Pathways to the Future
NATURAL RESOURCES

Richmond Region Natural Resources Plan 2027

DRAFT





PlanRVA
Where the region comes together to look ahead.

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EXECUTIVE SUMMARY

The Natural Resource Plan is a regional framework for conserving the natural systems that support communities, economies, and resilience across the Richmond region.

Why this plan matters. Natural resources cross jurisdictional boundaries and provide interconnected benefits: clean water, habitat, flood protection, productive land, recreation, and community character. This plan gives local governments and regional partners a common evidence base for protecting these assets while responding to development pressure, changing climate conditions, and uneven access to natural amenities.

How to use the plan. Use the natural resources descriptions, maps, findings, and implementation actions to inform comprehensive plans, capital investment programs, development review, conservation and restoration programs, resilience initiatives, and regional coordination. The plan is a decision-support resource; implementation remains locally led with the opportunity for collaboration among local governments, partner agencies, landowners, and community organizations. **The key maps in this plan are best viewed via this plan's online map products; readers are encouraged to utilize the plan and these online map products in tandem.**

Plan Goals at a Glance

01 Terrestrial Habitat	Protect, restore, and connect high-value terrestrial habitats and the ecosystems they support.
02 Water Quality	Protect and improve water quality by safeguarding headwaters, streams, wetlands, riparian areas, and other natural systems.
03 Flood Resilience	Reduce flood risk and strengthen resilience through natural and nature-based approaches that work with regional hydrology.
04 Working Lands	Sustain agricultural and forest lands that provide economic, ecological, cultural, and community benefits.
05 Recreation & Culture	Expand equitable access to natural areas, outdoor recreation, and the cultural resources connected to the region's landscapes.

Key direction. The plan organizes regional work around protecting, restoring, and connecting natural resource assets; integrating natural resource information early in local decisions; and using shared data and partnerships to advance implementation.

Implementation roles. Local governments can apply the plan in land use, development, capital improvement program, parks, utilities, and resilience work. PlanRVA can support regional coordination, data sharing, technical assistance, and convening. State and federal agencies, conservation partners, landowners, businesses, and residents are essential implementation partners.

Regional Action Agenda

Ten shared priorities for coordinated regional action

Priority	Decision focus	PlanRVA regional role
1. Protect and connect priority natural areas	Focus conservation, restoration, and development-sensitive planning on core habitat, landscape corridors, riparian areas, wetlands, and floodplains.	Shared mapping; conservation coordination; technical assistance.
2. Improve watershed health	Advance riparian protection, stormwater retrofits, water-quality monitoring, and watershed-scale project coordination.	Data integration; monitoring coordination; regional project support.
3. Reduce flood risk with natural infrastructure	Prioritize floodplain function, nature-based solutions, recurring-flood-risk reduction, and resilient capital planning.	Regional flood data; partner convening; project-pipeline support.
4. Sustain farms, forests, and local food systems	Protect productive lands and support practices, markets, and policies that keep working lands economically viable.	Regional coordination; mapping; partnership building.
5. Expand equitable access to nature and culture	Close access gaps through parks, trails, blueways, public access, heritage assets, and safe connections.	Access inventory; cross-jurisdiction coordination; funding support.
6. Maintain a current decision-support system	Refresh maps and datasets, document limitations, and make information usable for local and regional decisions.	Data stewardship; web mapping; training and technical assistance.
7. Build a regional project pipeline	Use a shared intake, screening, readiness, and funding-matching process for multi-benefit projects.	Project inventory; grant coordination; partner matchmaking.
8. Apply an equity and community-benefit screen	Prioritize projects that address exposure, access gaps, community-identified needs, and long-term resilience.	Shared screening criteria; engagement support; reporting.
9. Align plans, policies, and capital programs	Connect the plan to regional plans, local comprehensive plans, hazard mitigation, transportation, parks, utilities, and CIP processes.	Model tools; peer exchange; localized technical assistance.
10. Report progress and adapt	Use annual reporting and periodic plan updates to maintain accountability and respond to new data, conditions, and opportunities.	Annual dashboard; biennial review; regional convening.

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Adopted by the PlanRVA Commission (*Month Day*), 2027

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Acronyms and Abbreviations

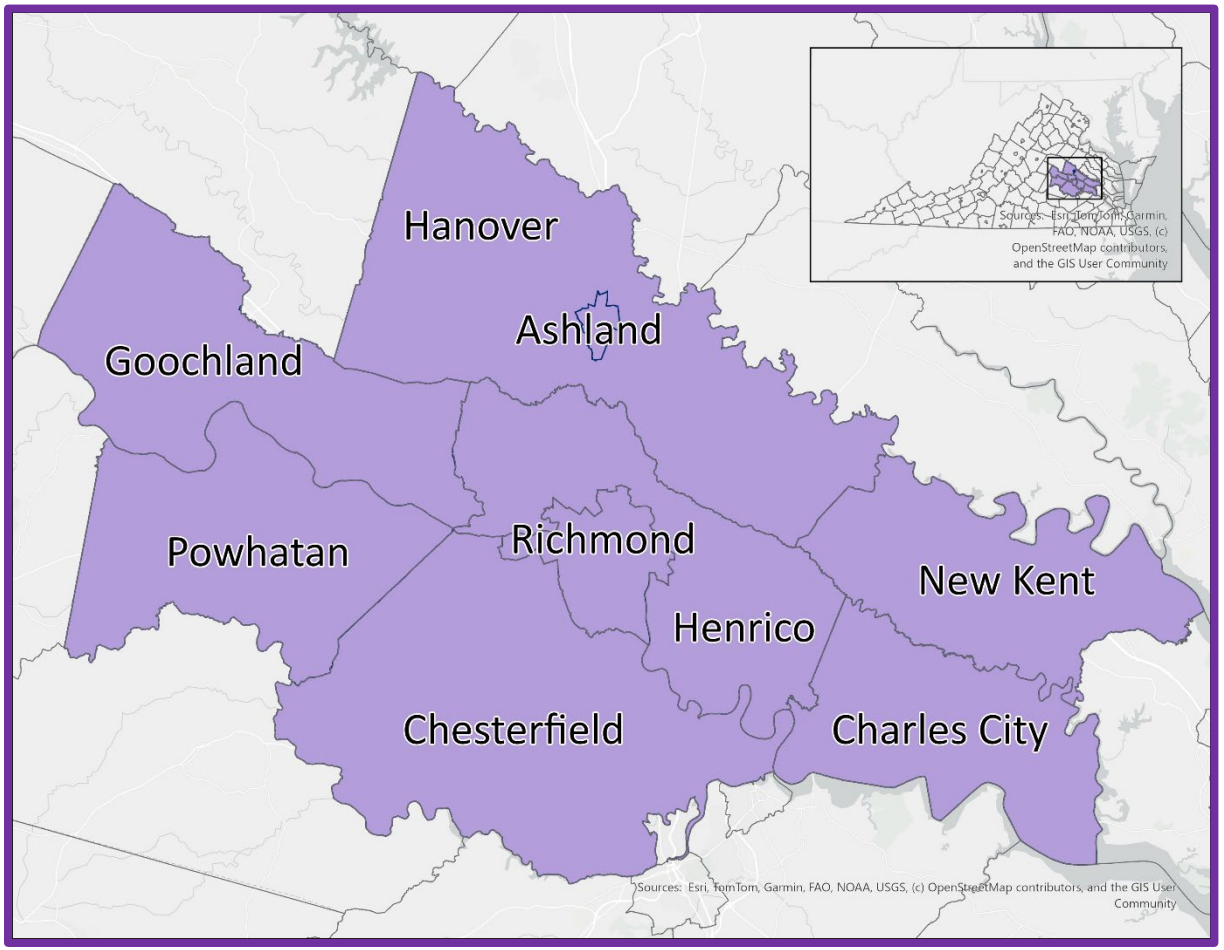
AFD	Agricultural and Forestal District	RRTPO	Richmond Regional Transportation Planning Organization
ALCOA	Aquatic Life Conservation Opportunity Area	RTE	Rare, Threatened, Endangered
ARP	Advance Restoration Plan	SLR	Sea Level Rise
BMP	Best Management Practice	SWCD	Soil and Water Conservation District
CBPA	Chesapeake Bay Preservation Act	TAZ	Transportation Analysis Zone
CCAP	Comprehensive Climate Action Plan	TDR	Transfer of Development Rights
CEDS	Comprehensive Economic Development Strategy	TMDL	Total Maximum Daily Load
DCR	Virginia Department of Conservation and Recreation	uLESA	Urban Land Evaluation and Site Assessment
DEQ	Virginia Department of Environmental Quality	USDOT	United States Department of Transportation
DOF	Virginia Department of Forestry	VaNLA	Virginia Natural Landscape Assessment
DWR	Virginia Department of Wildlife Resources	WIP	Watershed Implementation Plan
EPA	United States Environmental Protection Agency	RRTPO	Richmond Regional Transportation Planning Organization
FCV	Forest Conservation Value	RTE	Rare, Threatened, Endangered
FEMA	Federal Emergency Management Agency		
FHWA	Federal Highway Administration		
HMP	Hazard Mitigation Plan		
HUC-12	Hydrologic Unit Code 12 Watershed		
LCWC	Lower Chickahominy Watershed Collaborative		
LRTP	Long Range Transportation Plan		
NLN	Natural Land Network		
NOAA	National Oceanic and Atmospheric Administration		
NRP	Natural Resources Plan		
PDR	Purchase of Development Rights		
REF	Regional Ecosystem Framework		
RMA	Resource Management Area		
RPA	Resource Protection Area		

Definitions

Best Management Practice (BMP)	A structural or nonstructural practice designed to reduce pollution, improve water quality, manage stormwater, or provide other environmental benefits.
Carbon Sequestration	The process of capturing and storing atmospheric carbon dioxide in vegetation, soils, water bodies, or other natural and engineered systems.
Conservation Easement	A voluntary legal agreement that permanently limits certain types of development or land uses in order to protect conservation values.
Floodplain	The relatively flat land area adjacent to a river, stream, or other water body that is subject to flooding during periods of high water.
Green Infrastructure	A network of natural and nature-based features and practices that provide environmental, economic, and community benefits, including stormwater management, habitat connectivity, and recreation opportunities.
Habitat Connectivity	The degree to which landscapes allow wildlife and ecological processes to move between habitat areas.
Hydrologic Unit Code 12 (HUC-12) Watershed	A small-scale watershed boundary used by federal, state, and local agencies for water resource planning and analysis.
Impervious Surface	A hard surface such as pavement, rooftops, or compacted ground that prevents water from infiltrating into the soil.
Nature-Based Solutions	Strategies that protect, sustainably manage, or restore natural systems in ways that address societal challenges while providing environmental and human benefits.
Riparian Buffer	A vegetated area adjacent to a stream, river, wetland, or other water body that helps filter pollutants, reduce erosion, and provide habitat.
Scenario Planning	A planning process that evaluates multiple plausible future conditions to understand potential impacts, risks, and opportunities.
Storm Surge	An abnormal rise of water generated by a storm, over and above predicted tidal levels.
Transportation Analysis Zone (TAZ)	A geographic unit used in transportation planning and modeling to analyze travel patterns and forecast transportation demand.
Watershed	An area of land where all water drains to a common water body such as a stream, river, lake, or estuary.
Wetland	An area that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Chapter 1: Introduction

The Richmond Regional Planning District Commission, now known as PlanRVA, was formed by the local governments in the Richmond region on August 14, 1969. PlanRVA supports the the Town of Ashland, the City of Richmond, and the counties of Charles City, Chesterfield, Goochland, Hanover, Henrico, New Kent, and Powhatan. The statutory framework for the creation of planning district commissions recognized that they would be voluntary associations of local government intended to foster regional cooperation. The intention was to provide a forum for state and local governments to address issues of a regional nature, things of greater-than-local significance. PlanRVA's Environment Program brings together citizens, local government staff, Tribal Nations, and community groups to plan for responsible management, protection, and restoration of the region's natural resources.



Map 1. Regional Context Map

In 2009, PlanRVA developed a Regional Green Infrastructure Plan. This plan identified regional-scale priority areas for environmental conservation and outlined recommendations for incorporation into regional and local plans. The 2026

PlanRVA Natural Resources Plan (NRP) is an updated and expanded effort, incorporating newly available data. PlanRVA's Natural Resources Plan utilizes state data, regional analysis, and local priorities with the goal of protecting, conserving, and maintaining access to these resources in the present and into the future as the region grows and changes.

The NRP is divided into three major components:

- The **Natural Resource Lens Description and Maps** section and the **Updated Regional Ecosystem Framework (REF)** section both provide information about the five groupings of natural resource data included in this plan, referred to as "lenses." The NRP uses the term lenses as an organizing term, recognizing that natural resources can be "looked at" - considered and categorized - in multiple ways. The lenses in the NRP are: Terrestrial Habitat, Water Quality, Flood Resilience, Working Lands, and Recreation & Culture. The lenses and REF sections describe the data and analysis used to arrive at the maps that show regional-scale priority areas. The maps in these sections are the major products of this plan.
- The **Risks Factors and Opportunities** section describes the risks and opportunities that could impact the region's natural resources.
- The **Implementation** section includes regional goals for PlanRVA's work in each type of natural resource category lens and actions to help reach them.

Section I of Article XI of the Virginia Constitution states:

"To the end that the people have clean air, pure water, and the use and enjoyment for recreation of adequate public lands, waters, and other natural resources, it shall be the policy of the Commonwealth to conserve, develop, and utilize its natural resources, its public lands, and its historical sites and buildings. Further, it shall be the Commonwealth's policy to protect its atmosphere, lands, and waters from pollution, impairment, or destruction, for the benefit, enjoyment, and general welfare of the people of the Commonwealth."

The development of this plan was guided by PlanRVA's Environmental Technical Advisory Committee, member localities, key stakeholders (regional partners, state agencies), and public input (see Community Engagement section).

The NRP is a component of PlanRVA's regional strategic plan, and is intended to act as a cornerstone for PlanRVA's environmental planning program. Emphasis areas in this plan, both geographic and topical, will inform project-specific and place-based plans for all areas of the agency's work, including transportation, environment, and

resilience. The information in the NRP and the resources developed through the planning process will also help identify, target, and engage community members and local stakeholders in continued inclusive participatory planning.

The NRP, individual lens maps, and the Regional Ecosystem Framework are non-regulatory decision-support tools. They are intended to inform regional and local planning conversations, grant applications, conservation partnerships, and future data development. They do not establish parcel-level restrictions, alter local land use authority, designate regulatory conservation areas, or set fixed project or trail alignments. Site-specific decisions remain subject to local planning processes, engineering and feasibility review, applicable federal and state requirements, landowner coordination, and public engagement. Accompanying this plan are several online map products which let readers explore the plan's data layers in more detail than is possible in the printed plan. Some layers are visible by default to support readability at the regional scale, while other supporting layers may be turned on as needed. Default visibility does not indicate priority or regulatory status, and supporting layers do not all carry equal planning weight. The map colors were selected to distinguish overlapping datasets and improve legibility; users may adjust layer visibility, transparency, or display settings where available to improve accessibility or local review. If a dataset is not currently included in a lens map, readers should also review the Implementation Framework actions because several actions identify future mapping, monitoring, or data-development needs.

How to Use the Maps

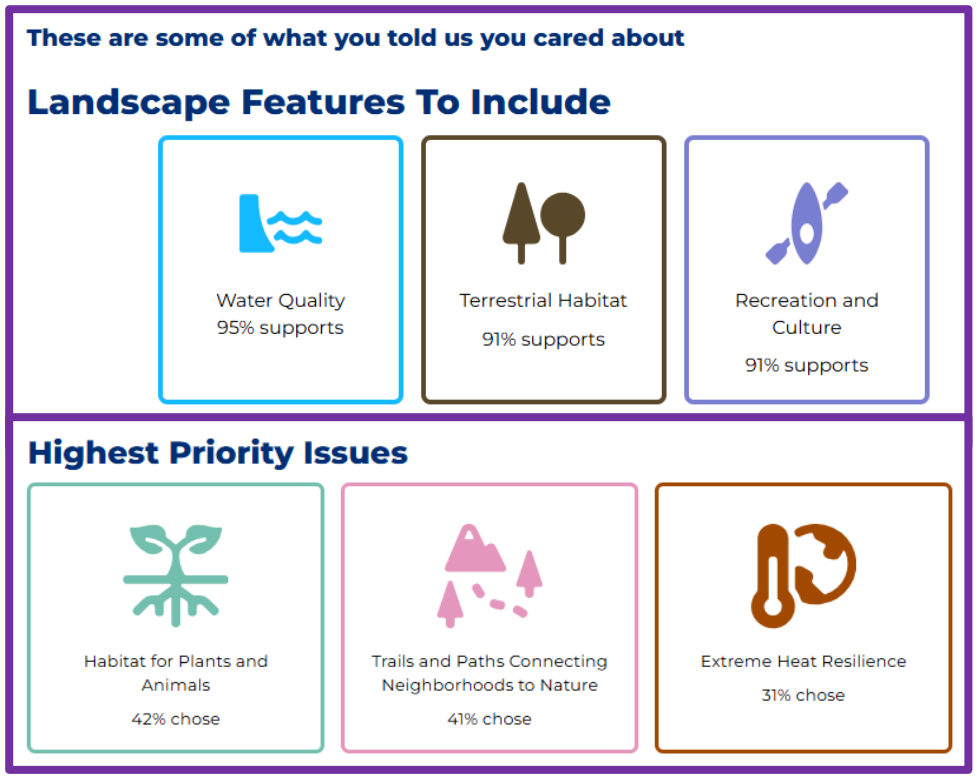
This plan includes both static maps in the report and interactive online maps. The static maps summarize key regional patterns and are intended to support discussion, coordination, and decision-making at a regional scale. The online maps allow users to explore individual data layers in more detail, zoom to specific localities, turn layers on and off, and compare natural resource priorities with other planning considerations.

The maps are decision-support tools, not regulatory maps. They do not replace site-specific studies, local land use authority, engineering analysis, environmental permitting, or field verification. Instead, they provide a shared regional framework to help PlanRVA, localities, state agencies, and partners identify opportunities for conservation, restoration, resilience, recreation access, and coordinated implementation.

Chapter 2: Community Engagement

This page describes the Natural Resource Plan public and stakeholder engagement process, with more details included in Appendix B.

Survey 1: Exploring Key Landscape Features. Survey 1 was designed to gather stakeholder and public feedback on priorities for the region's natural resources. Survey 1 was posted on the Natural Resources Plan Project Engagement Page and was open from February to March 2025. Comments received from Survey 1 were shared back to the community and other stakeholders. The results of this survey helped guide creation of the lens maps.



Survey 2: Lens Map and Action Concepts Feedback. Survey 2 was designed to gather stakeholder and public feedback on the draft lens maps and on potential activities to undertake to protect these natural resources. To set the stage for this engagement, a Storymap was posted on the Engagement Page that provided information and the draft map for each lens. Survey 2 was posted on the Engagement Page and was open from December 2025 through mid-January 2026. Comments received from Survey 2 were shared back to the community and other stakeholders. The results of this survey helped guide map finalization as well as inform content throughout the plan document, particularly the Implementation Framework section.

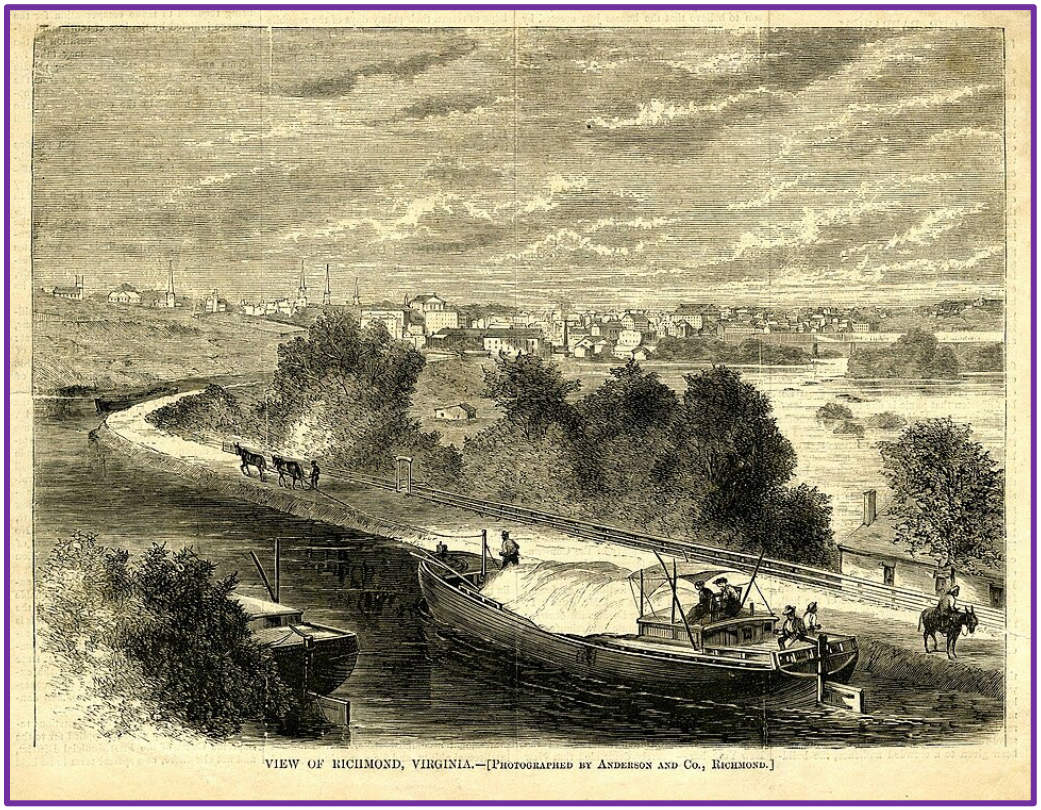
Public Review. A draft of the Natural Resources Plan was posted for 30 days on the Project Engagement Page for public review prior to PlanRVA Commission consideration.

Overall, feedback from local governments, state partners, stakeholders, and the public during the three engagement phases informed revisions to the draft plan, including refinements to narrative language, map terminology, data caveats, and implementation actions. The engagement process is intended to support an iterative regional plan that can be updated as locality priorities, datasets, and implementation opportunities evolve.



Chapter 3: Lens Description and Maps

Natural resources is a broad term that encompasses many features and characteristics across the Richmond region. This section provides information about the five groupings of natural resource data included in this plan, referred to as “lenses.” This plan is organized into these lenses recognizing that natural resources can be considered and categorized in multiple ways. This plan uses the following five Lens groupings to present existing conditions and analysis:



View of Richmond, Circa 1870. Courtesy of VCU Libraries

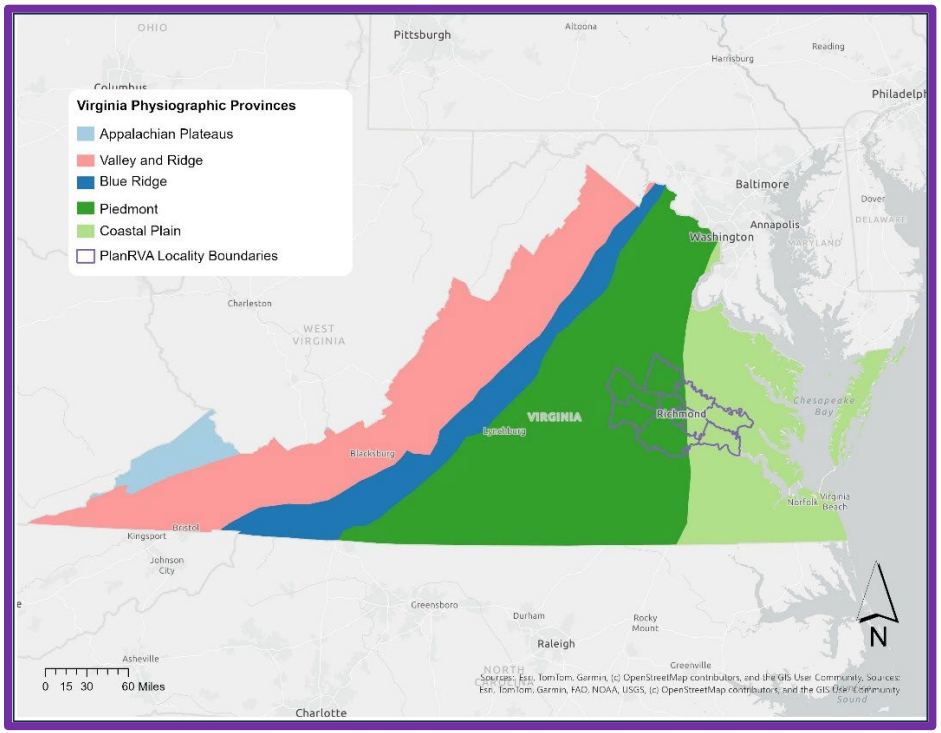
- **Terrestrial Habitat**
- **Water Quality**
- **Flood Resilience**
- **Working Lands**
- **Recreation & Culture**

Each section below describes the background context and data analysis used to create the Lens Map that shows regional-scale priority areas for that Lens. The maps in these sections are the major products of this plan. Some analysis conclusions are also presented for each Lens section as Key Takeaways. Natural resources in the PlanRVA region are constantly evolving, and these maps are a part of PlanRVA’s current environmental planning strategy to catalogue and prioritize natural resource management planning recommendations in the region.

Lens 1: Terrestrial Habitat

Terrestrial Habitat Lens Map Purpose: The Terrestrial Habitat Lens Map displays geographic features that create a regional-scale habitat network (i.e., web of connectivity) for wildlife. The Terrestrial Habitat map helps identify areas where these habitats are concentrated (habitat cores) and connected, thereby supporting regional planning decisions that protect ecological function while accommodating growth and development. This map focuses on higher priority habitat areas, and habitat connectivity from a regional and state landscape level.

The PlanRVA region spans a diverse landscape shaped by two major physiographic (physical geography) provinces: the Piedmont and the Coastal Plain, shown in Map 2. Each of these provinces supports distinct but interconnected habitat types. Rolling uplands, hardwood dominated forests, and headwater streams characterize the Piedmont, while the Coastal Plain contains a higher proportion of mixed pine forests, expansive floodplains, tidal rivers, wetlands, and low-gradient streams that transition toward the Chesapeake Bay. This diversity of landforms and land cover creates a mosaic of habitats that supports a wide range of wildlife species and ecological functions, from migratory pathways and breeding areas to foraging and overwintering habitat.



Map 2. Virginia Physiographic Provinces

Geographic data on land cover and function can help prioritize areas to protect for a variety of species and the habitats they depend on. For example, bald eagles prefer large, intact forests near rivers and reservoirs that provide nesting sites and clean waters that support healthy fish populations. North American river otters rely on connected streams, wetlands, and

floodplains with good water quality and abundant prey, and their presence can reflect the condition of aquatic and riparian systems. Eastern box turtles require contiguous forest blocks, forest edges, and undeveloped corridors that allow safe movement across the landscape. During their life cycle and migration, monarch butterflies utilize open habitats such as meadows, rights-of-way, and restored stream buffers that contain milkweed and diverse flowering plants. These species, and many others, rely on the broader network of forests, wetlands, rivers, grasslands, and green infrastructure found throughout the PlanRVA region. The Terrestrial Habitat map focuses on higher priority habitat areas, and habitat connectivity from a regional and state landscape level.



Data and Analysis

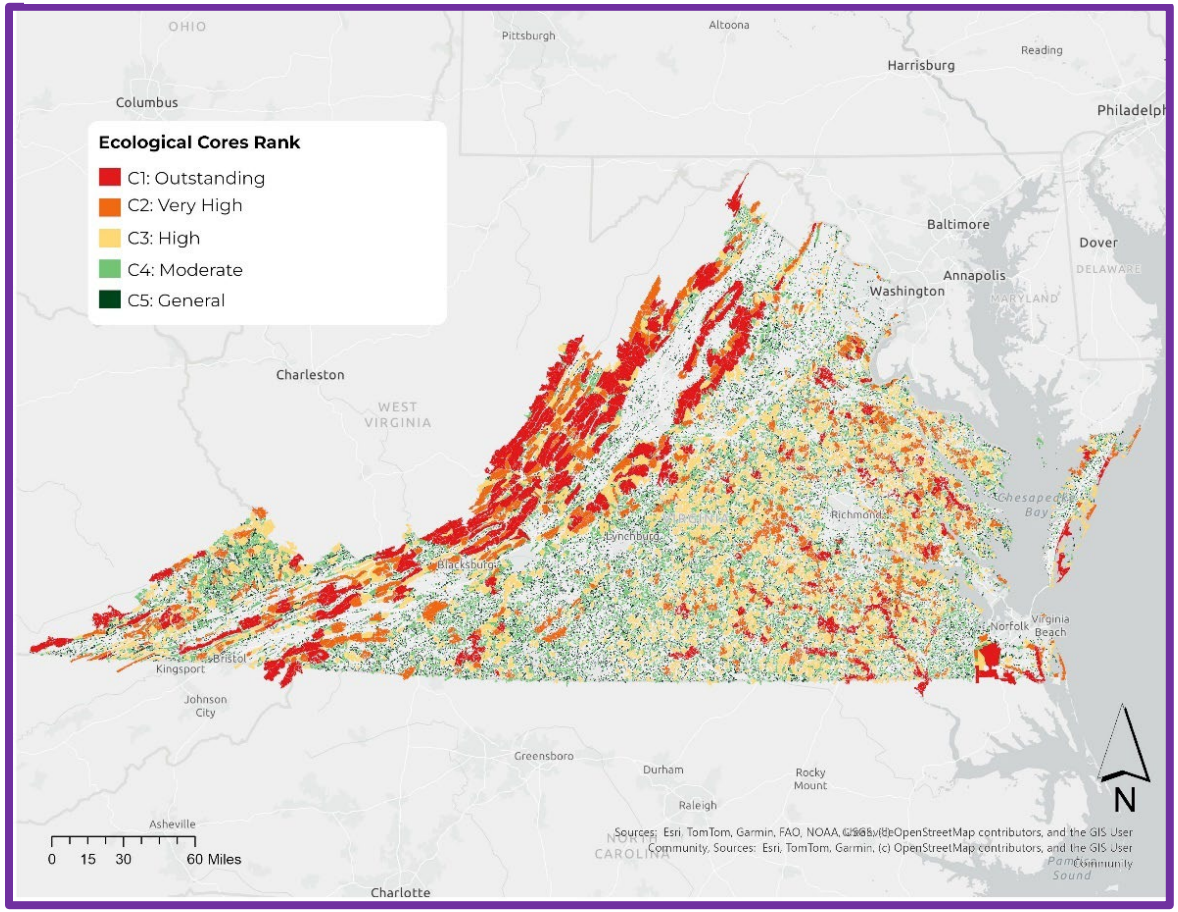
The Terrestrial Habitat Lens Map, Map 6 on page 23, primarily uses Virginia Department of Conservation and Recreation (DCR) data. DCR has worked with other state agencies to gather and analyze data that identifies areas of regional or large-scale habitat and assess which habitat has the greatest ecological value. The Virginia Natural Landscape Assessment (VaNLA) data is the starting place for several other datasets.

Why is Habitat Connectivity Important?

Habitat connectivity is crucial because it allows wildlife to move, find resources (food, mates, shelter), maintain genetic diversity, and adapt to climate change. Connected habitats prevent isolation and support overall ecosystem health and functions benefiting both wildlife and humans. Landscape corridors have been shown to increase the exchange of animals among habitat patches and reduce conflict among human and animal populations. Studies have also found that habitat patches connected by corridors retain more native plant species than isolated patches.

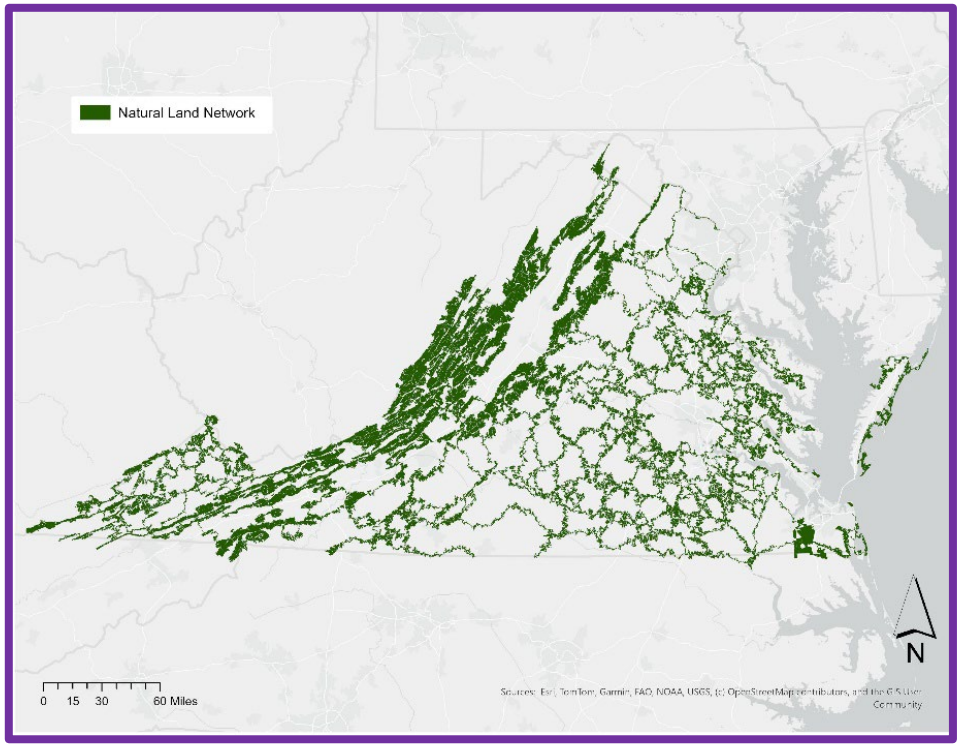
While not included on the Terrestrial Habitat map itself, the VaNLA data (Map 3) is the basis for multiple layers on the Terrestrial Habitat Lens Map (Map 6). The VaNLA uses land cover data to identify continuous natural habitats called Ecological Cores, which are large patches of natural land with at least 100 acres of interior cover – meaning, habitat that is not interrupted by roads, utility corridors, or other developed land uses. The VaNLA data also includes smaller features called Habitat Fragments, with 10 to 99 acres of interior cover, which connect Ecological Cores and serve habitat, water quality, and other functions. Habitat Fragments can be valuable in localities with few large patches of natural land. These Ecological Cores and Habitat Fragments are ranked by integrity (from C1: Outstanding Ecological Integrity to C5: General Ecological Integrity) to reflect the wide range of benefits and ecosystem services they provide, including biodiversity conservation, wildlife habitat, aesthetic values, recreational opportunities, and protections for air and water quality. While each Core and Fragment is unique, in general, larger Cores and Fragments in conserved status will be ranked higher than smaller, non-conserved Cores and Fragments.

Map 3. VaNLA Ecological Cores & Habitat Fragments - Virginia



The VaNLA data described above is the underlying dataset for the primary layers – the **Natural Land Network**, **ConserveVirginia 3.0 Natural Habitat and Ecosystem Diversity,** and the **Wildlife Biodiversity Resilience Corridors** - that are shown on the Terrestrial Habitat Lens Map (Map 6). These primary layers are described below.

Map 4. Natural Land Network – Virginia

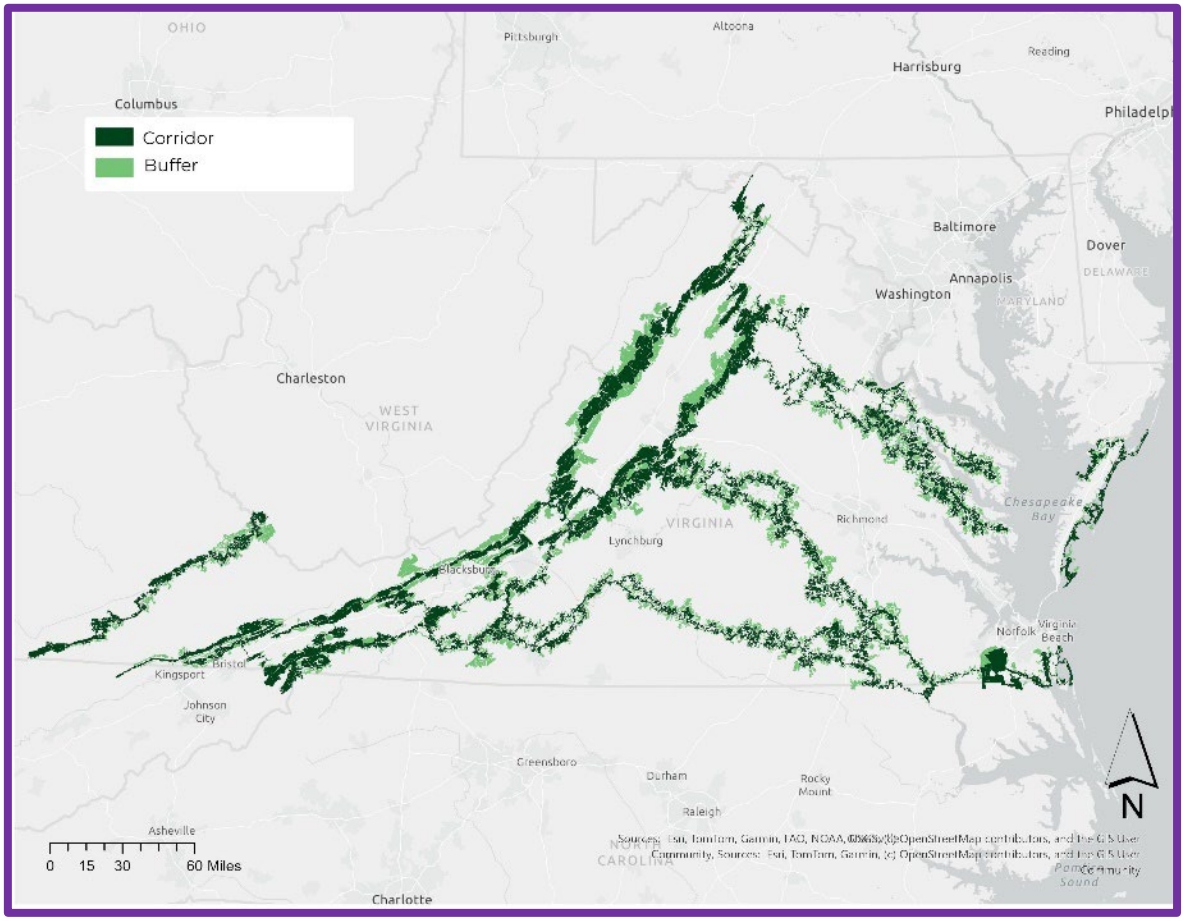


The **Natural Land Network (NLN),** a mapping tool created by DCR, is shown in green on the Terrestrial Habitat Map (Map 6). The NLN includes high-priority Ecological Cores from the VaNLA classified as having Outstanding Ecological Integrity (C1) or Very High Ecological Integrity (C2) and Habitat Fragments that connect these Cores to each other. The NLN is important because it outlines a statewide network of connected habitats - see Map 4 to the right for the NLN statewide context.

Another mapping tool created by DCR, the **ConserveVirginia 3.0 Natural Habitat and Ecosystem Diversity** layer, is shown in brown on the Terrestrial Habitat Map (Map 6). This dataset starts with the Natural Land Network (NLN) and adds other conservation prioritization data for a more complete picture across the Commonwealth. These additional data include Resilient Landscapes identified by The Nature Conservancy, Natural Heritage Conservation Sites (DCR), and Native Brook Trout Habitat (DCR). These layers all identify landscapes that are unique, rare, or in a comparatively undisturbed state, representing high value areas for preservation. On the Lens map, areas where this layer overlaps with the NLN are shown in darker brown. This data layer is included on the map in part because ConserveVirginia lands are areas the Commonwealth of Virginia prioritizes conservation investment decisions.

The Wildlife Biodiversity Resilience Corridors layer, shown in orange outlines on the Terrestrial Habitat Map (Map 6), is informed by ConserveVirginia and VaNLA data, and was developed for Virginia's Wildlife Corridor Action Plan. These corridors represent areas of relatively high biodiversity, low fragmentation relative to surrounding landscapes, and high environmental diversity. This data layer is included on the map because multiple state agencies (Virginia Department of Wildlife Resources, Virginia Department of Conservation and Recreation, Virginia Department of Transportation, and the Virginia Department of Forestry) have cooperatively developed and begun implementing the Wildlife Corridor Action Plan. A focus of this plan is protecting vital wildlife habitat corridors and reducing wildlife-vehicle conflicts, such as collisions, to promote driver safety. Efforts to implement the Wildlife Corridor Action Plan align with PlanRVA's work in both transportation and environmental realms. See Map 5 to the right which shows the statewide context for Virginia's biodiversity resilience corridors.

Map 5. Biodiversity Resilience Corridors – Virginia



Why does the Wildlife Biodiversity Resilience Corridors layer (orange outlines) include land that isn't shown on the Lens Map as part of the Natural Lands Network (NLN) or ConserveVirginia data?

The NLN and ConserveVirginia layers include only the more highly ranked habitat areas. Other land within the orange outlines is likely lower ranked ecological cores and habitat fragments from the VaNLA data; though ranked lower, these areas of habitat can play an important role supporting the overall wildlife corridor.

The Terrestrial Habitat Lens Map (Map 6) also shows areas (yellow outlines) where lands included in any of the three layers described above are protected through public ownership, easements, or other conservation programs.

Other Data Considerations

As described above, the Terrestrial Habitat Lens Map focuses on higher priority habitat areas, and habitat connectivity from a regional and state landscape level. However, as shown in the VaNLA statewide context map (Map 3), there are many additional areas of important habitat throughout the region, including within urban and suburban settings. Tree canopy, reforestation opportunities, native plantings, riparian buffers, park-based habitat improvements, and green infrastructure can improve habitat connectivity, lower ambient temperatures, manage stormwater, and support pollinators and other wildlife. These smaller or more developed-area interventions may be especially important in localities with limited remaining large natural areas. Locality-level natural resource or green infrastructure plans (e.g.: James River Parks Natural Resource Management Plan, City of Richmond Urban Tree Plan) are one way that additional habitat areas can be examined and more fine-grained habitat corridor networks can be developed.

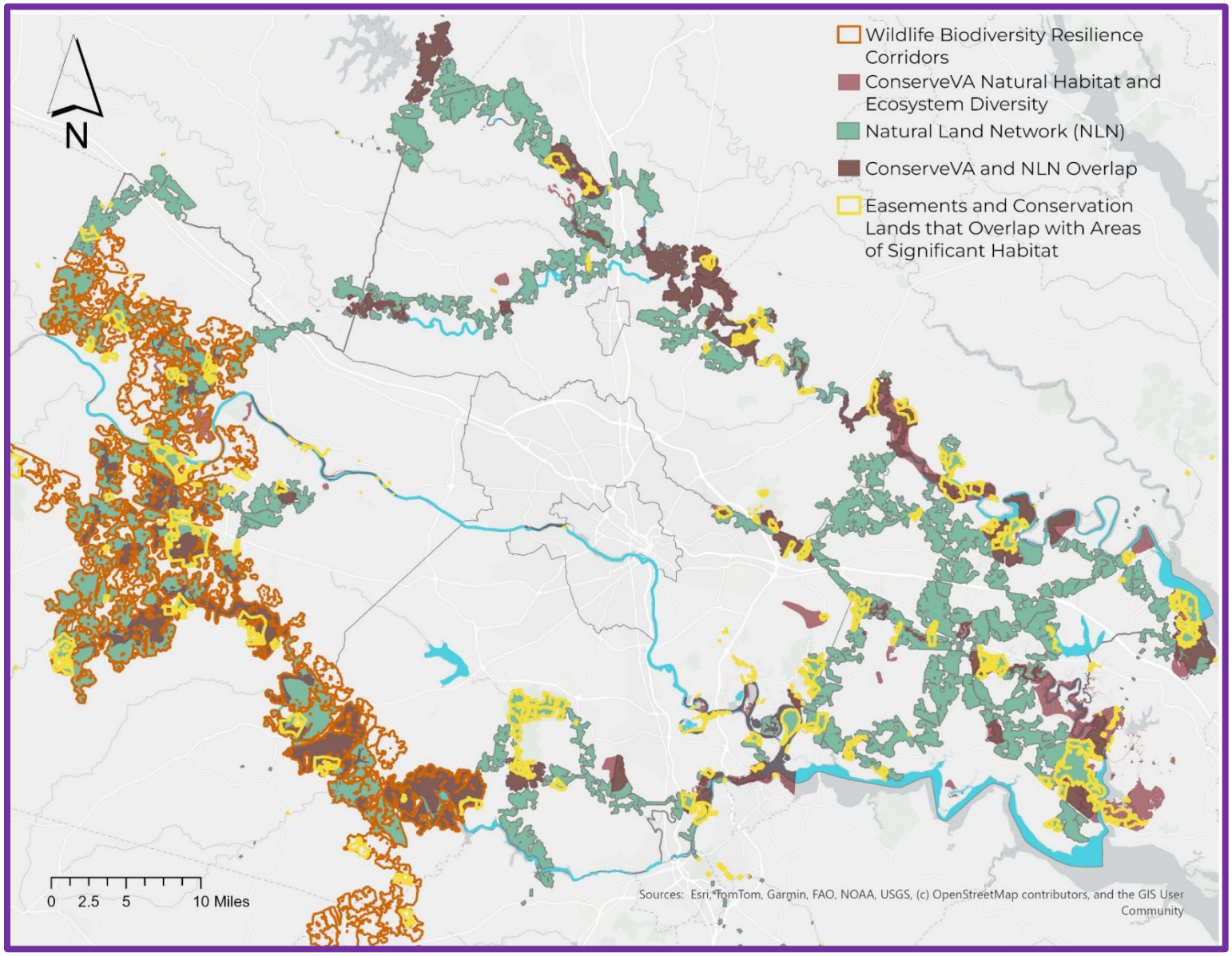
The Terrestrial Habitat Lens Map does not show the specific location of rare, threatened or endangered (RTE) species, or habitats that are suitable for RTE species. However, that data is used in the development of the VaNLA cores, so it is reflected on the map in a more generalized way. In addition, RTE species information, as well as other habitat data, is included in the Regional Ecological Framework (REF) map, as further described in that section of the report below. In both instances, a more generalized depiction helps to protect these sensitive species and habitats.

Terrestrial Habitat Lens Map - Key Takeaways

- Roughly 25% of the surface area in PlanRVA is covered by the regional-scale connections shown on the Terrestrial Habitat Map (Map 6).
- There are clusters of regional-scale, higher priority habitat areas to the east and west in the region.
- The east and west clusters are connected to the north and south by rivers and waterways (Pamunkey, North Anna, South Anna, Chickahominy, and Appomattox) and conserved lands (sites along the north and south routes).
- As shown on the Virginia context maps on the previous pages, our region plays a critical role in the statewide Wildlife Biodiversity Resilience Corridor connecting the Hampton Roads/Great Dismal Swamp region to the Blue Ridge Mountains.

See the **Risks Factors and Opportunities** section for information about how planned development may affect these key areas of habitat, and the **Implementation** section for preservation and management strategies and actions.

Map 6. Terrestrial Habitat Lens – PlanRVA



Lens 2: Water Quality

The Water Quality Lens Map Purpose: The Water Quality Lens displays water quality data at the watershed level to help prioritize areas for conservation, restoration, or where additional monitoring is needed.

The PlanRVA region is rich in water resources. Four major rivers - the York/Pamunkey, Chickahominy, James, and Appomattox – run along or through the region, with abundant streams, wetlands and riparian areas interspersed between them. Eastern portions of our rivers and some streams are tidally influenced up to the fall line which runs through the city of Richmond, and the majority of the region is within the state and federally defined Coastal Zone (Map 7). The Coastal Zone covers an area similar to, but more extensive than, the Coastal Plain physiographic province shown in the Terrestrial Habitat section. All water bodies in the region ultimately flow to the Chesapeake Bay before entering the Atlantic Ocean.

The extent of the Coastal Zone in the region is noteworthy because additional state and federal water quality requirements apply within it. Local governments and projects in the Coastal Zone are subject to programs and regulations intended to protect the health of downstream waters and the Chesapeake Bay, including requirements related to stormwater management, erosion and sediment control, and protection of sensitive shoreline and riparian areas. As a result, land use and infrastructure decisions in much of the region are closely tied to broader watershed health and Chesapeake Bay restoration goals.

Water quality is an important contributor to the quality of life in the region. From the water we drink, to the rivers in which we recreate, to the wildlife we watch, none of it would be possible without clean water.

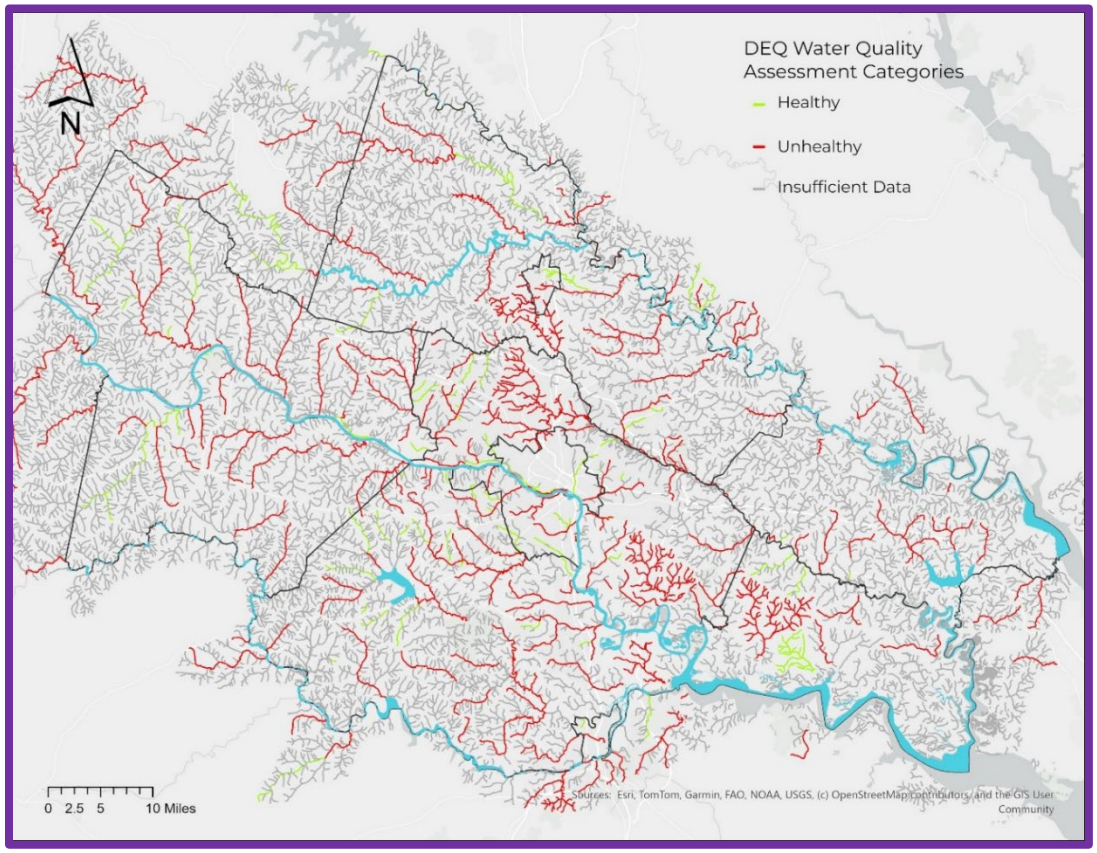


Map 7. Virginia's Coastal Zones

Data and Analysis

The Water Quality Lens Map (Map 9 on page 29) uses **Department of Environmental Quality (DEQ) water quality monitoring data** as the basis for analysis. The DEQ data contains a wealth of information about many of the stream segments in our region. Map 8, below, uses DEQ data to show each stream reach with colors indicating whether it has been classified as unhealthy (red) or healthy (yellow), or whether there is insufficient data for classification (grey).

Map 8. Stream Health - PlanRVA



What is a "Healthy" or "Unhealthy" Stream?

Under DEQ's water quality standards, surface waters are assessed for their ability to support designated uses, including aquatic life, fish consumption, public water supply (where applicable), recreation (swimming), and wildlife. Stream segments that fail to meet one or more of the standards that apply to them are classified as impaired, while segments that meet standards are classified as unimpaired. For the purposes of this map, unimpaired stream segments are considered healthy, and impaired segments are considered unhealthy.

The Water Quality Lens Map (Map 9) summarizes the individual stream reach data on Map 8 to provide a broader watershed-scale perspective. As defined by NOAA, a watershed is a land area that channels rainfall and snowmelt to creeks, streams, and rivers, and eventually to outflow points such as reservoirs, bays, and the ocean. The Water Quality Lens Map data is grouped at the HUC-12 watershed level (**see box to right**).

To support regional planning, individual stream assessments are combined into two indicators shown on the map. Water health reflects the overall balance of healthy and unhealthy stream segments within each watershed. Data strength shows how much of a watershed's stream network has been assessed, helping users understand where results are based on more complete information. Together, these indicators highlight watersheds that may benefit from restoration, continued protection, or additional monitoring. See box below and Appendix A for additional methodology information.

What is a HUC-12 Watershed?

Both water quality and data strength are generalized to the watershed level, in this case, to the HUC-12 level. The HUC (Hydrologic Unit Code) system is the standard way that watersheds are identified at different scales. HUC-12s are the smallest, most detailed watershed boundaries available. As a unit of analysis, HUC-12s are useful for efforts to improve water quality because all stream segments within a HUC-12 channel water to a common outlet, so projects within the same HUC-12 benefit from coordination.

Additional information on DEQ water quality monitoring programs is available on the Virginia Department of Environmental Quality website.

Each stream segment was assigned a score based on DEQ's assessment category and the length of the stream segment:

- **Healthy waters** (fully or mostly supporting water quality standards) received positive scores.
- **Unhealthy waters** received negative scores.
- **Streams with insufficient data** were not included in the water quality score.

Longer stream segments have more influence on the final watershed score than shorter segments. Scores for all stream segments within a HUC-12 watershed were added together to create an overall watershed water quality score. The map categories were divided using the regional median and standard deviation so that watersheds could be compared relative to one another across the PlanRVA region.

Other Data Considerations

The Water Quality Lens Map (Map 9) focuses on the spectrum of water quality levels at the watershed scale (HUC-12). Locality-level natural resource or green infrastructure plans, pollution limits set by Total Maximum Daily Loads (TMDLs), or watershed management plans are ways that specific streams and stream reaches can be more closely assessed.

This map does not show all types of data available in Virginia that may be pertinent for water quality considerations. In some instances, certain types of features may not be applicable across the whole region, such as Resource Protection or Management Areas (RPA/RMA) associated with the Chesapeake Bay Preservation Act which are required only in localities in the region's coastal localities (refer to Map 7). Given the regional-scale focus, the map also does not include data showing potential pollution sources such as point source discharge or VDEQ permit locations, septic, or water/wastewater facilities. Finally, unlike several of the other lens maps, this map does not include the ConserveVirginia Water Quality Improvement Layer. While the Water Quality Improvement Layer is valuable for state-level prioritization efforts, the types of component data built into the state layer are diverse, and would complicate the development of implementation actions that are an important component of this plan. Its focus on a state-wide comparison rather than a region-wide comparison provides an incomplete picture of opportunities and areas of importance in this region.

Water quality information should be interpreted as a guide to both conservation opportunities and restoration opportunities, rather than as a simple unimpaired/impaired classification. Areas with relatively high-quality waters may be priorities for protection, while impaired or stressed waters may be priorities for restoration, monitoring, best management practices, and watershed partnerships.

Common impairments in regional waters may include bacteria, nutrients, sediment, low dissolved oxygen, altered temperature, chemical contaminants, trash, and flow alteration. These impairments do not necessarily indicate that a waterbody is unsafe for all uses or that public drinking water is unsafe. Rather, they identify where monitoring has found that one or more designated uses such as aquatic life, recreation, fish consumption, or shellfish harvesting may not be fully supported. Understanding the type of impairment and its potential causes can help localities and partners identify conservation, restoration, stormwater, riparian buffer, agricultural, and infrastructure strategies that improve watershed health over time. A summary of common impairments, their causes, and their potential impacts can be found in Table 1.

Table 1. Common Stream Impairments, Causes, and Impacts

Common impairment types	Potential causes	Potential impacts
Bacteria / pathogens	Pet waste, livestock access to streams, leaking septic systems, sanitary sewer overflows, failing sewer infrastructure, stormwater runoff carrying waste into streams	At certain concentrations, can make waters unsafe for swimming, paddling, fishing contact, or shellfish harvesting; may indicate untreated waste entering waterways
Excess nutrients - nitrogen and phosphorus	Fertilizer runoff from lawns and agricultural lands, wastewater treatment plant discharges, septic systems, pet waste, atmospheric deposition, eroding soils	Can contribute to algal blooms, low dissolved oxygen, aquatic habitat degradation, fish stress or kills, and downstream impacts to rivers, reservoirs, and the Chesapeake Bay
Sediment / turbidity	Streambank erosion, construction activity, exposed soils, agricultural runoff, unpaved roads, stormwater flows from impervious surfaces	Clouds water, smothers fish spawning areas and benthic habitat, transports attached pollutants, reduces reservoir capacity, and can increase treatment needs for drinking water suppliers
Low dissolved oxygen	Excess nutrients and algae decomposition, warm water temperatures, slow-moving or impounded waters, organic waste, poor riparian shade	Stresses or kills fish and aquatic organisms; reduces habitat quality for sensitive species
Temperature impairment	Loss of riparian tree canopy, heated stormwater runoff from pavement and rooftops, shallow or widened stream channels, impoundments	Reduces habitat suitability for temperature-sensitive aquatic species; can worsen low dissolved oxygen conditions
pH imbalance / acidity	Industrial discharges, legacy mining or disturbed soils in some watersheds, acid rain, poorly buffered soils, certain wastewater or stormwater inputs	Can harm fish, mussels, macroinvertebrates, and other aquatic life; may increase the mobility of some metals
Metals such as copper, lead, zinc, mercury, or cadmium	Industrial sites, legacy contamination, vehicle wear, roofing and building materials, stormwater runoff, atmospheric deposition, mining-related sources	Can be toxic to aquatic life and may accumulate in sediments or fish tissue; some metals can create human health concerns through fish consumption advisories
Toxic organic contaminants such as PCBs, PAHs, pesticides, solvents, or petroleum compounds	Legacy industrial contamination, urban runoff, spills, improper disposal, pesticide use, leaking storage tanks, vehicle emissions and oil residues	Can persist in sediments, bioaccumulate in fish and wildlife, and lead to fish consumption advisories or aquatic life impacts
Trash / floatables / plastics	Litter, illegal dumping, uncovered loads, inadequate waste capture, storm drains conveying debris during rainfall	Degrades habitat, harms wildlife, reduces recreational value, clogs stormwater infrastructure, and affects community perception of waterways
Biological impairment / poor benthic community health	Combined effects of altered flow, pollutants, sedimentation, channel modification, poor riparian buffers, invasive species, temperature stress, and habitat loss	Indicates degraded stream health even when a single pollutant is not clearly identified; may reflect cumulative watershed stressors
Flow alteration / hydrologic modification	Increased impervious cover, stormwater runoff, channelization, dams, withdrawals, loss of wetlands and floodplain storage	Causes flashy stream flows, erosion, habitat instability, reduced baseflow, and increased flood or drought sensitivity
Chloride / salinity	Winter road salt, brine application, water softeners, wastewater discharges, industrial sources	Can harm freshwater organisms, alter stream chemistry, affect drinking water taste or infrastructure, and persist in groundwater and surface waters
Algal blooms / chlorophyll-a	Excess nitrogen and phosphorus, warm temperatures, stagnant or slow-moving waters, low flushing conditions	Can reduce dissolved oxygen, create nuisance conditions, affect recreation, produce odors, and in some cases involve harmful algal toxins

Water Quality Lens Map - Key Takeaways

- At the higher and lower ends of the spectrum (setting aside medium value HUCs), the analysis shows the following numbers and percentages of HUCS with high and low data strength and water quality in Table 2:

Table 2. Summary of Water Quality Analysis

	Data Strength		Water Quality	
	# of HUCs	% of HUCs	# of HUCs	% of HUCs
High	29	34%	7	8%
Low	25	29%	8	9%

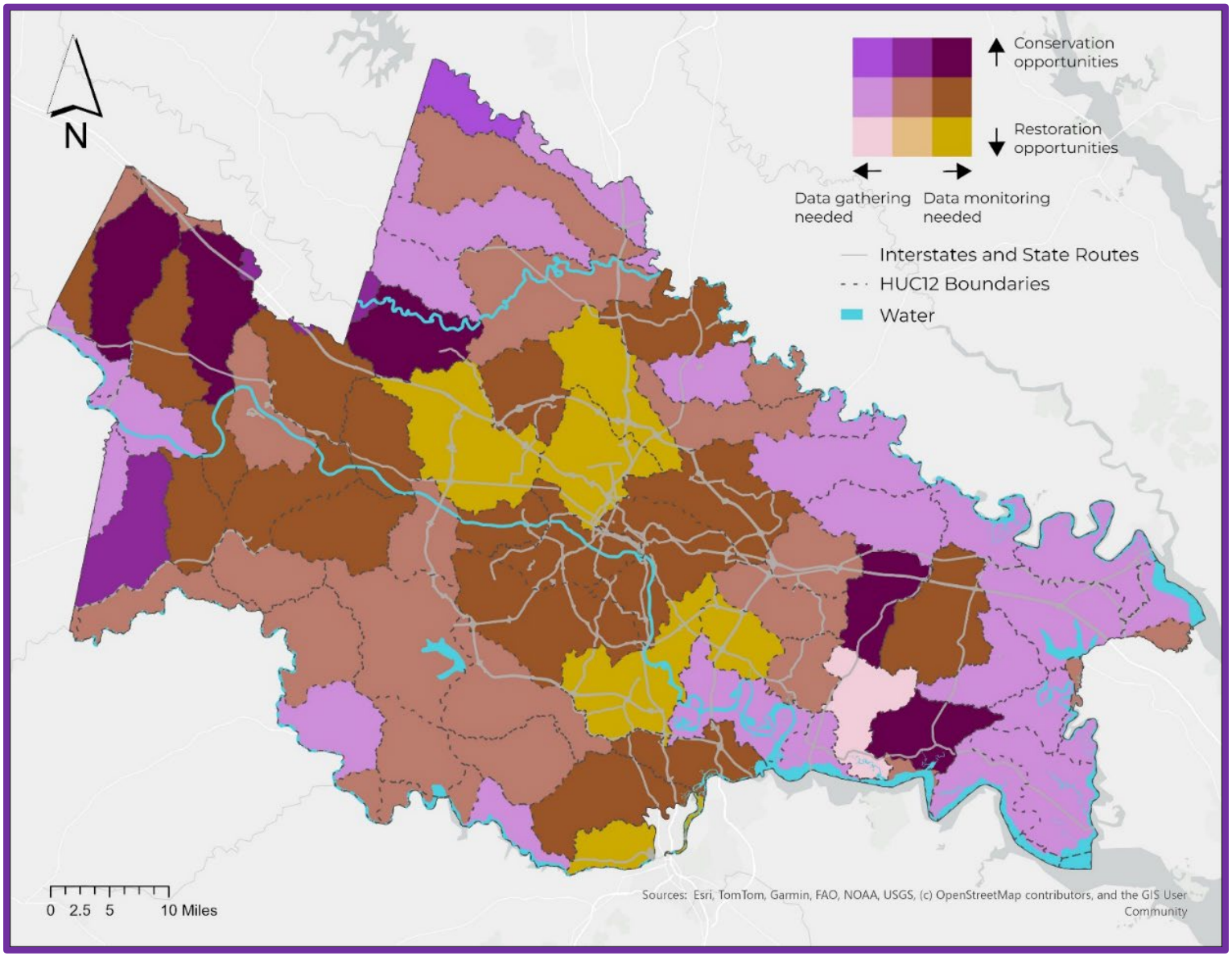
- Developed areas generally have lower water quality, with lower water quality HUCs clustering along developed sections of interstates.
- Rural parts of the region typically have high water quality watersheds, but those watersheds typically have weaker data strength.
- Urban and suburban areas have mixed or low water quality watersheds with stronger data strength.

See the **Risks Factors and Opportunities** section for information about how planned development may affect key areas of habitat, and the **Implementation** section for preservation and management strategies and actions.

Understanding the Water Quality Lens Map. The Water Quality Lens Map (Map 9) is a bivariate map. Bivariate maps show the relationship between two variables. In this case, the map shows water quality and data strength. Water quality scores were derived from the ratio of impaired stream segments to unimpaired stream segments in the DEQ data. Data strength was determined by calculating the percentage of each watershed's stream miles that have been assessed by DEQ, providing an indicator of where data is more vs. less complete.

The colors can be interpreted as follows: **Low data strength**: the lightest colors, furthest to the left in the legend grid, indicate low data strength. The limited data present suggests water quality that is unimpaired (purple), medium (lighter purple), or impaired (lightest purple). **Medium data strength**: the colors that are in the middle vertical column of the legend grid indicate medium data strength. The data that exists indicates water that is unimpaired (darker purple), medium (tan), or impaired (light tan). **High data strength**: the darkest colors on the far-right vertical column in the legend grid indicate more complete data. These colors represent water that is unimpaired (darkest purple), medium (darkest brown), or impaired (mustard).

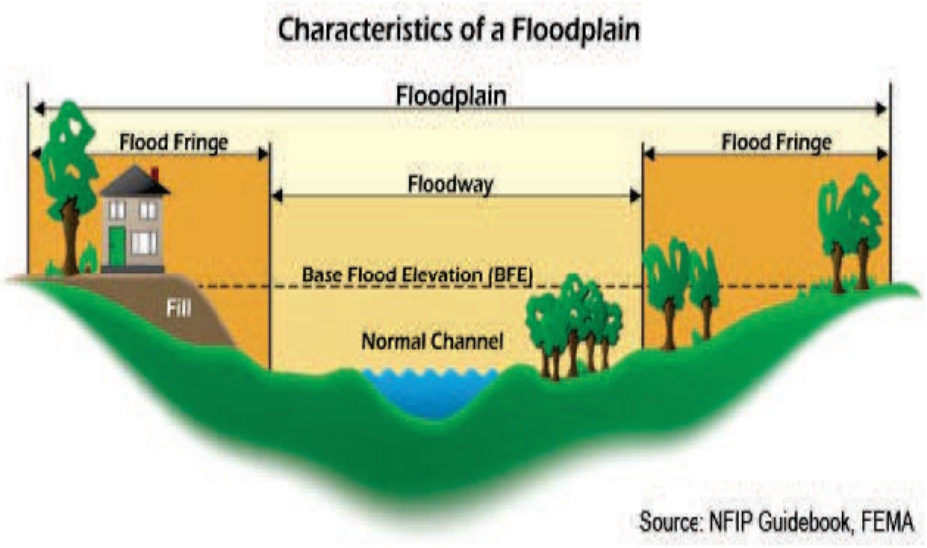
Map 9. Water Quality Lens – PlanRVA



Lens 3: Flood Resilience

Flood Resilience Lens Map Purpose: The Flood Resilience Lens Map displays landscape features that reduce flood risk or accommodate flood waters. In other words, it shows existing conditions for the purpose of mitigating current flooding impacts and preventing future risk. In addition to areas that are most prone to or at risk of flooding, the map includes data on wetlands and floodplains, natural landscapes that slow and store floodwaters.

Given its geography and climate, flooding is one of the most common types of disasters that can occur in the Richmond region. Flooding can occur at any time of the year, including late winter due to snowmelt and ice jam breakaway, early spring due to seasonal rain patterns, and late summer due to hurricanes and tropical systems. In riverine flooding, a river or stream's water level rises and overruns the banks potentially threatening the immediate area. Eastern parts of the region may also experience tidal flooding during tropical storms and nor'easters. Other parts of the region may experience flooding if dams or other impoundment structures are overtopped, damaged or fail. As a result of all these factors, there are many neighborhoods and communities in the Richmond region that are vulnerable to riverine flooding. Flooding can also cause damage to public and private infrastructure, like roads and bridges, and critical facilities, like police and fire stations.



Wetlands and floodplains are a natural part of our landscape that have many benefits, particularly when they are maintained in a way that preserves their original function. The Virginia Department of Conservation and Recreation (DCR) notes that natural floodplains and wetlands boost nearby property values and can provide recreational tourism

opportunities, provide a buffer against fast moving flood water, absorb and store excess runoff, filter pollutants from our water resources, and provide habitat for many plants and animals.

Data and Analysis

The Flood Resilience Lens Map (Map 10, page 34) uses a variety of local, state and federal data. The map shows the location of various types of water bodies, including estuaries, reservoirs, rivers and wetlands. On top of this, the map shows the location of several types of areas at higher risk of flooding:

High Risk Flood Hazard Areas are areas where there is a greater likelihood of flooding occurring; these areas are shown in red or orange on the map. These areas are primarily mapped by the Federal Emergency Management Agency (FEMA) through the National Flood Insurance Program (NFIP), a federal program that helps communities reduce flood risk and provides access to federally backed flood insurance. Under the NFIP, FEMA identifies Special Flood Hazard Areas (SFHAs), which are areas with at least a 1% chance of flooding in any given year, sometimes referred to as the "100-year floodplain." On FEMA Flood Insurance Rate Maps (FIRMs), these areas are typically designated as Zones A, AE, AO, or VE. Development within these areas is subject to floodplain management regulations intended to reduce flood damage and protect public safety. In addition to FEMA-mapped SFHAs, this category also includes Henrico County's High Risk Community Flood Hazard Areas. These are locally-identified upstream floodplain areas that are regulated by the County in a similar manner to FEMA-designated floodplains due to their elevated flood risk.

Dam Break Inundation Zones are shown in orange or yellow on map. Defined by DCR Division of Dam Safety and Floodplains - Dam Safety Program, these Zones are areas that could flood if an upstream dam were to fail. There is no percentage chance associated with these mapped areas because Virginia dams vary in age and condition. Dam points are available in the ArcGIS Online map project. They are default invisible but can be turned on if needed. The data show that there are 68 high hazard dams in the region.

The **Conserve Virginia 3.0 Floodplains and Flooding Resilience** layer is shown in blue stripes on the map. This layer includes several component datasets, including undeveloped forest and agricultural lands upstream of the areas of the 10 worst flooding disasters across Virginia; and a higher priority set of mapped wetlands, streams and floodplains. This data layer is included on the map in part because ConserveVirginia lands are the areas the state of Virginia uses to prioritize conservation investment and project implementation decisions.

The **National Wetlands Inventory (NWI) Wetlands** identifies wetlands throughout the region and is shown in bright green on the Flood Resilience Lens Map. Wetlands in the PlanRVA region include several major types:

- Estuarine and Marine Wetlands, which occur along tidal shorelines and coastal transition areas,
- Freshwater Emergent Wetlands, which are dominated by grasses, sedges, and other non-woody vegetation, and
- Freshwater Forested/Shrub Wetlands, which are dominated by trees or woody vegetation and are common along river corridors, floodplains, and low-lying areas.

These wetland systems provide important ecological functions including flood water storage, water filtration, shoreline stabilization, wildlife habitat, and resilience to flooding and sea level rise.

The Flood Resilience Lens Map also shows the location of conserved lands, labeled on the map as Easements and Conservation Lands.

Other Data Considerations

The Flood Resilience Lens map does not show areas that may be at high risk for pluvial flooding, which is when heavy rainfall overwhelms drainage systems and causes water to pool in low spots. This type of flooding can occur in areas that are not adjacent to water bodies. While pluvial flooding data has been developed at the regional and state (DCR, Coastal Resilience Web Explorer) levels, additional refinements to account for existing stormwater infrastructure would add to the utility of these datasets, which could then be considered for this Lens Map in the future. In combination with the data layers on this Lens Map, the pluvial flooding data could help with prioritizing areas in greater need of attention and action.

The Lens Map also does not include areas where modeling shows that storm surge could exacerbate flooding levels. Storm surge is an abnormal rise of water generated by a storm, over and above normal tidal water levels. This rise in water level can cause extreme flooding. There is data available that shows this information; Category 4, 3, 2, 1 Storm Surge data (which correspond to hurricane category levels) is available through the National Weather Service's National Hurricane Center and is also shown on PlanRVA's Flood Risk Mapper. Since the Flood Resilience Lens Map concentrates on region-wide data sets, this data was not included on the map due to the limited portion of the region subject to tidal influence and storm surge. In addition, the degree of overlap among the storm surge category levels, and across the floodplain and dam inundation data layers, indicated that this information is best viewed within a dynamic map like the Flood Risk Mapper.

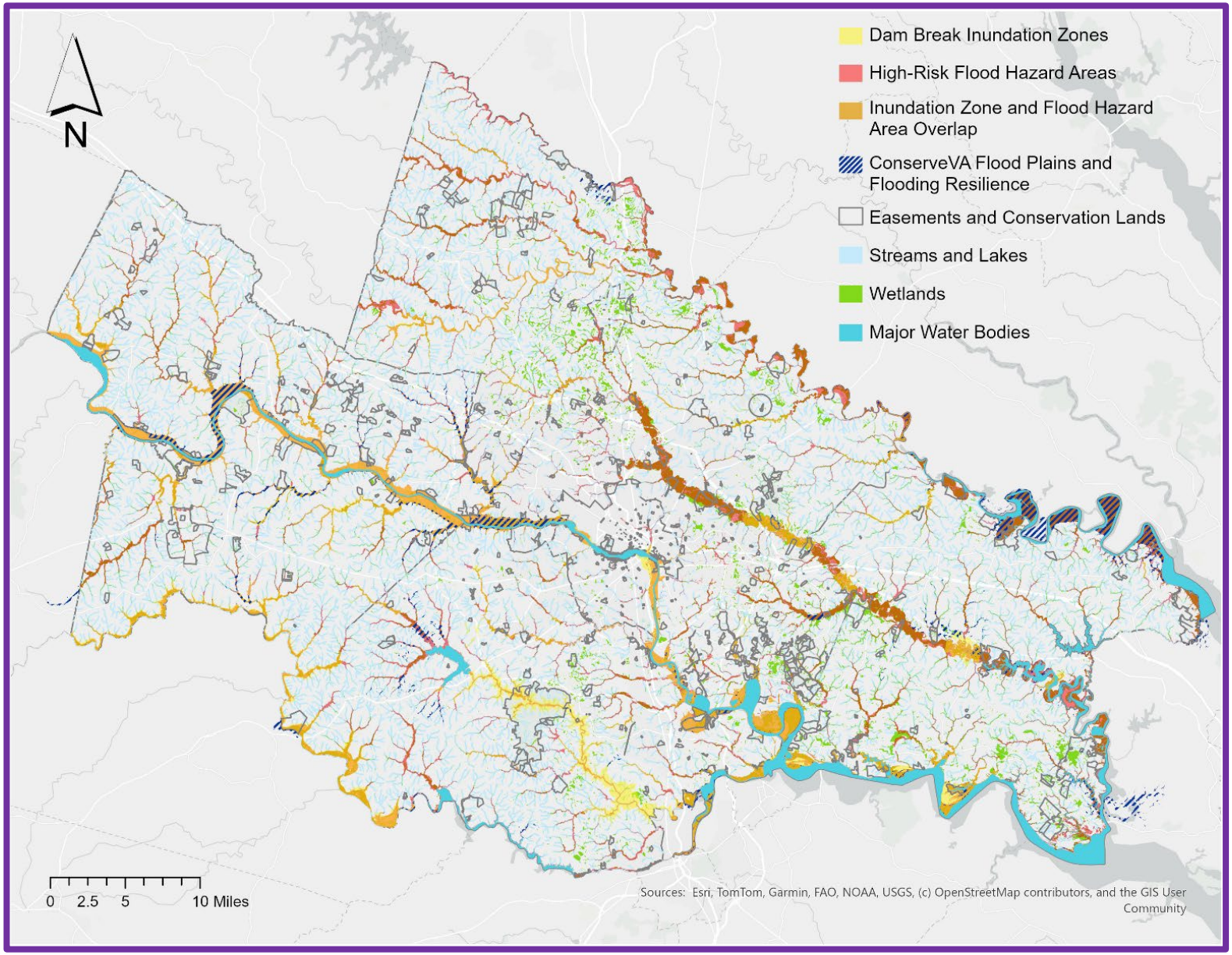
Finally, projected sea level rise-related future water levels and future floodplain locations are not shown on this map but are discussed in the **Risk Factors** section.

Flood Resilience Lens Map - Key Takeaways

- There are at least 118,556.30 acres of wetlands and at least 174,741.84 acres of floodplains in the region.
- At least 19,843.09 acres, or 11.36%, of the region's floodplains coincide with state flood resilience conservation priorities, spanning all counties in the region.
- At least 12,150.19 acres, or 10.25%, of the region's wetlands coincide with state flood resilience conservation priorities.
- Wetlands and floodplains (separately or coincident) buffer waterways throughout the region, with the width varying in part based on topography.
- Wetlands can be connected to other waterbodies or occur as disconnected areas that stretch into upland areas beyond floodplains.



Map 10. Flood Resilience Lens – PlanRVA



Lens 4: Working Lands

Working Lands Lens Map Purpose: The Working Lands Lens Map displays high-quality agricultural and forestry lands producing food and fiber. The data highlight priority areas for conservation of working lands and where working lands provide co-benefits to people and the environment.

Agriculture and forestry are major economic powerhouses of Virginia's economy. According to the Virginia Department of Agriculture and Consumer Services (VDACS), the two industries have a combined economic impact of over $105 billion in Virginia, and create nearly 500,000 jobs directly while supporting 785,000 jobs elsewhere in Virginia's economy. Farmland and forests are grouped together in this plan and referred to as Working Lands.

Working Lands in the Richmond region produce a wide range of products, including food and timber, while supporting wildlife, helping to absorb and filter water, and moderating temperature. The region's Working Lands also hold, or sequester, greenhouse gases, acting as "carbon sinks."

For this plan, working lands include both traditional rural agricultural and forestry landscapes and urban agriculture, with relevance varying by locality. Rural working lands may support agriculture, forestry, habitat, water filtration, and scenic landscapes, while urban and suburban areas may include land suitable for community gardens, urban farms, and related green infrastructure.

What is carbon sequestration?

Sequestration is the process of capturing carbon dioxide from the atmosphere (or from emissions sources) and storing it so that it does not contribute to climate change. Forests and soils naturally absorb and store carbon dioxide. For example, trees take in carbon dioxide during photosynthesis.

Learn more: Comprehensive Climate Action Plan for the Richmond Region 2025.

Data and Analysis

The Working Lands Lens Map (Map 11 on page 38) uses a variety of local and state data. The two primary layers show the region's higher priority remaining forests and agricultural land.

The **Forest Conservation Value (FCV) Model** is a tool designed by the Virginia Department of Forestry (VDOF). It identifies the highest priority forestland for conservation in Virginia, and is part of ConserveVirginia. The model considers factors such as the size and connectedness of forests, the potential for sustainable forest management, the health of surrounding watersheds, the risk of development, and the presence of important or declining forest habitats and tree species. The model ranks all forestland in Virginia from 1 (lowest) to 5 (highest) conservation value. For the Working Lands Lens Map (Map 11), the FCV data was used with several modifications. First, the Lens Map only includes the higher-level conservation value rankings – categories 3, 4 and 5, which are labeled in the model as high, very high, and outstanding. Second, the Lens Map data does not include the component of the model that assessed "threat of conversion," i.e., the area's development vulnerability. The reason for this is that this plan separately, and in a more regionally specific manner, assesses development vulnerability in the **Risk Factors and Opportunities** section. The FCV data is shown in shades of green on the Lens Map.

The **Virginia Agricultural Model** was developed by the Virginia Department of Conservation and Recreation to quantify the relative suitability of lands for agricultural activity across the state, ranking lands in classes from unsuitable to optimal. In this model, agricultural value is assessed primarily on inherent soil suitability but also accounts for current land cover as well as travel time between agricultural producers and consumers. The Working Lands Lens Map (Map 11) only includes the highest-level classes (classes 4 and 5), shown in shades of orange on the map.

The **Urban Land Evaluation and Site Assessment Tool (uLESA),** was developed at Virginia Commonwealth University to assess suitability for equitable urban and suburban agriculture. Data is currently only available for Richmond and Chesterfield. The Working Lands Lens map includes only those areas classified by the tool as highly suitable, shown in purple.

The Lens Map also shows several types of areas that require or encourage continued agricultural or forested land uses. The first type of area shown on the map is lands that are conserved either through public ownership or conservation easements, shown on the map as Easements and Conservation Lands with hashed shading. The second type is lands that are enrolled in local conservation programs known as Agricultural and Forestal Districts (AFDs), shown on the map in a red outline. AFDs can be established by local governments in collaboration with residents. In the Richmond region, Hanover, New Kent, and Powhatan Counties have AFDs, which provide tax benefits to landowners, as well as protection from development pressures during the term of the district. They also benefit the community and

surrounding ecosystems through preserving rural areas, encouraging non-sprawling development patterns, and supporting local economies.

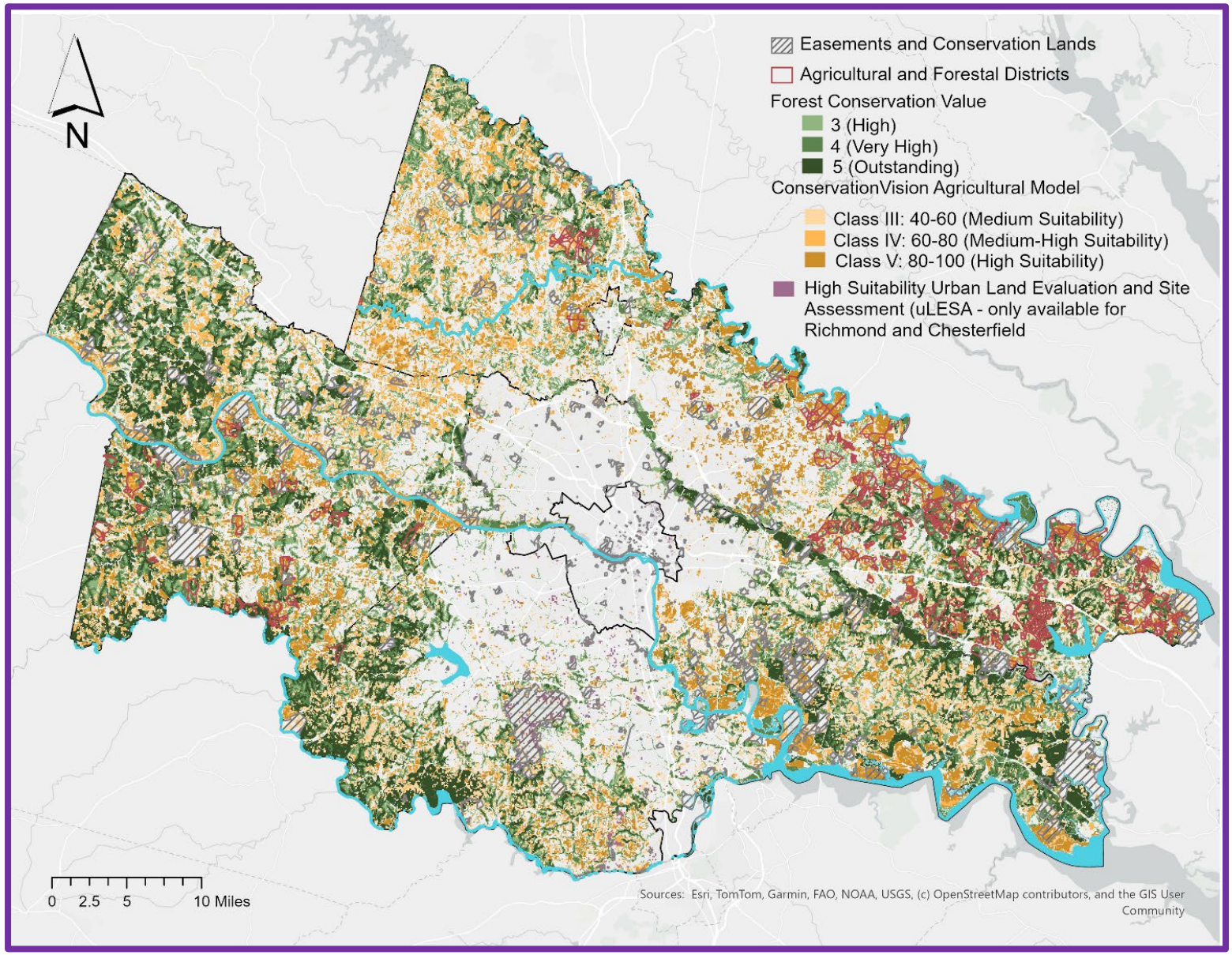
Other Data Considerations

There are other types of agricultural and forestry information that are not included on this map. For example, Prime Agricultural Soils are located throughout a large portion of the rural areas of the region. Specific place types such as century farms and century forests, or community-oriented farmers market and pick-your-own locations, are also not included. Some of these types of information, such as Prime Agricultural Soils, are available as existing data layers, while others might need to be compiled based on local knowledge.

Working Lands Lens Map - Key Takeaways

- In localities with AFDs, they are highly coincident with high value forest or agricultural land – acting as a short-term conservation measure with benefit for the landowner.
- Land of high forest conservation value is concentrated along waterways, especially along the Chickahominy and Appomattox Rivers in Chesterfield County.
- Agricultural suitable land occurs in large blocks located in Charles City, eastern Henrico, southwest Hanover & eastern Goochland (spanning the locality boundaries).

Map 11. Working Lands Lens – PlanRVA



Lens 5: Recreation and Culture

Recreation and Culture Lens Map Purpose: The Recreation and Culture Lens Map displays natural and nature-based recreation and culture destinations as well as the connections between them. These connections form a potential regional greenway network – a system of connected walking and biking trails that could link destinations with about 327 miles of new routes, in addition to 196 miles that already exist. Examples of existing or forthcoming greenway trails, respectively, include the Capital Trail and the Fall Line Trail. A focus of this Lens Map is coordination with regional transportation planning, aligning the greenway trail network with planned regional active transportation facilities.

The Richmond region has about 317,570 acres of publicly owned lands and parks and a wide range of recreational assets including boat launches, trails, and hunting lands. The region's recreation resources provide substantial economic, quality of life, health, and recreation benefits.



Data and Analysis

The Recreation and Culture Map (Map 13, page 43) uses a variety of local and state data., with a focus on creation of a set of **Greenway Opportunity Areas**. These regional Greenway Opportunity Areas, represented in shades of green on the map, connect destinations through 'positive pathways,' while avoiding natural and infrastructure obstacles (see descriptions below). Features marked with an asterisk were omitted from the Recreation and Culture Lens Map for readability reasons, but were included in the analysis used to develop the Greenway Opportunity Areas.

Destinations:

Natural and nature-based recreation and culture sites that draw visitors and/or provide services to trail users:

- Rural villages identified in Comprehensive Plans
- Conservation lands - local, state, and federal parks
- Virginia Department of Wildlife Resources (DWR) boat ramps

Positive Pathways:

Linear landscape features that are good candidates for trail locations given natural or easement-related development limitations.

- Floodplains* (see Flood Resilience section for additional information))
- The Natural Land Network (NLN) (see Terrestrial Habitat section for additional information)
- Transmission line corridors*

Natural and Infrastructure Obstacles:

Features that would impede active transportation. While these features may be surmountable, doing so may be technically challenging or expensive.

- Rivers
- Rail lines*
- Interstate Highways*

The draft Greenway Opportunity Area corridors were refined by overlaying the existing and proposed trail networks as identified in locality plans, the Virginia Outdoors Plan, and regional transportation plans such as BikePedRVA2045 (**see box above**). The draft locations were then further adjusted to align with local priorities and locality feedback. The mapping in this section distinguishes planned greenway trails that overlap with locality proposed trails (light green) and those that don't overlap (dark green) to highlight the Greenway Opportunity Areas that are newly proposed in this regional plan.

What is BikePedRVA2045?

BikePedRVA 2045 is a comprehensive regional framework for active transportation. It is also a collection of best management practices for improving travel options, and a plan that recognizes the need for all people to have viable means of travel for work, play, school, and everyday life. Learn more by clicking on the link below.

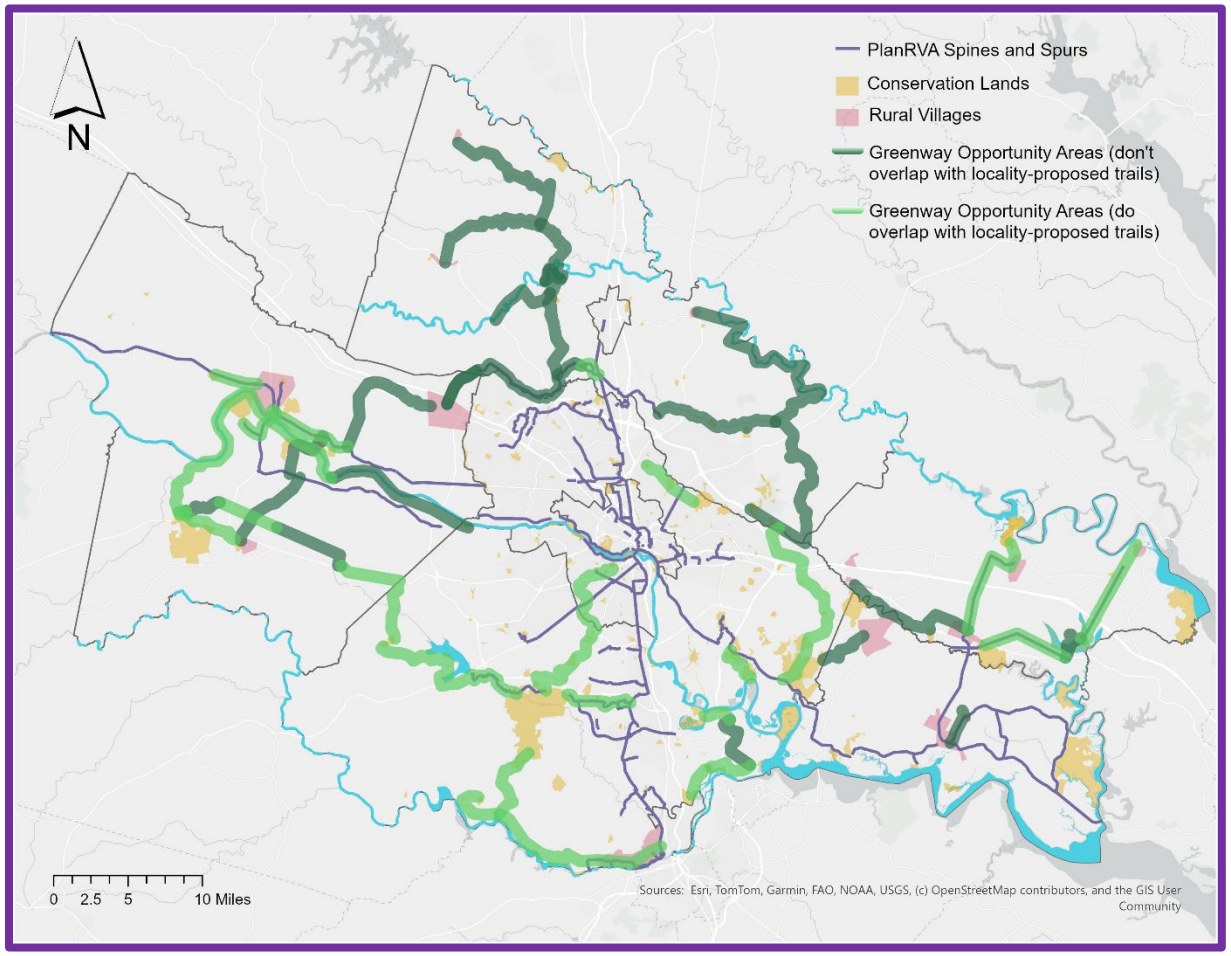
Learn more: BikePedRVA 2045
View Maps



The Greenway Opportunity Areas that were developed using the process described above are shown on Map 12 (**right**), and are shown, along with the other features, on the Recreation and Culture Lens Map (Map 13).

These Greenway Opportunity Areas are conceptual corridors, not fixed alignments. Further analysis and community coordination would be needed to determine the best location and design for each trail segment. Final alignments require local planning, engineering and environmental feasibility review, landowner coordination, funding decisions, and public engagement. The Greenway Opportunity Areas shown on the map do not commit any locality or property owner to a specific route. New Greenway Opportunity Areas can be added as local and regional plans are updated moving forward and can also be adjusted as there are updates to locality plans or regional active transportation plans.

Map 12. Greenway Opportunity Areas – PlanRVA



Key components of regional trail plans (such as BikePedRVA2045 mentioned above) are shown on the Greenway Opportunity Areas Map (Map 12) and the Recreation and Culture Lens Map (Map 13) as **PlanRVA Spines and Spurs** (purple lines). Spine trails are major interregional east-west or north-south routes (e.g., the Capital Trail), and Spurs trails are intraregional trails that connect the Spines to neighborhoods and other parts of the region (e.g., Centralia Road trail in Chesterfield).

Another layer shown on the Recreation and Culture Lens Map (Map 13) is **ConserveVA Scenic Preservation** (brown lines). This layer did not inform Greenway Opportunity Areas but was included because it shows key areas such as national and state designated scenic byways, state designated scenic rivers, All-American roads, and national historic trails.

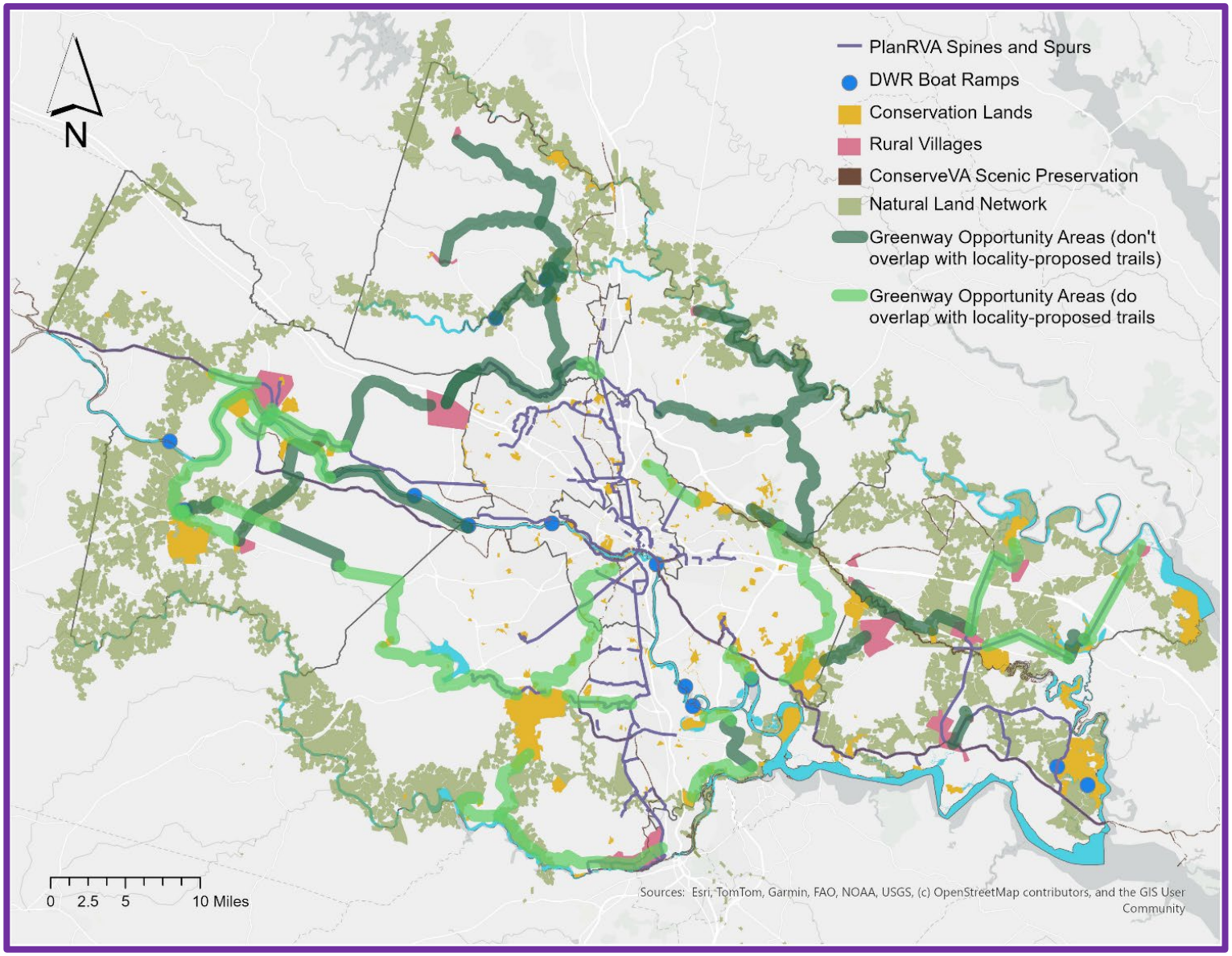
Other Data Considerations

There are many cultural and recreational amenities in the region that are not included on this map. For example, the lens map does not show all existing or planned trails and bike lanes, all neighborhood parks, or historic districts and scenic or community character areas designated by localities. Locality-level comprehensive plans, recreation master plans, or green infrastructure plans are ways that additional cultural and recreation areas and facilities can be examined, and more fine-grained recreation and trail networks can be developed.

Recreation and Culture Lens Map - Key Takeaways

- The Spines and Spurs trail layer shown on the map includes 62 miles of existing trails and bikeways as well as 319 miles of proposed routes.
- The Greenways Opportunity Area layer shown on the map highlights approximately 158 miles of trail opportunities that overlap with the proposed spines and spurs network or other locality-proposed trails, and an additional approximately 168 miles of new trail opportunity corridors that increase connectivity and expand the proposed network.

Map 13. Recreation and Culture Lens Map – PlanRVA



Chapter 4: Regional Ecosystem Framework

The individual Lens Maps provide information about each category of natural resource, allowing for focused review and identification of priorities within each category. The Regional Ecosystem Framework (REF) is a tool that allows multiple categories of natural resources to be considered together, to examine where there are the highest combined values. PlanRVA had previously developed a REF for use in transportation and other planning applications. With this Natural Resource Plan, the REF has been refined to include an updated methodology and new data categories used to develop the Lens Maps.

As with the previous REF, the general approach aligns with the U.S. Department of Transportation (USDOT) guidance. Specifically, it follows the Eco-Logical model, which is a USDOT Federal Highway Administration best practice tool for planning. It was developed cooperatively with resource agencies including the National Park Service, Bureau of Land Management, Environmental Protection Agency, United States Fish and Wildlife Service, National Oceanic and Atmospheric Administration, USACE, and Forest Service. The REF integrates resource management plans into a unified framework. The goal of the REF is to reach more context-sensitive solutions for transportation and other planning projects; the data in the REF can allow planners to avoid key resources, or if that is not possible, to minimize impacts or provide mitigation.

Data and Analysis

Table 3 lists the data layers that were compiled for use in the updated REF. Many of these are the same layers used in the individual natural resources Lens Maps. Additional details on the data and methodology for the REF are included in Appendix A. On the resulting Regional Ecosystem Framework (REF) Map (Map 14), areas that are darkest green have more higher priority natural resources, ranging down to areas with very light or no color, where few or lower priority natural resources are present – typically in the most intensely developed portions of the region. The digital version of this tool allows the user to click on any hexagon to see the component index scores for the natural resource categories, as well as view flagged information on water quality and wildlife-vehicle conflict areas that are not part of the index calculation but may be helpful for project review and planning processes.

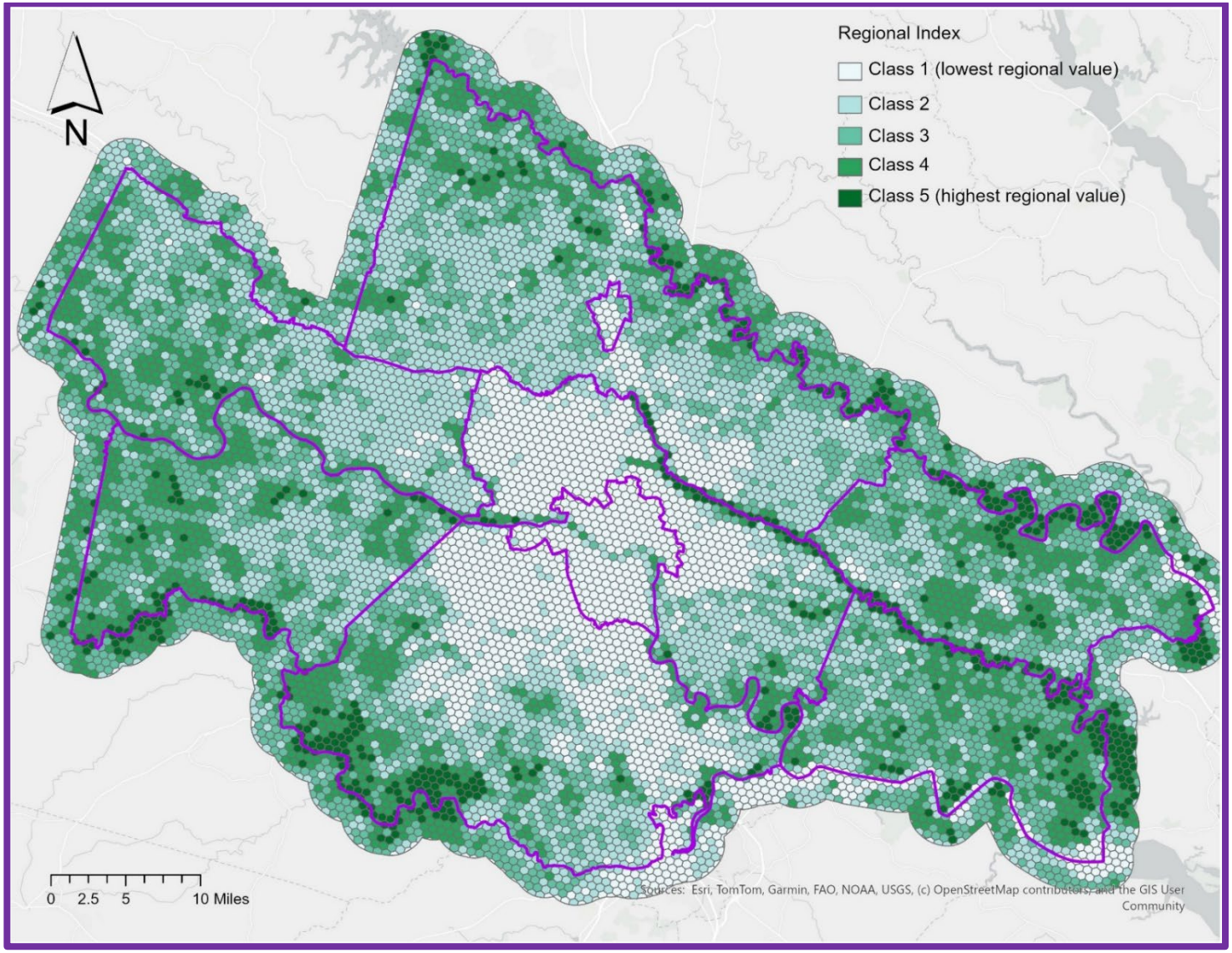
Table 3. REF Datasets

Category	Dataset	Source
Water Quality	National Wetlands Inventory *	U.S. Fish and Wildlife Service
	Aquatic Life Conservation Opportunity Areas (ALCOAs)	VDCR
	ConserveVA Healthy Waters Conservation Opportunity Areas (HWCOAs)	VDCR
Terrestrial Habitat	Ecological Cores	VDCR
	Natural Land Network	VDCR
	Wildlife Biodiversity Resilience Corridor	Wildlife Corridor Action Plan
	Predicted Suitable Habitats Summary	VDCR
	Natural Heritage Screening Layer	VDCR
Working Lands	Forest Conservation Value	VDOF
	Agricultural Model	VDCR
Flooding	Special Flood Hazard Areas	FEMA
	Sea Level Rise (SLR)	NOAA
	Henrico Community Flood Areas	Henrico County
	Future Flood Hazard Areas	VDCR
Flags (not factored into the regional index)	Water Quality Assessment	VDEQ
	Areas of High Wildlife-Vehicle Conflict Occurrences	VDWR

* This dataset was included in the Flood Resilience Lens Map, but regrouped to Water Quality for the REF

The component layers were integrated using a uniform hexagonal grid to provide a consistent spatial unit for aggregating complex and overlapping datasets. Each hexagon in the grid covers about 0.74 km^2, or 182.86 acres. For each hexagon, composite scores were calculated based on the proportion of area covered by each natural resource feature, using either presence/absence weighting or attribute-based weighting to reflect differences in ecological value. The final regional index was calculated using a root-sum-of-squares approach, which emphasizes higher-value scores so that strong performance in any single category meaningfully contributes to overall environmental significance.

Map 14. Regional Ecosystem Framework (REF) Map – PlanRVA



Chapter 5: Risk Factors and Opportunities

The Natural Resources Plan identifies priority natural-resource assets and provides a regional framework for understanding where conservation, restoration, and resilience investments may provide the greatest benefit. This section builds on the lens maps and Regional Ecosystem Framework by examining three cross-cutting risks that can affect multiple natural-resource systems at once:

- **Land use change and development pressure;**
- **Flood risk to agricultural and forestry lands; and**
- **Future flood conditions associated with sea level rise, storm surge, and pluvial flooding.**

These risks were selected because they are closely tied to the plan's mapping and analysis and because they have practical implications for local land-use planning, development review, capital improvement planning, hazard mitigation, infrastructure investment, land conservation, and private-land stewardship. They also illustrate the interconnected nature of the region's natural resources: a decision affecting land cover, drainage, floodplain function, or agricultural and forest land can have corresponding effects on habitat connectivity, water quality, flood resilience, recreation, cultural resources, and local economic activity.

The analysis in this section is intended to support regional and local decision-making rather than to establish parcel-level restrictions or predict site-specific outcomes. The maps identify broad patterns and areas for further evaluation. They should be used alongside locality comprehensive plans, zoning and development standards, floodplain regulations, engineering analyses, field verification, landowner input, and applicable state and federal requirements.

Together, the risks and opportunities described below can help PlanRVA, localities, landowners, conservation organizations, state agencies, and other partners target resources toward actions that reduce avoidable risk while protecting the natural systems that support the region's communities.

Land Use Change (Development Pressure)

Development and redevelopment are necessary components of a growing and economically resilient region. However, the location, form, and intensity of land use change can substantially affect natural resources. Conversion of forests, agricultural lands, wetlands, and other natural areas to more impervious or intensively managed uses can fragment habitat, reduce groundwater infiltration, increase stormwater runoff, affect water quality, alter drainage patterns, and place additional pressure on flood-prone areas and working lands.

Each locality in the region plans for future land use changes – the amount, type and intensity of new development or redevelopment - through Comprehensive Plans and other planning documents. The exact nature and timing of growth, however, is subject to a complex set of factors. In 2023, PlanRVA undertook an exploratory scenario planning process called Pathways to the Future to examine the implications of different plausible futures for the region. This cross-disciplinary process used eleven models to analyze the baseline conditions, a business-as-usual scenario and four plausible future scenarios. Varying assumptions about drivers of change and growth forecasts differentiated the future scenarios. Input from a committee of subject-matter experts and the public informed the scenario assumptions for drivers of change, including the amount of population and job growth, housing preferences and demand, flooding and other natural hazards, economic growth, and technological change.

The Natural Resource Plan draws upon the data used in Pathways to the Future Scenario Planning to examine likely locations for development to occur over the next twenty years. The analysis uses projected impervious cover change to reflect new development, as new buildings, roads and other development features result in additional impervious cover. The analysis looked across the scenarios at which areas, geographies known as Transportation Analysis Zones or TAZs, were projected to have higher or lower development pressure across all of the possible futures examined in the Scenario Planning process - **identified as at least one standard deviation from the median value.** In determining the high and low development categories, the analysis accounted for different percentages of impervious cover in the region's rural, suburban and urban segments.

What is a Transportation Analysis Zone (TAZ)?

A traffic analysis zone or transportation analysis zone (TAZ) is the unit of geography commonly used in transportation planning models, used for planning an area's future transportation system needs. Similar to census tracts, the spatial extent of zones varies, ranging from very large areas in the exurb to as small as city blocks in central business districts.

The results of this analysis are shown below.

- Map 15 shows the projected higher and lower development pressure TAZs.
- Maps 16-21 show the TAZs overlaid on the natural resource lens maps and REF.

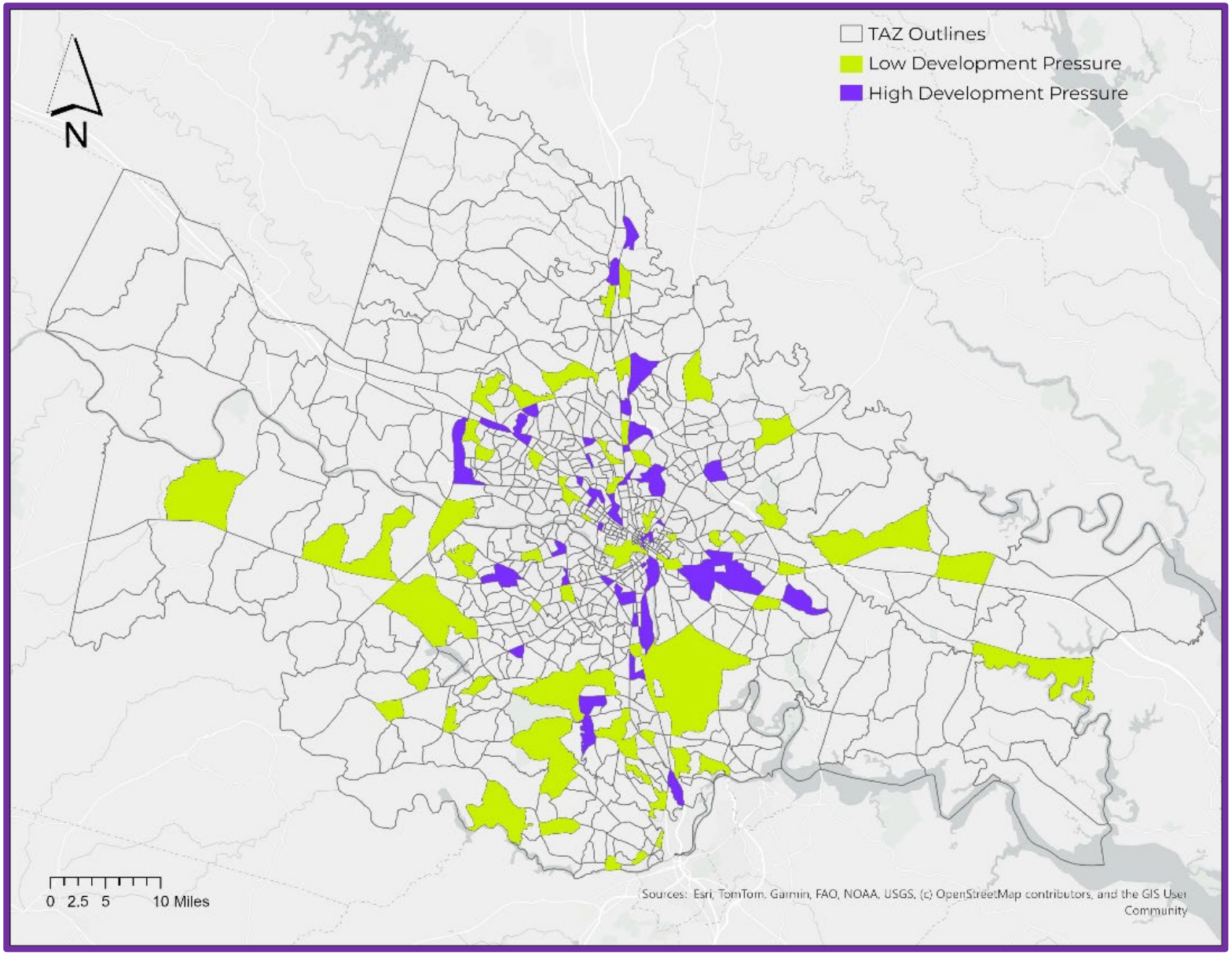
Additional methodology details are found in Appendix A.

Analysis Note

In the model used for this analysis, projected increases in population and employment drive assumptions about increased development/impervious cover. Note that there are some land uses that are not as well matched to this approach, such as data centers and utility scale solar, which involve large-scale land cover change with no change in population and typically limited changes in job numbers. It is difficult to predict the exact location or timing of these land uses. Accordingly, assumptions about these uses are not included in the opportunities and risks analyzed here.

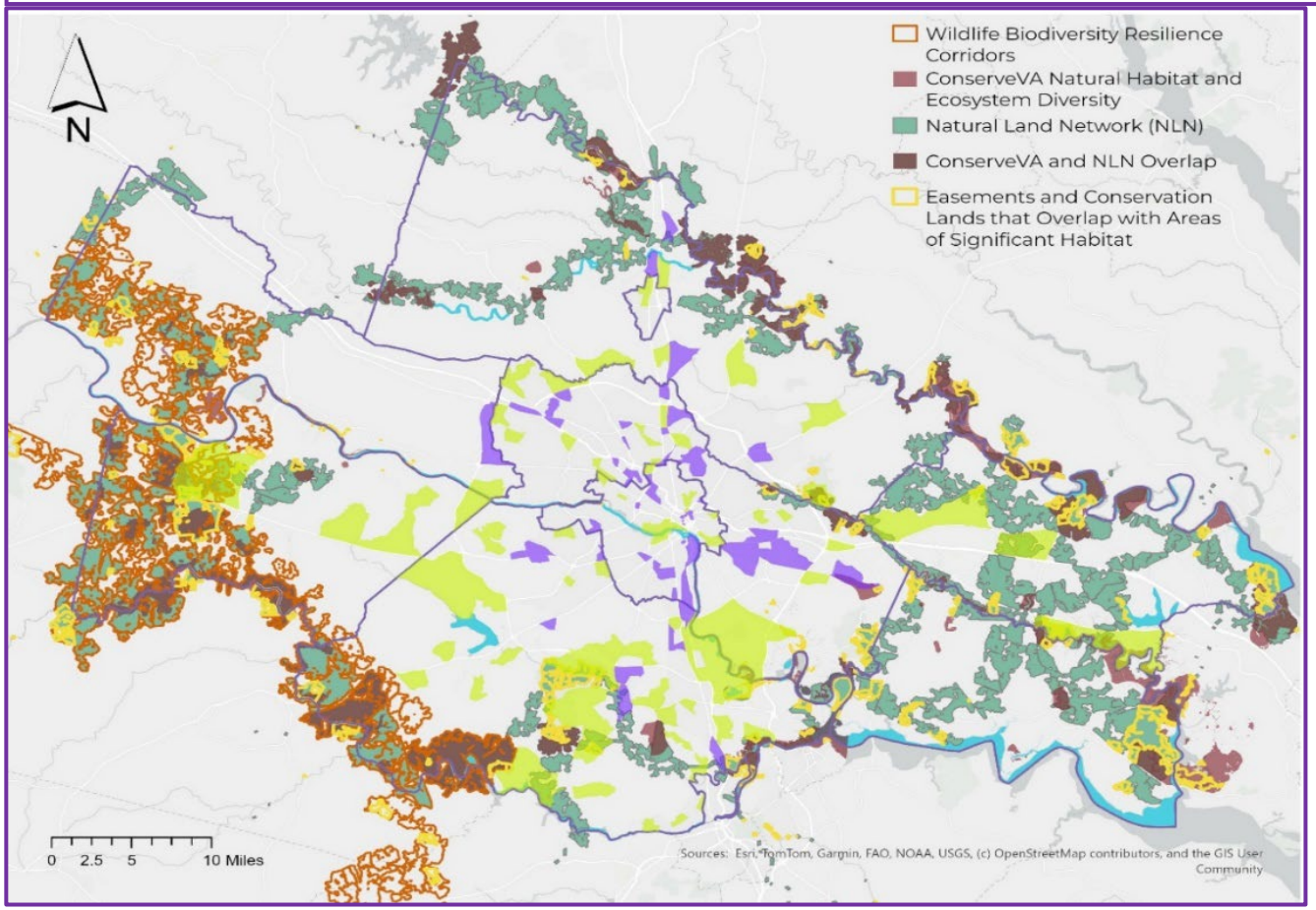
View Interactive Versions of the Land Use Change (Development Pressure) Maps Below by Clicking Here

Map 15. High and Low Development Pressure TAZs



Terrestrial Habitat - What the development pressure analysis suggests:

High development pressure zones pose a risk to habitat connectivity through development. As natural land cover converts to various residential and economic land uses, forest cores shrink and connections between them break. There are just a few TAZ's in this category in Chesterfield (2), Henrico (1), and Hanover (1) where High Development Pressure coincides with important areas for habitat connectivity, but which are not yet protected via conservation lands or easements. Strategic easements and conservation lands can maintain these cores and connections. Several areas of high habitat connectivity overlap with Low Development Pressure TAZs. These could be good opportunities for conservation or enhancement projects.

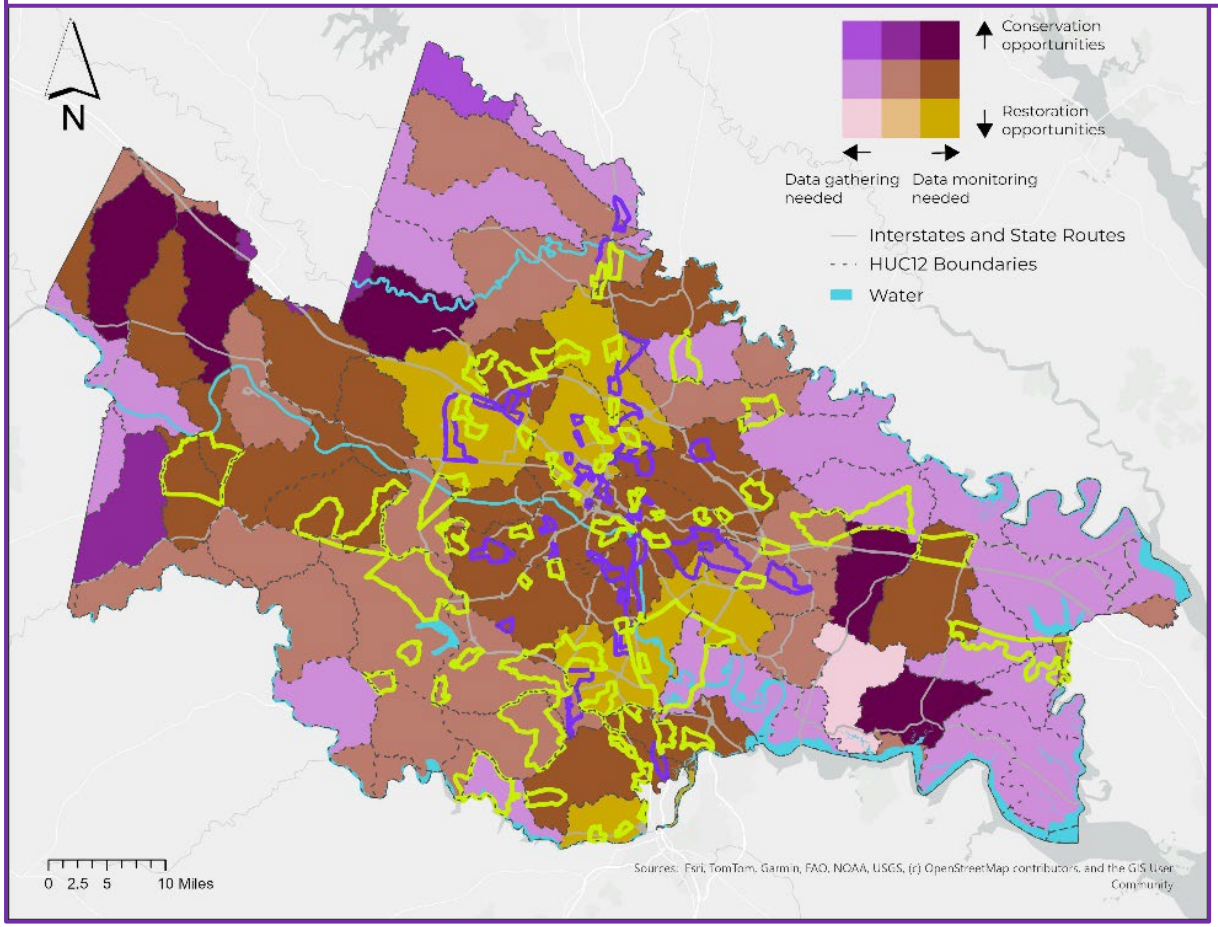


Map 16. Terrestrial Habitat Lens with Development Pressure Overlays

High Development Pressure
Low Development Pressure

Water Quality - What the development pressure analysis suggests:

Several high and low development pressure TAZ's overlap with watersheds with low- or medium data availability; these could be good areas for additional monitoring. This data could justify requests for more monitoring of streams in specific watersheds. There is overlap between high development pressure areas and watersheds with low water quality scores; these areas should be prioritized for mitigation, as well as coordination with stakeholders on their water quality improvement programs, like James River Association's Community Conservation program, Virginia Department of Forestry's Riparian Forests for Landowners program, and Alliance for the Chesapeake Bay's Green Infrastructure programs. There is also overlap between low development pressure areas and low or medium water quality scores. These would also be good opportunity areas for BMPs/ other mitigation efforts.

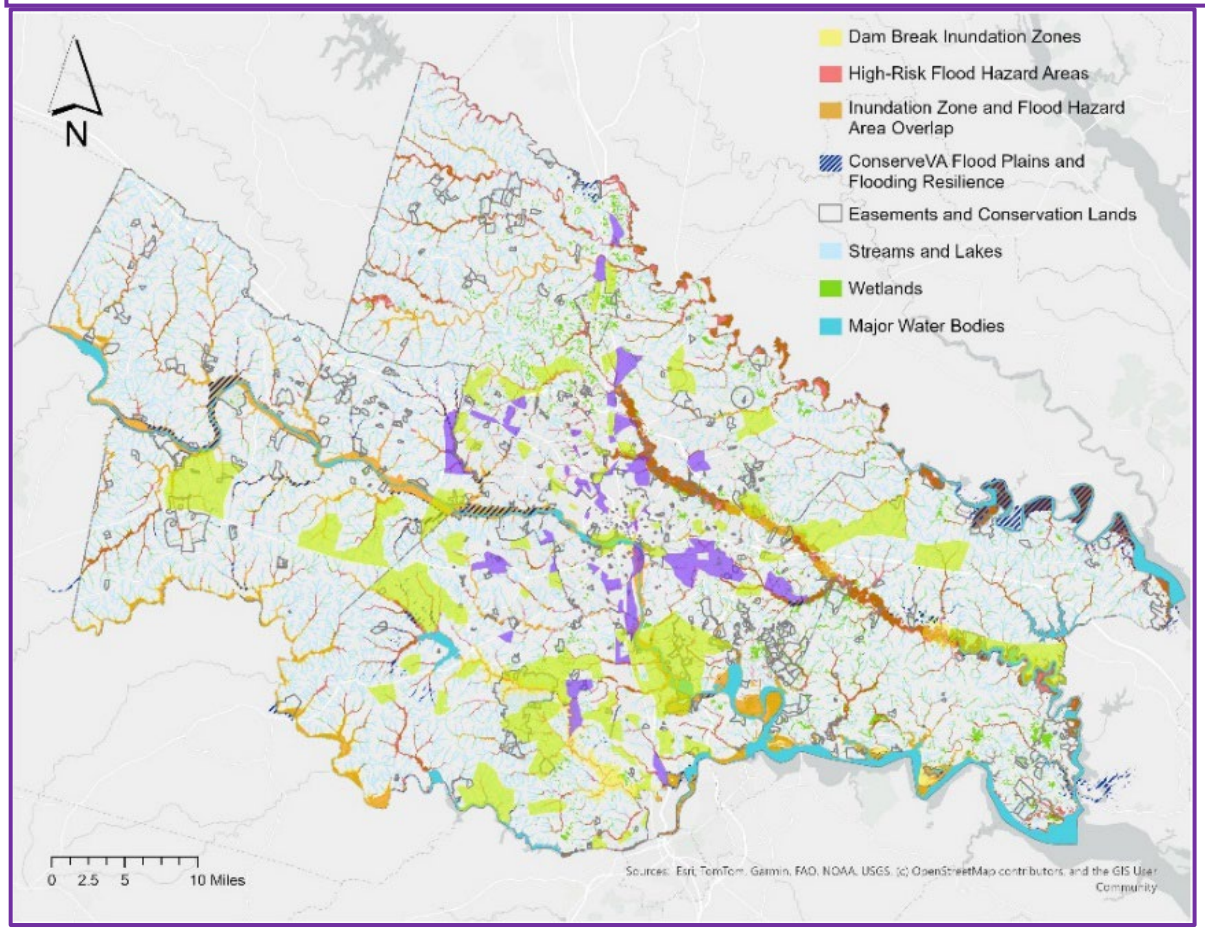


Map 17. Water Quality Lens with Development Pressure Overlays

High Development Pressure
Low Development Pressure

Flood Resilience - What the development pressure analysis suggests:

High development pressure areas tend to coincide with high flood risk areas. This suggests that careful development planning is necessary. Developers and landowners should be aware of the risks associated with increasing impervious cover, as more impervious surfaces increase the volume or runoff and reduce opportunities for water to infiltrate into soil. This can exacerbate flood risk and severity. Prudent development plans will maximize green space, tree cover, and the use of permeable surfaces. Furthermore, it suggests that any existing wetlands in these areas should be very high priorities for conservation. Reciprocally, TAZs with low development pressure but existing flood risk may be prime areas for larger scale mitigation projects and conservation.

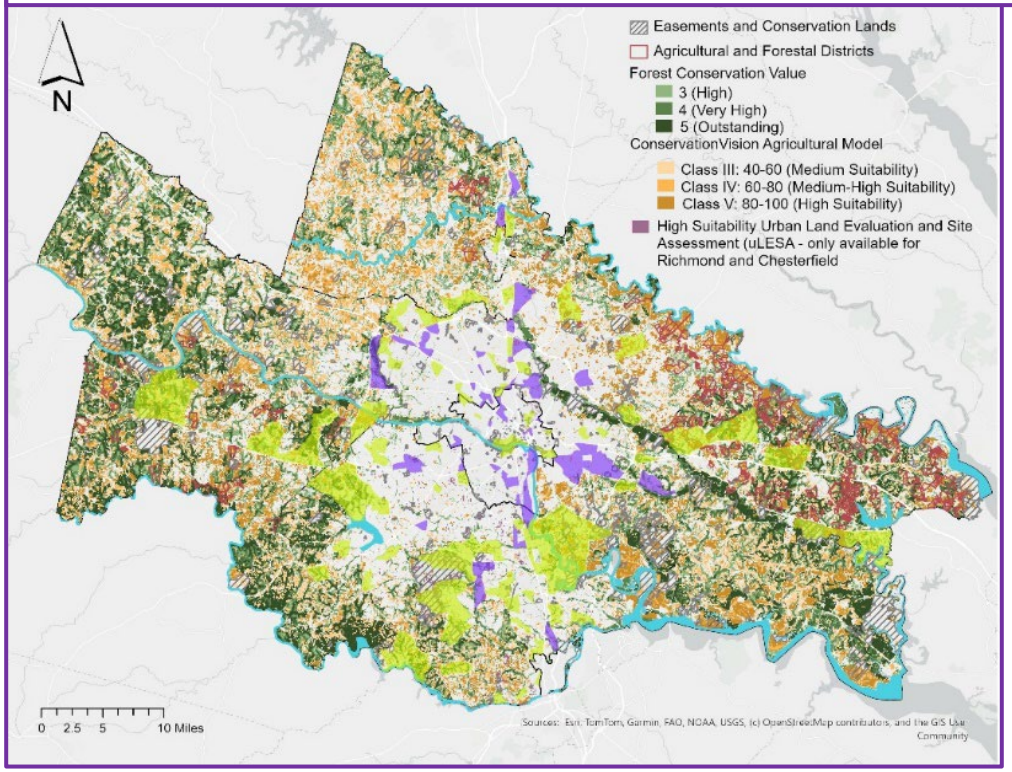


Map 18. Flood Resilience Lens with Development Pressure Overlays

High Development Pressure
Low Development Pressure

Working Lands - What the development pressure analysis suggests:

There is limited overlap between projected high development pressure TAZ's and areas with the highest Agriculture/Forest values, with the exception of some smaller areas along rivers. There are many areas with projected low development pressure that overlap with areas of high Agriculture/Forest values, such as in New Kent, where much of these high value lands are currently in Agricultural and Forestal Districts. Where growth is expected to occur in areas identified as high value working lands, there are opportunities for localities and NGOs (like Alliance for the Bay or easement holders) to reach out to landowners to make them aware of tools to keep land in that land use, like easements or AFDs. Low development pressure flags good candidates for additional conservation efforts of high value forest and agricultural land. For this map, it is important to consider those areas that are projected to have medium development pressure (neither purple nor yellow); these areas are where the majority of the highest value forests and suitable agricultural land exist. For this reason, Charles City, Hanover, Goochland, and Chesterfield (in the southernmost portion) could be areas for focused conservation efforts.

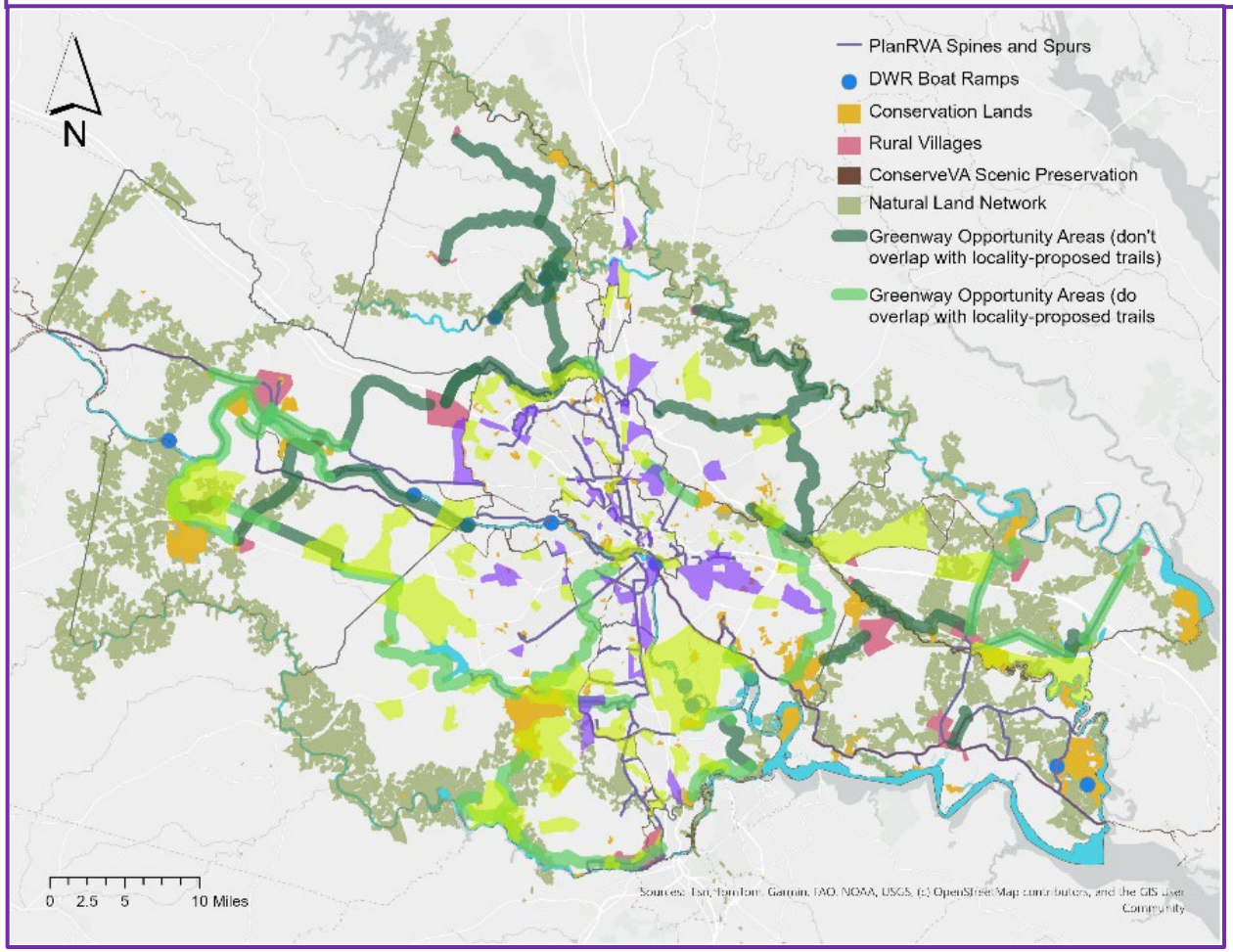


Map 19. Working Lands Lens with Development Pressure Overlays

High Development Pressure
Low Development Pressure

Recreation and Culture - What the development pressure analysis suggests:

High development pressure areas may highlight areas where future development could be monitored for opportunities to add trails to development design. In addition, for rural villages or other rural and suburban areas that overlap with high development pressure TAZ's, these could be future/ growing rural village sites that could be especially good opportunities for greenway connection. Low development pressure areas could indicate areas where there are more potentially more options for feasible trail locations. The map shows significant overlap between the greenways layer and the low-development pressure TAZ's.

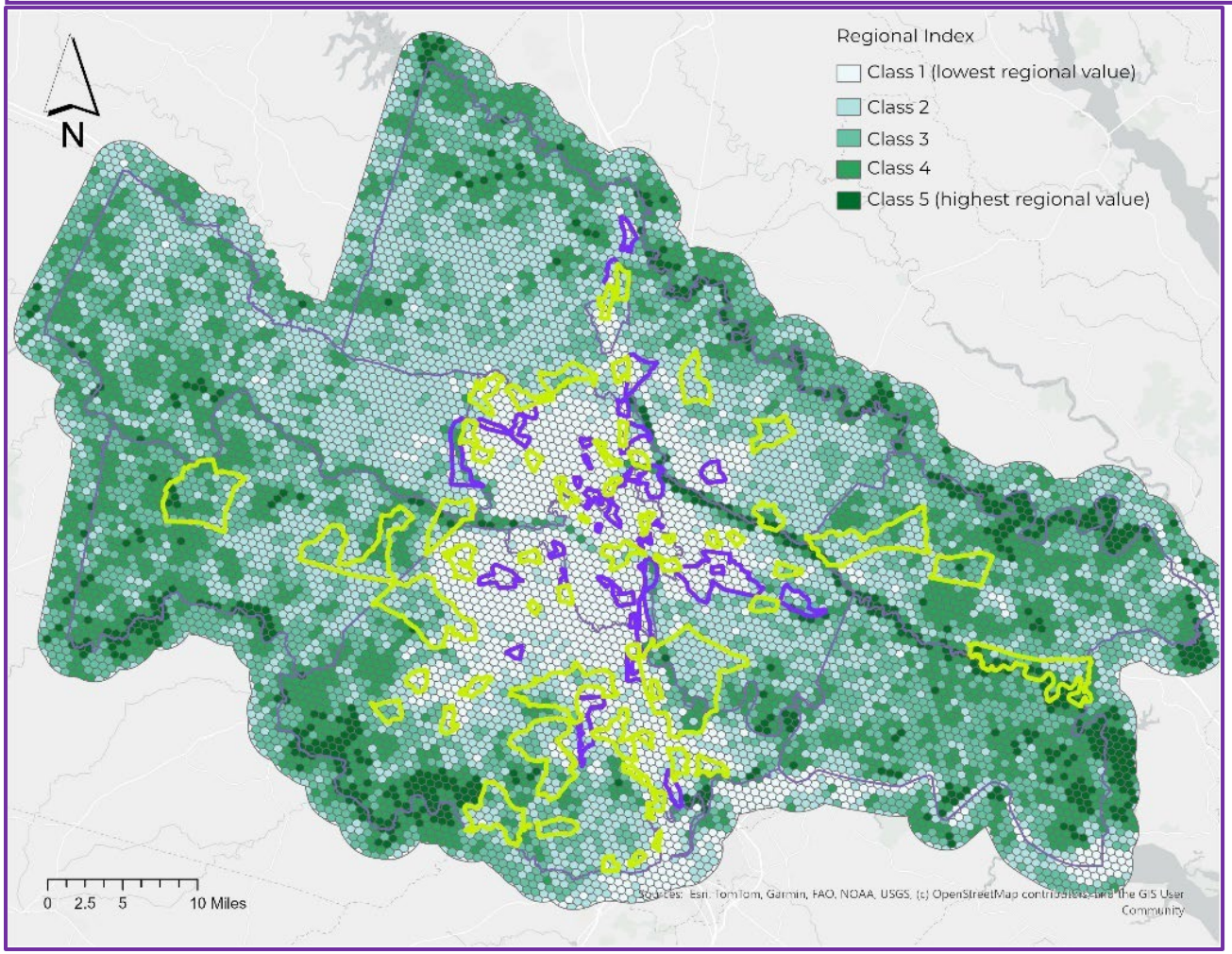


Map 20. Recreation and Culture Lens with Development Pressure Overlays

High Development Pressure
Low Development Pressure

Regional Ecological Framework - What the development pressure analysis suggests

There are a few TAZ's where high development pressure overlaps with high ecological value; for example, in Henrico County. These areas could be prioritized for further analysis for potential to direct infrastructure and development to other parts of the TAZ. For low development/high ecological value overlaps, these areas could be good opportunities for investing in environmental features, conservation, etc.



Map 21. REF with Development Pressure Overlays

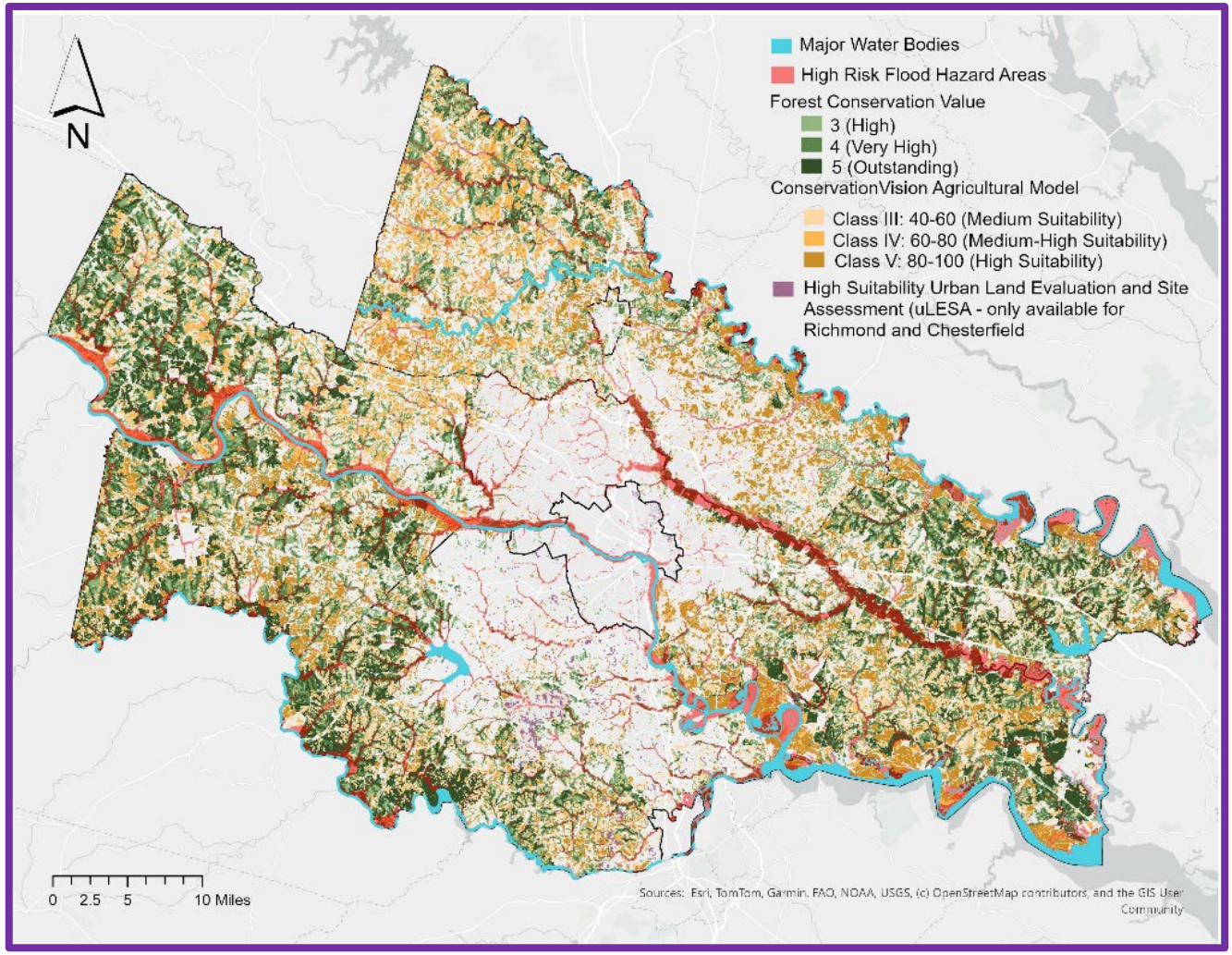
High Development Pressure
Low Development Pressure

Flood Risk to Working Lands

Agricultural and forestry lands are important economic, cultural, and environmental assets in the region. They support local businesses, food and fiber production, scenic and rural character, wildlife habitat, water-quality protection, carbon storage, and floodplain function. At the same time, many working lands are located in or near river corridors, floodplains, wetlands, and low-lying areas that face recurring or potentially increasing flood risk.

Floodplains can be highly productive areas for agriculture because they often contain fertile soils, relatively level terrain, and access to water. These same characteristics can also make farms, forestry operations, access roads, equipment, crops, livestock facilities, and related infrastructure vulnerable to flood damage. Flooding can delay planting and

Map 22. Flood Risk to Working Lands



harvest, damage crops and timber resources, erode soil, transport sediment and pollutants, disrupt access, and affect the long-term viability of agricultural and forestry operations.

Map 22 overlays high-risk flood-hazard areas with the Working Lands Lens to identify locations where flood exposure and high-value agricultural or forest lands may overlap. This analysis can help localities, landowners, conservation organizations, and agricultural and forestry partners identify areas where risk-reduction and land-stewardship strategies may be particularly valuable.

Potential strategies may include:

- Protecting and restoring floodplains, wetlands, riparian buffers, and forest cover that store floodwater and reduce erosion;
- Supporting soil-health, nutrient-management, conservation-tillage, and other practices that improve infiltration and reduce runoff;
- Protecting agricultural and forestry lands through conservation easements, Agricultural and Forestal Districts, Purchase of Development Rights, or other voluntary tools;
- Considering flood exposure when locating new agricultural structures, access roads, storage areas, and other long-lived investments;
- Coordinating flood-resilience planning with working-lands conservation, watershed planning, and hazard-mitigation efforts; and
- Expanding technical assistance and outreach to landowners regarding available conservation, resilience, and agricultural-support programs.

The current Flood Resilience Lens Map provides an important baseline for evaluating existing flood hazards. However, future conditions may differ from present-day mapped conditions. Landowners and planners—particularly in riverine, tidal, and low-lying portions of the region—should also consider predictive flood information related to sea level rise, storm surge, changing rainfall patterns, and localized drainage challenges when evaluating long-term investments and land-management decisions (see next section).

Sea Level Rise, Predictive Flood and Storm Surge, and Pluvial Flooding

The Flood Resilience Lens Map included in this plan provides information about current flood risk conditions using the best available datasets available at the time of analysis. As a planning and prioritization tool, it establishes a baseline for understanding existing flood conditions across the region.

However, flood risk is not static. The Flood Resilience Lens Map does not incorporate predictive information about how flood hazards may change over time due to factors such as sea level rise, storm surge, or changing precipitation patterns such as increasingly intense rainfall events that can overwhelm stormwater systems and cause localized, or pluvial, flooding. Continued development and changes in land cover may also alter drainage patterns and affect the severity and frequency of flood impacts. These future conditions are important considerations for the region's long-term resilience and should be evaluated alongside current flood risks when making decisions about land conservation, infrastructure investments, development, and emergency preparedness.

Future flood conditions have implications across all of the NRP lenses. Changing water levels and flood regimes may alter the extent and function of wetlands and other habitats, affect water quality through increased erosion and pollutant transport, cause salt-water intrusion, influence the viability of agricultural and forestry operations, and disrupt recreational assets such as trails, river access points, parks, and cultural resources. Flood events can also damage homes, businesses, and critical infrastructure, creating economic impacts and sometimes placing disproportionate burdens on communities with fewer resources available for preparation, response, and recovery. Understanding where future flood risks may overlap with environmental and social vulnerabilities can help the region identify opportunities for more equitable and effective investments.

Fortunately, a growing number of tools and datasets are available to help localities and regional partners understand both current and future flood conditions. PlanRVA's Flood Mapper provides an interactive, publicly accessible platform that brings together flood-related information relevant to the region. At the

state level, the Virginia Department of Conservation and Recreation's Coastal Resilience Master Plan provides predictive analyses that examine future flood exposure associated with sea level rise, storm surge, and other flood hazards. Through the Coastal Resilience Web Explorer and related technical resources, users can evaluate projected flood impacts to communities, infrastructure, natural resources, and economic assets under a range of future conditions. AdaptVA, developed by the Virginia Institute of Marine Science's Center for Coastal Resources Management, further supports climate adaptation planning by serving as a statewide information gateway for local governments, agencies, and community partners. The platform provides access to flood risk maps, sea level rise information, shoreline adaptation resources, legal and policy guidance, and decision-support tools that help users assess physical and social vulnerability and identify appropriate resilience strategies.

Future monitoring and analysis could include stream and flood gauge coordination, streambank and river erosion assessment, and refined flood-risk products that evaluate the overlap between wetlands, conserved lands, easements, and other conservation values.

While predictive flood analyses cannot determine exactly how future conditions will unfold, they can help decision-makers understand a range of plausible futures and identify strategies that provide benefits under multiple scenarios. When considered alongside the NRP lens maps, these datasets can help prioritize nature-based solutions, inform updates to Comprehensive Plans and capital improvement programs, support transportation and infrastructure planning, identify projects that may be competitive for resilience funding, and guide conservation efforts in areas likely to become increasingly important for flood mitigation.

As additional predictive datasets become available and analytical methods evolve, future updates to the Natural Resources Plan may further integrate these resources into regional decision-making. By considering both current and future flood conditions, localities and regional partners can make more informed choices about where to direct investments, coordinate actions, and proactively reduce risk while enhancing the long-term resilience of the Richmond region.

Chapter 6: Implementation Framework

The Natural Resources Plan is one interconnected piece of PlanRVA's Regional Strategic Plan, adopted by the PlanRVA Commission on June 12, 2025. The Regional Strategic Plan Vision guides strategic planning efforts across the agency and the region by identifying five key interconnected themes for which PlanRVA and our partners strive:

Strategic and Resilient Infrastructure. Infrastructure and systems designed and maintained to protect and enhance individual and community health and well-being.

A Healthy Environment Thriving ecosystems - healthy watersheds, clean air, fruitful working lands, flourishing habitats, and communities that are located and planned in ways that recognize the connections between environmental health and human health and well-being.

Attainable Housing. Diverse housing stock that makes attainable housing options for everyone that are safe, comfortable, resource-efficient, and built in coordination with available or planned infrastructure and services.

Strong Economy. A region with a diverse and resilient economic base, an educated and skilled workforce, employment that enables workers to meet their family needs, and communities with the physical, structural, and social conditions to support and attract employers, workers and visitors.

Opportunity and Choice for Everyone. A region that engages and collaborates with all voices and creates pathways to success through access to jobs, housing, infrastructure and services, quality education, a healthy environment, and other elements that allow all individuals and families to thrive.

The Natural Resources Plan will guide the work of the environment program at PlanRVA, providing data-based decision support to regional projects that conserve and restore ecological value, and guidance for minimizing impacts to important environmental areas. The pages below show the Goals and Actions for each natural resource lens. The Natural Resources Lenses are deeply intertwined; often, actions that help to protect or improve one type of natural resource will result in co-benefits for one or more of the other categories. For example, efforts to protect or improve water quality, manage land to reduce flood risk, or increase recreational opportunities such as greenway trails, can all have terrestrial habitat co-benefits. In order to illustrate this, the pages below indicate possible or likely co-benefits using the icons shown in Table 4.

Goals

These five Goals and descriptions provide the intended direction for each lens category. The following pages provide more detailed information for each Goal.

Table 4. Lens Goals

	Goal	Description
	**Terrestrial Habitat**: Preserve high-quality habitats and protect and enhance corridors between them.	Prioritize conservation and other efforts in areas in regional scale corridors shown on the terrestrial habitat lens map, and other priority areas identified in current or future locality or other specific terrestrial habitat plans. Work to restore or enhance habitats across the region.
	**Water Quality**: Protect healthy waters and restore water quality where it is impaired.	Prioritize protection of healthy waters shown on the water quality lens map and work to restore areas shown as having impaired water quality. Work to improve water quality monitoring data across the region, and particularly in areas shown as lacking data.
	**Flood Resilience**: Improve the region's ability to withstand and recover from floods.	Increase the use of nature-based solutions and conservation tools to enhance and protect natural landcover in high flood risk areas shown on the Flood Resilience Lens Map.
	**Working Lands**: Protect working lands and recognize the benefits provided to humans (ex. economic, health, clean air and water).	Increase the use of conservation tools to preserve high value agricultural and forestry lands shown on the Working Lands Lens Map. Protect the health of connected ecosystems that support the function and health of working lands.
	**Recreation and Culture**: Develop bike and pedestrian trails that connect natural recreation and culture destinations.	Identify low environmental impact routes for bike and pedestrian infrastructure to build the regional greenway trail network, conceptualized in the Recreation and Culture Lens Map. Analyze suitable areas for implementation of nature-based solutions such as tree plantings and erosion reduction measures along these routes.

Terrestrial Habitat

Goal: Preserve high-quality habitats and protect and enhance corridors between them.

Prioritize conservation and other efforts in regional scale corridors shown on the terrestrial habitat lens map, and in other priority areas identified in current or future locality or other specific terrestrial habitat plans. Work to restore or enhance habitats across the region.

Potential Co-benefits For:			

There are many approaches and tools that are being used or could be used in the region to help achieve this goal. Documents such as locality Comprehensive Plans have Future Land Use Map designations and other design guidance that direct the location, amount, and type of new development. Zoning and other code regulations provide standards for the types of data that are required to be mapped at the site level, which can help inform the least impactful placement of development on a given site. These regulations may also include standards or incentives that influence how development may avoid or minimize disturbance of habitat. Policies at the local or regional level for new public facility and infrastructure projects may include habitat considerations in site selection criteria or development standards. For example, policies could guide new public investments so as to avoid disturbing high-priority habitats, or conversely, to recognize and plan projects to have mutual benefits, such as aligning greenway trails or parks with high-priority habitat areas or modifying road culverts or underpasses to remove wildlife and bike/pedestrian barriers. Similarly, there may be policies and programs at the local level that guide public land management in ways that preserve or restore habitat or removing barriers to wildlife movement, such as reforesting public properties and roadway medians. Localities may also have or participate in programs that directly address or incorporate open space preservation goals, such as Purchase of Development Rights (PDR), Transfer of Development Rights (TDR), or other easements or land purchase programs, Agricultural and Forestal Districts (AFDs), wetland banks, or FEMA's Community Rating System.

Programs and Projects Example

To date, Henrico has conserved more than 15,800 acres of land in the eastern half of the county and has invested more than $30M for conservation. The county continues to identify additional opportunities to enhance conservation, such as through establishing wetland banks.

While government agencies can play an important role, all regional residents can contribute. Most of the region's land is privately owned, so homeowners, landowners, homeowner's associations, developers, and other stakeholders can play a role in land development and management practices that contribute positively to habitat issues. In addition, residents, landowners, and businesses can participate in habitat conservation volunteer opportunities, such as the DWR Restore the Wild or National Wildlife Federation's Habitat Certification programs, and can also learn about voluntary land protection tools through Capital Region Land Conservancy.

The approaches and tools listed above are only some of the many ways that the region could make progress on this goal. The lists below include planned near-term key actions, as well as other recommended actions to continue or explore.

Near-Term Actions:

1. Continue coordination and facilitation of the Lower Chickahominy Watershed Collaborative (LCWC) to advance multi-jurisdictional habitat conservation priorities.
2. Apply the Regional Ecosystem Framework (REF) to identify and prioritize habitat cores, corridors, and restoration opportunities.
3. Expand urban tree canopy through establishment of local canopy targets and regional reforestation initiatives prioritizing heat-vulnerable areas.
4. Encourage development and implementation of tree preservation and maintenance programs, including incentives and ordinances.
5. In alignment with the Pathways to the Future Air Quality Plan, promote nature-based carbon sequestration strategies, including forest conservation and restoration of natural lands.
6. Expand use of living shorelines to enhance habitat and stabilize riverine and tidal systems.
7. Support soil health practices (e.g., biochar, soil amendment strategies) that enhance ecosystem function and carbon storage.

Potential Partners

- Localities
- Community and nonprofit groups, ex. Capital Region Land Conservancy, Virginia Master Naturalists
- Government Agencies, ex. PlanRVA and RRTPO, DCR, DOF, FHWA/VDOT
- Landowners
- Development Community
- Residents

On-going and Long-Term Actions

1. Pursue or support development of locality level or other smaller scale natural resource/habitat preservation plans. Particularly in high development pressure areas of the region that are not yet protected via conservation easements or other measures (see Risks and Opportunities section – TAZs in this category are present in: Chesterfield (2), Henrico (1), and Hanover (1)).
2. Continue applying and updating the Regional Ecosystem Framework (REF) and lens map data to identify priority habitat conservation, restoration, and connectivity opportunities.
3. Coordinate with conservation organizations, state agencies, Tribal partners, localities, and landowners to strategically conserve and restore habitat lands across the region.
4. Incorporate habitat connectivity and conservation priorities into transportation planning, capital improvement programs, and infrastructure project development.
5. Support planning for and implementation of wildlife crossing improvements and barrier removal projects in areas with documented wildlife-vehicle conflicts.
6. Share information about conservation tools such as conservation easements, Purchase of Development Rights (PDR), Transfer of Development Rights (TDR), Agricultural and Forestal Districts (AFDs), and other voluntary land conservation programs.
7. Facilitate regional information sharing on habitat-related best practices, including comprehensive planning, zoning, public land management, tree preservation, invasive species management, and habitat restoration.
8. Support outreach and technical assistance for private landowners, homeowner associations, developers, and businesses regarding habitat-friendly land management practices.
9. Promote public participation in habitat conservation and restoration initiatives, including volunteer stewardship programs, native plantings, riparian buffer restoration, and community tree planting efforts.
10. Track and evaluate habitat conservation outcomes to inform future planning and investment decisions.

Possible Outcome Metrics

- Acres of permanently conserved land within priority habitat cores and corridors.
- Percent of priority habitat cores and corridors permanently conserved.
- Net change in forest cover within priority habitat areas.
- Rate of conversion of priority habitat to developed land.
- Tree canopy coverage and net canopy change in priority habitat and heat-vulnerable areas.
- Acres of interior forest retained or increased.
- Habitat connectivity or fragmentation score for identified regional corridors.
- Miles of functioning riparian buffer and living shoreline added or maintained.
- Reduction in priority wildlife-movement barriers and wildlife-vehicle collision rates at treated locations.

Water Quality

Goal: Protect healthy waters and work to restore water quality where it is impaired.

Prioritize protection of healthy waters shown on the water quality lens map and work to restore areas shown as having impaired water quality. Work to improve water quality monitoring data across the region, and particularly in areas shown as lacking data.

Potential Co-benefits For:		

Water quality is already a central environmental focus for Virginia and the region. Federal, state and local laws govern and provide a framework for the many efforts and required processes that already exist and are underway in our communities each day. However, the lens map in this plan highlights areas where more work can be done to improve water quality, protect areas with healthy waters, and improve our water quality knowledge.

Similar to habitat considerations, locality Comprehensive Plans and Zoning codes can guide the location, intensity and design parameters of new development or redevelopment in ways that can have a significant impact on the region's waterways. Locality zoning and environmental regulations (stormwater, erosion and sediment control, etc.) can include approaches such as development standards that minimize impervious cover, enhanced stormwater management, and stream buffer requirements or incentives. Locality stormwater management programs can address stormwater system maintenance, upgrades and retrofits and other types of projects, such as stream restoration, which may occur in partnership with residents, homeowner's associations and businesses.

Programs and Projects Example

The Greening Richmond Public Libraries initiative is a partnership led by the James River Association with Richmond Public Library, Richmond Department of Public Utilities/RVAH2O, Four Winds Design, and PlanRVA to design and install green infrastructure at library branches across Richmond that reduces polluted stormwater runoff and builds public awareness of water quality issues. Since 2019, projects have been implemented at multiple branches using practices such as bioretention basins, conservation landscaping, native plantings, and street trees to intercept and filter runoff before it reaches local waterways and the James River.

Locality departments and other government agencies can work together to address wastewater treatment facilities, sewer line maintenance and upgrades, septic systems and other issues that can affect water quality. Policies at the local or regional level for new public facility and infrastructure projects can include water quality in site selection criteria or development standards. For example, policies could guide new public investments to avoid sites with significant water quality issues, or plan for enhanced approaches to new or upgraded stormwater management facilities as part of road or new public facility construction. In many cases, localities and other government agencies have developed watershed-specific Total Maximum Daily Load (TMDL)/Watershed Implementation Plan (WIP), Advance Restoration Plan (ARPs) or other similar types of plans.

While government agencies can play an important role, all regional residents can contribute, and there are many stakeholders that work on water quality issues. Homeowners, landowners, homeowner's associations, developers, and others employ strategies on their properties that reduce pollution runoff and encourage water infiltration to the soil. Examples include appropriate pet waste and trash disposal, reducing salt use on roads and sidewalks in the winter, minimizing the use of pesticides and herbicides on lawns, and maintaining native vegetation buffers and forested land. In addition, there may be opportunities to participate in water quality-related volunteer opportunities, such helping to gather water quality data or participate in clean-up activities such as Clean the Bay Day organized by the Chesapeake Bay Foundation and the Virginia Conservation Assistance Program.

The approaches and tools described above are only some of the many ways that the region could make progress on this goal. The lists below include planned near-term key actions, as well as other recommended actions to continue or explore.

Near-Term Actions:

1. Expand regional best management practice (BMP) implementation efforts by identifying and advancing priority retrofit and restoration sites.
2. Integrate water quality improvements into transportation, trail, and public infrastructure projects.
3. Support efforts to update and implement watershed plans, TMDLs, and other water quality improvement strategies.
4. Coordinate with state agencies and partners to expand BMP programs into additional geographic areas.

Potential Partners:

- Localities
- Community and nonprofit groups, ex. James River Association
- Government Agencies, ex. PlanRVA and RRTPO, DEQ, DCR, Soil and Water Conservation Districts
- Landowners
- Development Community
- Residents

5. Lead and support regional initiatives to reduce litter, including marine debris reduction and public education campaigns.
6. Improve targeting of restoration efforts using watershed-scale data and priority mapping tools.
7. Promote soil conservation and nutrient management practices on agricultural lands.
8. Support wastewater and stormwater system improvements that reduce nutrient loads and emissions.

On-Going and Long-Term Actions

1. Coordinate with localities, state agencies, nonprofits, and academic partners to improve water quality monitoring coverage and address data gaps identified through the lens analysis.
2. Support expansion of volunteer monitoring programs and citizen science initiatives that improve understanding of watershed conditions.
3. Promote protection of high-quality watersheds and headwater streams through conservation planning and land protection strategies.
4. Facilitate regional information sharing regarding effective water quality policies, programs, and implementation approaches.
5. Support implementation of watershed management plans, TMDLs, Watershed Implementation Plans (WIPs), Advance Restoration Plans (ARPs), and related restoration strategies.
6. Encourage adoption of enhanced stormwater management practices, stream buffer protections, low-impact development techniques, and impervious surface reduction strategies.
7. Support continued investment in stormwater infrastructure retrofits, stream restoration projects, wastewater treatment improvements, and septic system upgrades.
8. Integrate water quality priorities into transportation, land use, recreation, and capital improvement planning efforts.
9. Promote and grow public education regarding watershed stewardship, litter prevention, pet waste management, nutrient reduction, and other practices that protect water quality.
10. Periodically update watershed-scale analyses and priority restoration maps to guide future project implementation.

Possible Outcome Metrics

- Percent of waterways and priority watershed areas with current monitoring data.
- Percent of HUC-12 watersheds characterized as high water quality.
- Acres of high-quality watershed land and headwater areas permanently conserved.
- Change in impaired stream miles, lake acres, or tidal-water acres.
- Miles of impaired waters showing improving trends or restored uses.

- Estimated annual nitrogen, phosphorus, sediment, bacteria, and other pollutant-load reductions.
- Miles and acres of functioning riparian buffers protected or restored.
- Acres of wetlands, floodplains, and forested land protected or restored in priority watersheds.
- Net change in impervious cover within high-quality and impaired watersheds.
- Acres of impervious cover removed, disconnected, or treated through green infrastructure and low-impact development.
- Reduction in sanitary sewer overflows, wastewater bypasses, failing septic systems, and other priority wastewater-related risks.
- Change in biological-integrity indicators for priority waterways.
- Change in the percentage of monitored recreation waters meeting bacteria standards.
- Reduction in litter and illegal dumping in priority waterways and stormwater systems.

Flood Resilience

Goal: Preserve natural landcover in high-risk flood areas and prioritize areas to implement nature-based solutions for flood resilience (withstand and recover from harm).

Increase the use of nature-based solutions and conservation tools to enhance and protect natural landcover in high flood risk areas shown on the Flood Resilience Lens Map.

Potential Co-benefits For:			

Flooding events can damage property and put human lives in danger. With high stakes for public safety, floodplains are regulated at multiple levels of government. Localities in the region guide development in the floodplain through zoning and environmental regulations. These floodplain regulations differ somewhat by locality but typically guide use, structure type, and intensity. In addition, locality regulations governing stormwater management influence the quantity of water that may run-off during heavy rainfall, though water levels in the region's streams and rivers are also influenced by outside localities and regions as water makes its way downstream. The region can help address flooding by preserving or restoring floodplains as a natural landscapes.

Federal, state and local governments and other stakeholders in the region all work to help prepare the region's population for flooding and other natural disasters. Officials and other stakeholders work to share information with residents and businesses about risks as well as how to prepare for flood events. At the regional level, the Richmond-Crater Hazard Mitigation Plan (HMP) provides a detailed flooding risk assessment and actions that the region and localities can take to prepare and recover.

Programs and Projects Example

Henrico County's Voluntary Acquisition Program is a community-centered flood mitigation initiative that helps reduce future flood risk by purchasing eligible, flood-prone properties from willing homeowners. Participation is entirely voluntary, and the County prioritizes properties in high-risk flood hazard areas while engaging residents in program design and outreach. Following acquisition, properties may be preserved as open space or repurposed for resilience projects that support flood mitigation and reduce repetitive losses. The program is supported by the Virginia Community Flood Preparedness Fund through the Virginia Department of Conservation and Recreation.

Efforts to reduce risk by protecting our floodplains and to prepare our community at all scales, from neighborhoods to localities, are important. Flood resilience will become even more critical as the region's climate changes, bringing more extreme and unpredictable weather events.

The approaches and tools described above are only some of the many ways that the region could make progress on this goal. The lists below include planned near-term key actions, as well as other recommended actions to continue or explore.

Near-Term Actions

1. Utilize flood risk, heat island, repetitive loss, and other resilience datasets to identify priority implementation areas.
2. Conduct spatial analysis to identify resilience, recreation, and ecosystem service co-benefit opportunities across various project types such as trail development and BMP implementation.
3. Expand implementation of green infrastructure and BMPs that reduce flood risk and enhance natural floodplain function.
4. Expand tree canopy and green infrastructure to reduce flooding and stormwater impacts, while also mitigating urban heat island effects and strengthening overall climate resilience. Support distributed energy and resilience strategies that reduce vulnerability to extreme weather.
5. Integrate flood resilience into transportation, land use, and capital planning processes through data, goals and mutually beneficial studies, programs and projects.
6. Conduct regional coordination through the Environmental Technical Advisory Committee (EnvTAC) and partner forums to align resilience priorities and strategies.
7. Advance development of a regional resilience implementation framework. The framework will enable planners to consider or prioritize implementation project opportunities weighing natural resources and resilience co-benefits.

Potential Partners:

- Localities
- Community stakeholders
- Government agencies (e.g., DEQ, DCR, FEMA, VDEM)
- Development community
- Property owners

<u>On-Going and Long-Term Actions</u>

1. Support implementation of resilience actions identified through regional and local Hazard Mitigation Plans, Long-Range Transportation Plans, Comprehensive Economic Development Strategies (CEDS), and other adopted plans.

2. Continue coordination with the Virginia Department of Conservation and Recreation's Office of Resilience Planning regarding implementation of the Coastal Resilience Master Plan and Virginia Flood Protection Master Plan.
3. Coordinate with state and local partners to evaluate opportunities for additional stream or flood gauges, improved access to gauge data, streambank and river erosion monitoring, and integration of these datasets into future flood resilience and watershed planning.
4. Advance development and implementation of a regional resilience project pipeline focused on nature-based solutions and flood mitigation.
5. Promote conservation and restoration of floodplains, wetlands, forests, and other natural systems that reduce flood risk.
6. Support local efforts to incorporate flood resilience considerations into comprehensive plans, zoning ordinances, capital improvement programs, and development review processes.
7. Conduct periodic assessments of critical infrastructure vulnerability to flooding, sea level rise, extreme precipitation, and other climate-related hazards.
8. Support local participation in the CRS program through updates to the Hazard Mitigation plan, public education and outreach efforts, and exploration of creating a regional CRS (Community Rating System) working group.
9. Support development and expansion of resilience hubs, emergency preparedness resources, and community outreach programs.
10. Facilitate regional information sharing on flood resilience best practices, funding opportunities, and implementation lessons learned.
11. Promote nature-based solutions, green infrastructure, and floodplain restoration projects that provide multiple environmental and community benefits.
12. Update regional flood risk analyses and resilience planning tools as new climate, floodplain, and hazard data become available.
13. Develop a regional analysis of pluvial flood hazard and potential impacts to infrastructure and environmental resources.

Possible Outcome Metrics

- Acres and percent of high-risk flood hazard areas permanently conserved.
- Net change in natural landcover within high-risk flood hazard areas.
- Acres of wetlands protected, restored, enhanced, and lost.
- Acres of floodplain restored or reconnected.
- Miles of functioning riparian buffer protected or restored.

- Estimated floodwater storage capacity restored or protected through nature-based solutions.
- Estimated reduction in peak runoff or runoff volume from implemented projects.
- Acres of forested floodplain and tree canopy retained or expanded in priority areas.
- Reduction in structures, critical facilities, and road segments exposed to high flood risk.
- Change in repetitive-loss properties, expected annual flood damage, and flood-related road or service disruptions.
- Reduction in flood exposure for socially vulnerable populations and priority neighborhoods.
- Acres of tidal wetlands, living shorelines, and marsh migration areas protected or restored, where applicable.

Working Lands

Goal: Protect working lands and recognize the benefits provided to humans (ex. economic, health, air, clean water).

Increase the use of conservation tools to preserve high value agricultural and forestry lands shown on the Working Lands Lens Map. Protect connected ecosystems that support the function and health of working lands.

Potential Co-benefits For:		

While the region has a densely developed urban center, suburban communities, and other higher density nodes, there are also extensive agricultural and forested lands across PlanRVA's localities. Guiding plan documents in many of the region's localities note the importance of existing working lands in retaining community character and history, providing economic benefits, and playing an important role in ecosystem functions. While landowner decisions and market forces affect agricultural and forestry uses, locality Comprehensive Plans, zoning, and other regulations can impact where working lands are allowed and/or feasible. In addition, some localities and stakeholders in the region support or encourage working land uses through programs such as Purchase of Development Rights (PDR), Agricultural and Forestal Districts (AFD) or land or easement purchase. Other government and stakeholder efforts focus on supporting agricultural and forestry through programs that provide education, funding, or marketing through agri-tourism and eco-tourism programs.

The approaches and tools described above are only some of the many ways that the region can protect and enhance working lands. The lists below include planned near-term key actions, as well as other recommended activities to continue or explore.

Programs and Projects Example

Successful Agricultural and Forestal District programs exist in New Kent, Hanover, and Powhatan counties. The programs can be expanded within the localities they current exist in, and there are opportunities for other localities in the region to establish their own AFD programs for further Working Lands conservation.

Near-Term Actions

1. Incorporate working lands into regional green infrastructure and resilience planning efforts.
2. Promote conservation and BMP implementation on agricultural and forest lands.
3. Support tools that protect working lands, including conservation easements and Agricultural and Forestal Districts.
4. Recognize and communicate ecosystem service benefits of working lands, including water quality protection and flood mitigation.
5. Coordinate with partners to align working lands conservation with resilience strategies.
6. Promote sustainable grazing, livestock, and nutrient management practices.
7. Support urban agriculture and regional food systems to increase resilience and reduce transportation emissions.
8. In alignment with PlanRVA's Air Quality Plan, encourage co-location strategies such as agrivoltaics where appropriate.
9. Explore opportunities for expanding the uLESA urban agriculture prioritization tool region-wide in partnership with VCU.

Potential Partners:

- Localities
- Community stakeholders
- Government agencies (e.g., Soil and and Water Conservation Districts, Virginia Cooperative Extension, etc.)
- Property owners.

On-Going and Long-Term Actions

1. Support development of locality-level agricultural and forest conservation strategies that incorporate local priorities, working lands data, scenic resources, and cultural assets. Support future data development for urban agriculture, local food-system assets, and urban/suburban working-land functions where these issues are relevant to locality priorities.
2. Promote use of conservation easements, Agricultural and Forestal Districts, Purchase of Development Rights programs, and other land protection tools to maintain working lands.
3. Facilitate regional information sharing regarding effective planning, zoning, and development practices that support long-term agricultural and forestry viability.
4. Support outreach and technical assistance for landowners regarding conservation programs, financial incentives, forest management, succession planning, and agricultural best management practices.
5. Encourage implementation of sustainable forestry, soil health, nutrient management, and regenerative agriculture practices.
6. Support regional food system initiatives that strengthen local agricultural economies and improve food access.
7. Coordinate with conservation, forestry, agricultural, and economic development partners to align working lands preservation with resilience and ecosystem service objectives.

8. Promote recognition and valuation of ecosystem services provided by working lands, including carbon sequestration, water quality protection, flood mitigation, wildlife habitat, and air quality benefits.
9. Monitor trends in agricultural and forest land conversion to inform future conservation and planning efforts.
10. Periodically update working lands analyses and priority conservation areas as new data become available.

Possible Outcome Metrics

- Net change in agricultural land and working forest acreage.
- Acres and percent of high-value working lands permanently conserved.
- Rate of agricultural and forest land conversion to developed uses.
- Acres of prime farmland, farmland of statewide importance, and priority forestland retained in working-land use.
- Acres of agricultural and forestry land with active stewardship, management, or conservation plans.
- Acres of working lands using soil-health, nutrient-management, sustainable forestry, or regenerative agricultural practices that demonstrate sustained adoption.
- Reduction in estimated sediment, nutrient, or runoff contributions from participating working lands.
- Acres of riparian buffers, wetlands, and floodplain land protected or restored on working lands.
- Estimated carbon storage or sequestration associated with conserved and sustainably managed working lands.
- Acres of working lands contributing to habitat corridors, pollinator habitat, or other ecological connectivity.
- Change in the number and diversity of active farms and forest operations.
- Funding leveraged per acre of working land permanently conserved, restored, or placed under long-term stewardship.

Recreation and Culture

Goal: Link bike and pedestrian trails to parks, natural areas, rural villages, and waterways.

Identify low environmental impact routes for bike and pedestrian infrastructure to build the regional greenway trail network, conceptualized in the Recreation and Culture Lens Map. Analyze suitable areas for implementation of nature-based solutions such as tree plantings and erosion reduction measures along these routes.

Potential Co-benefits For:			

While greenway trail planning and construction may often occur through local or regional governments and agencies, trail segments can be built in conjunction with new development (reservation of trail easements, or trail construction), and multiple parties can coordinate to try to link more local trail networks in parks/facilities and neighborhoods to regional greenways.

Regional trail networks can be included in, and facilitated by, locality Comprehensive Plan recreation and transportation chapters and land use/development design guidance, zoning regulations (open space and trail standards for new development), and standards for public facility and infrastructure projects. Local governments can also play a role through approaches and policies for public land acquisition, investing in projects that have mutual benefit such as alignment of greenway trails or parks with areas of habitat preservation.

Programs and Projects Example

The James River Park System Natural Resources Management Plan establishes a framework for protecting natural areas while supporting public use across the more than 600 acres of Richmond's riverfront park system. Recommendations address invasive species management, native habitat restoration, erosion, climate resilience, and volunteer stewardship. The plan demonstrates how trails, river access, and park improvements can be paired with these nature-based solutions to reduce environmental impacts and improve access.

Near-Term Actions

1. Update and enhance the Rivers of the Richmond Region guide.
2. Develop and maintain an interactive regional map of river access points, trails, and recreation assets.
3. Expand and promote the Virginia Water Trails network, including the Lower Chickahominy region.
4. Integrate greenway and trail planning with environmental goals, including water quality improvement and flood resilience.
5. Identify and advance opportunities to align trail development with conservation and resilience priorities.
6. Improve public access to rivers, trails, and natural areas through coordinated planning and investment.

Potential Partners:

- Localities
- Community stakeholders (Sports Backers, etc.)
- Government agencies (FHWA/VDOT, FOLAR, CVTA, etc.)
- Development Community

On-Going and Long-Term Actions

1. Continue advancing implementation of the regional greenway trail network through coordination with localities, state agencies, nonprofits, and private partners.
2. Support incorporation of regional trail priorities into local comprehensive plans, transportation plans, parks plans, and capital improvement programs.
3. Identify opportunities to connect parks, natural areas, waterways, historic resources, rural villages, and community destinations through active transportation networks.
4. Promote trail development approaches that minimize environmental impacts while enhancing conservation, flood resilience, and water quality outcomes.
5. Coordinate with transportation agencies and local governments to improve safe bicycle and pedestrian access to recreation assets and natural areas.
6. Expand public access to waterways through coordinated planning for boat launches, river access points, water trails, and supporting facilities.
7. Support integration of green infrastructure, tree canopy expansion, habitat restoration, and erosion control measures into trail and recreation projects.
8. Facilitate regional information sharing regarding trail planning, funding opportunities, design standards, maintenance practices, and public engagement strategies.
9. Promote recreation and cultural tourism opportunities that support local economies while conserving natural and cultural resources.
10. Periodically update regional trail network priorities and implementation strategies based on changing community needs and project progress.

Possible Outcome Metrics

- Miles of completed regional greenway trail.
- Percentage of the mapped regional greenway network constructed and publicly accessible.
- Percentage of the planned network that is continuous and connected.
- Miles of high-priority trail-network gaps closed.
- Number and percentage of parks, natural areas, waterways, rural villages, and cultural destinations connected to the network.
- Percentage of residents within walkable or bikeable distance of a trail access point.
- Change in safe trail access for underserved and transit-dependent populations.
- Number of priority road, rail, and water barriers addressed to improve trail connectivity and safety.
- Trail use and visitation trends.
- Reduction in bicycle and pedestrian safety risks at trail crossings and access points.
- Acres or miles of natural resources protected, restored, or enhanced through trail alignment and design.
- Tree canopy, native vegetation, and green infrastructure performance along trail corridors.
- Estimated stormwater runoff reduction or erosion-control benefits associated with trail projects.
- Number of publicly accessible water-trail and river-access locations connected to the land-based trail network.

Cross-Cutting (Regional Capacity & Implementation)

While this plan is organized around five distinct natural resource lenses (Terrestrial Habitat, Water Quality, Flood Resilience, Working Lands, and Recreation & Culture), the region's most effective investments often advance multiple goals at the same time. Conservation, restoration, green infrastructure, transportation, public-facility, and land-management projects can provide co-benefits that extend beyond a single lens, strengthening environmental resilience, public health, quality of life, and long-term economic vitality.

For example, protecting a forested floodplain may reduce flood risk, protect water quality, maintain wildlife habitat, store carbon, support working-land functions, and provide opportunities for trails or public access where appropriate. Similarly, a well-designed greenway project may improve recreation access while incorporating tree canopy, stormwater treatment, habitat restoration, erosion control, and connections to waterways or cultural destinations.

This Cross-Cutting section is not a sixth natural-resource lens. It identifies the shared regional systems needed to implement the five lens goals: coordination, technical assistance, data and mapping, project development, funding, public engagement, monitoring, maintenance, and performance tracking. PlanRVA, local governments, state and federal agencies, Tribal partners, nonprofit organizations, landowners, businesses, academic institutions, and community members all have important roles in implementation.

The action lists and Cross-Lens Action Matrix in Table 5 illustrate where common actions are expected to provide primary benefits and where they may provide secondary or co-benefits across other lenses. The matrix is intended to help localities and partners identify multi-benefit opportunities, coordinate implementation efforts, avoid unnecessary environmental impacts, and prioritize projects that advance multiple regional objectives through a single investment.

Co-benefits should be considered during project development but should not be assumed automatically. Actual benefits will depend on project location, design, scale, implementation quality, site conditions, long-term maintenance, and community context. Projects should be evaluated individually to confirm expected benefits, identify potential tradeoffs, and avoid or minimize impacts to sensitive natural and cultural resources.

Where actions also support emissions reduction, air-quality improvement, public health, housing, transportation, or economic-development objectives, PlanRVA and regional partners should coordinate implementation with the

applicable regional plans and programs such as the PlanRVA Air Quality Plan, Comprehensive Economic Development Strategy, Long Range Transportation Plan, and Scenario Planning project.

Cross-Cutting Implementation Principles

- **Prioritize multi-benefit investments.** Favor projects and policies that advance two or more Natural Resources Plan goals while avoiding or minimizing adverse impacts to other natural resources.
- **Use regional data and local knowledge together.** Apply lens maps, local plans, field assessments, watershed and hazard data, community input, Tribal knowledge, and site-specific information when identifying and designing projects.
- **Support local implementation while addressing regional needs.** Respect locality authority and locally adopted priorities while coordinating on issues that cross jurisdictional, watershed, habitat, transportation, floodplain, and infrastructure boundaries.
- **Protect high-value resources before restoration is needed.** Permanent protection of high-quality habitats, forests, wetlands, floodplains, headwaters, working lands, and cultural landscapes can often be more cost-effective than restoring functions after they are lost.
- **Consider access and community vulnerability.** Give appropriate consideration to communities with elevated flood, heat, water-quality, transportation-access, or environmental burdens; limited access to parks, trails, or natural areas; and limited capacity to pursue planning and implementation resources.
- **Plan for long-term stewardship.** Consider ownership, operations, maintenance, monitoring, replacement, and lifecycle costs as part of project development.
- **Use consistent and transparent measures.** Establish shared definitions, baseline conditions, data sources, update schedules, and reporting methods so regional progress can be evaluated over time.
- **Coordinate early across disciplines.** Integrate natural-resource considerations into land use, transportation, capital improvement, hazard mitigation, housing, economic development, public health, utility, parks, and recreation planning before project sites and investments are fully committed.

Near-Term Actions

1. **Provide ongoing technical assistance to localities and partners** for environmental planning, policy development, grant applications, project identification, project design, implementation, monitoring, and long-term stewardship.
2. **Facilitate quarterly coordination, peer learning, and technical training through the Environmental Technical Advisory Committee (EnvTAC).** Priority topics may include habitat connectivity, water quality, flood resilience, working lands, tree canopy, green infrastructure, conservation tools, trail planning, data standards, funding opportunities, and project maintenance.
3. **Strengthen regional coordination with state agencies, neighboring Planning District Commissions, Tribal partners, conservation organizations, watershed groups, academic institutions, agricultural and forestry partners, businesses, and other implementation organizations.**
4. **Develop and maintain a regional pipeline of priority conservation, restoration, resilience, green infrastructure, working-lands, and recreation projects.**
5. **Develop and maintain shared regional data standards, mapping resources, and baseline datasets** for land conservation, habitat connectivity, water quality, flood risk, working lands, trails, and tree canopy.
6. **Support regional outreach and education campaigns** related to watershed stewardship, native plants, tree care, litter prevention, flood preparedness, conservation tools, habitat-friendly land management, sustainable working lands, and the benefits provided by natural systems.
7. **Identify and pursue coordinated funding opportunities** for priority projects, including local, state, federal, utility, philanthropic, private-sector, and other funding sources.
8. **Support local adoption of policies, programs, and capital-planning practices that improve natural-resource outcomes.**
9. **Identify regional and locality-level planning, policy, data, staffing, funding, and implementation-capacity gaps** and target technical assistance, training, partnership development, grant support, and program development to address those needs.

Ongoing and Long-Term Actions

1. **Establish and maintain a process for tracking progress toward Natural Resources Plan goals, actions, projects, and performance measures.**
2. **Periodically update the Natural Resources Plan, lens analyses, and supporting datasets** to reflect new science, changing land-use conditions, updated hazard information, regulatory changes, project results, and emerging regional priorities.
3. **Support integration of Natural Resources Plan priorities into future updates of regional and local plans**, including comprehensive plans, transportation plans, capital improvement programs, hazard mitigation plans, watershed plans, housing plans, economic development strategies, parks and recreation plans, and resilience plans.
4. **Evaluate regional trends related to land conservation, habitat connectivity, water quality, flood risk, recreation access, tree canopy, working-land viability, and other priority indicators** to inform future planning and investment decisions.
5. **Maintain and enhance regional decision-support tools, mapping resources, and geospatial analyses** that support project prioritization, grant applications, capital planning, land-use decision-making, public communication, and policy development.
6. **Support development of long-term operations, maintenance, monitoring, and stewardship strategies** for completed projects, especially green infrastructure, trails, stream restorations, living shorelines, tree plantings, conservation lands, stormwater practices, and other assets requiring ongoing care.
7. **Encourage incorporation of ecosystem services, natural-resource benefits, co-benefits, and lifecycle costs into project evaluation, capital planning, and long-term investment decisions.**
8. **Monitor emerging environmental challenges, regulatory changes, funding opportunities, and best practices** that may affect implementation of the Natural Resources Plan, and share relevant information with localities and partners.

9. **Support development of future regional initiatives and partnerships addressing natural-resource issues that cross jurisdictional boundaries**, including watersheds, habitat corridors, floodplains, greenway and water-trail networks, working-land landscapes, transportation corridors, and tidal or coastal resilience areas.
10. **Facilitate regional information sharing regarding project performance, maintenance practices, funding strategies, policy approaches, and lessons learned** from local and regional implementation efforts.
11. **Support meaningful community and stakeholder engagement in project development and implementation**, including engagement with residents, landowners, neighborhood and community organizations, agricultural and forestry operators, businesses, nonprofit organizations, and other affected interests.

Possible Regional Capacity and Implementation Metrics

The Cross-Cutting section should include measures that track whether the region is building the capacity needed to produce the environmental outcomes identified under the five lenses. These measures should complement the lens-specific outcome metrics.

- Percentage of PlanRVA localities participating in EnvTAC, regional natural-resources coordination, shared data efforts, training, or technical-assistance activities.
- Number of localities and partner organizations receiving technical assistance for environmental planning, policy development, mapping, grant applications, project design, implementation, monitoring, or stewardship.
- Number and percentage of local plans, ordinances, capital improvement programs, transportation plans, hazard mitigation plans, watershed plans, and other adopted plans incorporating Natural Resources Plan priorities.
- Value of public, private, state, federal, utility, philanthropic, and other funding leveraged for priority conservation, restoration, resilience, working-lands, green infrastructure, and recreation projects.
- Number of collaborative projects involving multiple localities, watersheds, agencies, Tribal partners, nonprofit organizations, or other implementation partners.

Table 5. Cross-Lens Action Matrix

Legend

- ✓ **= Primary benefit:** The action is principally intended to advance the lens goal.
- ○ **= Secondary or co-benefit:** The action commonly advances the lens goal when appropriately located and designed.
- ▵ **= Enabling or implementation support:** The action supports planning, coordination, data, funding, or delivery for the lens but does not independently produce a direct resource outcome.

Action	Terrestrial Habitat	Water Quality	Flood Resilience	Working Lands	Recreation & Culture
Targeted BMP implementation, stormwater retrofits, and stream restoration	○	✓	✓	○	○
Integrate BMPs and green infrastructure into transportation, trail, and public-facility projects	○	✓	✓	○	✓
Urban tree canopy expansion and urban forest management	✓	✓	✓	○	✓
Tree preservation, native landscaping, and invasive-species management programs	✓	✓	○	○	○
Soil conservation, nutrient management, and soil-health practices	○	✓	✓	✓	○
Urban agriculture, community gardens, and local food-system initiatives	○	○	○	✓	✓

Action	Terrestrial Habitat	Water Quality	Flood Resilience	Working Lands	Recreation & Culture
Strategic conservation of priority lands through easements, acquisition, AFDs, and related tools	✓	✓	✓	✓	○
Regional Ecosystem Framework and lens-map analysis for project targeting and site selection	△	△	△	△	△
Living shorelines and tidal or riverine shoreline restoration	✓	✓	✓	○	○
Flood, heat, repetitive-loss, pluvial-flood, and vulnerability data used to prioritize resilience investments	○	○	✓	○	○
Green infrastructure expansion, including bioretention, bioswales, permeable surfaces, and urban stormwater retrofits	○	✓	✓	○	✓
Greenway and trail development integrated with green infrastructure, tree canopy, erosion control, and habitat restoration	○	○	○	○	✓
Litter prevention, illegal-dumping reduction, waste reduction, and organics-management initiatives	○	✓	○	○	○
Wastewater treatment, sewer-system, septic-system, and stormwater-system improvements	○	✓	○	○	○
Regional coordination, technical assistance, peer learning, and partner training	△	△	△	△	△

Action	Terrestrial Habitat	Water Quality	Flood Resilience	Working Lands	Recreation & Culture
Lower Chickahominy Watershed Collaborative coordination and implementation	✓	✓	○	○	○
Rivers of the Richmond Region guide, interactive mapping, and recreation-asset information	○	○	○	○	✓
Virginia Water Trails expansion and improved public water access	○	○	○	○	✓
Marine-debris reduction and waterway-cleanup efforts	○	✓	○	○	○

Chapter 7: Conclusion

The Natural Resources Plan provides a regional framework for protecting, restoring, and enhancing the natural systems that support the Richmond region's environmental quality, public health, economic vitality, resilience, and quality of life. Building on PlanRVA's earlier Regional Green Infrastructure Plan, this plan uses updated data, regional analysis, and local priorities to identify natural resource assets and opportunities across five interconnected lenses: Terrestrial Habitat, Water Quality, Flood Resilience, Working Lands, and Recreation and Culture.

A central theme of this plan is that the region's natural resources do not function in isolation. Forests, wetlands, streams, floodplains, agricultural lands, parks, trails, and cultural landscapes are part of an interconnected system. Actions taken to protect one resource often provide benefits across multiple areas. For example, land conservation can support habitat connectivity, protect water quality, reduce flood risk, preserve working lands, and expand opportunities for recreation. Similarly, investments in green infrastructure, stream buffers, tree canopy, living shorelines, and low-impact trail development can help localities meet multiple environmental and community goals through coordinated implementation.

The plan also highlights that the region faces both near-term and long-term pressures. Development patterns, increasing impervious cover, flood risk, changing climate conditions, loss of working lands, habitat fragmentation, and gaps in water quality data all have implications for how the region grows and manages its natural assets. At the same time, these challenges create opportunities to use the plan's maps, the Regional Ecosystem Framework, risk analyses, and implementation actions to better target conservation, restoration, resilience, and public access investments.

This plan is collaborative, iterative, locally informed, and non-regulatory. It provides a shared regional framework for decision support while preserving local authority over land use, capital projects, and implementation priorities. PlanRVA and partners can update the plan, maps, and action priorities over time as new data, locality feedback, funding opportunities, and community needs emerge.

Successful implementation will depend on continued collaboration among local governments, Tribal Nations, state and federal agencies, regional partners, conservation organizations, landowners, the development community, and residents. Many of the actions identified in this plan will be carried out through local comprehensive plans, zoning and development review processes, transportation and capital improvement planning, hazard mitigation planning, watershed planning, parks and recreation planning, land conservation programs, and voluntary stewardship efforts. PlanRVA's role will include supporting regional coordination, providing technical assistance, maintaining decision-support tools, convening partners through forums such as the regional Environmental Technical Advisory Committee and Lower Chickahominy Watershed Collaborative, and helping advance a shared pipeline of priority projects.

This plan is intended to be both a guide for action and a living resource. As new data, funding opportunities, state and federal programs, regulatory requirements, and local priorities emerge, the Natural Resources Plan will be revisited and refined. On-going progress tracking, updated geospatial analyses, and periodic plan updates will help ensure that the region's strategies remain responsive to changing conditions and grounded in the best available information.

By working across jurisdictional boundaries and aligning natural resource priorities with transportation, land use, housing, economic development, hazard mitigation, and infrastructure decisions, the Richmond region can make more effective and lasting investments. Protecting and restoring natural resources is part of the region's practical strategy for building safer communities, healthier watersheds, more connected landscapes, more resilient infrastructure, and greater access to nature for current and future generations.