

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)
HB 206 Forest Cores Mitigation: 2025 Regulatory Advisory Panel (RAP)

2025 RAP Meeting # 1
Thursday September 11, 2025
Meeting Scheduled to Begin at 10 AM

Meeting Location: DEQ Piedmont Regional Office | 4949-A Cox Road | Glen Allen, VA 23060

Note regarding Public Attendance: While the 2025 RAP meetings are open to the public, there will not be an opportunity for public comment during the meetings. As required, there will be a public comment period on the proposed amendments to the regulation, which will be announced on [Virginia Regulatory Town Hall](#). For more information, please refer to the Virginia Register of Regulations website that explains the [Regulatory Development Process](#).

TENTATIVE AGENDA

9:30 Sign-in

- *Please arrive between 9:30-10:00 am to sign-in and receive visitors badge from the receptionist.*
- Participants will need to be buzzed in by the receptionist.
- RAP members check in with DEQ staff to receive nametag and tent card; public will also sign in with DEQ.
- There is no guest wi-fi. Please plan to download or print materials in advance or use your own mobile hotspot. Only a limited number of copies of materials will be printed for reference.

10:00 Welcome: RAP Charge for 2025

Jonathan Rak, Chief Policy Advisor, DEQ

10:10 Introductions

10:25 RAP Process, Roles, and Timeline (September - November 2025)

**10:45 Land Disturbance Analysis: Solar Projects Permitted Through the SCC and DEQ
Presentation & Discussion / Q&A**

Aaron Berryhill, Department of Energy

11:15 Review Ecological Cores and How they Relate to Our Charge

Presentation & Discussion / Q&A

Joe Weber, Department of Conservation & Recreation

12:15 LUNCH BREAK (Firehouse Subs and beverages provided for Primary RAP members and SME)

1:00 Presentation & Discussion of Proposals / Q&A

2:45 Wrap-Up/Next Steps - *Adjourn at or by 3 pm*

Anticipated 2025 Forest Core RAP Meeting Topics	Dates
1: Introductions, Background Information, Introduce Proposals	Thursday, September 11, 2025
2: Discussion of Proposals	Thursday, October 9, 2025
3: Identify Proposals with Greatest Support	Thursday, November 6, 2025

2025 Forest Cores RAP Meeting Guidance: Participation Guidelines

Role of DEQ Representatives

- DEQ serving multiple roles: as lead convener, as a decision maker, and as a stakeholder.
- DEQ representatives will prepare materials, present, and actively participate in the process, including gathering and synthesizing technical information for the stakeholders.
- DEQ will draft the regulations based on outcome of the RAP process.

Role of RAP Members: Review proposals and provide input for DEQ to consider that will:

- Help improve the outcome (to benefit from brain trust of this group)
- Identify potential implementation challenges
- When possible, propose draft alternative language/approach
- At minimum provide comments to flag/document any serious concerns
- To do in between meetings: Review materials, bring your organization/constituency up-to-speed and consult them on what to discuss/offer input at following meeting

Primary & Alternate RAP Members

- One Primary representative per organization. Represents their organization/constituency. Consults within their organization for input as needed per above (Role of RAP Members)
- A Primary member may request an alternate be designated to attend/participate in Primary's absence. Primary to contact DEQ in advance of the meeting to request Director's approval of the alternate
- If Primary is present, alternates may attend in-person meetings, but observing only
- **FOIA Reminder:** Outside of RAP in-person public meetings, RAP members may have no virtual or in-person meetings, or email threads with more than 2 people, and may only consult each other 1:1.

Role of Subject Matter Experts (SMEs)

- SMEs from State Agencies/Universities will actively participate to inform the process and provide relevant context and expertise. This may include:
 - Presenting relevant information
 - Answering questions
 - Stepping in with information/expertise to add, clarify, or otherwise support the discussion
 - Provide expert opinions
 - If called on to do so by DEQ: May draft, advise or review draft language

Seating Protocols: Primary RAP members at the main tables in center of room; SMEs behind main tables, agency staff, alternates, and public in chairs lining the walls.

Proposed Method for Determining Mitigation of Development Impacts on Virginia's Largest Forests

Background

This proposal emphasizes the protection of Virginia's largest contiguous forests. This proposal focuses primarily on quantifying "contiguous forest lands" or forested blocks as a way of ensuring that the loss of ecosystem benefits are avoided or properly mitigated for. HB 206 specifically uses the term "contiguous forest lands". While HB 206 clearly defines "forest land", the significance of "contiguous forest lands" has not been fully explored in previous RAP discussions.

Both the *VaNLA Ecological Cores* and Department of Forestry's *Forest Conservation Model* (FCV) consider the significance of large, contiguous blocks of forestland. Without considering specific Core rankings, the *VaNLA Ecological Cores* is an effective tool for visualizing large, intact forests across Virginia.

Forested Blocks

It is important to note that the ecosystem benefits of large forested blocks are not limited to just critical habitats or ecological integrity. Large forested blocks generally provide several ecosystem benefits such as:

Biodiversity & Habitat

- Greater availability of interior habitat
- Reduced edge effects
- Greater resilience from disturbances and stressors
- Nutrient cycling

Water & Hydrology

- Water quality protection
- Flood mitigation
- Stream health
- Erosion control

Human & Economic

- Resources for forest management and timber
- Air quality improvement
- Carbon sequestration
- Recreation

Large forested blocks may not always provide all the ecosystem benefits listed above. But it is likely that they will offer at least some of the key ecosystem benefits. For example:

- Large forested blocks generally support greater ecological integrity.
- Large forested blocks generally have greater value to the forestry industry and higher potential for forest management.
- When large forested blocks do not support the greatest ecological integrity (i.e. pine plantations), they may offer greater value to the forestry industry.
- When large forested blocks do not provide the greatest value to the forestry industry (i.e. far distances to roads, steep slopes, soil conditions), they may support critical natural habitats.

One potential weakness of an approach focused primarily on the overall size of forested blocks is the presence of some smaller blocks of forests that support critical or rare natural habitats. If there are no other processes to protect these sites from development, they could be at risk in an approach focused solely on the size of forested blocks.

Methods

Proposal 1: Total Size of Forested Blocks using VaNLA Ecological Core Boundaries

1. Use the VaNLA Ecological Cores layer that defines the boundaries of forest cores in Virginia.
2. Symbolize VaNLA forest cores without 'Core Rank'. Classify cores based on total acres.
 - If a Core is $\geq 4,000$ acres = Higher Mitigation.
 - If a Core is $< 4,000$ acres and $\geq 2,000$ and = Additional Mitigation.
3. If permanent conversion has occurred, then the total acres of the Core can be reduced.

Background:

This method seeks to quantify the concept of 'contiguous forestland'. Desktop/on-site verification and adjustments for permanent conversions are also relatively simple. While the size of a Core is correlated with C1 and C2 ranks, it does not guarantee that every large forest block would be ranked as a C1 and C2 core.

The statistics, in acres, of a C1 and C2 core was used to determine a potential acre threshold to be used for mitigation. This proposal is based on the Lower Quartile, but the Median could also be used. Depending on the acre threshold used, this method may result in MORE or LESS total land requiring added mitigation than a proposal solely based on C1 and C2 core rankings.

Size of C1 cores:

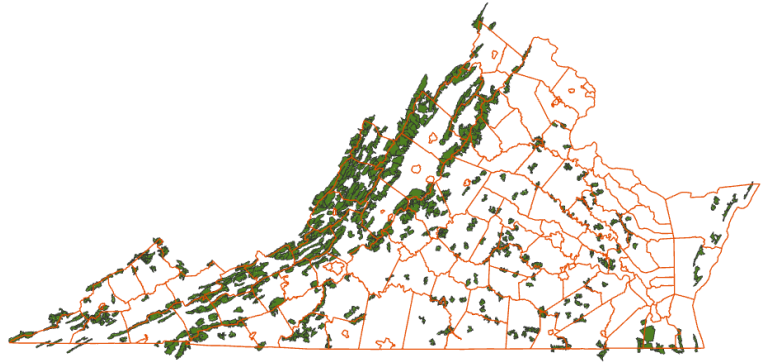
- Mean: 11,748 acres
- Median (50%): 7,945 acres (50%)
- Lower Quartile (75%): 4,180 acres
 - Rounded down to ~4,000 acres

Size of C2:

- Mean: 3,667 acres
- Median (50%): 2,746 acres
- Lower Quartile (75%): 1,734 acres
 - Rounded up to ~2,000 acres

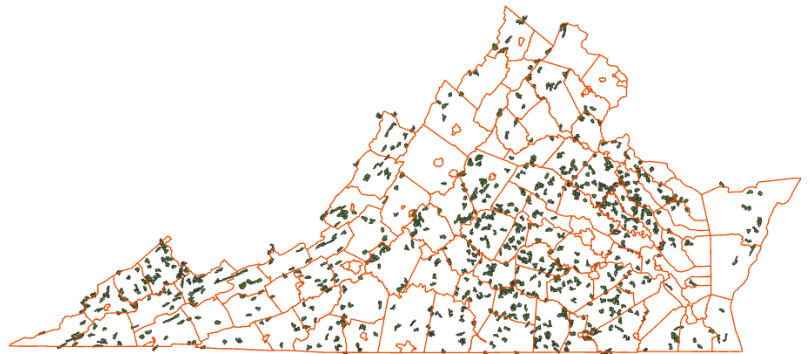
Total Cores $\geq 4,000$ Acres

	# of Cores $\geq 4,000$ Acres	Percent of Total
C1	191	77%
C2	203	33%
C3	88	4%
C4	1	0%
Total	483	6%



Total Cores $<4,000$ acres & $\geq 2,000$ Acres

	# of Cores $\geq 4,000$ Acres	Percent of Total
C1	46	19%
C2	210	34%
C3	480	21%
C4	27	0.5%
Total	743	9%



Proposal 2: Total Size of Forested Blocks without using VaNLA Ecological Core Boundaries

1. Create a new layer that defines the boundaries of contiguous forest land based on land cover in Virginia
2. Classify contiguous forest land based on total acres.
 - If a Core is $\geq x$ acres = Higher Mitigation
 - If a Core is $< x$ acres and $\geq x$ acres and = Additional Mitigation
3. If permanent conversion has occurred, then the total acres of the Core can be reduced.

Background:

While VaNLA offers a compelling methodology for defining the boundaries of forested blocks, this method seeks to quantify the concept of ‘contiguous forestland’ without the use of VaNLA. State agencies (DCR, DOF, etc.) could collaborate to build a new layer that identifies large contiguous blocks of forest land in Virginia. Based on the statistics of the dataset a new acre threshold could be used to determine when additional mitigation would be required.

Proposed Method for Determining Mitigation of Development Impacts to Outstanding and Very High-Integrity Ecological Cores in Virginia

Introduction

Under Virginia House Bill 206, this Subject Matter Expert (SME) proposal is submitted for consideration by the Regulatory Advisory Panel. It outlines a method to address mitigation of development impacts on contiguous forest within Ecological Cores ranked as Outstanding (C1) or Very High (C2) by the 2017 Virginia Natural Landscape Assessment (VaNLA). These impacts apply when forest within a core has been persistently converted to another land cover type at least two years prior to application for utility-scale solar development, as defined in the SME-approved definition of persistent conversion. If no such conversion occurred, the Ecological Core is considered intact, its rank remains unchanged, and mitigation should follow its original rank. In those cases, the GIS analysis and mitigation key described in this proposal do not apply. Lower-ranked Ecological Cores and Habitat Fragments (C3–C5) continue to be mitigated at a 1:1 ratio, with adequate vegetated buffers along waterways.

The “Length of Streams in Interior Forest” variable used to prioritize Ecological Cores in the 2017 VaNLA is defined as the total length of streams in meters within interior forest for each Ecological Core or Habitat Fragment, based on high-resolution stream and river flow lines from the USGS National Hydrography Dataset. In an SME meeting, there was agreement to drop Natural Heritage Resources (NHR)—such as rare, threatened, and endangered species and exemplary natural communities—from the Ecological Core mitigation process because these variables are difficult to field verify and recommendations for protection of NHR would be made separately during environmental review conducted by DCR and DWR as part of the permitting process. The decision was made to retain the Length of Streams in Interior Forest, Maximum Depth, and Total Area variables because they are field-verifiable. However, Maximum Depth and Total Area were later removed from the process for two main reasons: 1.) they are correlated with the Length of Streams in Interior Forest variable and could be perceived as double or triple counting; and 2.) the length of interior streams variable already approximates the other two characteristics. Streams located in the interior reflect the depth of the forest, and larger forest interiors tend to have longer interior streams.

Length of Streams in Interior Forest is a strong indicator of multiple ecological benefits, extending beyond rare species protection to include the protection of human drinking

water (Gay et al. 2025; Caldwell et al. 2023). Including Maximum Depth and Total Area would also require scaling them to match the range of the stream length variable, making the analysis less transparent and less field-verifiable for developers. Even though NHR were removed from this mitigation process, they remain fully represented through their role in the original prioritization and ranking of Ecological Cores.

Although this proposal uses interior streams as a measure of prior degradation to Ecological Cores, this does not imply that riparian buffers alone would sufficiently mitigate the impacts of development. Interior streams serve as a practical and defensible surrogate for the broader ecological integrity of a core because they are the most straightforward to verify using field observation, aerial photography, and GIS analysis. While Ecological Cores provide a wide range of high-quality ecosystem services, those associated with interior streams are among the most visible, measurable, and ecologically significant.

Data Review and Decision Points

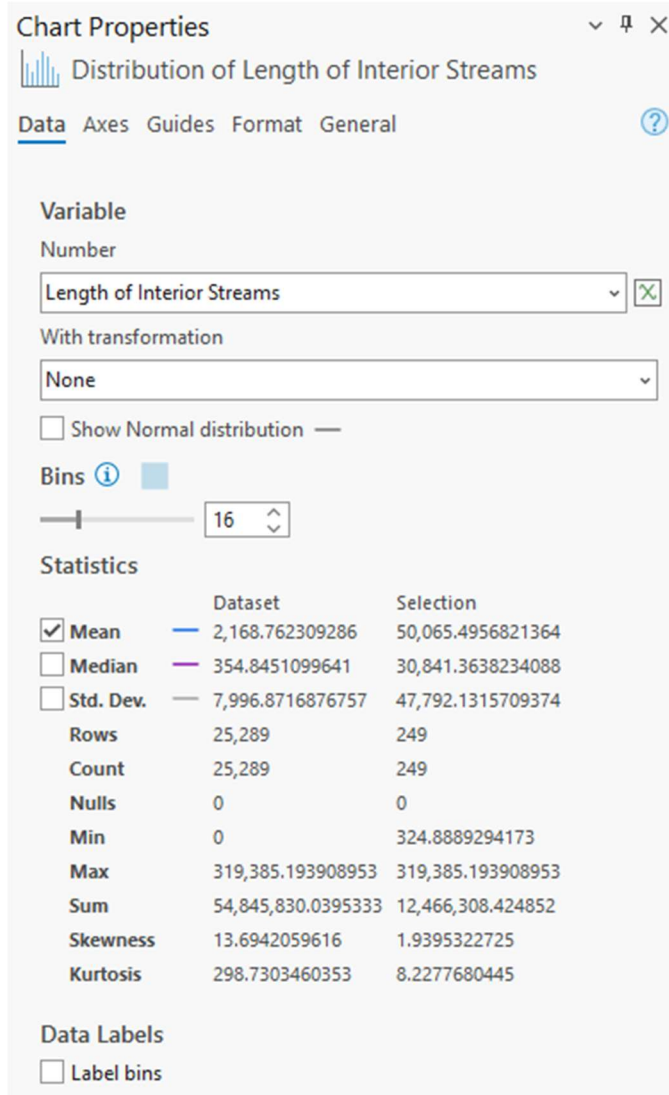
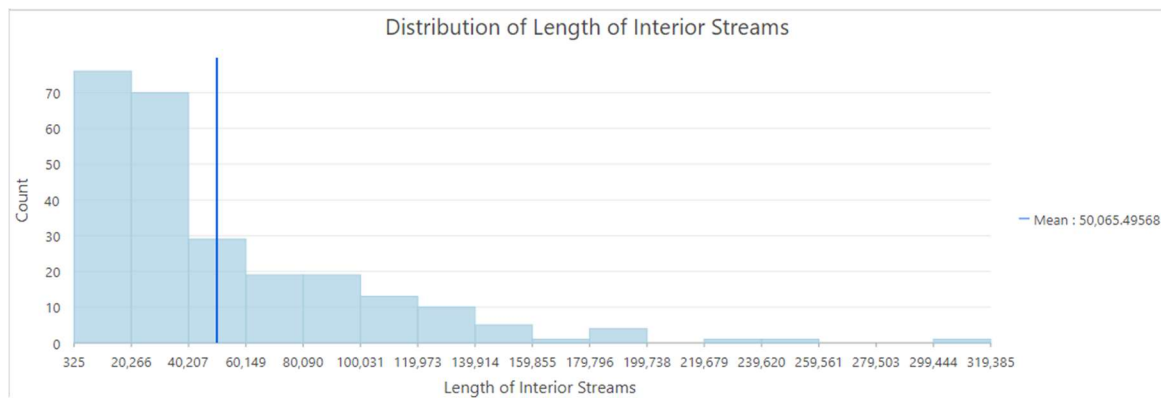
As is typical of environmental data, none of the three variables considered by the SME—Length of Streams in Interior Forest, Maximum Depth, and Total Area—have normal distributions; all are heavily skewed to the right. Consistent with the decision described above, this proposal uses only Length of Streams in Interior Forest.

While a log transformation could normalize the data for parametric statistical analysis, doing so would make the process less transparent to developers. For this reason, no transformation is applied. If the data were normalized, thresholds for changes in Ecological Core rank could be based on subtracting two standard deviations from the mean; however, this approach is inappropriate for skewed distributions.

Instead, thresholds for rank changes are set using the midpoint between the medians of sequential ranks. The median is less affected by extreme values and provides a more accurate measure of central tendency in skewed data.

Statistics and Thresholds for Rank Demotion

C1 Cores Histogram and Statistics for Interior Streams



C2 Cores Histogram and Statistics for Interior Streams

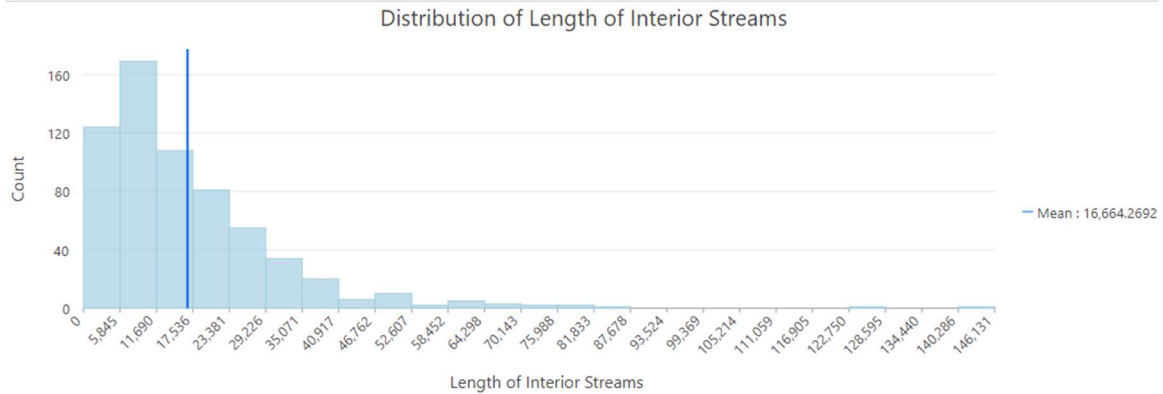


Chart Properties

Distribution of Length of Interior Streams

Data Axes Guides Format General

Variable

Number

Length of Interior Streams

With transformation

None

☐ Show Normal distribution —

Bins

25

Statistics

	Dataset	Selection
☒ Mean	2,168.762309286	16,664.2692003026
☐ Median	354.8451099641	12,410.9262418093
☐ Std. Dev.	7,996.8716876757	14,965.2147446029
Rows	25,289	624
Count	25,289	624
Nulls	0	0
Min	0	0
Max	319,385.193908953	146,130.809213271
Sum	54,845,830.0395333	10,398,503.9809888
Skewness	13.6942059616	2.828426617
Kurtosis	298.7303460353	17.5594876359

Data Labels

☐ Label bins

C3 Cores Histogram and Statistics for Interior Streams

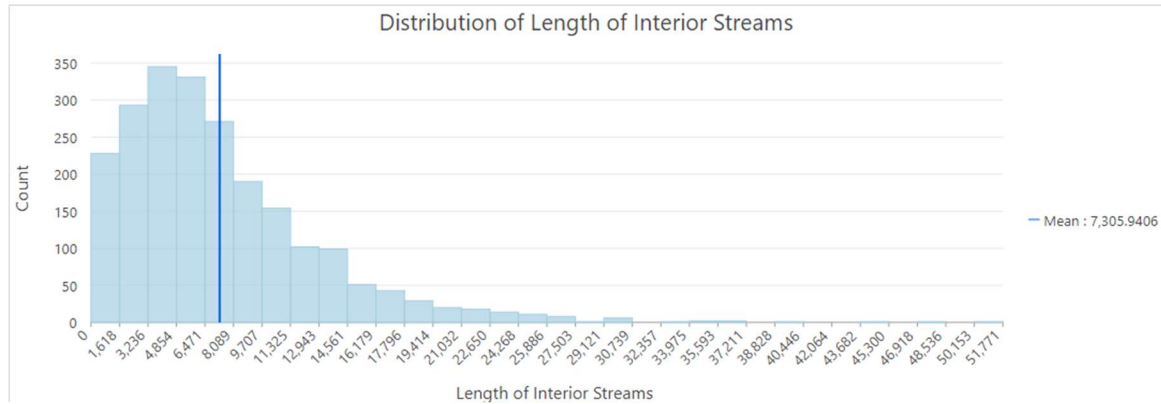


Chart Properties



Distribution of Length of Interior Streams

Data Axes Guides Format General

Variable

Number

Length of Interior Streams

With transformation

None

☐ Show Normal distribution —

Bins

32

Statistics

	Dataset	Selection
☒ Mean	2,168.762309286	7,305.9405993659
☐ Median	354.8451099641	5,968.8058131353
☐ Std. Dev.	7,996.8716876757	5,693.9622290296
Rows	25,289	2,223
Count	25,289	2,223
Nulls	0	0
Min	0	0
Max	319,385.193908953	51,771.2399505147
Sum	54,845,830.0395333	16,241,105.9523905
Skewness	13.6942059616	1.8209406171
Kurtosis	298.7303460353	9.0077820821

Data Labels

☐ Label bins

Threshold values for demoting Ecological Cores are calculated as follows:

- C1 to C2: $((30,841.36 - 12,410.93) / 2) + 12,410.93 = 21,626.15$ meters (rounded to 20,000 meters)
 - C1 cores with $\geq 20,000$ meters of interior streams remain C1
 - C1 cores with $< 20,000$ meters are demoted to C2
- C2 to C3: $((12,410.93 - 5,968.81) / 2) + 5,968.81 = 9,189.87$ meters (rounded to 10,000 meters)
 - C2 cores with $\geq 10,000$ meters of interior streams remain C2
 - C2 cores with $< 10,000$ meters are demoted to C3

Procedure to Determine Mitigation for Development in Ecological Cores

Step 1. Identify the Ecological Core:

Begin with a C1- or C2-ranked Ecological Core, projected to Virginia Lambert coordinates. Units for length must be meters. Extract the feature from the Ecological Cores service: [VaNLA Ecological Cores \(Feature Layer\) - Overview](#)

Step 2. Assess Persistent Conversion:

- If no persistent conversion of forest (see SME definition) has occurred at least two years before the solar application, the core is intact, its rank remains unchanged, and mitigation follows the original rank. Exit procedure.
- If persistent conversion of forest has occurred, digitize a new boundary to reflect current conditions, using the SME-defined criteria. Use the state of the land cover in the most recent [orthoimagery](#) maintained by Virginia Geographic Information Network's Virginia Base Mapping Program to determine persistent conversion. Limit edits strictly to the 2017 Ecological Core boundary to remove areas of persistent conversion. Do not expand the boundary beyond its 2017 extent, even if the core area has grown. Note: Harvested and clearcut lands are still classified as forest. Proceed to Step 3.

Step 3. Compare Areas:

Calculate the total area of the new boundary from Step 2 and compare it with the original total area (in square meters).

- De Minimis Exemption: If the decrease is 10% or less, the core is considered intact, its rank remains unchanged, and mitigation follows the original rank. Exit procedure.
- If the decrease is more than 10%, proceed to Step 4.

Step 4. Identify Interior Forest:

From the updated boundary, create a 100-meter inward (negative) buffer to define interior forest. Proceed to Step 5.

Step 5. Extract Flowlines:

Select and export flowlines with FTYPE = 460 (Stream/River) from the high-resolution National Hydrography Dataset. Proceed to Step 6.

Step 6. Clip Flowlines:

Clip the selected flowlines from Step 5 using the interior forest polygon from Step 4. Proceed to Step 7.

Step 7. Calculate Interior Stream Length:

Sum the Shape_Length field of the clipped flowlines to obtain the total length (meters) of interior streams. Proceed to Step 8.

Step 8. Apply Mitigation Key:

Use the total from Step 7 to apply the Ecological Core Mitigation Key below and determine any rank changes and required mitigation ratio.

Ecological Core Mitigation Key

Step 1: Was a new boundary digitized due to persistent conversion?

- No: Mitigate at 7:1 (C1) or 2:1 (C2) with adequate vegetated buffers on waterways to be protective of aquatic species.
- Yes: Proceed to Step 2.

Step 2: Was the original rank C1?

- Yes: Proceed to Step 3.
- No: Proceed to Step 4.

Step 3: Does the core have $\geq 20,000$ meters of interior streams?

- Yes: Remains C1; mitigate at 7:1 with adequate vegetated buffers on waterways to be protective of aquatic species.
- No: Demoted; proceed to Step 4.

Step 4: Does the core have $\geq 10,000$ meters of interior streams?

- Yes: Mitigate at 2:1 with adequate vegetated buffers on waterways to be protective of aquatic species.
- No: Demoted; mitigate at 1:1 with adequate vegetated buffers on waterways to be protective of aquatic species.

Context and Limitations

If no persistent conversion of forest occurred at least two years before application for utility-scale solar development (see SME definition), the Ecological Core remains intact, its rank does not change, and mitigation should follow its original rank. In such cases, the GIS analysis and mitigation key in this proposal do not apply.

This method is not intended to be perfect but is designed to remain simple, repeatable, defensible, and objective. Any method that applies across diverse situations must balance practicality with ecological rigor, and cannot capture every nuance of ecological function.

According to the VaNLA dataset, 75 C1 (30.1% of 249) and 253 C2 (40.5% of 624) contain initial lengths of interior streams below the thresholds for rank demotion. The SME group recognizes that this approach involves trade-offs, but maintains that Ecological Cores without more than de minimis conversion should be mitigated based on their original rank.

Citations

Gay ET, Martin KL, Caldwell PV (2025). Projected land use changes will cause water quality degradation at drinking water intakes across a regional watershed. PLOS Water, 4(4): e0000313. <https://doi.org/10.1371/journal.pwat.0000313>

Caldwell, P. V., et al. (2023). Forested watersheds provide the highest water quality among all land cover types, but the benefit depends on landscape context. Science of the Total Environment. <https://doi.org/10.1016/j.scitotenv.2023.163550>

Definition of Persistently Converted Forest

For the purposes of solar development permitting and mitigation, persistently converted forest refers to forested land that is cleared and no longer managed or permitted to regenerate as forest, resulting in a change in land cover away from forested conditions that would exist into the foreseeable future or reduce the functional, ecological, or economic capacities of the forest that would regenerate on the site. This includes land that is converted to built infrastructure, maintained in an unforested condition (e.g., maintained turf, gravel, or panel arrays), or otherwise excluded from natural or managed forest regeneration.

This definition does NOT apply to:

- Silvicultural activities such as timber harvests or clearcuts, including harvests of pine plantations, provided the area is replanted or allowed to regenerate as forest in accordance with applicable forestry practices.
- Areas cleared within two years prior to the solar permit application for the purposes of site preparation or development, if the forest cover present prior to clearing would otherwise meet the definition of forest.

By Electronic Mail: amber.foster@deg.virginia.gov

August 28, 2025

Virginia Department of Environmental Quality
Attention: Ms. Amber Foster, Renewable Energy PBR Coordinator, Office of Air Permitting &
Renewable Energy
1111 E Main Street
Richmond, VA 23219

RE: Forest Cores RAP Considerations

Dear Ms. Foster,

In response to the July 31, 2025 email soliciting proposals for consideration to support enhancements to the Forest Core Integrity Model by the Regulatory Advisory Panel (RAP), Dominion Energy offers the following for consideration to aid in improvements to the Forest Core Integrity Model.

1. Distinguish Between Protected Lands and Other non-protected lands

The current model treats all land uniformly, but ownership affects management practices, protection status, and long-term ecological outcome potentials which should be accounted for in the modeling.

- Protected lands (e.g., state parks, national forests, and land with conservation easements) have lower development risk.
- Other non-protected lands may be subject to timber harvesting, development, or other land uses that degrade ecological integrity.

Recommendation: Add a weighting factor to the integrity score based on ownership type and conservation status (e.g., protected, easement, unprotected).

2. Account for Intensive Forest Management

Not all forest cover contributes equally to ecological integrity. Forests managed for industrial timber production, especially monocultures like loblolly pine, often lack structural diversity, native understory, and habitat value.

- These areas may have high canopy cover but low ecological function.
- Loblolly pine plantations can suppress native biodiversity, impact soil qualities, and alter hydrology.

Recommendations:

1. Include a parcel-based land use intensity modifier in the model to downgrade scores for heavily managed forests.
2. Use remote sensing or forest inventory data to distinguish natural forest from plantation forestry.

3. Prioritize mixed hardwood stands and old-growth remnants in scoring.

3. Incorporate Parcel based Management History and Future Risk

Ecological integrity should reflect both current conditions and future vulnerability.

- Forests with recent clearcuts or active logging permits should be flagged.
- Areas with conservation plans or sustainable forestry certifications could be scored more favorably.

Recommendations:

1. Integrate land use history datasets and management plans into the model.
2. Use predictive modeling to assess future disturbance risk based on ownership and zoning.

4. Integrate Ground-Truthing

Model outputs should be or have the ability to be validated and to be refined.

Recommendation: Allow for field surveys to confirm habitat quality and species presence.

5. Water Quality as a Condition Indicator

The Virginia DEQ Integrated Water Quality Report provides a robust dataset on the health of surface waters across the Commonwealth. It should be incorporated into the forest core integrity model to better reflect current ecological conditions.

- Forest cores adjacent to or encompassing impaired waters show reduced ecological function due to nutrient loading, sedimentation, hydrological alteration.
- Conversely, cores associated with unimpaired waters demonstrate intact ecological processes and stronger ecosystem services.

Recommendation: Use water quality status as a modifying factor in the ecological integrity score to reflect the current condition of aquatic systems within or adjacent to forest cores.

6. Address Model Transparency and Accessibility

Model should be fully transparent to support broader use and acceptance of the model.

Recommendations:

1. Publish the full list of 50+ attributes and their weightings.
2. Provide open-source tools or dashboards for the public to explore and customize integrity scores based on additional field-based reconnaissance.

Mitigation should be based on an evaluation of the functions and values determined to be lost, with the final mitigation ratio having considered the functions and values that are replaced (partial or full replacement or improved) such as water quality, habitat, soil quality.

The RAP team should consider the well-established precedent of using compensation ratios used at the federal and state level for mitigating impacts to wetlands. While these ratios are currently applied based on cover type (forest, scrub shrub, emergent), the three categories of forest considered for mitigation under the PBR can easily adopt those ratios at a starting point.

- 2:1 mitigation for C1 (prior to consideration of function/value replacement factors)

- 1.5:1 mitigation for C2 (prior to consideration of function/value replacement factors)
- 1:1 mitigation for all other forest (prior to consideration of function/value replacement factors)

We look forward to participation in the RAP to help inform the final regulation.

Sincerely,

A handwritten signature in dark ink, reading "Amelia H. Boschen". The signature is written in a cursive, flowing style.

Amelia Boschen

Director Environmental & Sustainability