms. Denckla Cobb then reviewed the consensus method with the group. She reminded them that anyone at the table can take a quick straw poll to test for consensus and that all reds (1s) should be addressed. She then clarified that if you have ALL yellows (2s) and greens (3s), then you have reached consensus. If you have mostly yellows, you still have consensus, but it is a weak consensus and to make it stronger, you can address all the concerns. Questions and concerns should all be recorded.

There was to be one person in each workgroup to be the main note-taker to capture proposals and the discussion highlights. **Groups should be sure to record where there is consensus.** For points of continuing disagreement, it is also important to explain why. It's also important to indicate where members agree on core principles.

The goals of this session were to:

1. Seek to understand and to minimize confusion. Members are asked to ask questions for clarification only and are encouraged to call in SMEs to weigh in.
2. Identify any key suggestions or ideas that will be agreed on, while keeping in mind what the group believes DEQ and the legislation need to know.

And lastly, everyone should be able to participate and listen to each other. SMEs should listen to conversations and workgroups should ask if they need specific assistance, as well as look for technical accuracies.

The Workgroup Process Began around 10:40 AM.

- Workgroup 1: Avoidance & Minimization
- Workgroup 2+3: Mitigation/In Lieu
- Workgroup 4: Significant adverse impact <10 acres ag soil/50 acres forest
- Workgroup 5: Local Control

Each workgroup was assigned a table and a facilitator from IEN accompanied them, helping work through any issues that arose. This process was resumed after lunch, around 12:40, with the goal of building consensus on the proposals.

Delaying of Rapid Scan and Next Steps:

At 2:15, the full RAP was brought back together to discuss next steps. The original goal was for the workgroups to share their proposals with the rest of the RAP.

Ms. Olivia reviewed the timeline. RAP members were to finalize and refine proposals by Friday August 12, meaning there was some need to do asynchronous work on SharePoint. RAP members are asked to consider if they would like to meet.

This led to a long discussion about next steps. Many RAP members were concerned about the quick turnaround, as well WG2+3 being behind the other three workgroups.

Some RAP members were curious as to why there are two upcoming meetings so close to each other (but not back-to-back days) on the 19th and 23rd. Ms. Deckla Cobb explained that the rapid scan would give everyone the ability to read through the proposals, then come back to finalize and gather consensus within organizations, but emphasized that at some point these will all need to come together. It is decided that it is a priority to move forward with WG 2+3, and to prioritize getting feedback from the full RAP.

The WGs discussed with the broader group how their proposals were progressing. Many scenarios are put forth, but based on feedback from the WGs, it is ultimately decided that all workgroups will attend the RAP meeting on the 19th and will have half the day to continue working in their workgroup and half the day to present to the rest of the RAP. Some workgroups decided to meet in between, provided they comply with FOIA requirements. It is also decided that WG 2+3 will stay late at the next meeting to continue working. **The deadline for the 2nd draft of proposals was extended to August 16th, prior to the next meeting on August 19th.**

Future Meetings:

Meeting #3 - **Fri Aug 19**: Building Consensus (Day 1)

Location: Charlottesville – Hillsdale Conference Center, 550 Hillsdale Drive,
Charlottesville, VA 22901

Meeting #4 - **Tue Aug 23**: Building Consensus (Day 2)

Location: Richmond (Workforce Development and Conference Center)

Meeting #5 - **Wed Sep 28**: Review of Final Draft Report Wrap Up

Location: Charlottesville – Hillsdale Conference Center, 550 Hillsdale Drive,
Charlottesville, VA 22901

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
SMALL RENEWABLE ENERGY PROJECTS; IMPACT ON NATURAL RESOURCES,
REPORT. (HB 206)

REGULATORY ADVISORY PANEL MEETING MINUTES, MEETING #3

MEETING LOCATION:
HILLSDALE CONFERENCE CENTER
550 HILLSDALE DR., CHARLOTTESVILLE, VA 22901

Tuesday, August 2nd, 2022

Members (including primaries, alternates, and SMEs):

In Attendance (Last, First):

Berryhill, Aaron	Hammond, Drew	Murray, David
Binder, Cathy	Harbin, John	Newton, Jacob
Boschen, Amelia	Hawk, Chris	Orrell, Jim
Copenhaver, Brad	Hearne, Carrie	Piontek, Emily
Crockett, Robert	Holmes, Dan	Pollard, Speaker
Daniels, Lee	Jacobs, Zach	Rovner, Nikki
Davenport, Melanie	Jamison, Dan	Sanner, Peggy
Dicks III, Chip	Kane, Stephanie	Seaford, Kevin
Drazenovich, Rick	Killius, Anna	Seward, Susan
Dunscob, Judy	Lasher, Terry	Sink, Dominika
Fogel, Jonah	Machiran, Jeff	Smiley, Mitchell
Francis, Emily	Marshall, Elizabeth	Utt, Tyson
Green, Charles	Moore, Martha	Vaughan, Evan
		Weber, Joe

Members Absent:

Allmond, Josephus	Cizenski, Michael	Crum, Katie
Amores, Jon	Clark, Hilary	Dodson, Chris
Anderson, Meade	Coggeshall, Charlie	Dreiling, Michael
Belville-Marrion, Jenny	Connors, Corey	Egghart, Chris
Bolthouse, Julie	Corradi, Rob	Ericson, Jason
Brumberg, Sam	Crenshaw, Walter	Fanning, Patrick

Farrelly, Kevin
Flavin, Andrew
Flowers, Todd
Forren, Kelsey
Giese, Will
Gordon, Chris
Guthrie, Joe
Hammond, Jeff
Hertz, Heidi
Higgins, Victoria
Howe, Kevin
Ignosh, John

Jesensky, Kenny
Joshiyura, Neil
Lerch, Joe
Martin, James
Martin, Amy
McDonald, Christopher
Norris, Ben
Rolband, Michael
Saunders, Ben
Schmidt, Kevin
Shreve, Kyle
Sili, Jeff

Sims, Jessica
Skiffington, Michael
Sundstrom, Craig
Sydnor, Cutter
Thomas, Rick
Westcott Jr, David
Wheeler, Lauren
Wilder, Joe
Wortzel, Andrea

Department of Environmental Quality:

Foster, Amber
Meyer, Elena M.
Thompson, Tamera M.

Tripp, Susan
Dowd, Michael
Rolband, Mike (absent)

Facilitators, Institute for Engagement & Negotiation (IEN), University of Virginia:

Altizer, Kelly
Cobb, Tanya Denckla
Oliva, Michelle Montserrat
Rizk, Sarah

The meeting began at approximately **9:35 am EST**.

Meeting Purpose: This regulatory advisory panel (RAP) convened for Meeting #3 with the purpose of giving WG1, WG4, and WG5 time to present their strongest proposals and gather feedback from the full RAP. The afternoon portion of the meeting was designated to a working session for the workgroups to integrate feedback from the morning into their proposals.

Review of Shared Goal, Development of Working Session Goals, and Logistical Review:

A brief overview of the justification for proposals for WG2+3 can be found below. Specific suggestions will be incorporated into proposals.

Presentation by Dr. Lee Daniels:

Dr. Daniels (T.B. Hutcheson Jr. Professor of Environmental Soil Science at Virginia Tech) gave a presentation to the full RAP about soils, primarily focusing on soil conservation and restoration concerns for solar installations. This presentation highlighted the potential for post-disturbance soil restoration, such as pH adjustments,

soil amendments, and mechanical tillage. However, he also cautioned against promising landowners a 100% return to prior usage for solar installations, especially for prime agricultural soils.

Each disturbance is unique because of different land forms. Soil disturbance can vary widely from < 10% to regrading of the majority of the site. Major disturbances include roads, trenches, and stormwater basins, as well as local compaction. Often, under topsoil is acidic and requires lime, phosphorus, and additional organic matter.

Dr. Daniels notes that he has no doubts that we can re-soil and re-vegetate soil sites, however, you need to deal with topsoil and layer below. Given appropriate access to soil amendments, it can be revegetated, but we also need to recognize that depending on site conditions there could be wide disturbance. We also need to recognize that VA has already been heavily eroded (any point you see red soils)

Compaction is the dominant disturbance. No matter what site you're dealing with, you will have compaction as the most common ubiquitous problem to face. Any given site may have widely variable soil conditions. While low pH and fertility are relatively easy to deal with, compaction is not and needs physical remediation. More than 4-6 inches of compaction is very difficult to remedy. Compaction causes a multitude of problems, including the direct impedance of rooting, widely fluctuating wet and dry conditions, and poor infiltration that leads to increased local runoff.

To combat issues, Dr. Daniels recommends to save, properly store, and reapply soil, use liberal amounts of organic matter on both exposed subsoils and returned topsoil layers, apply tillage, and be sure to anticipate a second round of remedial actions needed when old infrastructure is removed in 20 to 30 years. Even so, topsoil replacement can't be fully effective if there is significant compaction. Even with remediation, you'll probably have ~25% reduction in productivity and it will require multiple tillage events. Heavily disturbed sites may need to be pasture or forests, not maximum productivity.

However, Dr. Daniels was adamant that you can successfully and restabilize sites, by considering three key stages:

1. Limiting short-term sediment losses during construction and keep initial erosion from happening
2. Managing existing soil and plant systems over time to minimize runoff
3. What will it take to return the land to the levels acceptable to the individual leasing the land?

Dr. Daniels addressed many of the group's questions. Many questions were very similar, asking how to best remediate while the solar panels are in use. Answers to this include keeping the site well vegetated and acknowledging it will likely require tillage. Lastly, every site is unique, but even so addressing impacts like compaction generally in walking site tours with the developer and addressing these things early on, can save money over time. Any significant disturbance from the planning phase and on, needs to

be decided how to be mitigated. There should be a site assessment step about what soil is there (soil maps and soil survey should not be the only tool to assess). All mining permits and other wetland creation sites, you need to have to plan for site installation, management, and decommissioning. It's important to consider how to get back to its land use.

Other resources available on soil quality include the memo from Dr. Daniels available in Sharepoint, as well as Landrehab.org.

Overview of Workgroup Process:

Ms. Oliva and Ms. Denckla Cobb give an overview of the workgroup process before giving the workgroups time to refine their proposals.

Members should have received an email to access the Sharepoint folder the night prior from Ms. Oliva and she indicates that if they have not, they should check their spam folder. Lastly on the technical side, there is one live document for each work group. Members should be careful that there are not multiple versions. Ms. Oliva then shifts to discuss the wealth of knowledge available in the RAP resources folder available to the participants.

Ms. Denckla Cobb then reviews the consensus method with the group. She reminds them that anyone at the table can take a quick straw poll to test for consensus and that all reds (1s) should be dressed. She then clarifies that if you have ALL yellows (2s) and greens (3s), then you have reached consensus. If you have mostly yellows, you still have consensus, but it is a weak consensus and to make it stronger, you can address all the concerns. Questions and concerns should all be recorded.

There is to be one person in each workgroup to be the main note-taker to capture proposals and the discussion highlights. **Groups should be sure to record where there is consensus.** For points of continuing disagreement, it is also important to explain why. It's also important to indicate where members agree on core principles.

The goals of this session are to:

1. Seek to understand and to minimize confusion. Members are asked to ask questions for clarification only and are encouraged to call in SMEs to weigh in.
2. Identify any key suggestions or ideas that will be agreed on, while keeping in mind what the group believes DEQ and the legislation need to know.

And lastly, everyone should be able to participate and listen to each other! SMEs should listen to conversations and workgroups should ask if they need specific assistance, as well as look for technical accuracies.

The Workgroup Process Begins around 10:40 AM.

- Workgroup 1: Avoidance & Minimization
- Workgroup 2+3: Mitigation/In Lieu

- Workgroup 4: Significant adverse impact <10 acres ag soil/50 acres forest
- Workgroup 5: Local Control

Each workgroup is assigned a table and a facilitator from IEN accompanies them, helping work through any issues that may arise. This process is resumed after lunch, around 12:40, with the goal of building consensus on the proposals.

Delaying of Rapid Scan and Next Steps:

At 2:15, the full RAP is brought back together to discuss next steps. The original goal is for the workgroups to share their proposals with the rest of the RAP.

Ms. Olivia reviews the timeline. RAP members are to finalize and refine proposals by Friday August 12, meaning there is some need to do asynchronous work on SharePoint. RAP members are asked to consider if they would like to meet.

This leads to a long discussion about next steps. Many RAP members are concerned about the quick turnaround, as well WG2+3 being behind the other three workgroups.

Some RAP members are curious as to why there are two meetings so close to each other (but not back-to-back days) on the 19th and 23rd. Ms. Deckla Cobb explains that the rapid scan would give everyone the ability to read through the proposals, then come back to finalize and gather consensus within organizations, but emphasizes that at some point these will all need to come together. It is decided that it is a priority to move forward with WG 2+3, and to prioritize getting feedback from the full RAP.

The WGs discussed with the broader group how their proposals were progressing. Many scenarios are put forth, but Based on feedback from the WGs, it is ultimately decided that all workgroups will attend the RAP meeting on the 19th and will have half the day to continue working in their workgroup and half the day to present to the rest of the RAP. Some workgroups will meet between now and then, provided they comply with FOIA requirements. It is also decided that WG 2+3 will stay late at the next meeting to continue working. **The deadline for the 2nd draft of proposals was extended to August 16th, prior to the next meeting on August 19th.**

Future Meetings:

Meeting #3 - **Fri Aug 19**: Building Consensus (Day 1)

Location: Charlottesville – Hillsdale Conference Center, 550 Hillsdale Drive, Charlottesville, VA 22901

Meeting #4 - **Tue Aug 23**: Building Consensus (Day 2)

Location: Richmond (Workforce Development and Conference Center)

Meeting #5 - **Wed Sep 28**: Review of Final Draft Report Wrap Up

Location: Charlottesville – Hillsdale Conference Center, 550 Hillsdale Drive, Charlottesville, VA 22901

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
SMALL RENEWABLE ENERGY PROJECTS; IMPACT ON NATURAL RESOURCES,
REPORT. (HB 206)

REGULATORY ADVISORY PANEL MEETING MINUTES, MEETING #4

MEETING LOCATION:
WORKFORCE DEVELOPMENT AND CONFERENCE CENTER
J. SARGEANT REYNOLDS COMMUNITY COLLEGE CAMPUS
1651 E. PARHAM RD, SUITE 108
RICHMOND, VA 23228

Tuesday, August 23rd, 2022

Members (including primaries, alternates, and SMEs):

In Attendance (Last, First):

Allmond, Josephus	Green, Charles	Pollard, Speaker
Belville-Marrion, Jenny	Harbin, John	Rovner, Nikki
Berryhill, Aaron	Hawk, Chris	Seaford, Kevin
Binder, Cathy	Holmes, Dan	Seward, Susan
Boschen, Amelia	Ignosh, John	Sili, Jeff
Connors, Corey	Jacobs, Zach	Sink, Dominika
Copenhaver, Brad	Jesensky, Kenny	Smiley, Mitchell
Crum, Katie	Killius, Anna	Sydnor, Cutter
Daniels, Lee	Lasher, Terry	Thomas, Rick
Davenport, Melanie	Lerch, Joe	Utt, Tyson
Dicks III, Chip	Moore, Martha	Vaughan, Evan
Drazenovich, Rick	Murray, David	Weber, Joe
Dunscomb, Judy	Newton, Jacob	
Fogel, Jonah	Orrell, Jim	
Gordon, Chris	Piontek, Emily	

Members Absent:

Amores, Jon	Cizenski, Michael	Crenshaw, Walter
Anderson, Meade	Clark, Hilary	Crockett, Robert
Bolthouse, Julie	Coggeshall, Charlie	Dodson, Chris
Brumberg, Sam	Corradi, Rob	Dreiling, Michael

Ericson, Jason
Fanning, Patrick
Farrelly, Kevin
Flavin, Andrew
Flowers, Todd
Forren, Kelsey
Francis, Emily
Giese, Will
Guthrie, Joe
Hammond, Jeff
Hammond, Drew
Hearne, Carrie
Hertz, Heidi

Higgins, Victoria
Howe, Kevin
Jamison, Dan
Joshiyura, Neil
Kane, Stephanie
Machiran, Jeff
Marshall, Elizabeth
Martin, James
Martin, Amy
McDonald, Christopher
Norris, Ben
Rolband, Michael
Sanner, Peggy

Saunders, Ben
Schmidt, Kevin
Seward, Susan
Shreve, Kyle
Sims, Jessica
Skiffington, Michael
Sundstrom, Craig
Westcott Jr, David
Wheeler, Lauren
Wilder, Joe
Wortzel, Andrea

Department of Environmental Quality:

Foster, Amber
Meyer, Elena M.
Thompson, Tamera M.

Tripp, Susan
Dowd, Michael (absent)
Rolband, Mike (absent)

Facilitators, Institute for Engagement & Negotiation (IEN), University of Virginia:

Altizer, Kelly
Denckla Cobb, Tanya
Oliva, Michelle Montserrat
Rizk, Sarah

The meeting began at approximately **9:35 am EST**.

Meeting Purpose: This regulatory advisory panel (RAP) convened for Meeting #3 with the purpose of giving Workgroup 2+3 time to present their proposals to the full RAP for comments, then the other workgroups were given time to present any updates to their proposals from the Friday meeting. The afternoon portion of the meeting was designated to a working session for the workgroups to finish their proposals for submission to the IEN planning team on 8/24.

Workgroup Progress

A brief overview of the justification for proposals for WG2+3 can be found below. Specific suggestions will be incorporated into proposals.

WG 2+3 found there to be tension between solar and conservation goals, so the scope of work came down to cost burdens, particularly for local governments. There is a value of economic development in solar, for both locals and for the state of Virginia, which needs to have competitively priced solar.

Preliminary conclusions included that determining functions and values of prime ag land, factored into the state mandated mitigation process, was necessary.

1. A format for assessing level of impact
2. Assessing mitigation techniques
3. Establishing executive methods (on site, off site, in lieu of)

Key questions that group explored were:

- What is the mitigation cost and net credits for doing other environmentally beneficial things?
- What are those things and how do we calculate them?
- Is there an easy checklist to establish this?

The workgroup concluded that mitigation contained in the siting agreement and permitted use should count towards the state mitigation process (you don't have to pay twice). Localities need to tailor mitigation to their particular needs. Then, whatever state mitigation program is put in place, is a reasonable checklist so that solar can look at land/locality and determine if mitigation required at a state level will quickly, efficiently, and objectively determine if the project is not economical. This process does not overstep any other statewide permitting processes.

The main focus of functions and values is to understand what environmental components need to be conserved and that,

- 1) There needs to be a mechanism to establish status prior to development
- 2) A mechanism to establish how they will be altered through the development
- 3) Appropriate mitigation actions will be taken to mitigate for those functions and values after avoidance and minimization procedures will be taken.

Many of the concerns from the full RAP revolved around the impact on aquifers and watershed basins. It is challenging to measure the impact on local land, water quality, and water loss. And, lastly, from a development perspective, many factors on a checklist would happen post CUP, post siting agreement, etc. so noting that developers may not have the answers on a checklist until far along in the process. WG2+3 clarifies that there will be a rough estimate up front (which is already standard practice), then you could refine it later. This would be based on available maps, GIS information, etc. It is meant to be a quick assessment without a large upfront cost.

WG4 provided a quick update for the group, which will be outlined in their final proposals.

It was decided that if any workgroup was unsure of whether to submit a proposal, they should submit it anyway. A conservative approach is best.

No other work groups had updates to present.

Workgroup Charge and Wrap Up:

Michelle and Tanya gave updates on the afternoon session and explained the expectation for proposal submission.

Workgroups met for a working session after lunch, with access to SMEs. They were to finalize their proposals in the format that would be used in their Qualtrics survey.

Final proposals are due by COB 8/24.

Michelle and Tanya briefly reviewed the logistical process of the Qualtrics surveys which will be due September 12.

Future Meetings:

Meeting #5 - **Wed Sep 28**: Review of Final Draft Report Wrap Up

Location: Charlottesville – Hillsdale Conference Center, 550 Hillsdale Drive,
Charlottesville, VA 22901

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
SMALL RENEWABLE ENERGY PROJECTS; IMPACT ON NATURAL RESOURCES,
REPORT. (HB 206)

REGULATORY ADVISORY PANEL MEETING MINUTES, MEETING #5, 9/28/22

MEETING LOCATION:
HILLSDALE CONFERENCE CENTER
550 HILLSDALE DR., CHARLOTTESVILLE, VA 22901

Wednesday, September 28, 2022

Members (including primaries, alternates, and SMEs):

In Attendance (Last, First):

Allmond, Josephus	Hawk, Chris	Pollard, Speaker
Belville-Marrion, Jenny	Higgins, Victoria	Sanner, Peggy
Berryhill, Aaron	Holmes, Dan	Seaford, Kevin
Binder, Cathy	Ignosh, John	Shreve, Kyle
Boschen, Amelia	Jesensky, Kenny	Sink, Dominika
Copenhaver, Brad	Killius, Anna	Smiley, Mitchell
Corradi, Rob	Lerch, Joe	Sydnor, Cutter
Crockett, Robert	Marshall, Elizabeth	Thomas, Rick
Davenport, Melanie	Martin, James	Utt, Tyson
Dicks III, Chip	Moore, Martha	Vaughan, Evan
Drazenovich, Rick	Murray, David	Weber, Joe
Dunscumb, Judy	Newton, Jacob	Wheeler, Lauren
Gordon, Chris	Orrell, Jim	Wilder, Joe
Harbin, John	Piontek, Emily	

Members Absent:

Amores, Jon	Dodson, Chris	Giese, Will
Anderson, Meade	Dreiling, Michael	Green, Charles
Bolthouse, Julie	Egghart, Chris	Guthrie, Joe
Brumberg, Sam	Ericson, Jason	Hammond, Jeff
Cizenski, Michael	Fanning, Patrick	Hammond, Drew
Clark, Hilary	Farrelly, Kevin	Hearne, Carrie
Coggeshall, Charlie	Flavin, Andrew	Hertz, Heidi
Connors, Corey	Flowers, Todd	Howe, Kevin
Crenshaw, Walter	Fogel, Jonah	Jacobs, Zach
Crum, Katie	Forren, Kelsey	Jamison, Dan
Daniels, Lee	Francis, Emily	Joshiyura, Neil

Kane, Stephanie
Machiran, Jeff
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McDonald, Christopher
Norris, Ben
Saunders, Ben

Schmidt, Kevin
Seward, Susan
Sili, Jeff
Sims, Jessica
Skiffington, Michael
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Foster, Amber
Meyer, Elena M. (absent)
Thompson, Tamera M.

Tripp, Susan
Dowd, Michael (absent)
Rolband, Mike (absent)

Facilitators, Institute for Engagement & Negotiation (IEN), University of Virginia:

Altizer, Kelly
Denckla Cobb, Tanya
Oliva, Michelle Montserrat
Rizk, Sarah

The meeting began at approximately **9:35 am EST**.

Meeting Purpose: This regulatory advisory panel (RAP) convened for Meeting #5 with the purpose of reviewing the survey results of RAP proposals. The IEN facilitation team came up with a recommended shortlist of proposals to cover based on how close they were to consensus. After confirming a shortlist with the RAP, a menti poll was used to determine the top proposals of highest strategic importance. The goal of reviewing these proposals was to take about 30 minutes per proposal and check for clarity, questions, and any changes that could be made to achieve consensus. It was understood by the facilitators and the RAP that achieving consensus on all proposals was not the goal.

Proposal Progress: The top five proposals that came out of the menti poll were:

1. Workgroup 1: Avoidance + Minimization, Proposal 1
2. Workgroup 2+3: Mitigation + In Lieu Mitigation, Proposal 1
3. Workgroup 2+3: Mitigation + In Lieu Mitigation, Proposal 2
4. Workgroup 1: Avoidance + Minimization, Proposal 6
5. Workgroup 5: Local Control, Proposals 2 and 3

However, given the time constraints of the day, a new shortlist was proposed after reviewing Workgroup 1, Proposal 1. The final list of proposals that were discussed in Meeting #5 were:

1. Workgroup 1, Proposal 1
2. Workgroup 5, Proposal 5
3. Workgroup 1, Proposal 6
4. Workgroup 5, Proposal 2
5. Workgroup 5, Proposal 1

6. Workgroup 4, Proposal 1
7. Workgroup 2+3, Proposal 1
8. Workgroup 2+3, Proposal 2

By the ending of the meeting, consensus was reached on

Workgroup 5, Proposal 1

Workgroup 5, Proposal 5

Workgroup 4, Proposal 1

It was important to the group to accurately represent the state of the proposals moving forward. Reflecting the range of expertise and positionality in the group by not using percentages as representations of consensus was discussed at length, as well as the purpose of the report to DEQ. In the report to the legislature and in moving forward in the regulatory process, the discussion of the following proposals are crucial in assisting with the process. As such, it should be treated as to guide DEQ in embarking on the regulatory process.

Workgroup 1, Proposal 1: The definition of “disturb”

The results of the survey showed support for this proposal was as follows:

Part 1: 18 (fully support) 10 (support with reservations) 4 (cannot support)

Part 2: 19 (fully support) 7 (support with reservations) 6 (cannot support)

The highlights from the discussion about proposal 1 are as follows:

- You can do something that is regulatory land disturbance that is not a significant adverse impact to forest lands. What matters in determining the impact of disturbance for forested land is the use of the land. Is it being converted from forest land to non-forest land?
- Incentivize developers to minimize adverse impacts and leave room for developers to be creative.
- The question of the importance of defining disturbance at all came up in the conversation, with the suggestion to point to other existancing definitions of disturbance instead. However, in the PBR process, the only definition for disturbance is defining the disturbance zone (for the purposes of where studies are being conducted, not necessarily for where something is actually disturbed). Whatever definition is determined by this process will be the only definition used by DEQ for the PBR process.

PROPOSED REVISIONS

“Minimize” or “minimization” means, for purposes of acceptable mitigation of “significant adverse impacts”

to “prime agricultural soils” or “forest lands,” to design or plan for and to implement practices and measures as part of project development that would result in the reduction ~~or lessening~~ of the ~~area or~~ degree of ~~potential significant impacts to~~ the resources: prime agricultural soils or forest lands, including ~~the following practices and measures:~~

Reducing or lessening the area of prime agricultural soils or forest lands disturbed at the Site; reducing or lessening the area or degree of permanent compaction of prime agricultural soils at the Site; reducing or lessening the volume or area of removal or movement of topsoil at the Site; reducing or lessening the placement of fill material or the excavation or regrading of prime agricultural soils at the Site; reduction of impervious surface area and erosion through election and use of ground cover vegetation at the Site, use of single-axis trackers and/or spacing of solar arrays pursuant to the operating plan; conserving areas of forest lands on the Site that are able to be put into productive use upon project decommissioning; replanting a portion of economically viable forest land in a manner that is also economically viable in the future; agrivoltaic practices, once deemed economically viable in Virginia; and reducing or lessening exposure of acid producing materials (APM).

This is an essential conversation for the RAP to have, but additional time needs to be allotted to reach an agreement. For now, these concerns and complexities will be reflected in the report. Further, DEQ should begin identification of best management practices that could be specified in these practices and measures, for future consideration of the RAP. Consensus was not reached.

Workgroup 5, Proposal 5: Virginia Energy Guidebook Development

The results of the survey showed support for this proposal was as follows:

17 (fully support) 13 (support with reservations) 2 (cannot support)

The highlights from the discussion about proposal 5 are as follows:

- The purpose of this proposal was clarified to the RAP. This proposal was a recommendation that the RAP wanted to pose to DEQ as a resource guide in effort to decrease friction between solar developers and localities. Its intention is to assist localities in understanding what solar provides and informing what local control there is available.
- RAP discusses that the Virginia Department of Energy is just one of multiple state agencies but it should be broadened to include other state agencies. It is critical that it does not limit perspectives from stakeholder groups. There is a recommendation that the Virginia Department of Energy lead a process to develop a guidebook.
- Understanding who the stakeholders are. For localities, understanding who it is for helps inform who the stakeholders are. Additionally, understanding the role/expertise of state agencies for land use.

Consensus is reached.

25 (fully support) 5 (support with reservations) 0 (cannot support)

Revised Proposal (Proposal would be a RAP recommendation, not a proposed regulation)

Virginia Department of Energy ~~shall develop~~ should lead a process that includes other relevant state agencies and key stakeholders to develop a guidebook online resource guide to be distributed to localities relaying best practices related to solar development (from both the developers and localities side).

This ~~should~~ would include sample, existing siting agreements that have been signed between localities and developers, to shed light on why certain development standards were placed on the project based on its location, local impact and local input. This guidebook ~~shall~~ would also provide a list of applicable permits that a given solar project may be required to obtain.

Workgroup 1, Proposal 6: Significant adverse impacts to prime agricultural soils and forest lands

The results of the survey showed support for this proposal was as follows:

22 (fully support) 9 (support with reservations) 1 (cannot support)

The highlights from the discussion about proposal 6 are as follows:

- The concern is that if you have scattered pieces of prime soils that get impacted by development, would you have to add those tiny pieces together to meet the threshold? Ideally, this would apply to a more workable farming unit.
- In response, RAP members explain that unless you meet the threshold, you will not need to consider the adverse impacts. Additionally, when you are looking at farm productivity, those small pockets are important.

There is importance of the land not being continuous, so the original proposal stands. Consensus is not reached.

Workgroup 5, Proposal 2: Encouraging earlier NOI submission

The results of the survey showed support for this proposal was as follows:

16 (fully support) 14 (support with reservations) 2 (cannot support)

The purpose of the proposal is to get some sort of contact (not leaving it up to the developers) so that relationship and approach can be identified early on in the process. It is also pertinent that it would remain confidential. This proposal will also help the developers understand ahead of time if there are issues.

There are two primary concerns from localities that are being heard.

1. The locality does not hear about the project fast enough
2. The locality does not have the resources to assess them

So, the NOI was used as a mechanism to address these concerns without creating additional burden on the developers.

The highlights from the discussion about proposal 2 are as follows:

- Considering FOIA impacts. The burden on the ability to create a potential project could take away opportunities.
- There has to be a happy medium where it moves up to be earlier in the process but not too early, where you don't risk FOIA requirements. Localities do not want to get in the way of potential development.
 - There is a mandate on the solar developer to give notice to locality before the land use file application (but that is just for siting agreement).
 - For developers, there is concern that the PBR process timeline is done in a sequence of events for a reason (cost control, etc). Changing that might have consequences.
 - For localities, there is concern that they are forced to make a decision before having all the information. That can lead to making a decision that is irreversible.
- Helpful for developers: if counties have a page on their website dedicated to their "solar wish list" and requirements, as well as contact information would go a long way in facilitating the conversation.

Consensus was not achieved and further discussion needs to be had. RAP members expressed that further discussion may find other ways to incentivize earlier communication.

Workgroup 5, Proposal 1: PBR and NOI timeline/steps

The results of the survey showed support for this proposal was as follows:

27 (fully support) 4 (support with reservations) 1 (cannot support)

There is concern about the words "publicly available" because the point of the memorandum is not to give away private information.

The highlights from the discussion about proposal 1 are as follows:

- Strike "publicly available"
- Change the memorandum to say a list of parcels and acknowledge the queue number

Consensus is achieved.

27 (fully support) 3 (support with reservations) 0 (cannot support)

PROPOSED REVISIONS

No later than 90 days prior to filing a PBR application (which triggers the public comment period), applicant shall submit the Notice of Intent to DEQ, with a copy sent to the applicable locality's Chief Administrative Officer, which will include publicly available copies of 1) ~~the memorandum(s) of land agreement~~ a list of parcels included in any existing land agreements, and 2) associated interconnection queue number.

Workgroup 4, Proposal 1: Method for field verification

The results of the survey showed support for this proposal was as follows:

22 (fully support) 6 (support with reservations) 4 (cannot support)

The highlights from the discussion about proposal 1 are as follows:

- HB894 is only charged with looking at prime ag, but in the discussion of the workgroup they recognized it would be for both. The process for prime ag is already done, but what is the equivalent qualified person and process for forestry?
- We can consider it a consensus, however we must acknowledge the concern that if agriculture has a qualification, then so should forestry.

Consensus is achieved.

25 (fully support) 5 (support with reservations) 0 (cannot support)

PROPOSED REVISIONS

Request that the workgroup convened to support Virginia Cooperative Extension with developing a map or repository of prime farmland (HB894 § 3 / 2022 Acts of Assembly Ch 488) propose and consider a clearly defined method for an optional field verification of the presence of prime agricultural soils and forests. For prime agricultural soils, this should be confirmed onsite by an appropriate state or national certified or licensed professional soil scientist.

Workgroup 2+3, Proposal 1: Create a standardized checklist of functions and values

The results of the survey showed support for this proposal was as follows:

19 (fully support) 12 (support with reservations) 1 (cannot support)

The highlights from the discussion about proposal 1 are as follows:

- There are concerns about who is doing the assessment, who is verifying, and the qualifications of the person who is doing the assessment. Ultimately the state should be confirming the results by a person who the state appointed.
- What is meant by current conditions? And could that mean that you could devalue the quality?
 - The purpose of this initial assessment is to understand the current condition of the property, what changes they are likely to cause on the property, and what is the mitigation cost of that change. That has to be part of that assessment to flag for a developer the financial risk.
- There is also some more discussion to be done on why the **conditions** are really important to include. For example, soil maps can be outdated. You may see aerial imagery that indicates whether the soil is no longer prime. The RAP has suggestions that Lidar is better than aerial in terms of assessing the condition of the soil.

Due to time constraints of the meeting, a test for consensus was not conducted.

PROPOSED REVISIONS

a. The state shall make available a standardized checklist of functions and values, as determined by this RAP, and access to standardized data to allow developers to conduct an initial high-level desktop assessment to evaluate the potential of proposed the solar project. The initial assessment would be as follows:

- (i) assessing the presence and current condition of prime agricultural soils and forest land;
- (ii) assessing the level of impacts of solar project on each;
- (iii) calculating the credits for avoidance and minimization efforts of solar developer; and
- (iv) establishing objective methods for determining a value proposition for mitigation with creditable, peer-reviewed methodologies.

When the applicant has submitted its application, the state should then assess the presence and condition of the resources. State agencies available for support and consultation should be listed for each of the above steps.

Workgroup 2+3, Proposal 2: Scoring criteria should be included to easily value prime ag/forest soil

The results of the survey showed support for this proposal was as follows:

7 (fully support) 23 (support with reservations) 2 (cannot support)

The highlights from the discussion about proposal 1 are as follows:

- Functions and values definitions are nebulous.
- The checklist aims to be finite, objective, applicable across the board. The goal is to be able to understand from a desktop survey what the cost will be.
- The functions and values would be scored/evaluated using established methodologies. Are there models in other states for how to determine a cost from an objective evaluation process? This process could be similar to the state's land use assessment using USDA data for crops or the process for compensation using a third party system for wetlands.

Due to time constraints of the meeting, a test for consensus was not conducted.

Conclusion

The RAP discussed the intention of this report being an educational document.

Following this meeting (meeting #5), the team at IEN will work through the feedback provided from the survey and as a result of the discussions summarized above. A draft report will be developed and circulated to RAP members around the middle of October for feedback. The primary purpose is to ensure that RAP comments are being accurately represented. The IEN team will then incorporate any final feedback and send to DEQ with a goal date of October 31, 2022.