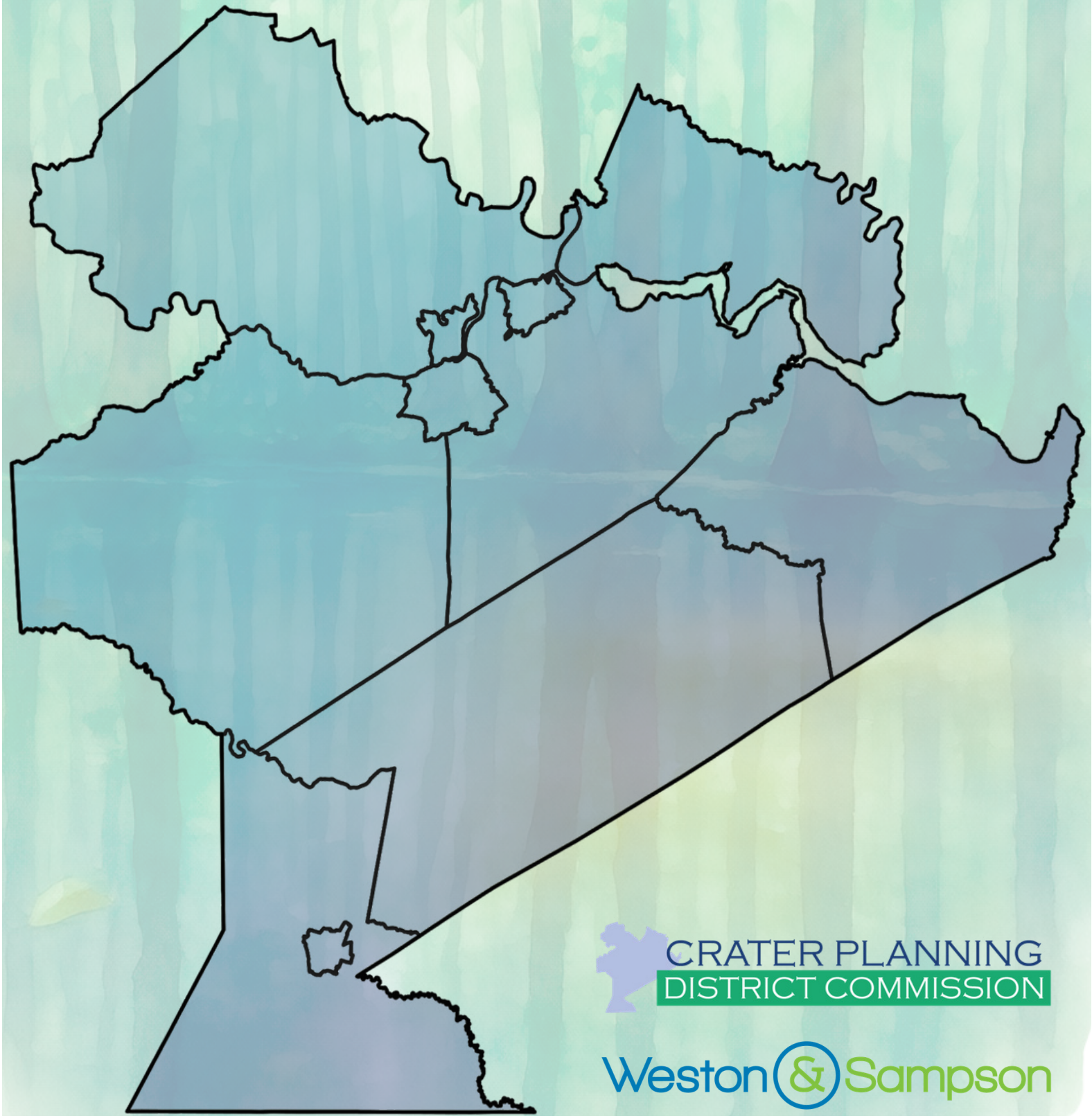
Crater PDC
Regional Resilience Plan

Version 1.0 | September 2026



CRATER PLANNING
DISTRICT COMMISSION

Weston & Sampson

Monument Professional Building
1964 Wakefield Street
Petersburg, VA 23805

CRATER PLANNING DISTRICT COMMISSION

Phone: 804.861.1666
Fax: 804.732.8972
craterpdc.org

County of Charles City
County of Chesterfield
City of Colonial Heights
County of Dinwiddie
City of Emporia
County of Greensville
City of Hopewell
City of Petersburg
County of Prince George
County of Surry
County of Sussex

RESOLUTION FOR ADOPTION OF THECRATER REGIONAL RESILIENCE PLAN

WHEREAS, the Crater Planning District Commission ("CPDC") is the Planning District Commission serving the counties of Charles City, Chesterfield, Dinwiddie, Greensville, Prince George, Surry, Sussex, and the cities of Colonial Heights, Emporia, Hopewell, and Petersburg, known together as Planning District 19; and

WHEREAS, the CPDC developed the Crater Regional Resilience Plan completed in 2026, as a requirement for regional and local governments to apply for and receive funding from the project implementation category of the Virginia Community Flood Preparedness Fund; and

WHEREAS, CPDC staff identified strategies for local governments to improve coordination and capacity insofar as resilience planning and mitigation of natural hazards; and

WHEREAS, CPDC staff conducted a comprehensive vulnerability analysis of regional assets and critical infrastructure to natural hazards including riverine and pluvial flooding, extreme heat, wildfire, tornadoes, as well as social vulnerability; and

WHEREAS, CPDC staff developed a suite of regional and local actions to guide future funding efforts toward programs and projects to address the region's most vulnerable assets, infrastructure, and communities from natural hazards; and

WHEREAS, the Virginia Department of Conservation and Recreation has certified the Crater Regional Resilience Plan fulfills all requirements set forth in the Community Flood Preparedness Fund Round 4 Manual for eligibility to apply and compete for project implementation funding in future grant round; and

NOW, THEREFORE, BE IT RESOLVED by the Crater Planning District Commission that it hereby adopts the Crater Regional Resilience Plan for a period of performance through September 1, 2031.

E. Jay Ellington
Executive Director

September 24, 2026
Date

Mayor Samuel Parham
Chair

September 24, 2026
Date

County of Chesterfield City of Colonial Heights County of Dinwiddie Tri-Cities Area MPO City of Hopewell City of Petersburg County of Prince George

David L. Bulova
Secretary of Natural and Historic Resources

Nikki Rovner
Director

Sarah Spota
Deputy Director

Frank N. Stovall
Deputy Director for Operations

Darryl Glover
Deputy Director for Dam Safety, Floodplain Management and Soil and Water Conservation

Laura Ellis
Deputy Director for Administration and Finance

COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

September 1, 2026

Kit Friedman
Crater Planning District Commission
1964 Wakefield St
Petersburg, VA 23805

RE: Crater PDC Regional Resilience Plan Submission – CFPF

Dear Mx. Friedman,

Thank you for submitting the *Crater PDC Regional Resilience Plan.* After careful review and consideration, the Virginia Department of Conservation and Recreation has deemed the Plan complete, meeting all criteria outlined in the Round 4 Grant Manual. This approval will remain in effect for a period of five years, ending on September 1, 2031.

The following elements were evaluated as part of this review:

Element 1: It is project-based and focused on flood control and resilience.

The *Crater PDC Regional Resilience Plan* includes potential projects for the commission itself as well as for its constituent localities. Crater PDC proposes several studies and planning initiatives such as watershed modeling, creating resilient design standards and supplementing locality GIS expertise. Typical locality projects include expanding river monitoring networks, stormwater improvements, restoring riparian buffers and augmenting storm shelter facilities.

Element 2: It incorporates nature-based infrastructure to the maximum extent possible.

The Plan leans heavily toward nature-based solutions. Floodplain restorations, buffer enhancements, increased urban tree canopy and land preservation figure prominently throughout project lists.

Element 3: It considers all parts of a locality regardless of socioeconomics or race.

The Plan offers a comprehensive contextual analysis of the region and its individual localities. It also examines specific variables that may compound negative impacts in flood-prone areas including poverty, access to green space, food production and availability, mobility and environmental health.

Element 4: Identifies all flooding occurring within locality, not only within SFHAs, and provides repetitive / severe repetitive loss data.

The Plan discusses flood risk at the regional scale due to broad physiographic characteristics, each locality's specific situation within that framework and ultimately narrows to neighborhood scale impacts along specific creeks.

Element 5: If property acquisition and / or relocation guidelines are included, equitable relocation strategies are addressed.

Not applicable at this time but may be considered in the future.

Element 6: Includes a strategy for debris management.

The Plan offers a regional perspective on debris management and suggests specific, actionable methods for localities to enhance their individual debris strategies from proactive pre-disaster maintenance efforts to creating detailed Debris Management Plans for post-disaster readiness.

Element 7: Includes administrative procedures for substantial damage / substantial improvement of structures within the SFHA.

The Plan explains the general screening process for substantial improvement and substantial damage and cites each locality's specific regulations.

Element 8: It includes coordination with other local and inter-jurisdictional projects, plans, and activities and has a clearly articulated timeline or phasing for plan implementation.

The Plan was developed with the guidance of an active steering committee comprised of representatives from all localities, several non-profits and other agencies. It draws from almost two dozen existing planning documents, creating criteria crosswalks to identify gaps, and ultimately melds those plans together into a cohesive resilience-focused plan. Project charts explore timelines and funding sources.

Element 9: Is based on the best available science, and incorporates climate change, sea level rise, storm surge (where appropriate), and current flood maps.

The Plan was created with reputable research and data from several state and federal agencies, including DEQ, DCR, US Census Bureau, FEMA, ASCE and NOAA.

DCR looks forward to working with Crater PDC to build more resilient communities. If you have questions or need additional assistance, please contact us at cfpf@dcr.virginia.gov. Again, thank you for your interest in the Community Flood Preparedness Fund and your participation in this program.

Sincerely,



Stacey Farinholt, CFM PLA
Acting State NFIP Coordinator

cc: Angela Davis, DCR
Leanne Petroziello, DCR

ACKNOWLEDGEMENTS

During the development of the Crater PDC Regional Resilience Plan, numerous local government staff, regional partners, state agencies, nonprofit organizations, tribal representatives, and technical experts contributed valuable knowledge, insight, and feedback. Their participation helped inform the regional vulnerability assessment, resilience strategies, and implementation actions included throughout the plan.

Crater Planning District Commission (Crater PDC)

E. Jay Ellington, Executive Director
Andrew Franzyshen, Director of Environment, Economic Development, & Housing
Kit Friedman, Environment & Resilience Planner

Member Localities

City of Colonial Heights
Prarthana Rao, Assistant Director of Planning
Wayne Leftwich, Director of Planning and Community Development

City of Petersburg
Darryl Walker, Stormwater Program Manager
Jared Crews, Director of Planning
Luke Peters, Floodplain Administrator
Janine Lester, City Arborist

City of Hopewell
Kelly Davis, Deputy Director of Development
Chris Ward, Director of Planning & Development
Josh Sementelli, Stormwater Program Manager
Noah Peterson, GIS/Stormwater Management Coordinator

City of Emporia
Melvin Prince, Director of Public Utilities
Beverly Walkup, Interim Director of Planning & Zoning (former)
Tyler Park, Director of Planning & Zoning (current)
Michael Rae, Emergency Service and Risk Management Coordinator

Charles City County
Gary Mitchell, Community Development Director (former)
Lynette Strother, GIS & Website Administrator

Chesterfield County
Summer Hobson, Principal Planner
Brett Meadows, Senior Planning - Comprehensive Planning
Jessica Robison, Fire Emergency Management Coordinator

Dinwiddie County
Mark Bassett, Director of Planning
Matt Culbreath, Assistant Director of Planning

Greensville County
Lin Pope, Director of Planning

Prince George County
Jack Greenstein, Planner
Angela Blount, Environmental Program Coordinator

Surry County
Darius Savedge, Senior Planner, Planning & Community Development
Horace Wade, Director of Planning & Community Development
Haley Keene, Senior Planner, Planning & Community Development (former)

Sussex County
Beverly Walkup, Director of Planning & Zoning
David Conmy, Deputy County Administrator / Economic Development Director (former)

Tribal Representative - Chickahominy Tribe
Dana Adkins, Environmental Director

Partner Organizations

Wetlands Watch
Genevieve Guerry, Flood Risk Project Staff

Virginia Department of Health / Crater Health District
Toinette Waldon, Environmental Health Manager

Virginia Department of Forestry
Meghan Mulroy-Goldman, Watershed Stewardship Specialist
Caleb Rivera, Community Forestry Specialist

Virginia Department of Environmental Quality
Elise Frazier, Coastal Planner, Coastal Zone Management

Friends of the Lower Appomattox River (FOLAR)
Heather Barrar, Regional Trails Program Director (former)
Elise Neuscheler, Environmental Stewardship Coordinator & Visual Communication Specialist

Plan RVA (Richmond Regional Planning District Commission)
Mark Bittner, Director of Data & Technology
Nicole Keller, Resilience Planner

Timmons Group
Aislinn Creel, Senior Project Manager

Weston & Sampson
The Crater PDC Regional Resilience Plan was prepared by Weston & Sampson, whose team provided technical expertise, stakeholder engagement, data analysis, facilitation, and planning support throughout the development of the plan.

Robin Seidel, AIA, Resilience Practice Leader and Technical Reviewer
Bella Purdy, AICP, Resilience Team Leader
Erin Mehard, AICP, Resilience Planner
Erin Herock, AICP, Resilience Planner
Elizabeth Suffa, AICP, WEDG, Resilience Planner
Brett Grunert, PE, Engagement Support
Julia MacNelly, Engagement Support
Gabrielle Carpenter, Graphic Design Support
Sophia Espie, Graphic Design Support

Special Thanks

The Project Team extends its appreciation to all stakeholders, community members, and partner organizations that contributed their time, expertise, and local knowledge during the planning process. Their input helped shape the regional vision, identify resilience priorities, and develop actions that support a more resilient future for the Crater region.

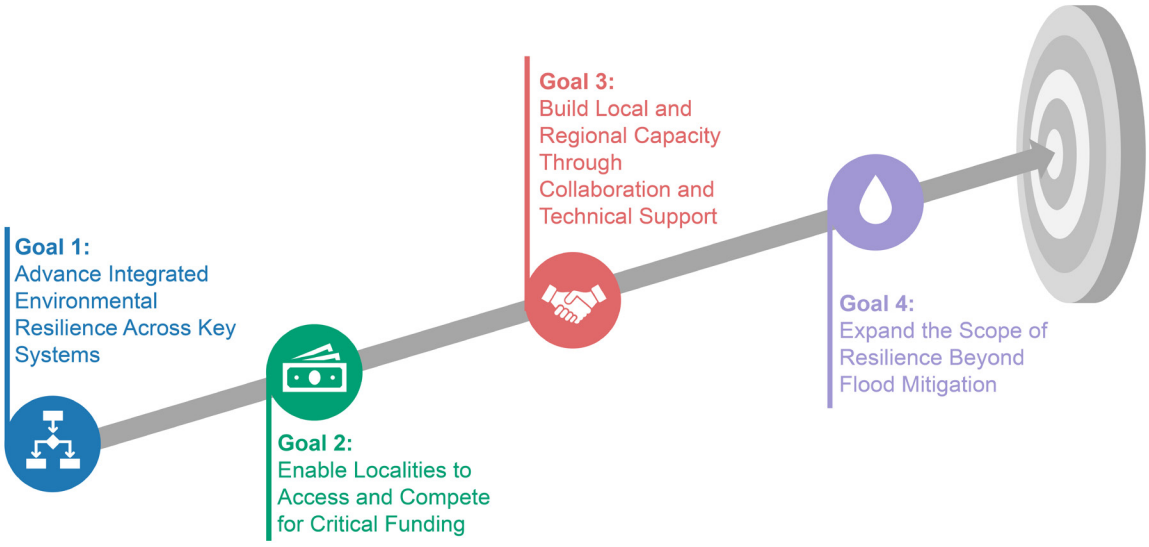
EXECUTIVE SUMMARY

The Crater PDC Regional Resilience Plan (referred to as the "Resilience Plan") establishes a shared framework for strengthening resilience across the eleven localities of the Crater Planning District Commission (Crater PDC): Charles City County, Chesterfield County, Colonial Heights, Dinwiddie County, Emporia, Greensville County, Hopewell, Petersburg, Prince George County, Surry County, and Sussex County. Developed with support from the Virginia Department of Conservation and Recreation, this Resilience Plan was funded through the Community Flood Preparedness Fund (CFPF). The Resilience Plan advances a coordinated, multi-hazard approach to reducing risk, building local capacity, and positioning communities to pursue future resilience and flood mitigation funding opportunities. The Resilience Plan was approved by the Virginia Department of Conservation and Recreation (DCR) for a five-year period of performance through September 2031.

The Resilience Plan intentionally looks beyond flooding alone. It evaluates riverine, coastal, and rainfall-driven flooding alongside other climate and environmental stressors, including extreme heat, severe storms, tornadoes and wind, and winter and ice storms. This broader approach reflects the interconnected nature of resilience in the Crater region, where aging infrastructure, changing precipitation patterns, low-lying river corridors, transportation dependencies, socioeconomic vulnerabilities, and uneven access to planning resources can compound risk across jurisdictional boundaries.

The planning process was shaped by extensive coordination with a regional steering committee composed of representatives from the Crater PDC's member localities, the Chickahominy Tribe, state and regional agencies, nonprofit partners, and technical experts. Through workshops, surveys, technical review, and discussion, committee members helped define aspects of the Resilience Plan to reflect both shared regional priorities and the distinct conditions, assets, and implementation challenges of individual localities.

Four goals guide the Resilience Plan:



These goals listed emphasize multi-benefit solutions, including nature-based infrastructure, watershed health, equitable access to resources and technical assistance, and resiliency strategies that connect efforts related to land use, transportation, public health, economic development, and environmental stewardship.

The Resilience Plan is regional in focus and advances several components. This includes a capacity building roadmap, regional vulnerability assessment, regional action framework, debris management strategy, and plan maintenance approach, while also including separate Resilience Plan chapters for each of the eleven localities. While each component serves a distinct purpose, together they provide a practical pathway for moving from assessment to implementation.

There are several components of the Resilience Plan:



The capacity building roadmap identifies institutional and technical needs and outlines actions to improve regional and local capacity.



The vulnerability assessment evaluates the exposure of community assets and populations to current and future hazards.



The regional and locality actions translate findings into implementable projects and policies.



The locality-specific chapters tailor resilience priorities to local risks, assets, and implementation needs



The debris management strategy supports preparedness and response coordination through suggested debris management guidelines.



The maintenance approach establishes a process for keeping the plan relevant over time.

Implementation of the Crater PDC Regional Resilience Plan will require sustained coordination among local governments, regional partners, state agencies, nonprofits, and community organizations. The Resilience Plan positions Crater PDC to support its member localities by coordinating regional initiatives, developing shared tools and data resources, supporting funding applications, and helping smaller or under-resourced localities advance resilience projects that may otherwise be difficult to implement independently. The Resilience Plan will be updated through two annual update cycles during its five-year planning horizon. By aligning local priorities with regional capacity, the Resilience Plan provides a foundation for equitable and coordinated resilience investment across the region.

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1.0 PLANNING APPROACH

1.1. Introduction

The Crater PDC Regional Resilience Plan (referred to as the "Resilience Plan") establishes a shared framework for strengthening resilience across the eleven localities of the Crater Planning District Commission (Crater PDC). The Resilience Plan was developed by a Project Team comprised of Crater PDC and Weston & Sampson, with guidance and support from a Steering Committee representing the region's localities and partner organizations. This effort marks a significant step toward enhancing the region's capacity to prepare for, withstand, and recover from environmental and climate-related challenges.

In Spring 2024, Crater PDC was awarded a Capacity Building and Resilience Planning Grant in Round 4 of the Commonwealth's Community Flood Preparedness Fund (CFPF). The CFPF, administered by the Virginia Department of Conservation and Recreation (DCR), provides grants to support local and regional projects that reduce flood risk and improve resilience to climate-driven flooding. This funding supports the development of comprehensive and inclusive local or regional strategies to address both present and future resilience needs.

While the CFPF is focused on resilience to flooding, the Resilience Plan is taking a multi-hazard approach to planning for the future. The Resilience Plan includes an assessment of extreme heat, tornadoes and wind, winter and ice storms, and coastal, riverine, and rainfall-driven flooding. Additionally, the plan centers the equitable distribution of resources for resilience planning throughout the region. The Crater region has experienced uneven distribution of environmental funding, technical support, and planning resources due to the region's divide between the Chesapeake Bay Watershed and the Chowan Basin, combined with local-level capacity challenges. Recognizing this disparity, the Resilience Plan aims to provide equitable representation and support to all localities, regardless of size, capacity, or access to past investments. The planning process emphasizes collaboration, transparency, and locality engagement to create a plan that reflects shared regional priorities while also addressing the distinct needs of each locality.

The steering committee, made up of representatives from all eleven localities and Crater-PDC-identified regional experts, guided development of the Resilience Plan by making sure the findings and strategies are practical and locally informed. The committee first convened alongside the Crater Region Environmental Stewardship Team (CREST) quarterly meeting and participated in a kick-off meeting plus four planning workshops. Throughout the process, the committee reviewed materials related to capacity building, climate vulnerability, and proposed actions.

The main components of the Resilience Plan include technical findings from a policy analysis crosswalk, a capacity building roadmap, and a vulnerability assessment. The Resilience Plan

culminated with the development of actions informed by technical findings and stakeholder-guided insights generated during this planning process. Priority actions include details, such as timelines, champions, and high-level cost assumptions to aid in implementation.

Adoption of the Resilience Plan establishes a shared regional framework for advancing resilience across the Crater region. By providing a roadmap for local implementation, strengthening regional coordination, and aligning with DCR and CFPF priorities, the plan positions the region to pursue future funding opportunities and implement resilience initiatives more effectively. In doing so, the plan serves as both a roadmap and a catalyst for action, guiding future investments, informing policy decisions, and strengthening the region's long-term resilience to climate risks, flooding, and other environmental stressors.

This plan refers to **resilience** as the capacity to anticipate, prepare for, respond to, and recover from hazards and other disruptions while minimizing adverse impacts to social well-being, public health, the economy, and the environment.

(Adapted from the Virginia Department of Conservation and Recreation's definition of flood resilience).

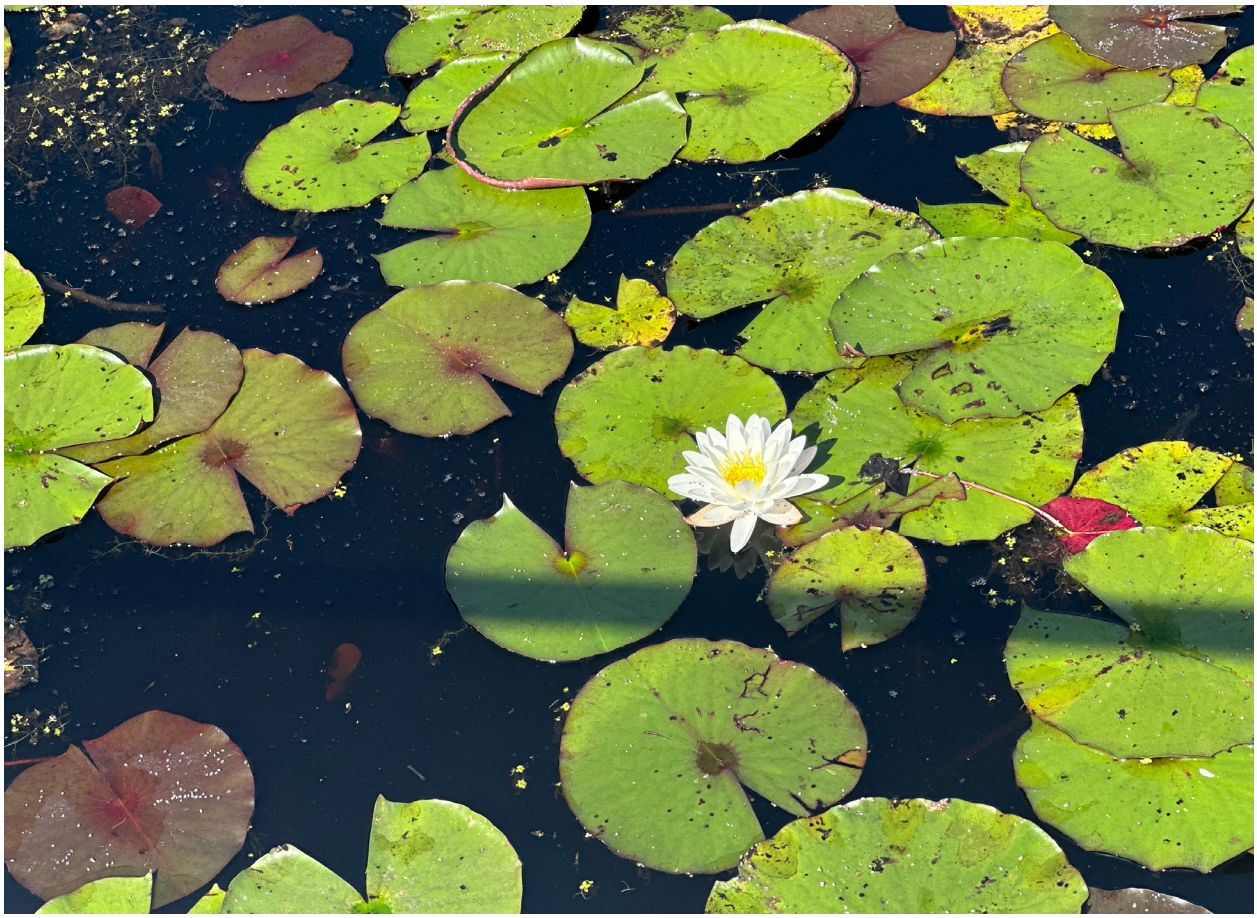


Photo 1.1 Airfield A-H Conference Center in Wakefield, Virginia, Kit Friedman

1.2. Vision and Goals

As a part of the visioning process during the first workshop, steering committee members helped develop a regional vision statement. This incorporated themes of collaboration and engagement across all of Crater PDC's constituencies and ultimately advance resilience in the region.

The vision statement for the Crater region is the following:

> ***We envision a collaborative and well-planned Crater region where localities share data, resources, and expertise to strengthen community health, advance environmental justice, and build resilient, connected, and prepared communities for the future.***

As a part of the Resilience Plan, localities also developed their own vision statement, shared in their respective section under Chapter 8 Locality Resilience Plans.

There are four overall goals of the Crater PDC Regional Resilience Plan. These are shared in Figure 1.1.

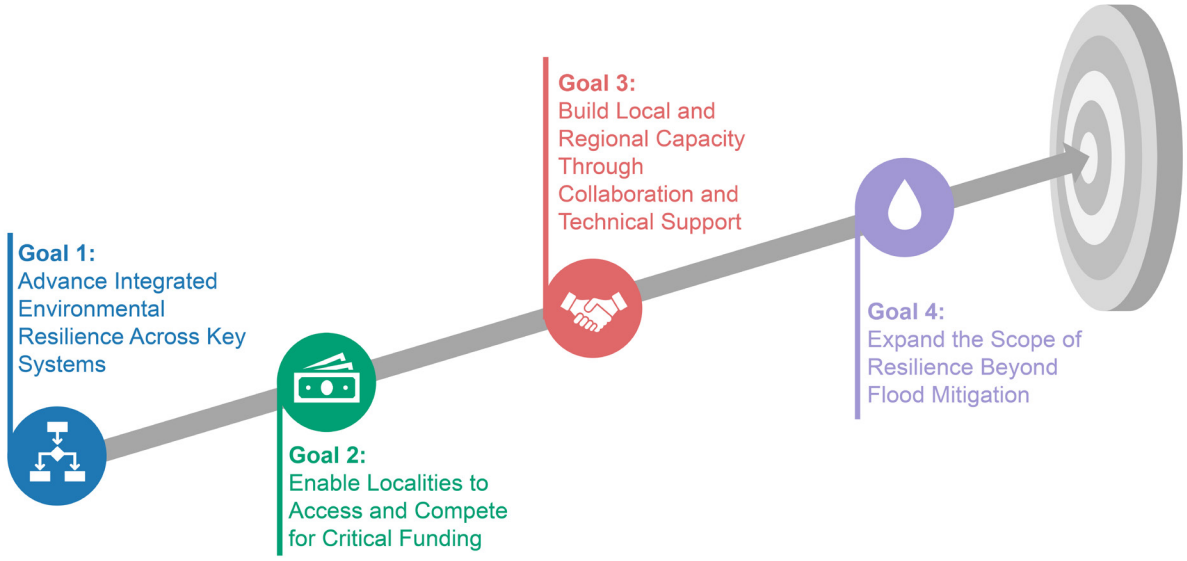


Figure 1.1 Goals for the Crater PDC Regional Resilience Plan

Goal 1: Advance Integrated Environmental Resilience Across Key Systems

Develop and implement strategies that holistically address flood resilience, water quality, erosion and sediment control, air quality, wetland preservation, environmental justice, and climate change mitigation. This includes:

- Identifying regionally significant vulnerabilities and environmental stressors.
- Prioritizing nature-based and infrastructure solutions to reduce flood risk and improve watershed health.

- Supporting policies and practices that reduce pollution, protect sensitive ecosystems, and improve long-term environmental outcomes.
- Promoting equitable resilience by ensuring underserved and vulnerable communities benefit from mitigation and adaptation actions.
- Aligning local and regional actions with state and federal climate and environmental goals.

Goal 2: Enable Localities to Access and Compete for Critical Funding

Provide Crater PDC's 11 member localities with tailored, actionable recommendations that strengthen their ability to secure state and federal funding. This includes:

- Developing project pipelines aligned with funding program requirements.
- Offering locality-specific data, mapping, and planning tools to support grant applications.
- Identifying matching fund strategies and partnership opportunities to improve competitiveness.
- Making scalable and adaptable strategies to varying local conditions, resources, and priorities.

Goal 3: Build Local and Regional Capacity Through Collaboration and Technical Support

Strengthen institutional capacity and foster durable regional partnerships to support long-term resilience implementation, particularly for smaller or under-resourced localities. This includes:

- Providing technical assistance, shared services, and planning templates that reduce the burden on individual jurisdictions.
- Facilitating regional coordination among local governments, state agencies, nonprofits, and academic partners.
- Establishing mechanisms for knowledge sharing, data exchange, and best practices across the region.
- Enhancing staff capacity through training, tools, and ongoing support to sustain resilience efforts beyond plan adoption.

Goal 4: Expand the Scope of Resilience Beyond Flood Mitigation

Move beyond a singular focus on flood control to address interconnected environmental and climate challenges impacting the region's long-term resilience. This includes:

- Integrating land use planning, transportation, public health, economic development, and environmental stewardship into resilience strategies.
- Addressing climate risks such as flooding, extreme heat, wildfire risks, and severe storms.
- Promoting multi-benefit projects that simultaneously improve infrastructure, environmental quality, and community well-being.
- Encouraging proactive, forward-looking planning that considers future climate conditions and cumulative impacts rather than solely historical risks.

1.3. Planning Framework

The Crater PDC Regional Resilience Plan framework used an incremental approach that began by meeting each locality where it was in terms of capacity, risk, and resources, then built toward the development of resilience strategies. The Resilience Plan has a useful life of five years, consistent with the DCR approval period, while the vulnerability assessment incorporates near-term future planning horizons where applicable to inform resilience actions. This vulnerability assessment is described in Chapter 6: Regional Vulnerability Assessment and Appendix B. Vulnerability Assessment Methodology and Scoring Framework. While the Resilience Plan is approved for a five-year period, many of its core strategies, foundational analyses, and ongoing actions are intended to extend into a broader ten-year planning framework, with periodic updates that allows the plan to remain relevant and responsive to changing conditions.

The planning process integrated several key methodological components:

- Regional coordination and assessment, including facilitated workshops to identify institutional strengths, gaps, and resource needs across localities;
- Localized data analysis, combining regional datasets with community specific information to assess vulnerabilities related to infrastructure, natural systems, and populations;
- Alignment of local priorities with regional capacity, developing strategies that are actionable at the local level while benefiting from regional coordination and economies of scale;
- Emphasis on co-benefits, particularly where resilience strategies also support conservation, preservation, economic stability, and public health.



Figure 1.2 Planning Framework for the Crater PDC Regional Resilience Plan

1.4. Steering Committee Participation

Crater PDC convened a steering committee of local, regional, and state partners to help shape the Resilience Plan's goals, metrics, and implementation strategies. Table 1.1 lists committee members and their affiliations.

Table 1.1: Steering Committee Member Names

	Entity	Member(s) Name
LOCALITIES	**City of Petersburg**	Darryl Walker, Jared Crews, Luke Peters, Janine Lester
	City of Colonial Heights	Prarthana Rao, Wayne Leftwich
	City of Hopewell	Kelly Davis, Chris Ward, Josh Sementelli, Noah Peterson
	City of Emporia	Melvin Prince, Beverly Walkup (former), Michael Rae, Tyler Park
	Chesterfield County	Summer Hobson, Brett Meadows, Jessica Robison
	Prince George County	Jack Greenstein, Bob Baldwin, Angela Blount
	Dinwiddie County	Mark Bassett, Matt Culbreath
	Sussex County	Beverly Walkup (current), David Conmy (former)
	Surry County	Darius Savedge, Horace Wade, Haley Keene
	Greensville County	Lin Pope, Gary Cifers
	Charles City County	Lynette Strother, Gary Mitchell (former)
SOVEREIGN NATION	**Chickahominy Tribe**	Dana Adkins
ORGANIZATIONS	**Wetlands Watch**	Genevieve Guerry
	Virginia Department of Health / Crater Health District	Toinette Waldon
	Virginia Department of Environmental Quality (CZM)	Elise Frazier
	Virginia Department of Forestry	Meghan Mulroy-Goldman, Caleb Rivera
	Friends of the Lower Appomattox River (FOLAR)	Heather Barrar, Elise Neuscheler
	PlanRVA (Richmond Regional Planning District Commission)	Mark Bittner, Nicole Keller
	Timmons Group	Aislinn Creel

The Steering Committee convened at multiple key points throughout the resilience planning process, with meetings held at the Crater PDC office in Petersburg or virtually. These meetings served as critical milestones for reviewing progress, providing technical input, and guiding decision-making. Committee members contributed local expertise and helped refine priorities. The recurring meetings also fostered collaboration among jurisdictions and stakeholders, strengthening alignment on shared resilience goals and implementation strategies.



Figure 1.3: Overview of Steering Committee Workshop Timing

For more information on Steering Committee engagement and a summary of the dedicated workshops conducted throughout the planning process, see Chapter 5: Steering Committee Workshops. Detailed workshop materials, participant feedback, and workshop findings are provided in Appendix A: Stakeholder Engagement Strategy.

2.0 REGIONAL PROFILE AND CHARACTERISTICS

This regional profile and characteristics chapter establishes a shared understanding of the environmental systems, economic structure, infrastructure networks, and development patterns that define the Crater region. It identifies cross-jurisdictional dynamics that influence resilience, infrastructure investment, and economic competitiveness, and provides a foundation for coordinated planning and decision-making. The findings presented in this section directly inform subsequent plan elements, including the identification of relevant policies, critical assets, and resilience strategies. While this section focuses on regional-scale conditions, each locality has its own distinct characteristics, assets, and challenges. Detailed locality-specific profiles are provided in Chapter 8. Locality Resilience Plans to support place-based planning and implementation.

2.1. Introduction

The Crater region encompasses a diverse region in south-central Virginia, consisting of eleven member jurisdictions, including the counties of Charles City, Chesterfield, Dinwiddie, Greensville, Prince George, Surry, and Sussex, and the cities of Colonial Heights, Emporia, Hopewell, and Petersburg. The region includes approximately 2,493 square miles and serves as a critical connector between the Richmond metropolitan area and Hampton Roads, positioning it as a strategic hub within the broader Mid-Atlantic region (Crater PDC, 2023). The region includes both urban and rural landscapes, with the Tri-Cities area (Petersburg, Hopewell, and Colonial Heights) serving as a central urban core, surrounded by largely rural counties characterized by agricultural and forested land uses. Independent cities function administratively separate from surrounding counties, contributing to a complex governance structure that requires regional coordination (Crater PDC, 2023).



Figure 2.1 Crater Region Localities

2.2. Regional Context and Setting

2.2.1 Historic Background

The Crater region's history reflects a long and layered evolution shaped by Indigenous communities, early colonial settlement, and the development of river-based commerce. Prior to European colonization, the region was home to several Indigenous groups, including the Chickahominy, Monacan, and Cheroenhaka/Nottoway peoples, whose presence continues to influence the region today. Early European settlement in the 17th century was closely tied to the James and Appomattox Rivers, which served as critical corridors for transportation and trade. Communities such as Petersburg and City Point (now part of Hopewell) emerged as important centers of commerce, with Petersburg developing into a major port, manufacturing hub, and rail center by the 19th century.

In the 20th century, the region transitioned from an agrarian and industrial economy to one shaped by manufacturing, military investment, and suburban growth. Hopewell became a center for chemical production, while the establishment and expansion of Fort Lee and other military facilities reinforced the region's role in national defense and logistics. At the same time, suburbanization and shifting economic patterns led to new retail and employment centers, particularly outside of historic urban cores, while some older industrial areas experienced decline.

2.2.2 Regional Identity and Development Patterns

The Crater region's development patterns today are strongly influenced by its strategic location within a broader network of regional and national transportation systems. Positioned between the Richmond metropolitan area and Hampton Roads, the region functions as a critical connector for the movement of goods, people, and services.

The region reflects a diverse mix of urban, suburban, and rural development patterns. The Tri-Cities area (Petersburg, Hopewell, and Colonial Heights) serves as the primary urban cluster, concentrating employment, services, and infrastructure. Surrounding counties exhibit a range of development conditions, from suburbanizing areas influenced by proximity to Richmond to predominantly rural landscapes characterized by agriculture, forestland, and low-density settlement.



Photo 2.1 Tri-Cities Area Development Pattern, Google Earth

Development patterns vary considerably by geography. The northern localities near Richmond, particularly Chesterfield and Prince George Counties, have seen robust residential and commercial growth. More rural jurisdictions continue to face disinvestment, vacancy, and constrained development capacity. Regional housing costs are below statewide averages, with the Crater-wide median home value of $183,991 sitting at less than two-thirds of Virginia's $295,500, though affordability remains a challenge relative to local income levels. The Comprehensive Economic Development Strategy identified a Regional Housing Study as a near-term priority to assess these conditions from a regional perspective and lay the foundation for future housing strategies (Crater PDC, 2023). This study is underway and projected for completion by the end of 2026.

Current growth trends are largely corridor-driven, with commercial and industrial development concentrated along major transportation routes, while rural areas continue to experience slower growth and emphasize land conservation and resource-based uses. At the same time, key regional anchors, including Fort Lee, industrial parks, and distribution centers, continue to shape land use patterns, employment concentrations, and infrastructure demand.

2.3. Environmental and Natural Systems

2.3.1 Physiography and Natural Features

The Crater region straddles the Fall Line, the geological boundary where the rocky Southern Piedmont gives way to the flat Atlantic Coastal Plain. This transition shapes much of the region's character. The cities of Petersburg and Emporia sit near the Fall Line itself, where the Appomattox and Meherrin Rivers become unnavigable (Plan RVA; Crater PDC, 2022). Elevations across the region drop from roughly 400 feet in the west to near sea level in the east (Crater PDC, 2023).

Rivers are central to the region's identity and ecology. The area drains through three major watersheds: the James, Appomattox, and Chowan. The Appomattox River bisects Petersburg and Colonial Heights, and Hopewell sits at its confluence with the James. Additional rivers, including the Nottoway, Meherrin, Blackwater, and Chickahominy, shape drainage patterns across the broader region (Crater PDC, 2023) (Plan RVA; Crater PDC, 2022).

Beyond the river corridors, the region supports a rich array of ecological communities, including Bald Cypress–Tupelo Swamps, Coastal Plain Floodplain Forests, and Tidal Freshwater habitats (Plan RVA; Crater PDC, 2022). Rural land is dominated by agriculture, primarily soybeans, wheat, corn, and cotton, while significant natural assets include Pocahontas State Park, Chippokes State Park, and the James River National Wildlife Refuge (Crater PDC, 2023).

2.3.2 Natural Resource Assets and Constraints

The region's wetlands, floodplains, and river corridors provide a range of essential ecosystem services, storing floodwaters, filtering pollutants, controlling erosion, and supporting wildlife habitat. These natural systems also support biodiversity: the area is home to several state and federally threatened or endangered species, including the Atlantic Sturgeon, James Spinymussel, and Red-cockaded Woodpecker. Designated natural area preserves, such as Cherry Orchard Bog in Prince George County, and Dendron Swamp and Chub Sandhill in Sussex County, provide

additional protection for rare plant communities (Plan RVA; Crater PDC, 2022).

Parks and greenspace are notable regional assets as well. Hopewell and Petersburg both have relatively generous park acreage for cities of their size, and organizations across the region partner with the Crater PDC and local governments on trail and greenspace projects that span municipal boundaries. River corridors like the Appomattox River Trail serve dual purposes, supporting riparian ecology while providing recreational opportunities for residents.

At the same time, several constraints limit how fully the region can benefit from its natural systems. Low-lying floodplains restrict where development can safely occur, and some communities rely on aging water and groundwater infrastructure that is increasingly vulnerable to both flooding and drought. The Resilience Adaptation Feasibility Tool (RAFT) Report also flags a longer-term concern: competition over water supply from the Appomattox River, as larger and wealthier neighboring jurisdictions potentially seek to acquire regional water system control, an outcome that could disadvantage the region's smaller, lower-income cities. Access is another barrier; transportation gaps and limited public awareness reduce residents' ability to reach and benefit from natural amenities, a disparity felt most acutely by lower-income and minority communities (University of Virginia Institute for Engagement & Negotiation, 2022).

2.3.3 Environmental Challenges and Opportunities

The Crater region faces a compounding and intensifying hazard landscape driven by its physical geography and changing climate. Flooding is the highest-priority risk, with the region's river corridors, aging stormwater systems, and low-lying urban areas regularly experiencing infrastructure damage, road closures, and boil-water advisories. Rising temperatures, more intense precipitation events, and increasing tidal influence along the James and Appomattox Rivers are expected to worsen these conditions over time, placing greater stress on systems



Photo 2.2. The Appomattox River is a large natural asset in the Crater region. Kit Friedman

already operating near or beyond capacity. These trends underscore the need for a coordinated climate resilience strategy that integrates land use planning, infrastructure investment, and hazard mitigation to reduce long-term vulnerability rather than relying on reactive, site-specific solutions. The urban heat island effect compounds these challenges in low-income neighborhoods that have the least capacity to adapt (Plan RVA; Crater PDC, 2022). Targeted interventions, such as urban tree canopy expansion, cool roofing, and equitable access to green space, will be critical to mitigating heat impacts while advancing broader resilience and public health goals.

At the same time, the region's rivers, parks, trails, and open space represent an underutilized economic, quality-of-life, and resilience asset. The Appomattox River Trail Greenway and Blueway, the Fall Line Trail, and the Capital Trail collectively offer a growing network of recreational infrastructure that can support outdoor tourism, active transportation, and community health (Crater PDC, 2023). When designed and managed intentionally, these assets can also function as green infrastructure, absorbing floodwaters, reducing heat, and enhancing ecological function, thereby serving a dual role in both economic development and climate adaptation Expanding public awareness, improving access for underserved communities, and investing in agritourism in the region's rural counties represent near-term opportunities to generate economic activity from natural assets that are already in place. Aligning these investments with resilience objectives can help ensure that economic gains are durable and that communities are better equipped to withstand future climate-related disruptions.



Figure 2.2 Key river trail corridors in the Crater region.

2.4. Economic and Industry Profile

2.4.1 Regional Economic Structure

The Crater region's economy has undergone significant transformation over the past century. Since its inception, the agricultural economy has given way to manufacturing and logistics industries. The region's historical roots in chemical manufacturing and industrial production, laid the groundwork for today's advanced manufacturing and pharmaceutical clusters. As of the 2022 American Community Survey, the Crater District has a total population of 556,840 residents across 217,220 households, representing 12% growth since 2012, compared to 6% statewide, though this growth is heavily concentrated in Chesterfield and Prince George Counties, while several rural localities have seen modest population decline (Crater PDC, 2023).

Government employment continues to anchor the regional economy. The three largest sectors by employment are Health Care and Social Assistance (30,145 workers), Retail Trade (27,674), and

Accommodation and Food Services (18,666). However, the sectors with the highest concentration relative to the national average are Transportation and Warehousing (location quotient of 1.64), Utilities (1.62), and Public Administration (1.48), reflecting the region's distinctive role as a logistics and government employment center. The largest employers include the Chesterfield County School Board, U.S. Department of Defense, Amazon Fulfillment Services, Walmart, Bon Secours Health System, UPS, DuPont Specialty Products, and Food Lion, among others (Crater PDC, 2023).

A persistent structural challenge is the region's role as a net exporter of labor. As of Q3 2023, 95,713 workers commute into the Crater region, while 141,149 residents commute out, a net outflow of 45,436 workers, effectively making the district a "bedroom community" for surrounding metropolitan areas, primarily Richmond (Crater CEDS, 2023–2028). The region's median household income of $59,552 falls well below the Richmond MSA median of $74,151, and fiscal stress is concentrated in several cities: Petersburg has the highest share of cost-burdened households at 41.4%, followed by Emporia at 36.2% (Crater PDC, 2023).

2.4.2 Regional Economic Drivers and Competitive Advantages

The Crater region's most fundamental competitive advantage is its transportation infrastructure. The CEDS describes the district's location and transportation network as "key assets and the centerpiece of the logistics industry," with Interstates 95 and 85 bisecting the district, I-295 and Route 288 providing linkages to I-64, and Routes 460, 58, and 10 offering east-west connections to the Port of Virginia (Crater PDC, 2023). The Norfolk Southern and CSX rail lines both traverse the district and converge in Petersburg, with major investments positioning Petersburg's Collier Yard as a key East Coast intermodal hub (Crater PDC, 2023).These major industrial sites and research institutions contribute to resilience by promoting innovation, supply chain flexibility, and economic diversification.

The region also benefits from strong industrial assets, including two mega-sites (MAMaC and the Sussex Mega Site), research partnerships through CCAM and CCALS, and the economic presence of Fort Gregg-Adams. (Crater PDC, 2023), (James H. Lambert, 2021). Despite these advantages, the CEDS is candid about the region's structural vulnerabilities. Workforce size, skills, and outmigration are identified as primary threats, alongside insufficient utility infrastructure, including gaps in electric, water/sewer, and natural gas access, that limit the competitiveness of available development sites (Crater PDC, 2023). These vulnerabilities can reduce regional resilience by limiting the region's capacity to prepare for and recover from disruptions.

2.4.3 Economic Challenges and Opportunities

Despite meaningful economic assets, the region faces persistent structural vulnerabilities. The Crater District functions largely as a net exporter of labor, with over 45,000 more residents commuting out than workers commuting in, reflecting a mismatch between local employment opportunities and the skills and income expectations of the resident workforce. Median household incomes fall well below the Richmond MSA average, and several cities, particularly Petersburg and Emporia, carry high rates of cost-burdened households and concentrated poverty. These socioeconomic conditions also heighten climate vulnerability, as lower-income households often have fewer resources to prepare for, respond to, and recover from climate-related shocks such as

flooding, extreme heat, and utility disruptions. The region's workforce pipeline is constrained by underperforming K-12 schools, a shrinking and aging population in rural areas, and outmigration of young professionals, creating a structural challenge for industries seeking to grow and recruit locally (Crater PDC, 2023). From a resilience perspective, these demographic and workforce trends limit the region's adaptive capacity, reducing the availability of skilled labor needed to design, build, and maintain more resilient infrastructure systems.

The region is well positioned, however, to build on an emerging foundation in advanced manufacturing and logistics. The designation of the Richmond-Petersburg MSA as a federal Tech Hub in pharmaceutical manufacturing in 2023 brings national visibility and access to significant implementation funding, with the region's established chemical manufacturing base, multimodal freight infrastructure, and proximity to research institutions creating a credible platform for sustained cluster growth (Alliance for Building Better Medicine, 2023). Warehousing and distribution activity continues to expand along major corridors, and the region's two mega-sites offer large-footprint development opportunities that are increasingly rare in the broader Mid-Atlantic market. At the same time, these sectors must contend with increasing climate risks, including supply chain disruptions, flooding of key transportation corridors, and energy reliability challenges, which underscore the importance of integrating resilience into economic development strategies. Coordinated investment in utility infrastructure, workforce development, and site readiness will be critical to converting this momentum into durable, higher-wage employment (Crater PDC, 2023). Embedding climate resilience into these investments, such as hardening infrastructure, diversifying energy sources, and aligning workforce training with climate resilient jobs and skills, can help ensure that economic growth is both competitive and capable of withstanding future climate stressors.

2.5. Transportation and Infrastructure

2.5.1 Regional Transportation Network

The Crater region's transportation network is one of its defining economic assets, anchored by an extensive highway system that provides critical national and regional connectivity. Interstates 95 and 85 bisect the region along north-south and east-west axes respectively, while I-295 provides a parallel bypass corridor around Petersburg and Richmond. Major U.S. routes, including Routes 460, 58, and 10, provide vital east-west linkages to the growing Port of Virginia, enhancing the region's role as a Mid-Atlantic logistics hub.



Photo 2.3 Intersection of Interstate-95 and Wagner Road, Google Earth

Rail infrastructure is equally central to the region's freight economy. Norfolk Southern and CSX operate lines throughout the Crater District, and two landmark multi-state rail modernization projects have significantly enhanced the region's long-haul freight capabilities. Norfolk Southern's Heartland Corridor project reduced rail shipment times between Norfolk and Chicago by 24 hours and over 200 miles by raising bridge and tunnel clearances to accommodate double-stacked freight trains. The CSX National Gateway Project, completed in 2013, created a north-south corridor from North Carolina to Ohio with a spur connecting to the Port of Virginia. Critically, both corridors intersect at Collier Yard in Petersburg, positioning the Crater District as a potential east coast hub for freight distribution. Amtrak passenger rail service at the Ettrick station served approximately 30,000 passengers in 2022, with northbound routes to Richmond and Washington, D.C. and southbound service to Norfolk and expansion to Raleigh, North Carolina is under construction (Crater PDC, 2023).

The region also benefits from several regional and municipal airports that support general aviation and limited commercial activity, including Dinwiddie County Airport, Emporia-Greensville Regional Airport, and Wakefield Municipal Airport. While these facilities serve an important role in supporting business access and private aviation, the absence of a commercial hub airport in the Tri-Cities area remains a competitive limitation, requiring travelers to use Richmond International Airport (RIC) for most commercial flights (Crater PDC, 2023).

2.5.2 Mobility and Connectivity

The Tri-Cities Area Metropolitan Planning Organization (TCAMPO) coordinates transportation planning for the urbanized core of the Crater region, covering Petersburg, Colonial Heights, Hopewell, and portions of Chesterfield, Dinwiddie, and Prince George Counties. Its primary role is to direct federally funded transportation investments in a way that advances regional goals of safety, mobility, equity, and economic development. In 2025, TCAMPO completed its Regional Multimodal Mobility Plan, which identifies targeted investments in active transportation and transit connectivity, with a particular focus on improving conditions for pedestrians, cyclists, and transit-dependent populations across the urbanized area (Crater PDC; TCAMPO, 2025).



Photo 2.4 Petersburg Area Transit (PAT) Bus, Photo Credit: RidePat.com

Public transit in the region is provided primarily by Petersburg Area Transit (PAT), which operates fixed routes serving Petersburg, Colonial Heights, and Hopewell. PAT transports an average of 57,000 passengers per month and offers connections to downtown Richmond via a partnership with GRTC (Petersburg, VA, 2026). In a notable policy decision, PAT eliminated fares in 2020, making its fixed-route service free with the support of state and local funding, and the agency has continued expanding partnerships with major employers and educational institutions to extend service coverage (Business View Magazine, 2023). The Greensville-Emporia Transit (GET) system offers fixed and paratransit service connecting central Greensville County to commercial areas throughout Emporia. Ridership fare is $1, though complementary paratransit service is available for individuals with certified needs under the Americans with Disabilities Act. Despite these efforts,

transit coverage remains limited across much of the broader Crater District, particularly in rural jurisdictions such as Dinwiddie, Prince George, and the southern counties, where car-dependent land use patterns and dispersed settlement make frequent service economically challenging (Crater PDC, 2023).

Multimodal infrastructure for bicyclists and pedestrians remains underdeveloped relative to the region's size and transportation needs. The car-centric character of regional development has historically marginalized non-motorized transportation, contributing to safety concerns for pedestrians and cyclists and limiting connectivity between residential areas, employment centers, and key destinations (Crater PDC, 2023). Recent regional planning efforts have worked to systematically identify these gaps, prioritizing active transportation investments in communities facing persistent poverty and limited mobility options. Those findings are now being translated into action through ongoing corridor studies and targeted funding applications seeking to improve pedestrian crossings, enhance roadway safety, and expand multimodal access at key locations throughout the urbanized area (TCAMPO, 2023).

2.5.3 Infrastructure Systems

Water and wastewater infrastructure across the Crater region is a recognized vulnerability for both quality of life and economic competitiveness. Many systems, particularly in rural jurisdictions, are aging and operating near or beyond designed capacity. The CEDS identifies water, wastewater, and sewer as primary infrastructure concerns, alongside broadband and natural gas, noting that insufficient utility infrastructure makes it difficult to attract new employers to industrial and mega-sites in the region even when land and location advantages are favorable (Crater PDC, 2023). Drinking water supply for Petersburg, Colonial Heights, and portions of Chesterfield, Dinwiddie, and Prince George Counties is managed regionally through the Appomattox River Water Authority (ARWA), which draws from the Chesdin Reservoir, though expanding and upgrading infrastructure to keep pace with growth remains an ongoing challenge.

Localities with limited fiscal capacity rely heavily on state and federal programs to finance utility improvements. Petersburg, as a CDBG entitlement community, directs federal funds toward neighborhood revitalization and infrastructure needs, and the Virginia General Assembly directed $76 million in federal ARPA funding through the Department of Environmental Quality specifically for wastewater improvements in Petersburg in 2023 (Virginia DEQ, 2026). Continued access to grant and low-interest loan programs, including Virginia's Clean Water State Revolving Fund, remains essential for localities across the district to maintain and expand water and wastewater systems. Recent events underscore the importance of these investments for resilience. In July 2025, an electrical failure at Hopewell's wastewater treatment plant released an estimated one million gallons of untreated sewage, prompting a regional swimming advisory along Gravely Run Creek and portions of the James River and highlighting vulnerabilities in aging utility infrastructure (Gehlich, 2025).

Broadband infrastructure represents an increasingly urgent gap, particularly in the region's rural counties. The Crater CEDS identifies broadband as a core infrastructure weakness, noting that insufficient connectivity limits workforce development, remote work opportunities, access to healthcare and education services, and the ability to attract businesses reliant on reliable digital infrastructure (Crater PDC, 2023). Virginia has been a recognized national leader in broadband expansion policy, deploying the Virginia Telecommunications Initiative (VATI) since 2017 and currently implementing the federally funded Broadband Equity, Access, and Deployment (BEAD)

program. Progress has been uneven and many projects having fallen behind schedule. Significant gaps remain statewide, with deployment slowed by permitting delays, pole upgrades, and cost overruns (JLARC, 2023) (Paullin, 2025). For rural portions of the Crater region such as Sussex, Greensville, and southern Dinwiddie Counties, timely broadband deployment is a precondition for broader economic development, workforce access, and quality-of-life improvements. While many communities rely heavily on web-based notification systems (including social media) to disseminate information on emergency preparedness and response, a significant portion of Crater PDC's population does not have consistent internet access via computer or smartphone.

Energy infrastructure, including natural gas access, is also an area of concern, particularly for industrial and manufacturing recruitment. The CEDS identifies natural gas access as insufficient in portions of the region, limiting the attractiveness of mega-sites and industrial parks to energy-intensive industries. Electricity infrastructure, by contrast, is more robust, anchored by Dominion Energy's significant presence in the region, including its Surry Nuclear Power Station in Surry County.



Photo 2.5 Emporia Dam on the Meherrin River. Kit Friedman

2.5.4 Transportation and Infrastructure Challenges and Opportunities

Aging and inadequate utility systems, including water, wastewater, broadband, and natural gas, limit both quality of life and economic competitiveness across the region. With constrained local fiscal capacity, most localities depend on state and federal investment to close these gaps, and continued access to those programs is essential to realizing the region's development potential (Crater PDC, 2023).

The region's transportation infrastructure also presents meaningful resilience opportunities. Continued investment in multimodal connectivity, including active transportation, transit, and freight systems, will strengthen the region's economic position while reducing vulnerability to single-mode disruptions. Efforts underway through TCAMPO's Plan2045 and the Regional Multimodal Mobility Plan offer a framework for prioritizing investments that serve both economic competitiveness and community resilience goals (Crater PDC, 2026).

3.0 STATUS OF RESILIENCE PLANNING FOR THE REGION

The crosswalk of existing plans and climate data is a comparative analysis of comprehensive plans, resilience plans, and other resilience-related documents across jurisdictions within the Crater PDC. The crosswalk evaluates how well each plan addresses criteria that were drawn from resilience plan structures. The evaluation criteria were inspired by the Virginia DCR Community Flood Preparedness Fund (CFPF) resilience plan requirements, providing alignment with state-level expectations for flood resilience planning.

3.1. Crosswalk Exercise

The crosswalk reviews documents ranging in scale from municipalities, counties, regional agencies, and state entities. These plans include the most recent comprehensive plans and all available resilience-related documents. The criteria used to evaluate each plan as it relates to resilience planning are explained below:

- **Plan Information** includes basic identifying details such as the locality covered, the scale of the plan (e.g., municipal, regional), the year of publication, and the plan title. This section helps situate each plan within its geographic and temporal context.
- **Background Context** focuses on the inclusion of a vision or goal statement, which reflects the community's aspirations and priorities regarding resilience. It also captures community and demographic information to assess whether the plan acknowledges population-specific needs and vulnerabilities.
- **Vulnerability Assessment** tracks whether the plan addresses climate change and future impacts, outlines hazards (past and present) affecting the area, identifies critical facilities, and discusses potential barriers that could hinder resilience efforts. Additionally, this section flags whether the plan identifies areas for protection, such as floodplains, wetlands, or historically vulnerable neighborhoods.
- **Resilience Actions** evaluates the extent to which each plan includes coordination with other jurisdictions (such as regional or state entities) and community groups, demonstrating multi-level and cross-sector collaboration. It also notes any proposed projects designed to enhance resilience and outlines supporting policies or strategies, such as zoning changes, green infrastructure implementation, or emergency preparedness initiatives.

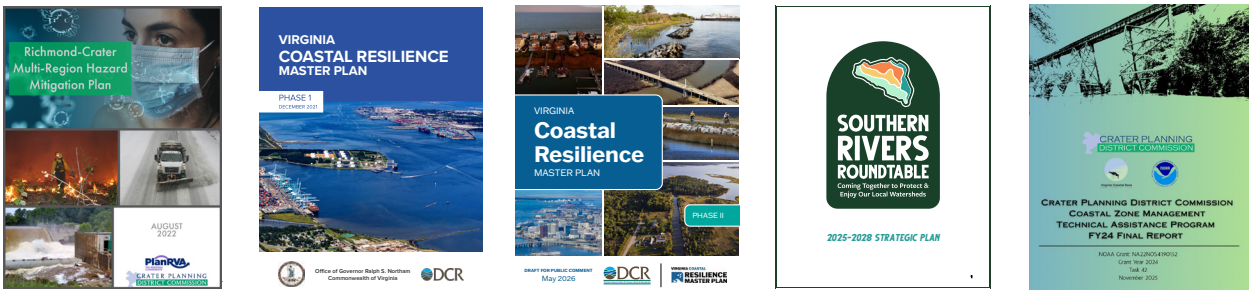


Figure 3.1 Example of Plans Used for Crosswalk Exercise.

The crosswalk uses a coded system to indicate how thoroughly each element is addressed: solid **blue** shading represents elements that are fully addressed, **hatched** shading indicates partial coverage, and **blank** cells signify elements that are not addressed. This visual system helps quickly identify gaps and strengths across the region's planning documents.

Contains

Partially Contains

Does Not Contain

Table 3.1. Summarized Findings of Crosswalk Exercise

		Context		Vulnerability Assessment				Resilience Actions				
	Plan Name (Year)	Vision + Goals	Community/ Demographics	Climate Change (Future)	Hazards (Past + Present)	Critical Facilities	Barriers	Identified Areas for Protection	Coordination with other Jurisdictions	Coordination with Community Groups	Proposed Projects	Policies/Strategies
Crater PDC Region	**Building Resilience in the Crater Region Report – RAFT** (2022)		■	▨	▨	■	■	▨	■	■	▨	■
	Southern Rivers Roundtable Strategic Plan (2025 – 2028)	■		▨	▨		▨	▨	■	■	■	■
	Crater PDC CZM Technical Assistance Grant Report (2025)			▨	▨		▨			▨	▨	▨
	Richmond-Crater Multi-Region HMP (2022)*	■	■	■	■	■	■	■	■	■	■	■
Virginia	**Virginia Coastal Resilience Master Plan: Phase 1** (2021)		■	■	▨	▨	■	▨	▨		▨	▨
	Virginia Coastal Resilience Master Plan: Phase 2 (2026)		▨	■	▨	▨	▨	▨	▨	▨	▨	▨
	Virginia Outdoors Plan (2024)		▨		▨	▨	▨	■	▨		▨	■

	Plan Name (Year)	Context		Vulnerability Assessment				Resilience Actions				
		Vision + Goals	Community/ Demographics	Climate Change (Future)	Hazards (Past + Present)	Critical Facilities	Barriers	Identified Areas for Protection	Coordination with other Jurisdictions	Coordination with Community Groups	Proposed Projects	Policies/Strategies
Locality Resilience Plans	**Hopewell Stormwater Resilience Plan** (2023)	▨	▨	■	▨		▨	▨		▨	■	▨
	Petersburg RAFT Checklist (2022)							▨	▨	▨	▨	■
	Hopewell RAFT Checklist (2022)							▨	▨	▨	▨	■
	Petersburg Resilience Plan (2022) *Used to Qualify for DCR Approval*											
Locality Comprehensive / Small Area Plans	**Petersburg Comprehensive Plan** (2024)	■	■	■	■	■	■	■	▨	■		■
	Emporia Comprehensive Plan (2015)	▨	■		▨	▨		▨	▨	▨	▨	▨
	Hopewell Comprehensive Plan (2018)	■	▨		▨	▨	▨	▨	▨	■	▨	■
	Colonial Heights Comprehensive Plan (2021)	■	■		▨	■	▨	▨	▨			▨
	Charles City County Comprehensive Plan (2014)*	■	■		▨	■	▨	▨	▨			▨
	Chesterfield Comprehensive Plan (2025)	■	■	▨		■		▨	▨	▨		▨
	Greensville Comprehensive Plan (2024)	■	■	■	▨	■	▨	▨	■	▨		■
	Dinwiddie Comprehensive Plan (2024)	■	■	▨		■		▨	■	▨		■
	Prince George County Comprehensive Plan (2022)*	■	■		▨	■	▨	▨	■			■
	Surry Comprehensive Plan (2020)	■	■	▨	▨		■	▨	▨	▨		■
	"6" Small Area Plans (Sussex) (2021)	■	▨			■	■	▨	▨			■

3.1.1 Crosswalk Analysis Results

The crosswalk analysis reveals that while some plans, such as the Building Resilience in Virginia's Crater Region Report (RAFT) and the Richmond-Crater Multi-Region Hazard Mitigation Plan, provide comprehensive and forward-looking coverage of resilience themes, many others only partially address key areas or lack the actionable detail needed to guide effective implementation. These more robust plans distinguish themselves through clear vision statements, integration of future climate risk, identification of critical infrastructure, and cross-sector project proposals. They also exemplify strong coordination across jurisdictions and sectors, an essential quality in a region where environmental challenges and vulnerabilities do not adhere to political boundaries. State-driven plans, such as the Virginia Outdoors Plan and both phases of the Virginia Coastal Resilience Master Plan, address key natural resource considerations within the Crater region. Phases I and II of the Coastal Resilience Master Plan provide up-to-date flood hazard data, identify key planning considerations for the Crater region, and outline the primary stakeholders involved in advancing resilience efforts within the coastal area of the Commonwealth.

In contrast, individual locality plans present a more uneven picture. Petersburg and Hopewell demonstrate the highest levels of engagement in resilience planning from Crater PDC localities, as documented in the Building Resilience in Virginia's Crater Region report by the Institute for Engagement & Negotiation. Both localities have also assembled a patchwork of resilience-related plans. Within their comprehensive plans, they stand out for emphasizing equity through meaningful engagement with underserved communities and explicit acknowledgment of social vulnerability. However, like other Crater PDC localities, these plans fall short in defining a cohesive long-term resilience vision and in outlining specific, fundable projects or strategies to build capacity over time. The comprehensive plan for another locality, Emporia, includes valuable baseline information, such as demographic trends and historical hazard exposure. This lacks consideration of future climate impacts and does not identify critical facilities, both of which are essential for anticipating and mitigating evolving risks. The comprehensive plan for Sussex County includes six small area plans, which are the components of Sussex County's Land Use Plan and Countywide Plans. Sussex County's multiple area plans offer valuable localized insights, especially regarding community context and land use. Each of the community plans lists strategies under the implementation recommendations section that provide cost, time scale, and responsible parties. These plans, however, do not mention climate change nor hazards in much detail.

Together, these findings underscore the fragmented nature of resilience planning across the region. They also highlight the importance of tools like the crosswalk matrix, which can identify gaps, lift up best practices, and support more cohesive, multi-scalar resilience strategies. As the Crater region faces increasing climate stressors, from inland flooding to extreme heat, advancing a shared planning vision grounded in inclusive engagement, science-based risk assessment, and cross-jurisdictional collaboration will be critical to providing long-term community resilience. This assessment of plans informed the planning process for the Crater PDC Regional Resilience Plan, especially the types information gathered from stakeholder engagement. It was evident that resilience planning for the Crater region, including the mapping of multi-hazard risks and analysis of asset vulnerabilities, would provide critical insights, as there was limited documentation of impacts and relatively little expressed concern outside of Hopewell and Petersburg. The review also revealed a strong foundation for action development. Despite a large amount of potential actions, there remained a need to identify and prioritize actions that would meaningfully advance resilience across the region and specifically reduce flood vulnerability within localities.

4.0 CAPACITY BUILDING ROADMAP

The purpose of the capacity building roadmap is to provide a clear, actionable guide for strengthening the region's ability to plan for and respond to climate-related risks. Grounded in the findings from a capacity and needs assessment questionnaire and input from the workshop, the roadmap identified priority strategies and policies tailored to local and regional gaps. Rather than serving solely as a list of resilience actions, the roadmap is intended to build the foundational capacity necessary for effective resilience planning by strengthening internal resources, technical expertise, partnerships, coordination mechanisms, and decision-making tools. These capacity-building actions are designed to equip localities with the knowledge, organizational structures, and support systems needed to pursue future resilience projects and integrate resilience considerations into ongoing planning and operations.

The roadmap outlines a phased approach with recommended timelines and next steps to help localities progressively enhance their resilience capabilities over time. In addition to implementation strategies, the roadmap includes findings from the policy review crosswalk exercise, highlighting opportunities to strengthen existing policies and identifying areas where new policies, programs, or procedures may be needed to support long-term resilience goals. Collectively, these recommendations provide a framework for developing the institutional capacity required to advance resilience action planning and implementation throughout the region.

4.1. Capacity and Needs Assessment

The capacity and needs assessment survey was open to members of the Regional Resilience Plan from April to August of 2025, receiving a total of eighteen responses. The online survey link was promoted at steering committee workshops and distributed via the email list, and a physical version of the survey was also made available at the first workshop. Fourteen of the survey responses were from workshop participants and four responses were from respondents of the online version of the survey. A total of twelve responses were submitted by locality staff, including cases where multiple individuals from the same locality participated. The localities represented include Prince George County, Surry County, Sussex County, Chesterfield County, Charles City County, City of Petersburg, City of Colonial Heights, City of Hopewell, and City of Emporia. Representatives from Greensville County and Dinwiddie County did not provide survey responses. However, Crater PDC staff conducted follow-up interviews with staff of these localities in-lieu of survey responses.

The survey was designed to gather localized insight into resource and support needs across seven categories: human/institutional capacity, financial assistance, technical assistance and training, infrastructure and operations, policy and planning, disaster response capacity, and regional coordination and support. These questions were structured to elicit input on both internal organizational gaps and broader systemic challenges facing localities. The intent was to use this survey not only to inform the workshop conversation but also to begin forming a regional baseline of capacity-building needs to guide future planning and support efforts. The survey responses provide valuable insight into regional capacity-building needs but reflect the perspectives of participating respondents and may not fully represent all departments, localities, or implementation perspectives across the Crater region. These identified capacity gaps will be used to inform locality specific actions and inform the initial strategies developed in the capacity building roadmap. These survey questions can be found in *Appendix A. Stakeholder Engagement Strategy.*

4.1.1 Human & Institutional Capacity

At the regional level, both Richmond Regional Planning District Commission (Plan RVA) and Crater PDC have dedicated planner positions for resilience planning. At the locality level, no positions are formally titled “resilience planner.” Instead, resilience-related responsibilities are often shared across multiple roles or embedded within existing staff positions. Most localities in the region have staff positions that support various aspects of climate resilience planning, even if it is not their primary responsibility. These roles often focus on related areas such as floodplain management, stormwater management, environmental planning, emergency response, and social services. While job titles vary, they are generally associated with fields including environmental planning, emergency management, stormwater, social services, and community development.

Across localities, the departments that most frequently engage in resilience planning include Planning/Zoning, Emergency Management, and Public Works/ Stormwater.

To expand staff capacity for resilience work, many participants indicated a need for additional full-time personnel, contracted consulting services, and technical support staff.

4.1.2 Financial Resources

The Community Flood Preparedness Fund (CFPF) and general state-level funding sources were identified as the most utilized financial resources among participating localities. Other cited state funding sources included the Virginia Department of Emergency Management (VDEM), Virginia Department of Forestry (DOF) and Virginia Department of Environmental Quality (DEQ) tree canopy grants, which support urban forestry initiatives and green infrastructure. Additionally, some localities have accessed support from the National Fish and Wildlife Foundation’s

Petersburg obtained over $15 million in grant funds for plans, studies, and projects submitted over five rounds of CFPF.

Emporia recently applied and received funding through CFPF for a Hydraulic & Hydrologic (H&H) investigation and stormwater inventory in Round 5 and emergency services capacity building in Round 6.

(NFWF) Small Watershed Grants (SWG) program, which funds projects that restore and protect water quality and aquatic habitats in local watersheds.

Despite the availability of these funding opportunities, many participants reported that their top financial challenge is a lack of local funding, particularly for implementation and for leveraging as match in cost-share programs. In addition, several localities highlighted constraints in their capacity to prepare grants, such as limited staff time, technical expertise, and administrative resources. These limitations hinder the ability of some communities to pursue and manage resilience-building projects, even when funding sources are available.

4.1.3 Technical Assistance & Training Needs

Most participants reported using FEMA Flood Insurance Rate Map (FIRMs) as a primary resource for assessing flood risk and informing local planning. Additional climate and environmental tools mentioned include the Virginia Natural Heritage Data Explorer, the Virginia Flood Risk Information System (VFRIS), Resource Protection Areas (RPA) and Resource Management Areas (RMA) maps under the Chesapeake Bay Preservation Act, the Coastal Barrier Resources Act (CBRA) Wetlands Inventory, and Coastal GEMS, an interactive GIS tool for coastal resource planning.
Despite the availability of these tools, most localities do not currently have a formal resilience plan. Petersburg is the only locality within the Crater region identified as having a DCR- approved resilience plan, adopted in 2022. Hopewell has a Stormwater Resilience Plan developed in 2023, but this does not have DCR-approval.



Figure 4.1 Identified Technical Assistance & Training Needs

The top technical assistance need cited by participants was grant writing and funding strategy support, reinforcing findings regarding limitations in local grant application capacity. Many localities also expressed a need for technical assistance to assess the vulnerability of critical assets and develop localized resilience planning recommendations.

In terms of training, participants identified several priority areas for local staff development. These included achieving certification as a Certified Floodplain Manager (CFM), training in emergency response planning, and education on nature-based solutions for flood mitigation. Additionally, there is strong demand for training on grant application development and financial management specific to resilience and adaptation projects.

4.1.4 Infrastructure & Operations

Many localities reported experiencing significant climate-related impacts over the past decade.

Hazards, such as flooding, tornadoes, heavy rainfall, extreme heat, and ice storms have had notable effects on public assets, particularly roads and transportation networks, water supply systems, and stormwater infrastructure. Most localities indicated that they have established some level of response protocols, redundancy and backup power systems to protect critical infrastructure. These measures include participation in FEMA emergency response training, the use of designated shelters during extreme weather events, and the availability of backup generators for key public facilities and offices.



Figure 4.2 Within the survey, many participants cited the same hazard event concerns.

4.1.5 Policy & Planning

Many localities indicated that they have existing land use or zoning policies that address aspects of climate resilience, particularly related to flooding and stormwater management. These policies are implemented through various mechanisms such as wetland and floodplain regulations, Resource Protection Area (RPA) and Resource Management Area (RMA) requirements, stormwater control measures, and specific chapters or provisions within local ordinances. Some communities also referenced environmental standards articles, Chesapeake Bay Preservation Act (CBPA) guidelines, and dedicated floodplain ordinances.

Despite this foundation, most localities expressed a need for additional support in the form of model ordinances or policy recommendations that are tailored to resilience planning. The primary barriers to adopting more comprehensive, resilience-focused policies include a lack of technical expertise or staff capacity, as well as limited funding to support policy development and implementation.

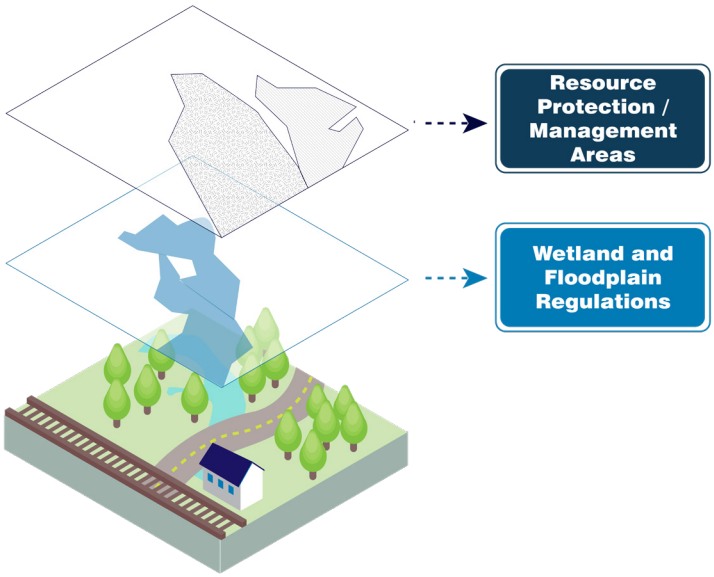


Figure 4.3 Example of land use / zoning policies used by localities.

4.1.6 Disaster Response Capacity

Many localities in the region reported having an Emergency Operations Plan (EOP) or similar disaster response framework in place. Chesterfield County recently updated their EOP in June 2024 to incorporate protocols for human-made disasters. Additionally, the Crater-Richmond

Hazard Mitigation Plan was cited as primarily a regional document that addresses natural hazard mitigation.

Responsibility for disaster response is most assigned to emergency management departments and fire and rescue services. However, most localities indicated that there is not a strong sense of regional coordination around disaster response efforts. A representative from Plan RVA referenced the Emergency Management Alliance of Central Virginia (EMACV) as a potential resource for enhancing regional collaboration for emergency management and public safety efforts, although awareness and engagement with EMACV vary across the Crater region.
Localities identified several major challenges in disaster response, including staffing shortages in emergency management and response roles, limited funding for emergency preparedness activities, and a lack of sufficient emergency shelter capacity. They also noted that their most pressing needs include additional response resources, increased funding to support preparedness efforts, and more support for post-disaster recovery planning.

Participation in the Federal Emergency Management Agency (FEMA) Community Rating System (CRS), a voluntary program that encourages floodplain management practices in exchange for flood insurance discounts, is currently limited.

Currently, no localities within the Crater region are enrolled in the Community Rating System (CRS). However, there appears to be growing interest in the program.

Colonial Heights is currently working with Crater PDC to pursue future enrollment. Localities interested in this program have expressed concerns about the need for dedicated local capacity to consistently manage and track CRS ongoing requirements.

4.1.7 Regional Coordination & Support

Many localities reported that they actively coordinate with other jurisdictions and regional or state agencies to advance their climate resilience efforts. Common regional partners include the Crater PDC, Plan RVA, the Virginia Department of Environmental Quality (DEQ), Friends of the Lower Appomattox River (FOLAR), and the Crater Region Environment Stewardship Team (CREST). These regional partners often facilitate localities working together to align strategies, share data, and pursue joint funding opportunities.

Figure 4.4 Regional Entities that Support Resilience Planning.

Localities identified several key areas where regional and state-level collaboration has been especially valuable or is still greatly needed. High on the list is support for grant writing and funding strategies, particularly for communities with limited internal capacity to pursue complex or competitive funding sources. Localities also emphasized the importance of access to high-quality data and mapping tools to better assess vulnerabilities and plan effective responses. In addition,

they noted a strong need for training programs and capacity-building initiatives to strengthen staff expertise in resilience planning and emergency preparedness.

Infrastructure and engineering support was another critical area where localities seek additional partnership, especially for designing and implementing nature-based solutions or modernizing outdated systems. Finally, many communities expressed interest in technical assistance for resilience planning and policy development, such as model ordinances, climate adaptation strategies, and guidance on integrating resilience into comprehensive plans and zoning codes. Regional partners, such as Crater PDC, can provide support because they are structured to serve multiple localities, giving them access to specialized staff, data, and funding opportunities that strengthen resilience planning and policy development.

4.2. Implementation Roadmap

The implementation roadmap was developed to help guide and coordinate resilience-building efforts across the Crater Region in a way that is actionable, transparent, and tailored to local capacity. Recognizing that localities face common challenges, a strategy table was created as a collaborative planning tool that breaks down complex strategies into clear, manageable steps. Each row captures a priority strategy, supported by background context and accompanied by defined roles for both Crater PDC and local governments. This structure enables shared ownership of the work while allowing flexibility for communities to engage at their own pace. The inclusion of criteria for each strategy in the form of a status column, a timeline, and “next-level” local government actions reflect an intentional process to track progress over time and encourage continuous advancement. Ultimately, the roadmap fosters alignment, reduces duplication of effort, and empowers localities to move from planning to implementation with sustained regional support.

4.2.1 Details of the Roadmap

The information included in the roadmap is explained in more detail below:

- **Strategy:** the overall strategy that the “Crater Partner Action” and “Local Government Actions” aim to achieve.
- **Background:** A brief explanation of the issue the strategy addresses. This provides context on why the action is needed, referencing challenges, gaps, or opportunities observed across the region.
- **Crater PDC Action:** The specific role or contribution of the Crater PDC in supporting or implementing the strategy. This may include convening, coordinating, funding, providing technical assistance, or leading regional assessments and planning.
- **Locality Action:** Actions for localities in implementing or participating in the strategy. This could involve adopting new policies, attending trainings, contributing data, collaborating with peers, or applying best practices locally.
- **Status of Strategy:** A snapshot of where things currently stand in the region regarding this strategy. This may indicate whether the strategy is underway, has stalled, or hasn’t yet been initiated, and it can include examples of past or current efforts by Crater PDC or localities.

- **Timeline:** An estimated timeframe for implementation. Timeframes used for this roadmap include:

  Short-term (0–2 years | Medium-term (2–5 years) | Long-term (5+ years)
- **Locality Next-Level Action:** An "above-and-beyond" step that builds on the base action. This might involve scaling up the strategy, collaborating across jurisdictions, implementing more advanced policies, or seeking national-level recognition. It encourages continuous improvement and innovation beyond minimum requirements.

A total of ten strategies with associated actions for both the Crater PDC and localities were developed that directly relate to the findings from the questionnaire and workshop. The actions are broken down into the seven common need areas: human/institutional capacity, financial assistance, technical assistance and training, regional coordination and support, infrastructure and operations, policy and planning, disaster response capacity. The knowledge building workshop provided an opportunity to identify the most urgent and widely shared priorities within the groups during the first activity. Human and institutional capacity, technical assistance and training needs, and financial resources were identified by the committee as the highest need categories. To improve upon these areas, in the roadmap, these topics received two strategies dedicated to them, and the rest of the topics have one strategy developed.

4.2.2 Responsibility and Maintenance of Roadmap

Monitoring actions and evaluating their effectiveness is a critical part of strategic planning. The goal of this roadmap is to provide a path forward that involves Crater PDC as a regional supporting entity. As suggested with Strategy Item #7 below, "Maintain a shared resilience action tracker", the plan for evaluating is to create an Excel spreadsheet to be used as a tracking device for these roadmap actions as well as those that will be developed within the Crater PDC Regional Resilience Plan. This document will make it as easy as possible to evaluate the progress of these actions, as well as, any hang-ups along the way. The Team has placed the actions of this roadmap within a spreadsheet, as this is the preferred method of tracking actions, similar to hazard mitigation planning work. This will allow Crater PDC to review this annually, having the actions trackable both regionally and locally. Updates will be marked in the first two annual updates as a part of the Crater PDC Regional Resilience Plan. Many of the actions detailed in the Implementation Roadmap focus on capacity building and could be candidates for funding by the Capacity Building and Planning grant through the Virginia CFPF. Information on how the *Crater PDC Regional Resilience Plan* will be maintained over time is discussed in *Chapter 10: Plan Maintenance*.

4.2.3 Roadmap Actions

Human & Institutional Capacity

Strategy 1: Streamline resilience planning tasks into existing local government positions.

Many localities do not have a designated resilience planner position, rather resilience-related responsibilities are shared across multiple roles or embedded within existing staff positions.

Crater PDC Action

Create a list of typical resilience planner duties and align them with local roles in floodplain management, stormwater, environmental planning, emergency response, and social services. Prioritize tasks based on available staffing.

Locality Action

1. Provide an overview of adjacent resilience planning roles and typical duties to Crater PDC.
2. Integrate resilience planning tasks provided by Crater PDC in existing positions.
3. Request or provide necessary resilience planning training adjacent to job roles to bring staff up to speed on their roles.

Status of Strategy

Most localities in the region have staff positions that support various aspects of climate resilience planning, even if it is not their primary responsibility.

Locality Next Level Action

Hire a full-time environmental / resilience planner at the local government level.

Timeline



Strategy 2: Develop and implement public education materials and campaigns on resilience planning.

Some localities noted a need for greater public awareness of resilience planning.

Crater PDC Action

Develop educational materials and language for localities to use during engagement, hold webinars or workshops for the public.

Locality Action

1. Utilize materials for public engagement on website, social media pages, and more.
2. Target community groups that can help host engagement events related to resilience planning.

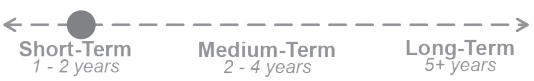
Status of Strategy

Some localities noted public education and buy-in regarding resilience as a barrier.

Locality Next Level Action

Co-develop locally tailored resilience stories or video content featuring community members; establish annual education workshops in partnership with local schools or civic organizations.

Timeline



Technical Assistance & Training Needs

Strategy 3: Maintain a directory specialists and resources related to resilience planning.

Many localities lack easy access to technical consultants, grant experts, and subject matter experts. A regional directory would streamline project implementation and support knowledge gaps.

Crater PDC Action

Compile and maintain an up-to-date directory of resilience consultants, funding contacts, and technical experts. Include categories such as grant writing, stormwater, equity, and hazard mitigation.

Status of Strategy

No formal directory in place; informal referrals and internal lists exist.

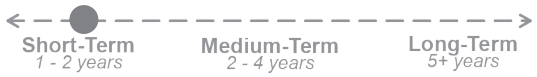
Locality Action

1. Use the directory to identify experts and request technical assistance.
2. Share recommendations or feedback.
3. Contribute to and regularly update with feedback.

Locality Next Level Action

Create internal lists of preferred providers and coordinate with neighboring jurisdictions for shared use.

Timeline



Strategy 4: Provide continuing education programming related to resilience planning.

Staff turnover and limited training budgets often prevent local staff from staying current on evolving resilience practices, regulations, and funding mechanisms.

Crater PDC Action

Host quarterly training workshops, webinars, and invite state/federal speakers. Coordinate with professional associations and offer recordings or resource packets. Offer financial assistance to locality staff to attend events or external trainings.

Status of Strategy

Trainings have been offered for localities by Crater PDC in the past, but Crater PDC can continue bolstering this opportunity.

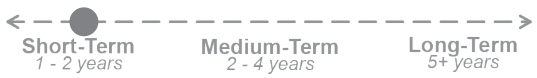
Locality Action

1. Send staff to relevant trainings.
2. Participate in webinars.
3. Suggest programming for Crater PDC to be aware of and potentially fund.

Locality Next Level Action

Partner with Crater PDC to co-host local trainings; identify internal training needs; establish annual training schedules and incentivize staff participation (e.g., certifications, recognition).

Timeline



Financial Resources

Strategy 5: Track grant cycles and provide an accessible format for localities to apply.

Many localities voiced a lack of awareness regarding available grants and capacity to track these cycles.

Crater PDC Action

Maintain grant calendar and notify localities of opening and closing dates.

Locality Action

1. Attend any meetings related to grants.
2. Apply to priority funding opportunities.

Status of Strategy

No grant calendar exists.

Locality Next Level Action

Hire a full-time grant writer or partner with Crater PDC.

Timeline

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Strategy 6: Establish grant-writing workshops.

Many localities expressed interest in grant-writing assistance during the resilience planning process.

Crater PDC Action

Schedule a grant workshop for major grants early on. Provide drop-in hours for localities to attend if they need additional resources in applying. Provide an avenue for localities that want to tackle similar projects/studies, to work together on grants/ co-apply if applicable.

Locality Action

1. Attend grant workshops.
2. Attend drop-in hours.
3. Assist other localities through peer-to-peer conversations at workshops or outside times.

Status of Strategy

No established grant-writing workshops. Crater PDC provides support on an ad-hoc basis as requested by locality partners, but not in a structured or group setting.

Locality Next Level Action

Establish a regional grant collaboration network with shared proposal development tools and coordinated multi-locality applications

Timeline

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Regional Coordination & Support

Strategy 7: Maintain a shared resilience action tracker.

For the development of the regional resilience plan, there is not a formalized method of tracking resilience actions.

Crater PDC Action

Maintain and share an excel of resilience actions and the strategies listed in this table to easily identify action movement.

Locality Action

Update resilience actions relevant to locality.

Status of Strategy

No established method of tracking resilience actions across the region.

Locality Next Level Action

Develop actions that relate to resilience that go beyond the regional resilience plan.

Timeline



Infrastructure & Operations

Strategy 8: Establish more formalized redundancy plans for critical infrastructure.

Although many localities have plans that address the need for redundancy, these plans can be more formalized and expanded upon to maximize implementation.

Crater PDC Action

Coordinate regional emergency response training and resource sharing. Share critical infrastructure findings from the vulnerability assessment.

Locality Action

1. Develop a list of high priority critical infrastructure.

2. Participate or continue to participate in FEMA emergency training.

3. Disclose location of emergency shelters and/or resilience hubs.

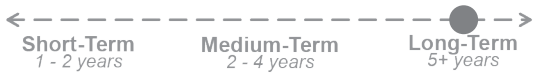
Status of Strategy

Most localities have some redundancy, backup generators, and participate in FEMA emergency training, but this can be expanded upon.

Locality Next Level Action

Conduct comprehensive assessments of critical infrastructure power needs; upgrade or expand backup systems; develop mutual aid agreements for power resources.

Timeline



Policy & Planning

Strategy 9: Update comprehensive plans and ordinance language to reflect resilience.

Many localities need support through model ordinances or policies for resilience planning. The crosswalk shows a lack of resilience in locality plans. Virginia law currently doesn't require resilience in comprehensive plans but encourages it.

Crater PDC Action

Develop model comp plan language / topic areas to include and guidance for ordinance language for resilience.

Locality Action

1. Include resilience and related topics within the next comprehensive plan update.

2. Integrate resilience focused ordinance language where appropriate.

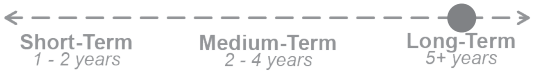
Status of Strategy

Most comprehensive plans do not mention resilience nor language beyond flooding and stormwater control measures.

Locality Next Level Action

Adopt enhanced resilience policies such as hazard overlay districts, stricter building codes, and incentives for nature-based solutions to exceed baseline planning requirements.

Timeline



Disaster Response Capacity

Strategy 10: Strengthen floodplain administration and support Community Rating System (CRS) enrollment.

Smaller localities often lack the staff capacity and expertise to manage floodplain programs effectively, while interest in CRS participation continues to grow.

Crater PDC Action

Coordinate regional emergency response training and resource sharing. Share critical infrastructure findings from the vulnerability assessment.

Locality Action

1. Attend regional trainings/workshops.

2. Utilize shared resources related to floodplain management.

3. Initiate CRS application and designate a coordinator

Status of Strategy

No localities are enrolled in the CRS, though some have expressed interest in adopting higher floodplain standards outside of the program

Locality Next Level Action

Once enrolled in the program, pursue additional creditable measures to achieve a better CRS score and receive even higher flood insurance discounts.

Timeline



5.0 STEERING COMMITTEE WORKSHOPS

The Steering Committee was engaged throughout the regional plan development, and feedback from this committee is the foundation of the plan itself. Representatives from each locality, watershed associations, regional entities, and state agencies provided pertinent information on the existing capacity and needs of the region, a shared vision and goals for the Crater PDC Regional Resilience Plan, areas of increased vulnerability to flooding and other hazards, and the actions that form a roadmap for the future of the region. There were four workshops in total. Between these workshops, committee members were given interim plan deliverables to review so that each piece of the plan reflected the priorities, lived experience, and most significant vulnerabilities of each locality. The following section of the plan summarizes the focus or topic of each workshop and the primary outcomes. Appendix A. Stakeholder Engagement Strategy includes a detailed description of all activities conducted with the committee and the accompanying data and results collected.

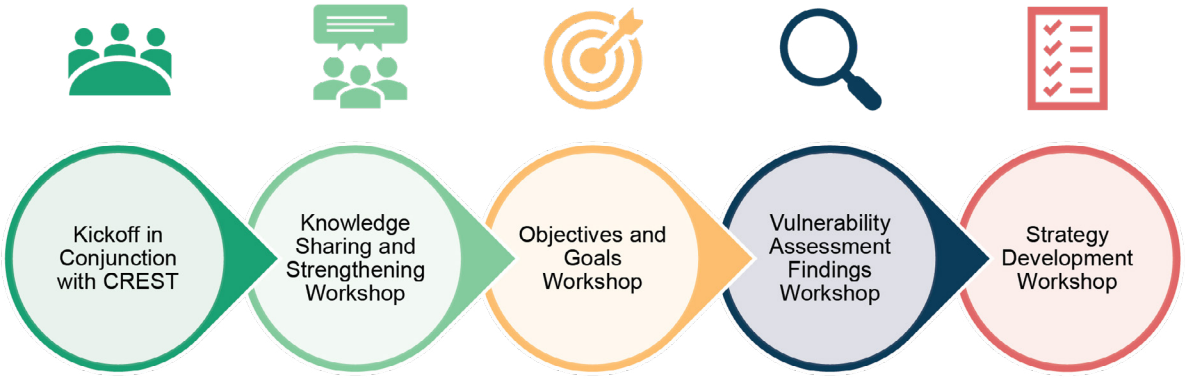


Figure 5.1. Steering Committee Touchpoints During the Planning Process.

5.1. Summary of Meetings & Workshops

5.1.1 Kick-off Meeting: Plan Introduction

February 5, 2025 | Virtual

The initial meeting of the Steering Committee took place in tandem with the Crater Region Environmental Stewardship Team's (CREST) monthly meeting. Coupling the two meetings

facilitated increased participation and awareness for the plan initiation. Participants heard an overview of the plan impetus, the Steering Committee's role in the plan development, and the tasks and schedule to be completed as a part of plan development.

Focus: Orientation to the planning process, building excitement

5.1.2 Knowledge Sharing & Strengthening Workshop

April 30, 2025 | In Person

This first in-person workshop focused on building a shared understanding of resilience across the Crater region. Steering Committee members exchanged local knowledge about hazards, community strengths, and vulnerabilities through facilitated discussions and mapping exercises. Participants developed early vision statements for both their localities and the region, identified areas at risk from flooding and other hazards, and completed a capacity building questionnaire to help inform the planning process.

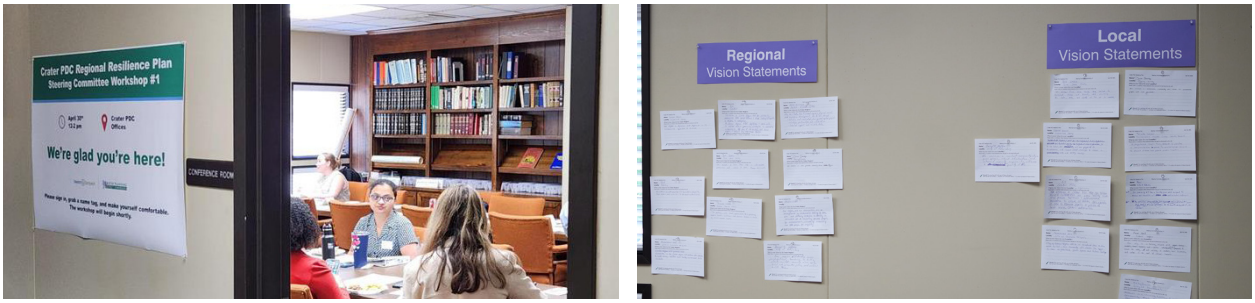


Photo 5.1. Steering committee members filled out materials during the workshop.

Focus: Relationship building, shared learning, visioning, identifying vulnerabilities.

5.1.3 Goals & Objectives Setting Workshop

August 20, 2025 | In Person

Building on the foundation of the first workshop, this session focused on identifying priority goals and long-term aspirations across six resilience sectors: housing, community, economy and jobs, transportation, environment, and infrastructure. Participants evaluated what is currently working, where improvements are needed, and what outcomes they hope to achieve by 2035. Small group activities also explored how high level goals could be translated into practical actions.



Photo 5.2 Steering committe members interacted with tabletop exercises.



Photo 5.3 Workshop activities linked to one another through a board and written activity.

Focus: Relationship building, shared learning, visioning, identifying vulnerabilities.

5.1.4 Vulnerability Assessment Primer Workshop

December 3, 2025 | Virtual

This workshop introduced Steering Committee members to the methodology and data behind the regional vulnerability assessment. The project team explained how assets were identified, how exposure and vulnerability are measured, and how results can be applied in local planning. An illustrative case study for Hopewell demonstrated how vulnerability data can guide investment and decision-making. Steering Committee members collaboratively brainstormed potential strategies to address vulnerability within a neighborhood in Hopewell. Participants provided feedback on assumptions, data use, and real world applications.

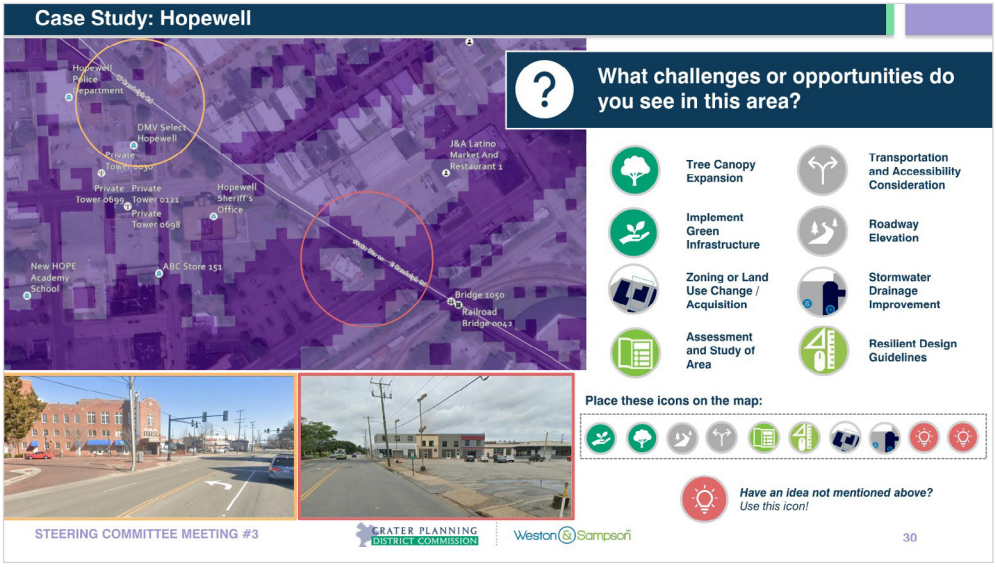


Photo 5.4 As a part of the workshop, participants were invited to do a case study exercise.

Focus: Sector based strengths and challenges, long term goals, action development.

5.1.5 Action Development Workshop

March 4, 2026 | In Person

The final workshop shifted the planning process into implementation mode. Participants reviewed and refined pre-developed regional and locality specific resilience actions informed by earlier engagement and the completed vulnerability assessment. Steering Committee members voted on actions, suggested revisions, and proposed new ideas reflecting local priorities. The session emphasized clarity, feasibility, and alignment with existing plans and funding mechanisms.

Focus: Reviewing and refining actions, prioritization, implementation pathways

5.2. Workshop Results

The workshop conversations reflected both a diversity of local perspectives and a strong sense of regional alignment. To build capacity to address climate vulnerabilities, localities frequently cited the need for more staff capacity, funding, and technical knowledge to implement strategies in areas of concern. This is why Steering Committee members were particularly interested in actions and resources Crater PDC can champion or create that can be disseminated to the localities. Some examples include model ordinances, design standards, or educational resources that can be used to shape development or steer resident actions around flood mitigation and energy efficiency. Other desired shared tools included online-hosted regional mapping, flood sensors and weather data collection, and early warning systems.

A central theme throughout the stakeholder engagement was the importance of regional collaboration.

In terms of climate vulnerability, stormwater flooding was repeatedly identified as a disruptive issue affecting homes, roads, and critical facilities. Participants emphasized the need for stronger floodplain management, conservation and protection measures, and updated and larger stormwater infrastructure. Additionally, it was mentioned that watershed-based planning can be used to determine a strategic location for flood mitigation activities, which can maximize benefits across localities. Steering Committee members also discussed longer-term strategies, such as voluntary property buyouts and managed retreat, stressing that these approaches must be implemented thoughtfully and with careful consideration of community ties, cultural identity, and economic realities.

The steering committee members stressed that resilience planning must intentionally address existing inequities and prioritize underserved communities and vulnerable populations

Equity and community well-being were central to nearly every discussion. Participants underscored the importance of trust-building, public education, and meaningful engagement, particularly when discussing risks, relocation options, or major infrastructure investments. These conversations reinforced a shared understanding that resilience extends beyond physical improvements to strengthen social cohesion and enable all residents to benefit from resilience investments.

Housing varies significantly in terms of development pattern, housing type, age, and condition throughout the region. However, Steering Committee members had a shared opinion that design standards, regulations, and education are needed to help residents make their properties more resilient and energy efficient. Additionally, several localities pointed out that having guidance or educational materials to share with property owners on green infrastructure and impervious surfaces reduction, would be useful. Staff often receive calls and complaints about drainage issues, but often do not understand the responsibilities of local government in such cases or the actions and resources available to private property owners to address these challenges. Committee members articulated a vision for housing that is safe, affordable, and resilient, featuring energy-efficient design, solar- and EV-ready infrastructure, and protections for both renters and homeowners during hazard events. Improving housing quality and affordability was widely recognized as essential to long-term resilience.

Infrastructure investment also emerged as a key priority. Aging water, sewer, stormwater, transportation, and energy systems were broadly viewed as vulnerabilities that could compound future risks if left unaddressed. Septic systems and wastewater management generally were cited frequently as a concern. For communities in which residents have well water and septic, resources are needed for private property owners to take action. Participants supported proactive upgrades, enhanced maintenance practices, and the integration of resilient design standards to minimize disruptions during extreme weather. Crater PDC is currently exploring ways to develop a cost-share program to alleviate the financial burden of septic and wastewater challenges in low-income areas to protect both public health and water quality. Many emphasized aligning resilience priorities with existing Capital Improvement Plans as a practical and achievable pathway forward.



Figure 5.1 Identified Actions to Support Nature-Based Solutions

Participants further highlighted the critical role of natural systems in supporting resilience. Expanding tree canopy, restoring riparian buffers, increasing access to rivers and open space, and protecting environmentally sensitive lands were identified as strategies that deliver multiple benefits. These nature-based solutions were valued not only for reducing flood risk and mitigating heat, but also for improving public health, enhancing water quality, and strengthening overall quality of life.

Economic resilience was another important focus. While the region's economic development activity was recognized as a strength, Steering Committee members expressed concern about overreliance on a narrow set of industries, the impacts of automation, and ongoing workforce challenges. Participants emphasized the need to diversify the economy, expand workforce development programs, and invest in emerging industries that support sustainability, resilience, and local employment opportunities.

Finally, across all workshops, participants underscored the importance of accessible data, clear communication, and practical planning tools. Steering Committee members called for user-friendly GIS platforms, transparent vulnerability data, and public-facing educational resources

that help residents and decision-makers understand risks and solutions. Participants emphasized the importance of meeting people where they are through trusted community events, existing networks, and clear, actionable messaging. These themes reflect a Steering Committee deeply engaged in shaping a Crater *PDC Regional Resilience Plan* grounded in local experience, informed by data, and centered on collaboration, equity, and long-term preparedness for the Crater region.



Photo 5.5. Participants engaged with a range of activities to provide feedback during steering committee workshops.

6.0 REGIONAL VULNERABILITY ASSESSMENT

The Crater PDC Regional Resilience Plan is grounded in a comprehensive understanding of how climate change is already affecting, and will continue to affect, communities across the region. At the core of this effort is the vulnerability assessment, which evaluates the extent to which the Crater region's people, infrastructure, natural resources, and economic assets are exposed and sensitive to climate-related hazards. This assessment provides a data-driven foundation for identifying risks, prioritizing investments, and guiding long-term resilience strategies across jurisdictions.

This section outlines the key components of the vulnerability assessment that inform the Resilience Plan. The general framework used for this process is shared in Figure 6.1. While a summary of major findings and analytical approaches is provided here, a detailed description of the methodology, including data sources, analytical frameworks, and modeling assumptions, is available in Appendix B. Vulnerability Assessment Methodology and Scoring Framework. In addition, this section presents regional-scale insights; however, more detailed, locality-specific analyses and findings are documented within each jurisdiction's respective chapter. These localized chapters provide further context on vulnerable assets and prominent hazards. Where available, supporting maps and visualized regional-level trend information are included to provide additional context on these hazards and their potential implications for the Crater region.



Asset Inventory Complied
The original asset inventory came from the Regional Hazard Mitigatior Plan (HMP) and was refined by the steering committee.

Hazard Data Evaluated
Through a narrative format, high-threat hazards were evaluated based on historical and projected context.

Hazards Selected for Analysis
Available data for a multi-hazard analysis was considered and priority hazards were selected for geospatial analysis.

Assessment Methodology Developed
Based on the available data and plan priority, the scoring used for the vulnerability assessment was developed.

Results Evaluated and Integrated
The asset inventory was evaluated and scored for vulnerability. These results were reviewed by the steering committee and integrated into the plan.

Figure 6.1 Regional Vulnerability Assessment Methodology

6.1. Asset Inventory

The purpose of the asset inventory was to establish a reliable, locally managed dataset of critical infrastructure across the region to support the vulnerability assessment. This inventory provided the foundation for evaluating which assets are most exposed and vulnerable to climate-related hazards. The critical asset inventory was based on Plan RVA's Critical Infrastructure Mapping Project, completed during fiscal years 2023–2024. This project responded directly to a recommendation in the Richmond-Crater Multi-Region Hazard Mitigation Plan (2022), which highlighted the need to improve the quality and availability of data used for hazard assessments. The 2022 HMP relied on FEMA's HAZUS dataset, an important national tool, but one that localities cannot update or tailor to their specific infrastructure or risk context. To address this limitation, Plan RVA secured State Homeland Security Program funding to create a regional infrastructure map that can be maintained and expanded by local governments. This asset inventory served as the basis for assessing exposure in the climate vulnerability analysis.

Assets were organized into two levels to support analysis: overarching asset categories and more detailed, specific asset types. The asset categories, shown in Figure 6.2, included the following: Transportation, Food and Agriculture, Communications, Financial Services, Natural Resources, Government Facilities, Energy, Healthcare and Public Health, Emergency Services and Community Assets, and Water and Wastewater. Within each of these asset categories, there are additional asset types that provide more detailed classifications.

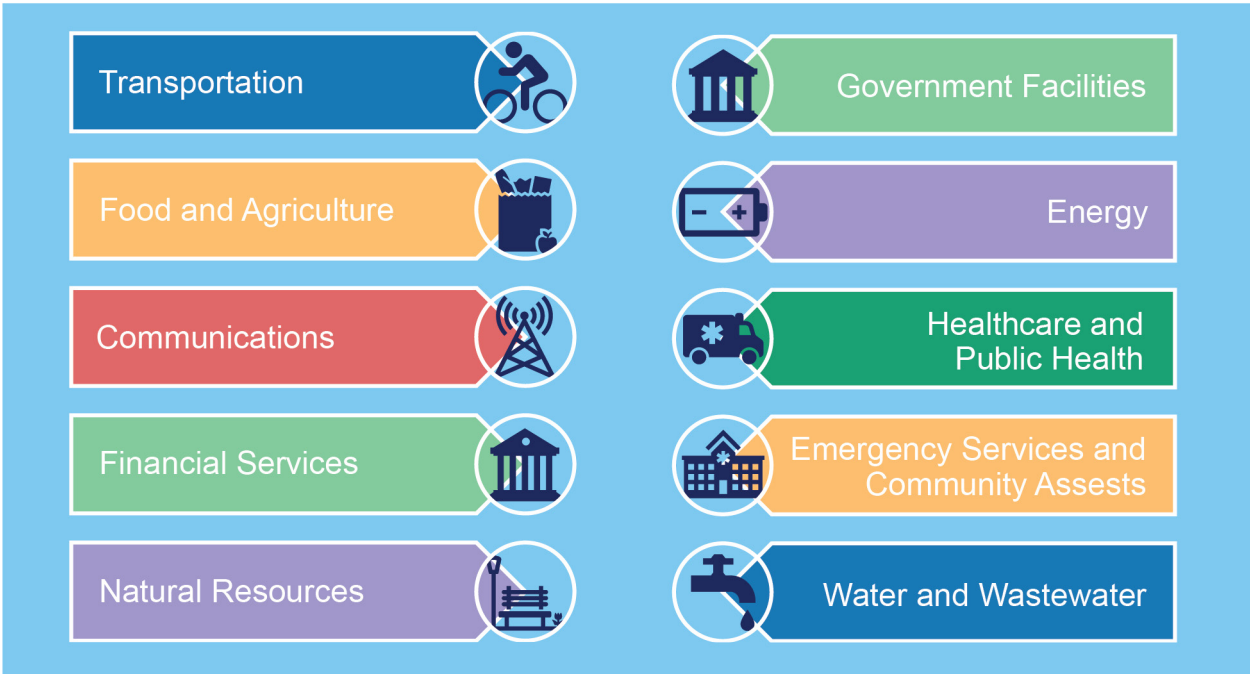


Figure 6.2 Overarching asset categories used for the asset inventory.

During the goal and objective setting workshop, the steering committee received a document outlining the asset categories. Additional information was subsequently provided via email to solicit feedback on the existing asset inventory. No further additions were submitted by the end of December 2025. The City of Hopewell sent updates to their inventory to include wastewater facilities not initially captured. Future updates may be incorporated as part of the annual update process for the Resilience Plan.

6.2. Assessment Methodology

The data utilized for Crater PDC's vulnerability assessment is available at varying resolutions. While the basis of the vulnerability assessment is a geospatial analysis, when hazard data is limited, information is provided at the regional scale in a narrative format. The analysis, both geospatial and narrative, will help guide local and regional investments, policies, and planning efforts to strengthen long-term resilience. *Appendix B. Vulnerability Assessment Methodology and Scoring Framework* provides the technical methodology and scoring framework used in the vulnerability assessment conducted for the *Crater PDC Regional Resilience Plan*.

In vulnerability assessments, typical components of evaluation are exposure, sensitivity, and adaptive capacity. The definitions of each of these components according to the U.S. Climate Resilient Toolkit are the following:

- **Vulnerability:** The propensity or predisposition of assets to be adversely affected by hazards. Vulnerability encompasses exposure, sensitivity, potential impacts, and adaptive capacity.
- **Exposure:** is defined by the presence of people, assets, and ecosystems in places where they could be adversely affected by hazards.
- **Sensitivity:** The degree to which a system, population, or resource is or might be affected by hazards
- **Adaptive Capacity:** The ability of a person, asset, or system to adjust to a hazard, take advantage of new opportunities, or cope with change

Relevant components were evaluated in Crater PDC's vulnerability assessment using indicators drawn from reputable data sources. Central to the vulnerability assessment is the asset inventory described above which serves as the foundation for applying vulnerability indicators.

6.2.1 Planning Horizon

The planning horizon is a defined time period to which plans, policies, and investments are developed and evaluated. Utilizing a time period sets an expectation for anticipating changes, assessing risks, and identifying actions, helping decision-makers align with short to long term goals. In the Crater PDC Regional Resilience Plan, the planning horizon was most useful for selecting the strength and projection of hazard events for the exposure analysis. During the Virginia Coastal Master Plan process, DCR established five planning ranges that serve as the basis for defining planning horizons. These are based on emission scenarios in the next 100 years. The selected planning horizon is shown in Figure 6.3.
These planning horizons and scenarios in more detail are the following:

- **Baseline (2020)** - Baseline data is based on historical, observed data and does not incorporate anticipated future conditions. This data serves as a point of comparison for future conditions.
- **Moderate Scenarios** - Moderate projections indicate a more likely future. They represent a "best estimate" for future conditions, suitable for decisions where more risk is acceptable. This contains near future (2030-2060) and far future (2060-2100) planning horizons.
- **High Scenarios** – High projections indicate a less likely but possible future with higher sea

level rise and precipitation estimates. These projections may be favored for use in decisions with little tolerance for risk. This contains the same planning horizons as moderate.

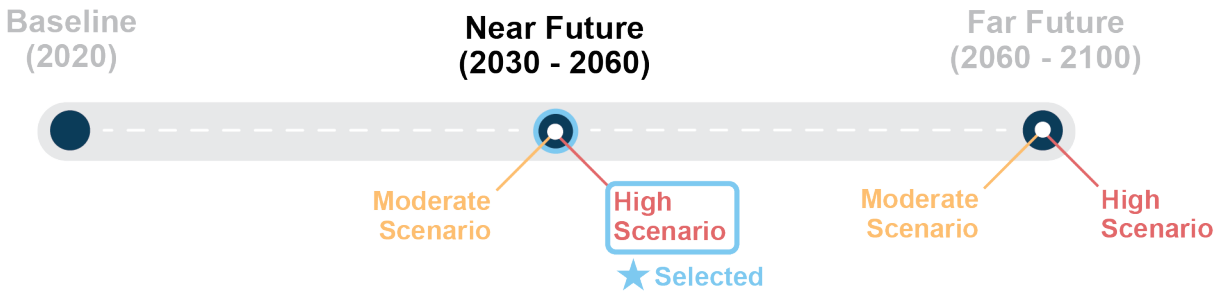


Figure 6.3 Planning horizons and scenarios aligned with Virginia DCR.

The Crater PDC Regional Resilience Plan utilizes the near future (2030-2060) planning horizon and the high scenario where applicable. This selection was made based on the proposed period that this plan will remain active. Steering committee members agreed that a ten year lifespan is appropriate, particularly given that the plan is eligible for five years under DCR requirements. Some hazards do not have future projection data available; therefore, historic or present-day data was utilized. Information on the planning horizons for specific hazard types are discussed in *Appendix B. Vulnerability Assessment Methodology and Scoring Framework*.

6.2.2 Hazard Selection and Profiles

The Team collected critical hazard data for the vulnerability assessment based on geospatially available data and alignment with the *Richmond-Crater Multi-Region Hazard Mitigation Plan*. For the exposure analysis, the vulnerability assessment scored each asset using five hazard layers from federal and state data sources for flooding, extreme heat, and wildfire. These sources were selected based on DCR's recommendations within the *Coastal Resilience Master Plan: Phase I* and best practices. Exposure to other hazards, such as wind, tornadoes, and extreme weather are explored in a narrative format with accompanying maps, as available, for regional historical or projected trends.

From the *Richmond-Crater Multi-Region Hazard Mitigation Plan* adopted in July 2022, there were fourteen hazards evaluated for the plan for the combined 26 localities between Plan RVA and Crater PDC. Of these, the highest risk were flooding, severe wind events, and tornadoes. The risk scores for these hazards are included in Figure 6.4.

This vulnerability assessment evaluated asset exposure to high and moderate risk hazards as well as wildfires. Because this is a multi-hazard vulnerability assessment, the limited availability of consistent geospatial data for non flood hazards presented challenges. Although wildfire represents a comparatively lower risk to the planning area, it was included in the assessment alongside extreme heat because reliable geospatial data were available and the hazard remains relevant to long-term community resilience and emergency preparedness planning.

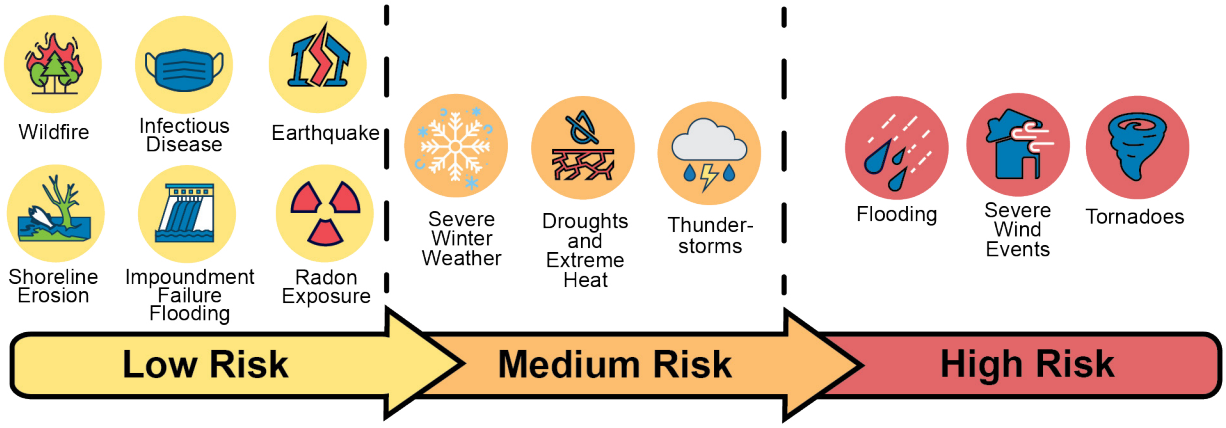


Figure 6.4 Hazard Risks in the Richmond-Crater Multi-Region HMP.

The following section includes hazard profile descriptions adapted from the *Richmond-Crater Multi-Region Hazard Mitigation Plan*, adopted in July 2022. The hazard profiles include the following:

- Flooding
- Severe Wind Events and Thunderstorms
- Tornadoes
- Severe Winter Weather
- Droughts and Extreme Heat
- Wildfires

In addition, information from *The First Virginia Climate Assessment* (November 2025), was used to inform the "Projected Changes" and "Vulnerability and Impacts" sections of the hazard profiles, as it provides current data on Virginia's changing climate.

Flooding

Flooding occurs when normally dry areas become inundated by water from overflowing rivers, tidal waters, heavy rainfall, or mudflows. Flooding can happen year-round, with higher risk in late winter and early spring due to snowmelt, ice jams, and seasonal rainfall, and in late summer from hurricanes and tropical systems. Development in flood-prone areas can increase both the frequency and severity of flooding. Flood duration varies by event, typically lasting from a few hours to several days, and generally recedes shortly after rainfall ends. Flooding may occur along all waterways, including localized areas away from major water bodies, and some areas are also vulnerable to tidal flooding from tropical storms and nor'easters (Plan RVA and Crater PDC, 2022).

The types of flooding addressed in this plan include coastal, fluvial, and pluvial flooding, each of which presents distinct causes and impacts. Coastal flooding occurs along tidal waterways and shorelines and is driven by sea level rise, storm surge, high tides, and coastal storms such as hurricanes and nor'easters. Sea level rise increases the baseline water level, allowing storm surge and tidal flooding to occur more frequently and to reach farther inland. Fluvial flooding

refers to riverine flooding that occurs when rivers, streams, or other inland waterways exceed their banks due to prolonged or intense rainfall, upstream runoff, or snowmelt. This type of flooding often affects floodplains and can persist for extended periods. Pluvial flooding results from heavy rainfall that overwhelms drainage systems or occurs faster than water can infiltrate into the ground, leading to localized surface flooding in areas that may be far from rivers or coastlines. Pluvial flooding is often associated with urbanized areas where impervious surfaces limit infiltration and can occur with little warning.

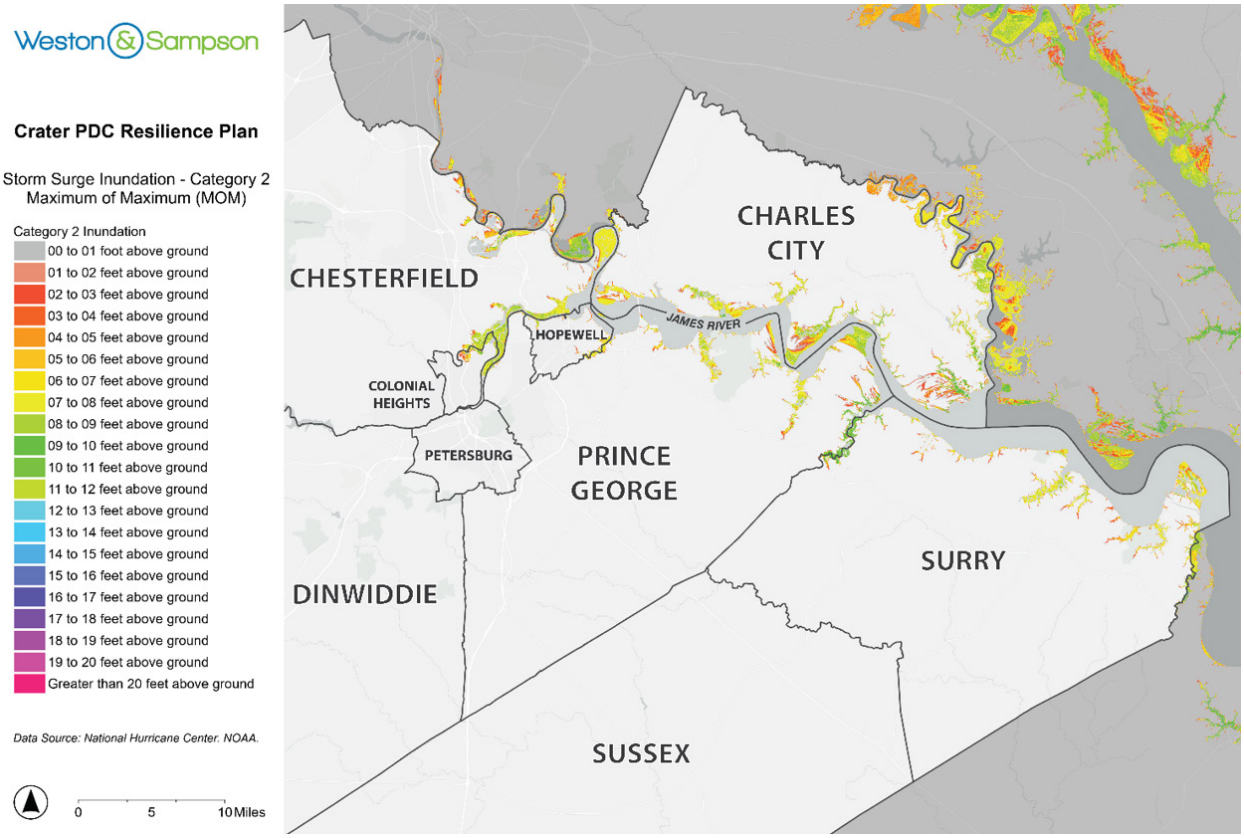


Figure 6.5. Storm surge inundation for the Crater region.

Location of Flooding

Coastal flooding directly affects only those localities situated near the mouth of the James River, where tidal influence and storm surge are present. This primarily includes Hopewell, Colonial Heights, Prince George County, Surry County, Charles City County, and Chesterfield County. Only about one percent of the Crater region's land is vulnerable to coastal flooding related to Category 2 Storm Surge Maximum of Maximum (MOM) as shown in Figure 6.5. Category 2 was selected as a future scenario anticipating more intense hurricane events.

Fluvial flooding affects localities located near rivers, streams, and other waterways. The National Flood Hazard Layer (NFHL) is a geospatial database containing current, effective FEMA flood hazard information used to support the National Flood Insurance Program (NFIP). This data provides an understanding of flood risk and the types of flooding present within a community. Within the Crater region, 13.1 percent of land area is vulnerable to fluvial flooding during the one percent annual chance flood event (100 year flood) according to effective FEMA flood maps.

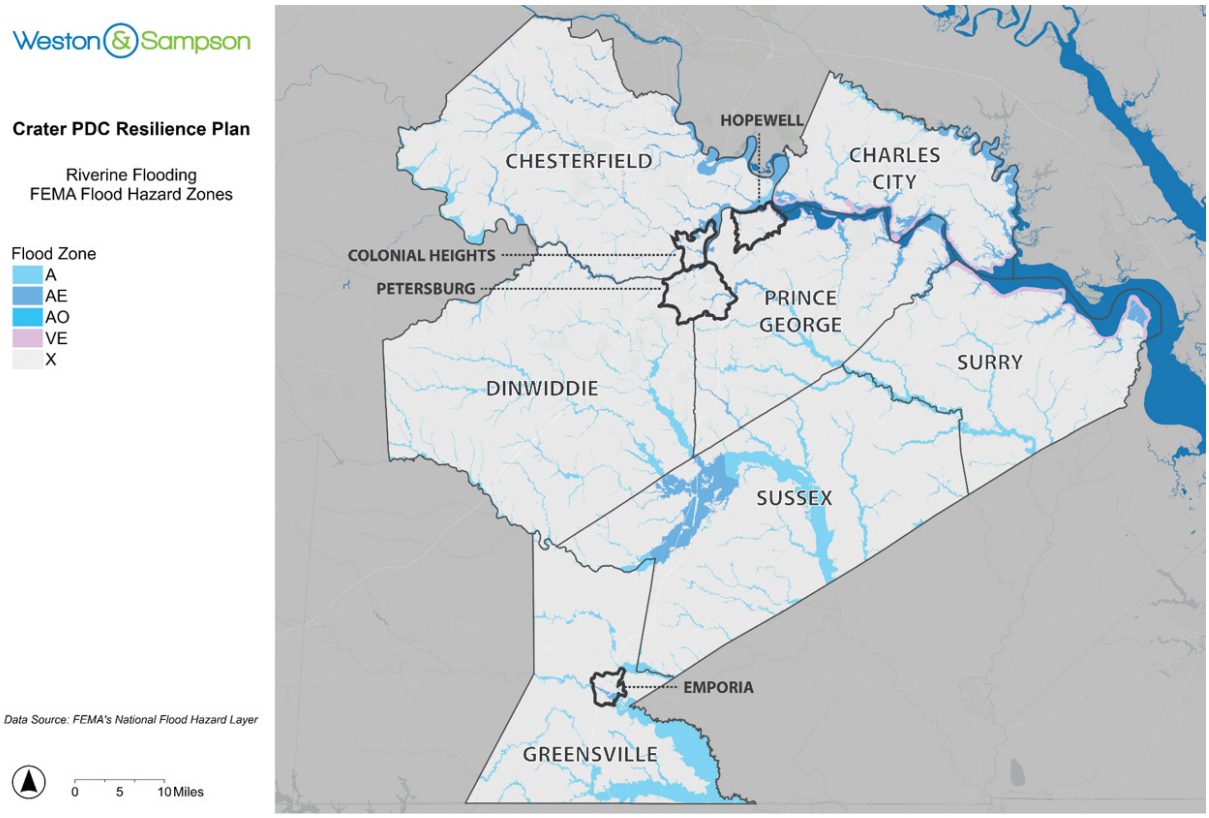


Figure 6.6 Riverine (fluvial) flooding for the Crater region.

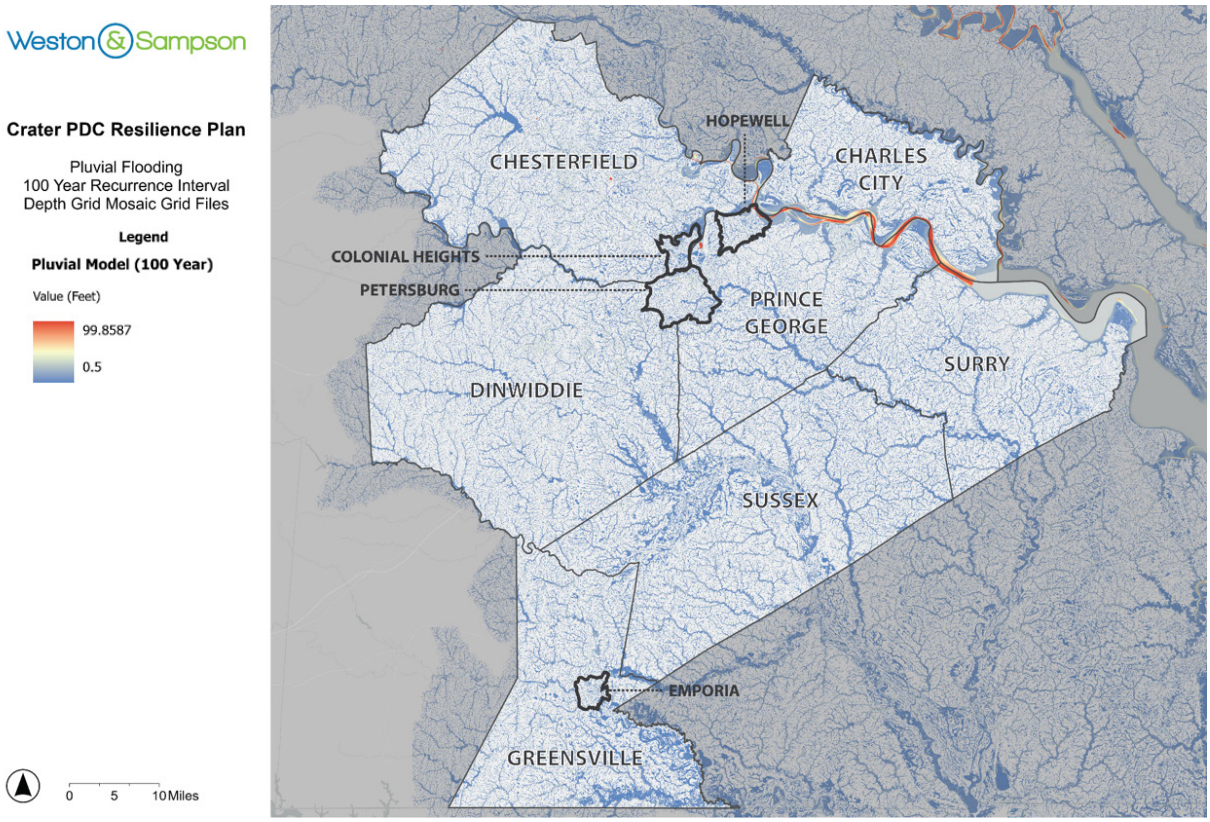


Figure 6.7 Near-Future Rainfall (pluvial) flooding 100-year recurrence for the Crater region.

These flood zones are represented as Zones A, AE, AO, and VE in Figure 6.6.

Pluvial flooding impacts every locality within the Crater region. The extent of pluvial flooding will vary depending on the topography and surface. Areas with high impervious cover and low-lying topography are most vulnerable to pluvial flooding impacts, especially those areas that also are associated with riverine flooding. 26.9 percent of the Crater region is vulnerable to pluvial flooding during the 100-year recurrence period, near-future scenario (2030 – 2060) as determined by Virginia DCR. Areas of pluvial flooding are shown in Figure 6.7.

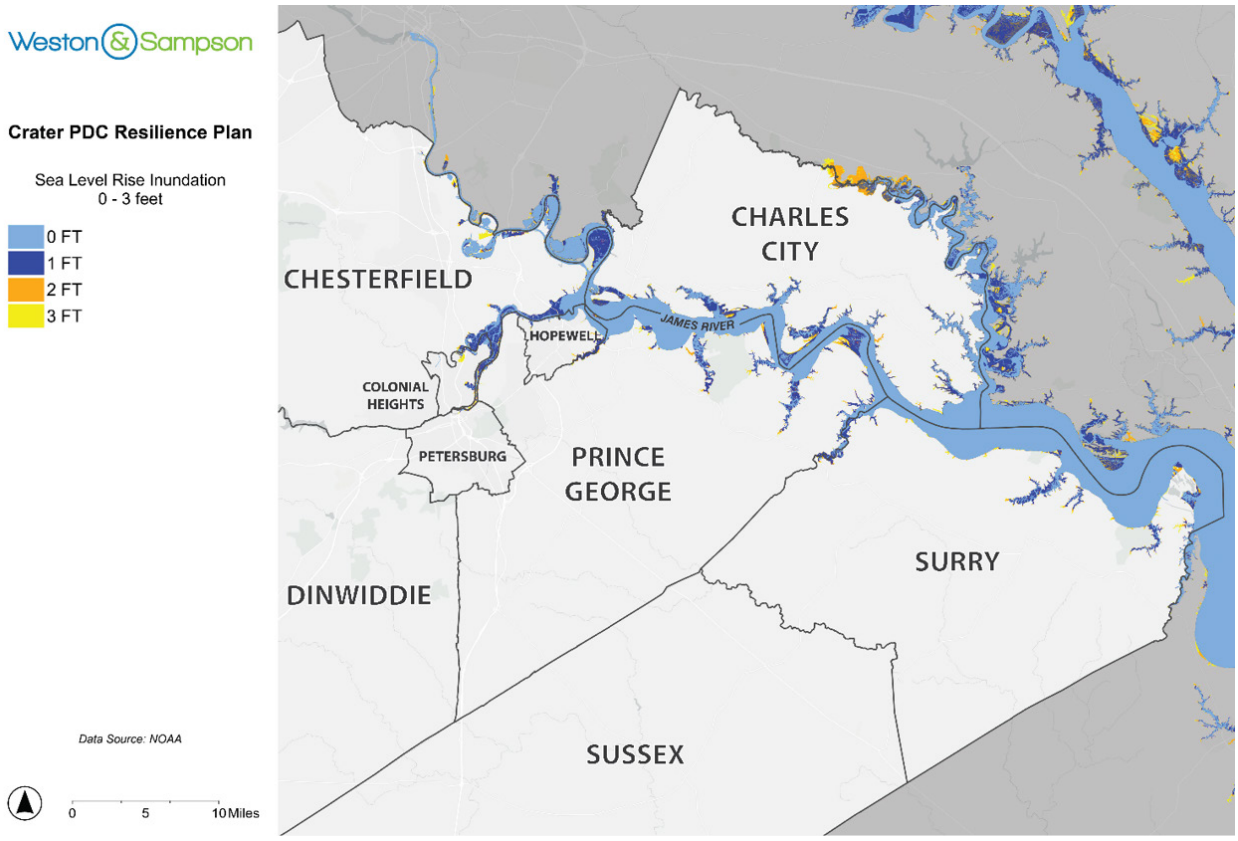


Figure 6.8 Near-Future Rainfall (pluvial) flooding 100-year recurrence for the Crater region.

Projected Changes

Sea level rise acceleration along the lower Chesapeake Bay in Virginia is among the highest on the U.S. East Coast according to *The First Virginia Climate Assessment*. Flood frequency and severity are expected to increase as sea levels rise and land subsidence continues. Events such as moderate storms or high tides that previously posed little to no risk, in the future, may be capable of flooding streets and coastal areas. Rising sea levels are expected to increase the frequency and extent of tidal inundation, especially during drought years when reduced freshwater river flows allow saltwater to push farther inland.

Pluvial and fluvial flooding have caused widespread damage within the Commonwealth due to intense and frequent rainfall, land use changes, and aging stormwater infrastructure. There is consistent evidence that heavy rainfall and changes in land use are likely contributing to more frequent riverine flooding in upland Virginia.

Communities are experiencing flooding due to the compounding effects of coastal, riverine, and rainfall hazards. Virginia coastal areas also experience frequent lower magnitude nuisance flooding, disrupting daily life in many ways including infrastructure impacts to commuter roadways, economic hardship of property damage, agricultural losses, saltwater intrusion, and public health concerns with failing septic systems and wastewater overflow.

The First Virginia Climate Assessment acknowledges that coastal regions in the Chesapeake Bay watershed, including the Crater region, are expected to become wetter in the summer, spring, and fall under both moderate (RCP4.5) and high (RCP8.5) emissions scenarios for the period 2066–2095, relative to the 1976–2005 baseline. Figure 6.9 shows the average seasonal total precipitation change from this historic baseline to a recent time frame to be around 30 percent for the region as determined by the Mid-Atlantic Regional Integrated Sciences and Assessments (MARISA).

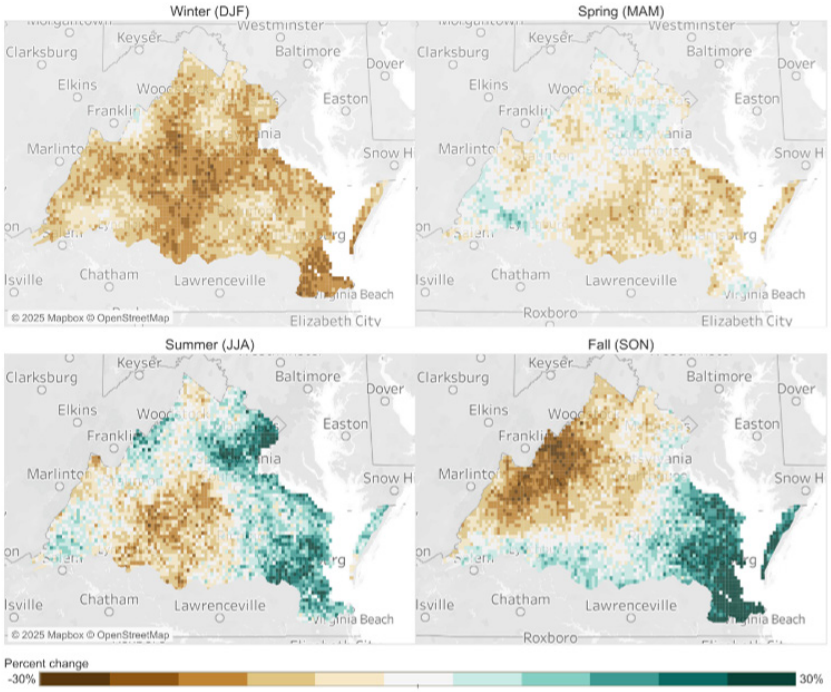


Figure 6.9 Change in average seasonal total precipitation from 1976 - 2005 baseline to 2006 - 2017 (MARISA).

Vulnerabilities and Impacts

Flooding in Crater PDC presents significant and evolving risks due to climate change, sea level rise, and increasingly intense precipitation events. Flood risk in Virginia is unevenly distributed due to a combination of climate and non-climate factors. Climate-related factors, such as rising rainfall, temperatures, and sea levels, are both intensifying current flood hazards and generating flood risk in locations that have not previously faced them. Non-climate factors, including land cover changes, historical investment and divestment patterns and existing social and economic disparities, shape vulnerability by influencing outreach capacity, leadership development, and community advocacy (USGCRP, 2024).

Coastal flooding primarily affects localities near the mouth of the James River, where rising sea levels and storm surge increase the frequency and extent of inundation. In urban areas, fluvial and

pluvial flooding are expected to intensify as more frequent and heavier rainfall events overwhelm existing stormwater systems, leading to roadway flooding, access and safety challenges, and impacts on water quality and treatment capacity.

The Virginia Academy of Science, Engineering, and Medicine (VASEM) identified sea level rise as the most immediate climate-related concern for Virginia's coastal areas in their June 2021 report, The Impact of Climate Change on Virginia's Coastal Areas. Recurrent flooding is projected to disproportionately affect vulnerable populations, including racial and ethnic minorities, low-income households, older adults, renters, individuals with limited English proficiency, and people with mobility challenges.

In addition to social vulnerabilities, critical infrastructure and environmental assets are at risk. Facilities regulated for toxic and hazardous substances, such as septic systems particularly along the James River, face increased exposure with sea level rise. In rural areas, flooding may degrade soil quality, cause waterlogging, increase salinity from saltwater intrusion, and contribute to septic system failures, posing public health risks.

Stormwater management systems are increasingly strained by intense and concentrated rainfall events, which reduce their capacity to collect, convey, treat, and discharge runoff. High tides, amplified by sea level rise, can further impede discharge points, exacerbating localized flooding. These changing patterns of flooding have implications for water resource management, infrastructure planning, and emergency preparedness across the region.

Severe Wind Events and Thunderstorms

Tropical cyclones are organized low-pressure systems over tropical or subtropical waters characterized by cyclonic wind circulation and strong convection. Rotating counterclockwise in the Northern Hemisphere, these systems are classified based on wind speed as tropical depressions (less than 39 mph), tropical storms (39–73 mph), or hurricanes (74 mph or higher). They produce severe winds, heavy rainfall, thunderstorms, lightning, storm surge, high waves, coastal erosion, and sometimes tornadoes, causing both direct and hydrologic impacts such as flash flooding, riverine flooding, and damage to buildings and power infrastructure. Hurricanes in the North Atlantic occur from June through November, peaking between mid-August and mid-October, with average landfall durations of 12 to 18 hours. Tropical storms can produce intense rainfall in short periods, as seen in the Crater region during Tropical Depressions Camille, Isabel, and Gaston, leading to flash floods, mudslides, and prolonged river flooding. Coastal flooding from storm surge can push inland, especially in flat areas with limited drainage.

Other extreme wind events, including derechos and nor'easters also pose significant risks. Nor'easters, typically occurring in fall and winter, can produce hurricane-force winds, heavy rain or snow, high surf, coastal erosion, and flooding along Eastern U.S. coastlines. Extreme winds from any of these events can damage buildings, down trees and utility poles, disrupt transportation, and cause widespread power outages, with mobile homes and weakened trees particularly vulnerable. Secondary hazards include flying debris, hazardous road conditions, and prolonged interruptions to business operations and emergency services.

Thunderstorms form when air masses with different temperatures and moisture levels collide. All thunderstorms produce lightning, and strong updrafts can carry water droplets to high, freezing levels of the atmosphere, where they become hail. These hailstones can fall with enough force to injure people and animals, as well as damage property. In Virginia, thunderstorms can occur

year-round but are most frequent during summer afternoons and evenings.

Location of Severe Wind and Thunderstorm Events

The Crater region falls within a 90-mph wind zone according to the American Society of Civil Engineers' Minimum Design Loads for Buildings and Other Structures (ASCE 7), based on a 50-year recurrence interval. For a 100-year event, ASCE 7 estimates the potential wind speed at 107 percent of the 50-year value, or approximately 96.3 mph. The Virginia Uniform Statewide Building Code (VUSBC) sets a minimum design wind speed of 90 mph (Plan RVA and Crater PDC, 2022).

High wind events have been observed throughout the region, and there are no reliable indicators to predict precisely where they will occur. Wind events can be widespread, potentially impacting the entire area. Counties on the eastern side, being closer to the coast, may experience higher wind speeds from tropical storms or nor'easters affecting Virginia and North Carolina. Localities in the Crater region have historically experienced primarily Category 1 hurricanes. More recently, the region has been affected by Hurricanes Elsa (2021), Zeta (2020), and Isaias (2020). Tropical storms and depressions occur more frequently than hurricanes, with recent events including Tropical Storm Ophelia (2023) and Tropical Storm Nestor (2019) (NOAA, n.d.).

While most common in the Southeast and parts of the Midwest, thunderstorms occur fairly regularly throughout the region and have been documented in every month of the year. The entire central Virginia region is considered equally susceptible to severe thunderstorms and related hazards, including hail and lightning damage.

Projected Changes

Specific projections of future average wind speed changes across Virginia are limited, and climate models generally show little consistent change in mean annual wind speeds across many U.S. locations (Wu, Bessac, Huang, & Wang, 2022).

The likelihood of hurricanes slowing or stalling near the coast has increased, which can worsen rainfall-related flooding. However, the extent to which climate change influences the stalling of tropical storms remains uncertain, though some climate models suggest Atlantic storms, including those near the Southeast U.S. coast, may slow down under warming conditions. Rapidly intensifying hurricanes have also created challenges for timely evacuations, and evidence suggests that the frequency of rapid intensification in Atlantic hurricanes may be rising due to long-term human-caused climate change. It is also predicted that unrestricted exurban and suburban sprawl will increase exposure of human development to severe thunderstorms and hurricanes (USGCRP, 2024).

Vulnerabilities and Impacts

Data from the Department of Energy and NOAA show that more than 94 percent of Virginia's major outages since 2000 have been associated with hurricanes, ice storms, and severe storms (Ruess, et al., 2025). Additionally, tropical storms and hurricanes have been responsible for some of the Southeast's biggest and most damaging flooding events since 2018 (USGCRP, 2024).

Extreme wind and thunderstorm events pose significant risks to communities and infrastructure across Virginia. Tropical storms and hurricanes can produce sustained high winds, gusts exceeding 70 mph, and powerful storm surges, leading to structural damage, downed trees, power outages, and hazardous debris. Rapidly intensifying storms can challenge evacuation efforts and exacerbate flooding impacts. Severe thunderstorms, while generally smaller in scale, can generate intense straight-line winds, tornadoes, and hail, causing localized but often significant damage to homes, vehicles, and utility infrastructure. In addition to physical destruction, these high-wind events disrupt transportation, communications, and critical services, with mobile homes, older structures, and vulnerable trees being particularly at risk.

Tornadoes

A tornado is a violent windstorm marked by a twisting, funnel-shaped cloud that extends to the ground. Tornadoes typically form during thunderstorms when cool, dry air overrides warm, moist air, forcing the warm air to rise rapidly. Damage from tornadoes results from both high wind speeds and wind-blown debris, often accompanied by lightning or large hail. Tornado wind speeds normally range from 40 to over 200 mph, with the most extreme tornadoes (EF5) exceeding 200 mph and capable of causing catastrophic destruction, turning ordinary objects into deadly projectiles (Plan RVA and Crater PDC, 2022).

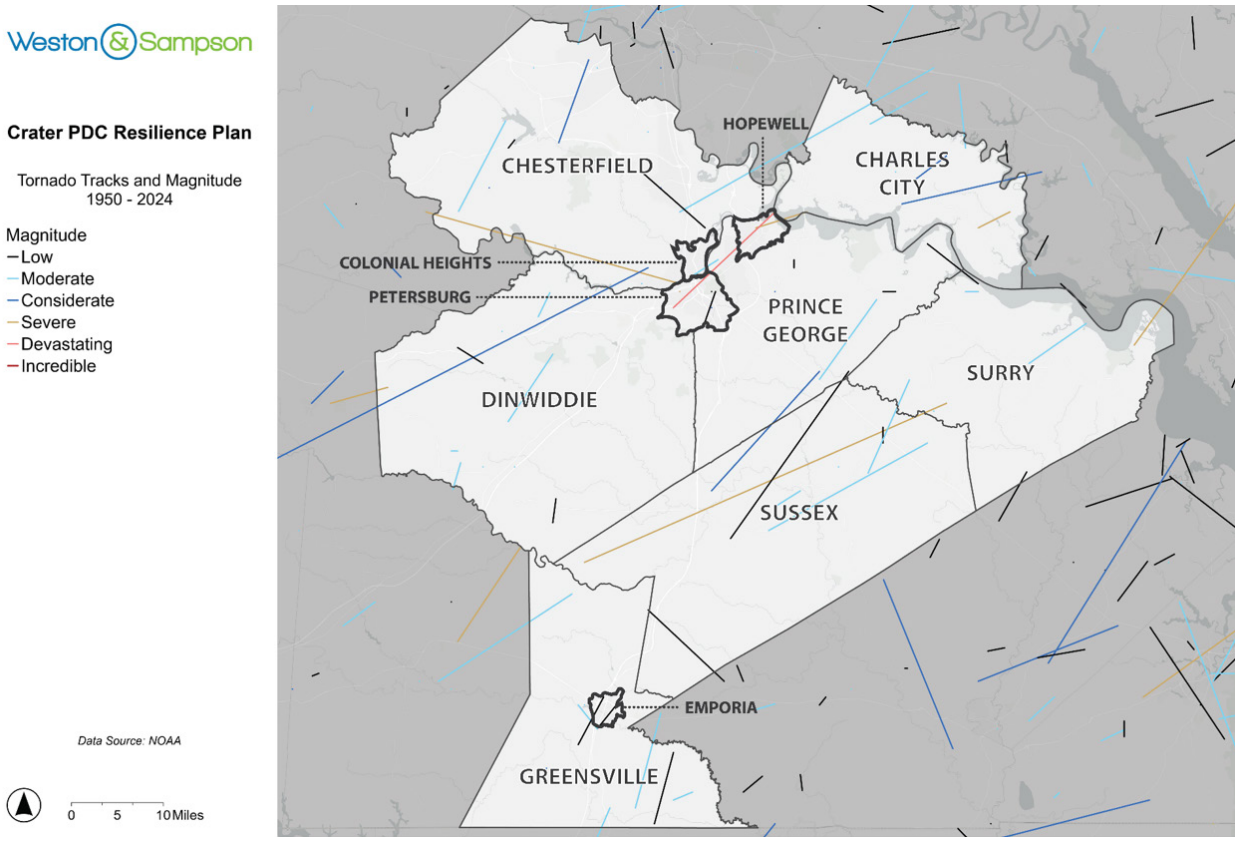


Figure 6.10 Tornado tracks and magnitude for the Crater region.

Location of Tornadoes

In Virginia, historically varied in distribution across the region, the likelihood of a tornado affecting any jurisdiction is generally similar (Plan RVA and Crater PDC, 2022). Low-intensity tornadoes

are the most common in Virginia, while stronger tornadoes are rare, with occasional high intensity events recorded. Tornadoes associated with tropical cyclones tend to be somewhat more predictable, forming near the storm's perimeter, typically to the right and ahead of its center, as it comes ashore. These tornadoes often occur in large outbreaks and generally move eastward. Tornado tracks of different magnitudes that have occurred in the region are shown in Figure 6.10.

Projected Changes

Currently, climate scientists are cautious about claiming a clear long term increase in the frequency or severity of tornadoes overall due to climate change. Tornado datasets are limited, and year to year variability is high, making trends difficult to isolate from improved detection and reporting. However, it is predicted that unrestricted exurban and suburban sprawl will increase exposure of human development to tornadoes (USGCRP, 2024).

Vulnerabilities and Impacts

Although high-intensity tornadoes are rare in the Crater region, they can cause widespread destruction along their path. Homes built before modern building codes, bridges, and above-ground power lines in commercial areas can be heavily damaged. Vehicles, personal property, and landscape features like trees, fences, and shrubs are also at risk. Downed trees can block roadways, disrupting traffic and access for emergency response. Manufactured homes are especially vulnerable, particularly those installed prior to building code requirements for foundation tie-downs. Old Dominion University has studied the relationship between manufactured homes and tornado trends. Studies overlaying tornado trends since 1950 with concentrations of manufactured homes show that Emporia, Greensville County, Sussex County, and Surry County have both increased tornado activity and a high proportion of mobile homes, highlighting particularly vulnerable areas (Plan RVA and Crater PDC, 2022).

The vulnerability of critical facilities depends largely on their construction type, with wood-framed buildings being more susceptible to damage than steel, brick, or concrete structures. Urbanized areas such as Petersburg may experience more overall damage due to higher population and building density, although tornado risk is considered uniform across the region (Plan RVA and Crater PDC, 2022).

Severe Winter Weather

Winter storms in the Crater region range from moderate snow over a few hours to blizzard conditions lasting several days. These storms may include snow, sleet, freezing rain, or a mix, often accompanied by low temperatures and impaired visibility. Sleet can accumulate on roadways, while freezing rain forms ice on roads, power lines, and trees, creating significant hazards even at small accumulations. Impacts frequently include vehicle accidents, stranded motorists, downed trees, power and communication outages, and disruptions to schools, businesses, and community services. Secondary roads often remain untreated for days due to limited snow removal resources, which can particularly affect vulnerable populations. Nor'easters can exacerbate winter storms by adding coastal flooding and shoreline erosion in localities situated near the mouth of the James River. Heavy, wet snow increases the risk of roof collapse and utility failure, while dry, powdery snow presents less structural risk but still complicates transportation. Additional hazards include frostbite and other cold-related health risks, damage to livestock and crops, frozen water pipes, and blocked roadways from ice-laden debris. Overall, while property damage from winter storms is typically limited, the combination of ice, snow, and extreme cold can severely disrupt critical

operations and pose ongoing safety, health, and infrastructure challenges (Plan RVA and Crater PDC, 2022).

Location of Severe Winter Weather

The Crater region has been impacted by varying degrees of snowstorms and ice storms over the last century. Generally, more winter weather events were reported for western localities (Plan RVA and Crater PDC, 2022).

Projected Changes

Severe weather events are increasing in frequency and duration in the Commonwealth, causing heavier precipitation that includes snow (Ruess, et al., 2025). NOAA's National Centers for Environmental Information (NCEI) reports that heavy seasonal snow and extreme snowstorms have occurred more often as the climate has changed, with about twice as many extreme snowstorms in the eastern two thirds of the contiguous U.S. in the latter half of the 20th century compared to the first half. Warmer than average Atlantic Ocean surface temperatures can increase moisture supply and intensify storms (NOAA, 2016).

Vulnerabilities and Impacts

Severe winter weather can be particularly challenging for vulnerable populations, especially residents living in substandard housing, those who cannot easily access alternative shelter during events, and individuals located far from heating centers during power outages. Transportation impacts are especially severe when vulnerable people rely on public transportation and those routes are interrupted by snow or ice accumulation (Plan RVA and Crater PDC, 2022).

There is very strong evidence that climate and weather hazards, such as severe winter weather, are the primary cause of outages in Virginia. Data from the Department of Energy and NOAA show that more than 94 percent of Virginia's major outages since 2000 have been associated with hurricanes, ice storms, and severe storms (DOE, 2021; Axios Richmond, 2024).

Droughts and Extreme Heat

Within the Commonwealth, drought can take several forms, with agricultural drought being the most common in the Crater region. Agricultural drought occurs when dry conditions affect crops during the growing season, while meteorological drought is defined as six or more months of precipitation below 75 percent of normal. Drought severity varies based on a community's dependence on specific water sources, and its occurrence is difficult to predict (Plan RVA and Crater PDC, 2022).

Extreme heat is also a major climate stressor in the Crater region. A heat wave is a prolonged period of excessive heat, often with high humidity. Extreme heat occurs when temperatures remain at least 10 degrees above average for several weeks (Plan RVA and Crater PDC, 2022).

Combined heat and drought conditions create compounding risks. High temperatures accelerate soil moisture loss, intensify water demand, and reduce agricultural productivity, while drought stressed landscapes can make communities more vulnerable to wildfire.

Location of Drought and Extreme Heat

The Crater region has experienced periods of drought and extreme heat in the past. These periods of drought typically occur broadly rather than in isolated locations, with impacts felt across urban,

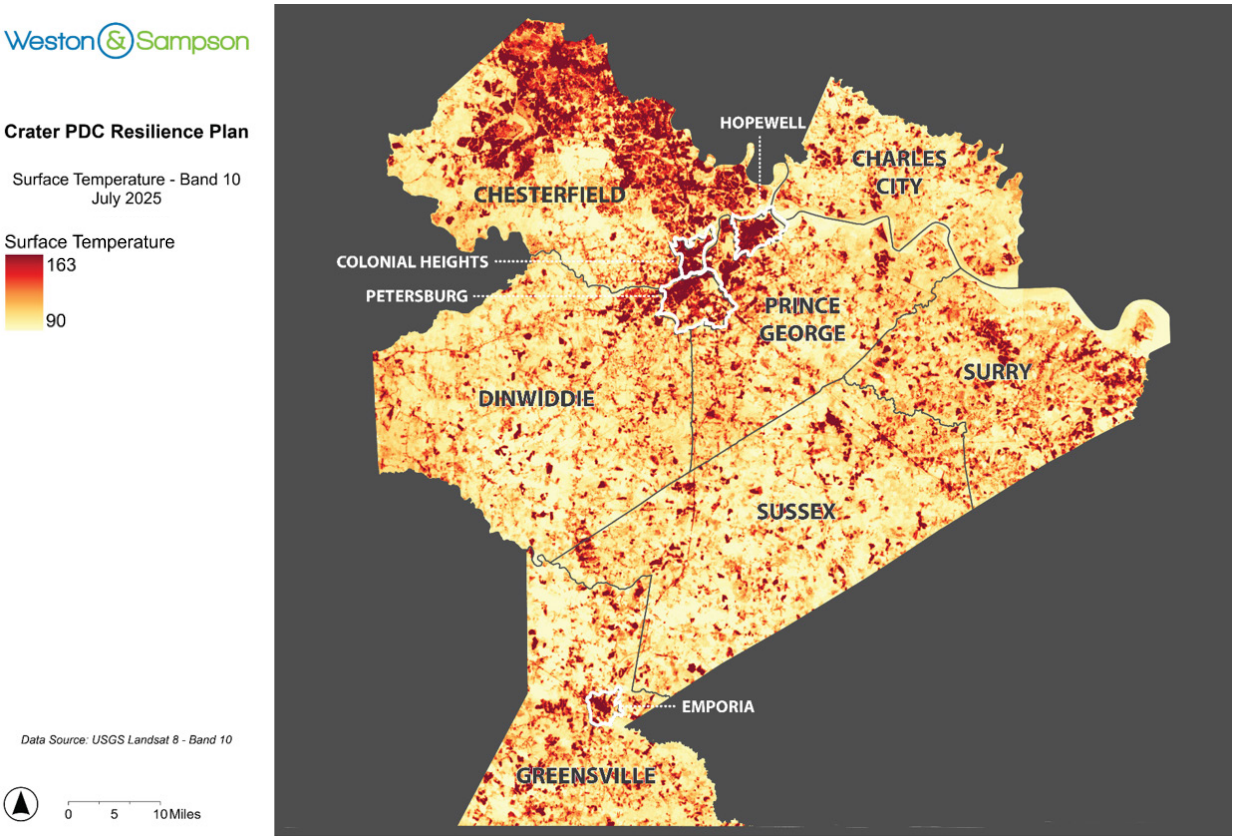


Figure 6.11. July 2025 Surface Temperatures across the Crater region.

suburban, and rural areas. Drought conditions tend to be more pronounced in agricultural areas, regions dependent on surface water or shallow groundwater supplies, and locations with limited water storage capacity. The trends in drought conditions from 2020 to 2026 are shown in Figure 6.12, with a map of severe drought conditions present in June 26, 2026 for the Crater region. Drought conditions observed in June 2026 were among the most severe experienced across the region in more than two decades, highlighting the increasing variability and intensity of climate-related hazards affecting the Crater region.

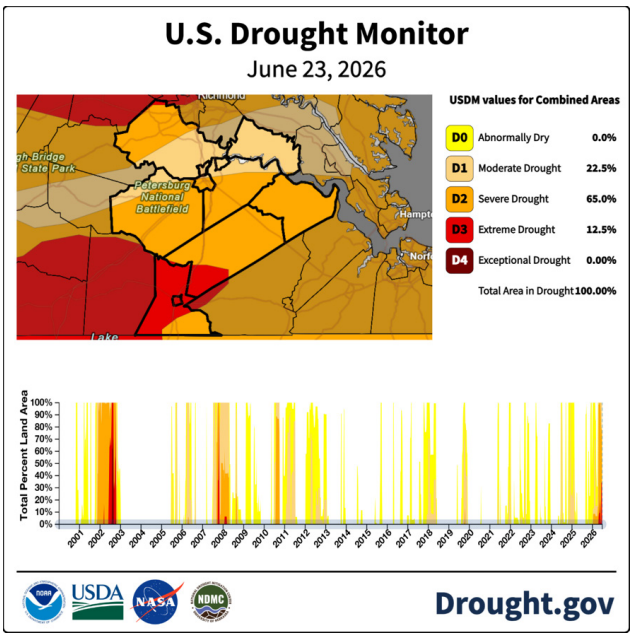


Figure 6.12 U.S. Drought Monitor Data

Extreme heat events are often most severe in densely developed areas, where extensive impervious surfaces and limited tree canopy contribute to elevated temperatures. This pattern is illustrated in Figure 6.11, which shows higher surface temperatures concentrated in and around the Tri-Cities in the northern portion of the region.

While extreme heat events are known to have occurred based on local experience

and regional observations, they are not currently documented in the NOAA National Centers for Environmental Information (NCEI) database. As a result, historical records may underrepresent the frequency or severity of drought and extreme heat impacts within the Crater region, highlighting the importance of incorporating local knowledge and supplementary data sources when assessing these hazards.

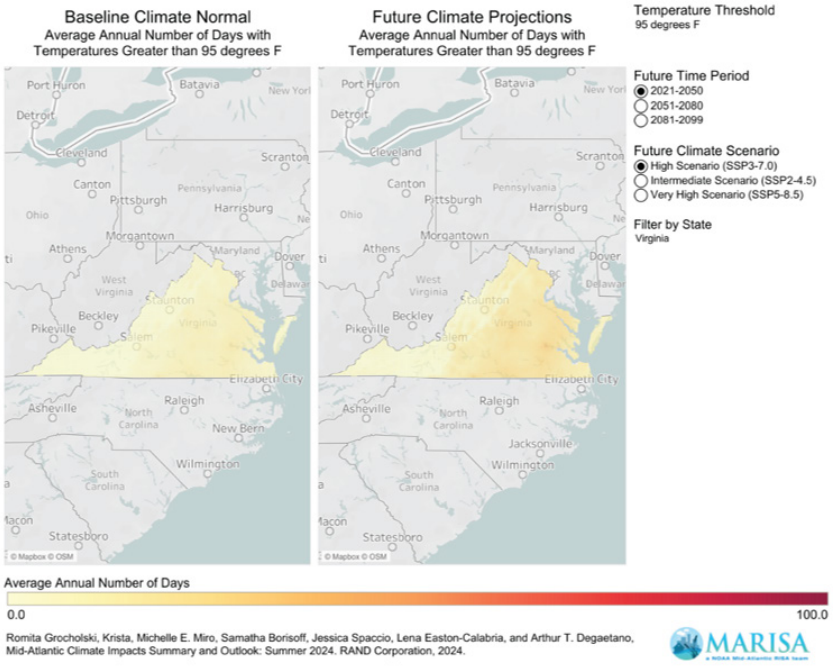


Figure 6.13. Climate normal vs. project for days 95°F (35°C) in the near-future time period.

Projected Changes

Extreme heat has increased throughout the 21st century in Virginia. The First Virginia Climate Assessment has identified a high of 0.29°F (0.16°C) per decade across nearly the entire Commonwealth since 1950. Future projections associated with extreme heat indicate 10 to 50 days above 95°F (35°C) by the end of the century (Ruess, et al., 2025). As shown in Figure 6 8, this trend is supported by projections developed through the NOAA Mid Atlantic Regional Integrated Sciences and Assessments (MARISA), which indicate that the average annual number of days above 95°F (35°C) is expected to increase in the Crater region during the near future planning horizon (2021–2050).

Wildfires

Location of Wildfires

Wildfires are defined as any fire that occurs in a wildland area, such as grasslands, forests, or brushlands, excluding prescribed burns. While wildfires are a natural part of ecosystem management, they can also result from natural or human causes. More than 80 percent of forest fires are caused by negligent human behavior, including smoking in wooded areas or failing to properly extinguish campfires, with lightning being the second most common cause. Wildfires are categorized into three classes: surface fires, ground fires, and crown fires. Surface fires, the most common type, burn along the forest floor, moving slowly and damaging or killing trees. Ground fires, often started by lightning or human activity, burn on or below the forest floor. Crown fires

spread rapidly, moving along the tops of trees and driven by wind. Wildfires are typically identified by dense smoke that can extend for miles. The likelihood of wildfire depends on local weather conditions, human activities such as camping, debris burning, and construction, and the level of public adherence to fire prevention measures. Drought and other natural disasters, including hurricanes, tornadoes, and lightning, increase wildfire probability by creating additional fuel in both urban and rural areas. Damage from storms can further exacerbate fire risk by blocking access roads and fire breaks, downing power lines, and damaging infrastructure (Plan RVA and Crater PDC, 2022). Wildfire risk is often concentrated in areas where human development occurs in close proximity to, or is interspersed with, wildland vegetation, collectively known as the wildland–urban interface (WUI). Within the WUI, two primary development patterns are identified: intermix zones and interface zones, shown in Figure 6.14. Intermix zones are areas where structures are dispersed within wildland vegetation, embedding buildings in fire prone landscapes and increasing exposure to flames, embers, and evacuation or suppression challenges. Interface zones are more densely developed areas located adjacent to large, contiguous wildland areas; although structures are not fully surrounded by vegetation, their proximity to wildlands places them at elevated risk from fast moving wildfires (Schug, Carlson, & Bar-Massada, 2023).

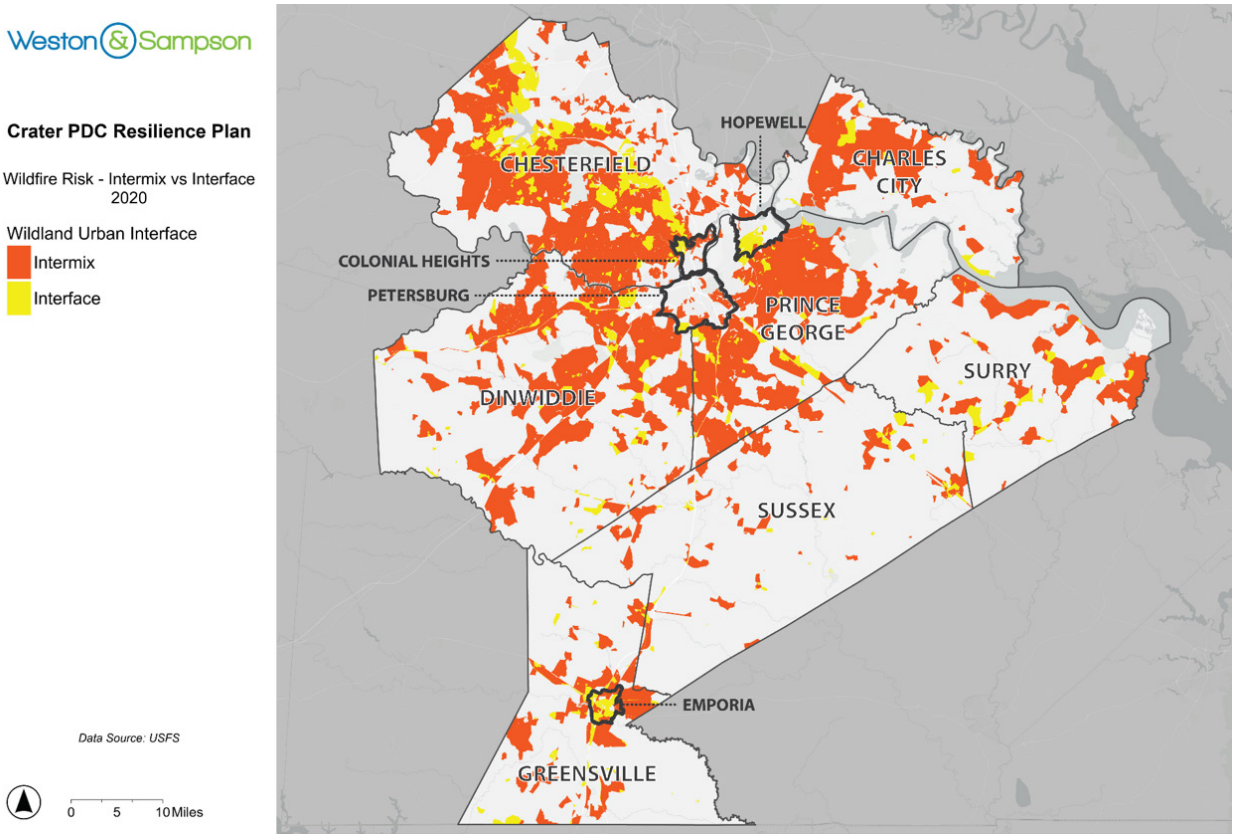


Figure 6.14 Wildfire risk (wildland-urban interface) across the Crater region.

Projected Changes

It is predicted that unrestricted exurban and suburban sprawl will increase exposure of human development to wildfires (USGCRP, 2024).

Vulnerabilities and Impacts

Wildfires in the Crater region have significant economic, public safety, and environmental impacts. Economically, they can destroy homes, businesses, and infrastructure, displacing residents and

requiring substantial resources for firefighting, recovery, and rebuilding. Wildfires also threaten the lives of residents and firefighters, particularly in areas with limited or blocked access. Environmentally, wildfires degrade air, water, and soil quality. Smoke poses health risks even for those far downwind, while burned soils can lose organic value, repel water, and increase runoff. These changes can reduce groundwater recharge, harm water quality, and elevate the risk of flooding and landslides during heavy rain events

6.3. Regional Assessment Findings

The following section summarizes the regional climate vulnerability findings, highlighting where climate related hazards and social vulnerability pose the greatest risk to assets across the Crater region. These results reflect combined exposure and sensitivity patterns identified through the scoring framework and provide a broad understanding of where vulnerability is most concentrated at the regional scale. In addition to this regional overview, each locality will receive its own high level vulnerability assessment in the Crater PDC Regional Resilience Plan, including a summary of priority areas and high priority hazards, asset specific vulnerabilities, and tailored actions to support local decision making and resilience planning.

6.3.1 Vulnerable Assets

The final vulnerability scores ranged from 0 to 34, reflecting the combined total of exposure (0–24 points) and sensitivity (0–10 points). These final scores were then classified into five vulnerability categories: Very Low, Low, Moderate, High, and Very High. Equal-interval buckets were selected because the scoring framework already incorporates weighting that elevates certain indicators, such as flood risk or social vulnerability, based on priority, implementation goals, and hazard likelihood. These indicators and their scores are explained in Appendix B. Vulnerability Assessment Methodology and Scoring Framework. The Very High category was designed to span the upper end of the scale since the highest observed asset score in the dataset reached 32 points. The full set of category thresholds is outlined in Table 6.1.

Table 6.1. Vulnerability Categories and Scoring

Category	Scoring Points	Number of Point Assets	Combined Miles of Roads
Very High Vulnerability	25 – 34	275	319.12
High Vulnerability	19 – 24	1,647	1,639.6
Moderate Vulnerability	13 – 18	3,987	1,956.4
Low Vulnerability	7 – 12	9,969	1,651.0
Very Low Vulnerability	0 – 6	3,987	762.0

Locality specific information for high scoring assets, those that scored as High or Very High Vulnerability area provided in the corresponding locality chapters. Additionally, each locality has been provided with the corresponding vulnerability assessment Excel file, which contain the underlying asset-level data and scoring results used in the assessment. These files allow local staff to review individual asset scores, understand the factors contributing to vulnerability rankings, and conduct more detailed analyses to support project development, grant applications, and local resilience planning efforts.

What do Vulnerability Scores Mean?

Vulnerability scores are intended to support relative comparison across assets within the Crater region rather than predict the probability of failure or damage. For example, an asset classified as High or Very High Vulnerability is considered more vulnerable than other assessed assets because it may be exposed to multiple hazards, serves critical community functions, and/or is located in an area with elevated social vulnerability. Conversely, a Low or Very Low Vulnerability score does not imply the absence of risk, but rather that the asset exhibits lower combined exposure and sensitivity relative to other assets evaluated in this assessment.

Importantly, these scores are not engineering-level risk assessments, damage estimates, or loss projections. The methodology does not evaluate adaptive capacity measures, such as asset condition, structural integrity, design capacity, replacement costs, or the likelihood of asset failure during a specific hazard event. Instead, the scores provide a regional-scale screening tool to identify potential areas of concern and prioritize assets for future planning, investment, and more detailed technical analysis.

Within the Crater region, very high and high vulnerability assets included representation from all broad asset categories, which include Transportation, Food and Agriculture, Communications, Financial Services, Natural Resources, Government Facilities, Energy, Healthcare and Public Health, Emergency Services and Community Assets, Healthcare and Public Health, and Water and Wastewater. Further breakdown of how specific assets scored for vulnerability in each locality are included in Chapter 8: Locality Resilience Plans.

The locations of very high and high vulnerability assets at the regional scale are shown in Figure 6.14. Numerous transportation infrastructure assets, including bridges, culverts, and roadways, fall within the highest scoring categories, reflecting their exposure to combined flooding hazards. Similarly, multiple dams ranked as highly vulnerable due to their exposure to pluvial and fluvial flooding. Aviation facilities, particularly airports in Chesterfield, Greensville, and Emporia, also emerged as vulnerable, primarily to pluvial flooding, with some facilities additionally exposed to coastal flooding, extreme heat, and wildfire risk. Several water treatment plants in Charles City, Chesterfield, and Petersburg score highly vulnerable due to combined exposure to pluvial and riverine flooding along with wildfire risk. Beyond core infrastructure, the findings highlight vulnerability among community-serving and institutional facilities, many of which support daily needs and emergency response. This included highly vulnerable public and private schools, medical facilities, nursing homes, pharmacies, and Commonwealth of Virginia (COVA) agency facilities.

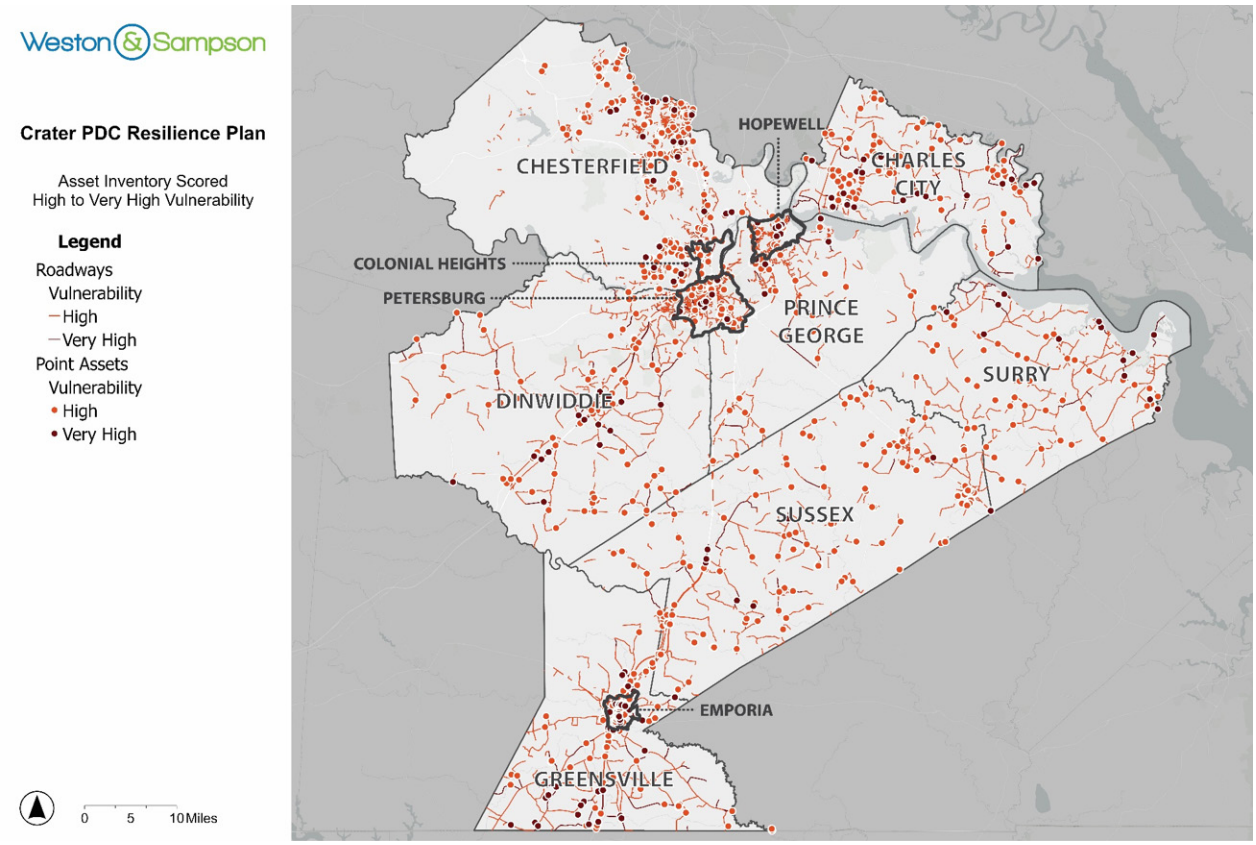


Figure 6.14 Assets identified as "High" or "Very High" Vulnerability in the Crater region.

6.3.2 Vulnerable Areas

To illustrate how vulnerability varies across the Crater region, a bivariate analysis of hazard exposure and social vulnerability (sensitivity) was performed. This method evaluated both dimensions simultaneously, rather than in isolation, allowing for clearer identification of locations where high hazard exposure overlapped with populations that may have fewer resources or a reduced capacity to prepare for, respond to, and recover from hazard events. The bivariate framework also distinguished areas with high hazard exposure but relatively lower social vulnerability from those with lower exposure but heightened social vulnerability, providing a more nuanced understanding of regional vulnerability patterns.

This analysis was conducted in ArcGIS Pro using the tessellation tool, which generated a uniform grid of 20-acre cells across the study area. The 20-acre cell size was selected to create a manageable unit for regional-scale analysis and mapping while accounting for data availability, processing constraints, and the scale of the study area. Each cell was assigned a hazard exposure score based on the hazards intersecting that location. Additional detail on the scoring criteria and point assignments used in this analysis is provided in Figure 6.15. The resulting bivariate map displays 16 possible color combinations, with each color representing a unique pairing of hazard exposure and social vulnerability scores.

Because of the selected 20 acre cell size, all cells were exposed to pluvial flooding, which served as the baseline exposure condition. The exposure categories intentionally emphasized flood exposure, similar to how asset inventory scoring was completed in the vulnerability assessment. Riverine and coastal flooding was more heavily weighted than other non-flooding hazards such as extreme heat and wildfire risk, based on their relative impact and prevalence within the Crater region. Exposure categories were defined as follows:

- Low exposure included pluvial flooding exposure only.
- Moderate exposure included pluvial flooding plus either wildfire risk or extreme temperature exposure.
- High exposure included pluvial flooding exposure plus either coastal storm surge or riverine flooding exposure.
- Very high exposure included pluvial flooding exposure, either coastal storm surge or riverine flooding exposure, and either wildfire risk or extreme temperature exposure.

For the social vulnerability (sensitivity) component of this analysis, the CDC/ASTR Social Vulnerability Index (SVI) was used, specifically the RPL_Themes indicator explained in the Scoring Framework section within Appendix B. Vulnerability Assessment Methodology and Scoring Framework. Sensitivity categories were defined as follows:

- Low sensitivity included 0.25 or lower SVI rank
- Moderate sensitivity included 0.25 – 0.50 SVI rank
- High sensitivity included 0.50 – 0.75 SVI rank
- Very high sensitivity included 0.75 or higher SVI rank

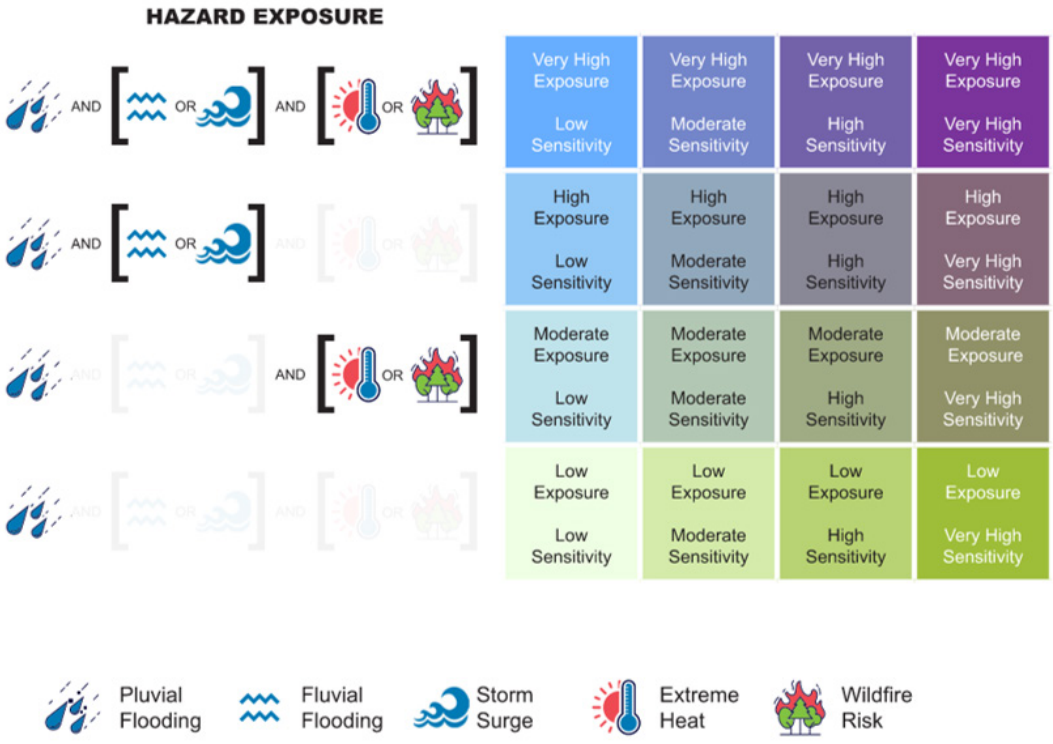


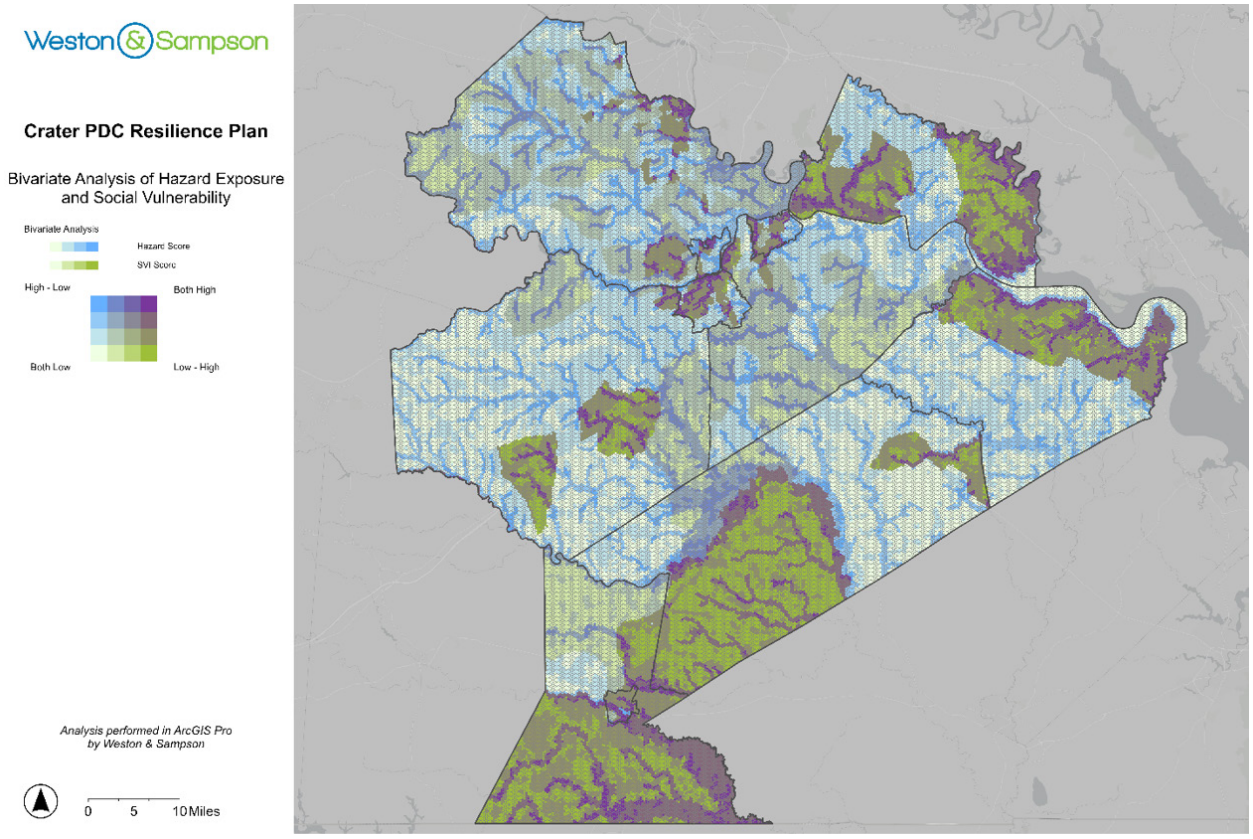
Figure 6.15 Legend for Bivariate Analysis of Vulnerability

The resulting bivariate map is intended to serve as a regional screening and planning tool that highlights where hazard exposure and social vulnerability intersect. Areas with the highest combined scores may warrant additional attention because potential hazard impacts could disproportionately affect populations with fewer resources to prepare for, respond to, and recover from disruptive events.

The map can be used to support:

- Community outreach and engagement efforts by identifying neighborhoods or areas where additional communication, preparedness education, or resilience-focused programs may be most beneficial.
- Mitigation project prioritization and grant applications by highlighting areas where resilience investments could provide benefits to both vulnerable populations and hazard-exposed infrastructure.
- Local planning and further analysis by helping Crater PDC identify areas that may warrant more detailed assessments, feasibility studies, or targeted resilience initiatives.

It is important to note that this analysis is not an engineering-level risk assessment and should not be used as the sole basis for site-specific project decisions. Rather, it provides a regional-scale perspective on vulnerability patterns and can help guide planning discussions, resource allocation, and future resilience investments across the Crater region.



6.16 Bivariate Analysis of Vulnerability in the Crater region

Overall, the hazard exposure pattern shown in Figure 6.16. was strongly influenced by floodway and floodplain geography, with the highest hazard scores (represented by the darkest blue and purple areas) concentrated along major floodplains and river corridors. This indicated that flood-related hazards, particularly riverine flooding, were a dominant driver of overall hazard exposure across the Crater region.

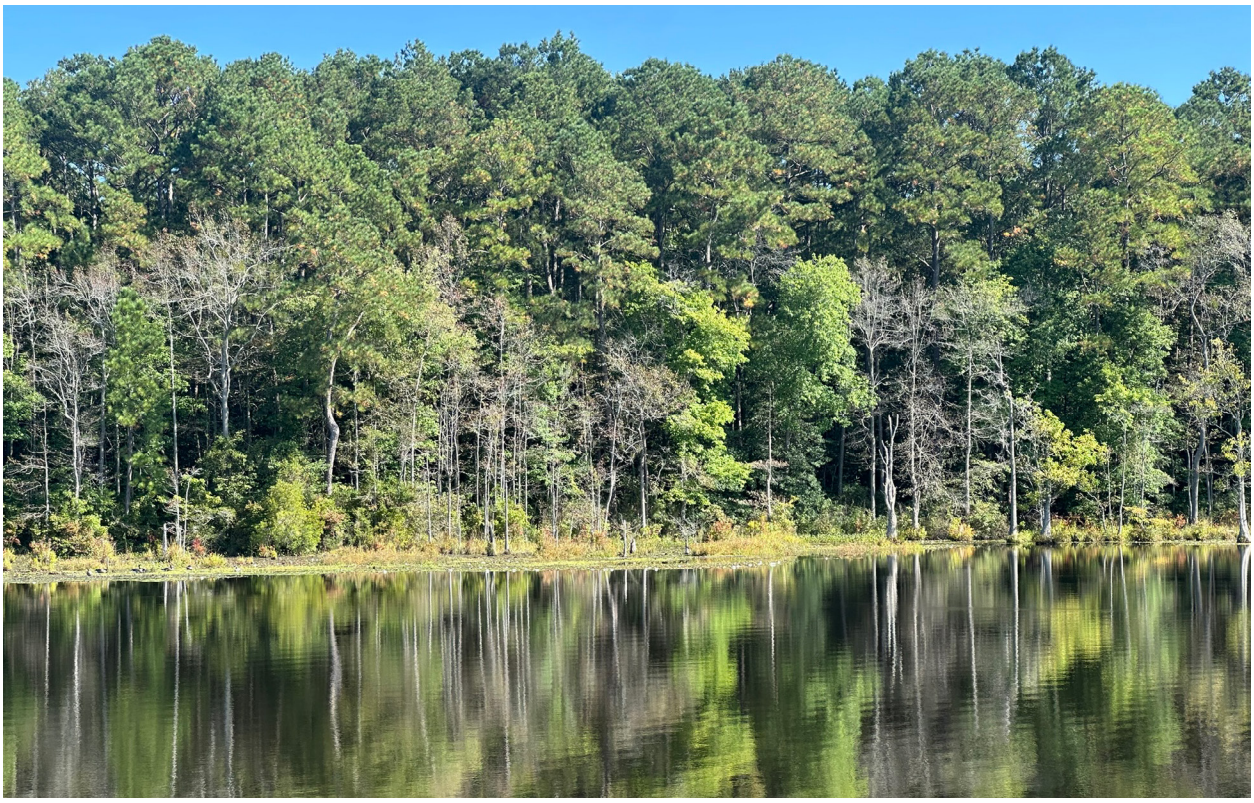


Photo 6.1 Airfield A-H Conference Center in Wakefield, Virginia, Kit Friedman

In contrast, social vulnerability patterns were more spatially dispersed, though notable concentrations of higher sensitivity were evident in the southern portion of the Crater region, particularly in Greensville County, Emporia, Sussex County, and the Tri-Cities area.

When the two dimensions were examined together, areas with both high hazard exposure and high social vulnerability were identified in each locality across the region. These overlapping conditions were most strongly concentrated in the southern portion of the Crater region and along the James River. Notable clusters of high exposure and high sensitivity were identified in Greensville County, Emporia, Sussex County, Charles City County, and Surry County. Similar patterns were also observed within the Tri-Cities, with particularly prominent clusters in Hopewell and Petersburg.

Locations with both high hazard exposure and high social vulnerability are of greatest concern, as these areas experience multiple hazard exposure alongside populations that may have limited capacity to prepare for, respond to, or recover from these hazard events. Identifying these intersections helps prioritize communities where targeted resilience investments, mitigation efforts, and adaptive planning strategies may yield the greatest benefit.

7.0 REGIONAL ACTIONS

The following chapter addresses regional actions for the *Crater PDC Regional Resilience Plan*. These actions were developed based on direction from the Steering Committee, results from the capacity and needs assessment, and resiliency best practices.

The regional actions section of the plan includes two types of actions:

- **Crater PDC Actions:** actions for which Crater PDC is responsible
- **Actions for All Localities:** actions that are ubiquitous throughout the region, that individual localities can champion, if interested

The "Crater PDC Actions" are intended to advance initiatives that are regional in nature and are best led by Crater PDC with other regional partners. These actions focus on establishing frameworks, fostering coordination, and piloting programs that can be scaled and adapted by individual localities over time. By advancing regional tools, methodologies, and partnerships, the Crater PDC can support consistent resilience planning efforts while providing localities with models and resources that can be integrated into their own plans and implementation activities.

Many of the "Actions for All Localities" are collaborative in nature, with opportunities for one locality to serve as a pilot and apply lessons learned across surrounding jurisdictions. Actions that can be implemented by all localities support greater regional resilience, consistency, and coordination. This common set of actions includes several key areas, including model ordinance language for resilience, multi jurisdictional coordination and communication, data and decision support tools, and education and outreach programs.

Additionally, Chapter 8: Locality Resilience Plans includes locality-specific actions tailored to each community's unique hazards, vulnerabilities, assets, and resilience priorities. These actions are presented within each localities resilience plan chapter to address local conditions and support locality's championing their own resilience planning efforts.

7.1. Action Key

In the following section of the plan, each regional and local action is documented using a consistent framework to provide adequate details for action prioritization and implementation. Each action is accompanied by the following information:



Action Components: Key considerations for action development and implementation.



Source: The origin of the action, such as stakeholder input, workshop activities, existing plans, or best practices.

Primary Goals: The broader resilience goal(s) or objective(s) that the action supports. These actions include the following:

- Strengthen Natural Systems and Land Use Resilience
- Improve Hazard Preparedness, Response, and Recovery
- Enhance Data, Tools, and Decision-Making Capacity
- Build Local and Regional Capacity
- Advance Regional Collaboration and Coordination
- Increase Public Awareness and Community Engagement
- Promote Equitable and Resilient Communities
- Strengthen Infrastructure and Built Environment Resilience
- Support Economic Resilience and Workforce Development

Priority Rating: An assessment of the relative importance or urgency of the action in relationship to the other actions in the plan. For these ratings, steering committee feedback throughout the planning process was prioritized. Actions were prioritized based off the capacity and needs assessment, ability to be funded through Virginia CFPF, and best practices. These ratings have not been through a scoring or ranking exercise by the Steering Committee. Localities are encouraged to confirm, adjust, or reprioritize ratings to reflect local conditions, capacity, and funding timelines before using them to sequence implementation or grant applications.

Hazards Addressed: The climate or hazard risks the action is intended to help mitigate or manage. These include the following:

- Flooding (pluvial/rainfall, fluvial/riverine, and/or storm surge)
- Extreme Heat
- Wildfires
- Extreme Storms and/or Winter Weather
- All hazards – *addresses each hazard group*

Type of Action: The general action type, or means of implementation that fall under the following:

- Policy and Planning
- Programs and Implementation
- Capital Projects and Infrastructure
- Data, Tools, and Decision Support
- Technical Assistance and Capacity Building
- Regional Coordination and Partnerships
- Public Education and Engagement
- Emergency Preparedness and Response
- Nature-Based Solutions
- Expand Recreational Access to Foster Stewardship
- Residential Adaptation Tool

Responsible Entity: The primary organization or jurisdiction responsible for leading the action.

Potential Partners: Additional agencies, organizations, or stakeholders that could support or collaborate on implementation.

Partner Action: Actions that localities or other listed stakeholders should engage in during or after the action is completed to further maintain or manage outcomes.

Estimated Cost: A high level cost range (low, medium, high). For capacity building / studies versus project actions, there are two different ranges used depending on the project type.

Cost	Studies / Capacity Building	Projects
Low	Less than $100 k	Less than $750 k
Medium	$100 k to $250 k	$750 k to $1.5 M
High	Greater than $250 k	Greater than $1.5 M

Implementation Readiness: An assessment of how close the action is to being competitive for grant funding. Each action is rated using one of the following terms, which may be combined (e.g., "Medium-term / Needs Site-Specific Study"):

- ***Near-term:*** The action can begin now with existing staff capacity and requires no land acquisition, site control, design work, or extensive data compilation before it could be scoped into a grant application.
- ***Medium-term:*** The action requires a defined preliminary step, such as a needs assessment, data inventory, site-specific study, or partnership commitment, before it is competitive for funding.
- ***Long-term:*** The action requires substantial groundwork, such as multi-jurisdictional data compilation, parcel identification, or technical study scoping, before a funding application could realistically be assembled, and is better suited to a phased approach.

- **Grant Application Pathway:** For each action, this section lays out the practical steps for pursuing funding, organized into five parts:
  - ***Likely Funder:*** The program most likely to support the action.
  - ***Grant Type:*** The funding category (e.g., planning, capacity-building, study, or implementation)
  - ***Anticipated Match:*** Expexted local cash or in-kind match requirements, where known, with recommendations verify current requirements within the funding agency.

7.2. Crater PDC Actions

The actions identified in this section outline a coordinated framework for the Crater PDC to advance resilience across all eleven localities in a way that strengthens both individual communities and the region as a whole. These actions are intended for implementation by the PDC, positioning it as a central convener, facilitator, and resource provider to support local efforts while ensuring alignment with regional priorities.

The matrix below summarizes all ten Crater PDC-led actions. Full detail, including the grant application pathway for each action, are found in the following action sheets

Table 7.1. Crater PDC Action Summary Matrix

ID	Action Title	Cost	Priority (Prelim.)	Implementation Readiness
CPDC-1	Develop Regional Model Ordinance for Nature-Based Solutions	Low	High (preliminary)	Near-term
CPDC-2	Facilitate Cross-Departmental Engagement in Regional Resilience Planning	Low	High (preliminary)	Near-term
CPDC-3	Develop Regional Tools for Community Hazard Data Collection	Low	High (preliminary)	Near-term
CPDC-4	Connect Communities to Watersheds through Access, Education, and Blue Trails	Medium	Low (preliminary)	Long-term
CPDC-5	Participate in a Regional Weather Monitoring Network	Medium	Medium (preliminary)	Medium-term
CPDC-6	Develop and Implement a Regional Debris Management Strategy	Medium	Medium (preliminary)	Near-term
CPDC-7	Centralize and Strengthen Regional GIS Data for Resilience Planning	Medium	Medium (preliminary)	Medium-term
CPDC-8	Coordinate Resilient Economic Development and Workforce Initiatives	Medium	Low (preliminary)	Medium-term
CPDC-9	Develop Regional Watershed Models for Each Watershed	Medium	Low (preliminary)	Long-term
CPDC-10	Conduct a Regional Resilient Housing and Land Suitability Study	Medium	Low (preliminary)	Long-term

Crater Partner Action (CPDC-1): Develop Regional Model Ordinance for Nature-Based Solutions

Integrate nature-based solution design standards, requirements, and incentive mechanisms into local stormwater ordinances to reduce flood risk, improve water quality, and enhance climate resilience. Crater PDC will develop regional baseline standards, model ordinance language, and guidance to support integration of nature-based solutions into ordinance updates. This action promotes practices such as rain gardens, bioswales, permeable pavement, riparian buffers, and urban tree canopy to manage runoff at its source. By incorporating these approaches into local requirements and incentives, communities can advance cost-effective stormwater management, protect natural systems, and encourage consistent, resilient development across the region.

Action Components:

Conduct an analysis on existing zoning ordinances to understand barriers, incentives, and gaps; update ordinances related to stormwater and development; review case studies from other localities.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Advance Regional Collaboration and Coordination
- Promote Nature-Based Solutions

Priority Rating:

High.

Hazards Addressed:

Flooding.

Estimated Cost:

Capacity Building/Study: Low (Less than $100k)

Type of Action:

- Policy and Planning
- Programs and Implementation
- Technical Assistance and Capacity Building
- Nature-Based Solutions

Implementation Readiness: Near-term.

Responsible Entity:

Crater PDC – Environment, Economic Development, & Housing, in coordination with Member Locality Departments of Public Works, Housing Development, and/or Environment / Floodplain Management.

Potential Partners:

Crater PDC member localities; Chesapeake Bay Foundation; Virginia Department of Environmental Quality (DEQ); watershed organizations.

Partner Action:

Member localities will use this regional framework to adopt and tailor ordinance updates, incentives, and design standards within their own zoning and stormwater regulations.

Source:

Capacity and Needs Assessment; Action Development Workshop

Grant Application Pathway

- **Likely Funder:** Virginia Community Flood Preparedness Fund (CFPF); Virginia Department of Environmental Quality (DEQ) Stormwater Local Assistance Fund (SLAF)
- **Grant Type:** Planning / technical assistance grant (non-competitive matching grant for SLAF; CFPF Capacity Building and Planning Grant as alternate)
- **Anticipated Match:** Historically 50% local match for SLAF (lower within the Chesapeake Bay Preservation Act service area).
- **Required Supporting Data:** Inventory of existing stormwater/zoning ordinances; identified regulatory gaps; locality letters of support; designated lead applicant.
- **Immediate Next Step:** Confirm applicant structure with DEQ and select a pilot locality within the next quarter.

Crater Partner Action (CPDC-2): Facilitate Cross-Departmental Engagement in Regional Resilience Planning

Assist member localities by hosting cross department working sessions that bring together emergency managers, planners, and other staff to improve coordination between emergency management and long term resilience planning. Develop simple checklists and crosswalk tools to help localities align preparedness, mitigation, recovery, and land use decisions. Conduct training exercises on pertinent topics to increase response capabilities.

Action Components:

Host facilitated cross department working sessions; develop emergency management and planning crosswalks; create implementation checklists to align plans and responsibilities.

Responsible Entity:

Crater PDC – Environment, Economic Development, & Housing.

Primary Goals:

- Build Local and Regional Capacity
- Advance Regional Collaboration and Coordination
- Improve Hazard Preparedness, Response, and Recovery.

Potential Partners:

Crater PDC member localities; local emergency management offices; planning and zoning departments; public works departments; Virginia Department of Emergency Management (VDEM).

Priority Rating:

High.

Hazards Addressed:

All Hazards.

Partner Action:

Localities can participate in cross department working sessions and incorporate checklist guidance into local emergency management plans, comprehensive plans, hazard mitigation plans, and capital improvement programs.

Estimated Cost:

Capacity Building/Study: Low (Less than $100k)

Type of Action:

- Policy and Planning
- Regional Coordination and Partnerships

Source

Capacity and Needs Assessment; Action Development Workshop

Implementation Readiness Near-term.

Near-term to initiate working sessions and develop tools; ongoing engagement and updates as plans are revised.

Grant Application Pathway

- **Likely Funder:** Virginia Community Flood Preparedness Fund (CFPF), Federal Emergency Management Agency (FEMA) Emergency Management Performance Grant (EMPG) Program
- **Grant Type:** Annual formula/capacity-building grant for emergency management programs
- **Anticipated Match:** Typically 50% local match for EMPG (in-kind staff time may qualify); confirm current-year policy with VDEM
- **Required Supporting Data:** Inventory of locality emergency management contacts; documented coordination gaps; proposed working session/checklist deliverables.
- **Immediate Next Step:** Contact the VDEM regional EMPG coordinator within 60 days to confirm eligibility and application window.

Crater Partner Action (CPDC-3): Develop Regional Tools for Community Hazard Data Collection

Develop, evaluate, and promote standardized tools and best practices for collecting public reported hazard and impact data across the region. Support member localities in using GIS referenced photos, location based reporting, and damage documentation coordinated with floodplain mapping. Provide guidance on leveraging existing platforms, such as 311 systems, FEMA Survey123, and Crisis Track, to improve data consistency, reduce costs, and strengthen post event assessments, planning, and grant readiness.

Action Components:

Develop regional standards and guidance; evaluate and recommend appropriate platforms; support alignment with collected data and hazard mitigation planning.

Primary Goals:

- Enhance Data, Tools, and Decision-Making Capacity
- Increase Public Awareness and Community Engagement.

Priority Rating:

High.

Hazards Addressed:

All Hazards.

Estimated Cost:

Capacity Building/Study: Low (Less than $100k)

Type of Action:

- Policy and Planning
- Technical Assistance and Capacity Building
- Public Education and Engagement

Implementation Readiness: Near-term.

Responsible Entity:

Crater PDC – Environment, Economic Development, & Housing.

Potential Partners:

Crater PDC member localities; local emergency management offices; planning and zoning departments; public works departments; Virginia Department of Emergency Management (VDEM).

Partner Action:

Localities can participate in regional coordination and training efforts; adopt recommended data collection tools or practices; integrate collected hazard and damage data into emergency management plans, hazard mitigation plans, comprehensive plans, capital improvement programs, and post disaster grant applications.

Source:

Capacity and Needs Assessment; Action Development Workshop

Grant Application Pathway

- **Likely Funder:** Virginia Community Flood Preparedness Fund (CFPF), Federal Emergency Management Agency (FEMA) Emergency Management Performance Grant (EMPG) Program
- **Grant Type:** Planning / capacity-building grant
- **Anticipated Match:** CFPF capacity building and planning grants are generally non-matching for localities with limited capacity.
- **Required Supporting Data:** Inventory of platforms used by member localities (311, Survey123, Crisis Track, or none); pilot locality identified; draft scope of work.
- **Immediate Next Step:** Survey member localities' hazard-reporting practices within the next quarter to support the application narrative.

Crater Partner Action (CPDC-4): Connect Communities to Watersheds through Access, Education, and Blue Trails

Support Crater PDC member localities in connecting residents to important natural and cultural areas, particularly rivers, streams, and watershed assets, by promoting increased public access, interpretive materials, and water based trail systems ("blueway trails"). Assist with planning and mapping blue trails, access points, and connections to parks, greenways, trails, and community destinations with vulnerability assessment results and adaptation in mind. Develop and share educational resources that foster watershed scale understanding, including how upstream and downstream activities influence flooding, water quality, ecosystems, and long term community resilience. Use these efforts to raise public awareness, encourage stewardship, and reinforce regional identity around shared water resources.

Action Components:

Inform the public of waterways (from rivers to creeks) through educational materials and signage; plan blue trails; develop regional guidance for water access; support partnerships with organizations like FOLAR.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Increase Public Awareness and Community Engagement
- Expand Recreational Access to Foster Stewardship

Responsible Entity:

Crater PDC – Environment, Economic Development, & Housing.

Potential Partners:

Crater PDC member localities; parks and recreation departments; local planning departments; FOLAR and other watershed organizations; The Nature Conservancy (TNC) and other conservation nonprofits.

Priority Rating:

Low.

Hazards Addressed:

All Hazards.

Partner Action:

Localities may partner with Crater PDC to identify priority watershed assets; participate in access and blue trail planning initiatives; adopt and use shared educational materials; pursue site specific implementation projects such as access points, signage, trails, and stewardship programming.

Estimated Cost:

Project: Medium ($750k to $1.5 M)

Type of Action:

- Nature-Based Solutions
- Public Education and Engagement

Source

Action Development Workshop

Implementation Readiness Near-term.

Near-term to develop guidance, tools, and pilot applications; ongoing support, refinement, and updates as needed.

Grant Application Pathway

- **Likely Funder:** Virginia Community Flood Preparedness Fund (CFPF), National Fish and Wildlife Foundation (NFWF) National Coastal Resilience Fund; Virginia Coastal Zone Management (CZM) Program
- **Grant Type:** Coastal planning / public access grant
- **Anticipated Match:** CZM grants typically require a non-federal match (commonly around 33%, often satisfiable with in-kind staff time).
- **Required Supporting Data:** Inventory of candidate blue-trail segments/access points; alignment with vulnerability assessment results; letters of support from parks/recreation and watershed partners (e.g., FOLAR)
- **Immediate Next Step:** Identify a pilot locality and candidate access points within two quarters to support a CZM planning-grant application.

Crater Partner Action (CPDC-5): Participate in a Regional Weather Monitoring Network

Partner with regional jurisdictions, academic institutions, and state or federal agencies to pilot the use of the PerryWeather platform within a locality as an initial step toward developing a robust regional weather monitoring network. The network would improve localized monitoring of precipitation, temperature, wind, and storm impacts, addressing data gaps not captured by broader monitoring systems. Enhanced weather data will support more accurate forecasting, flood and stormwater modeling, emergency response decision-making, infrastructure operations, and long-term climate adaptation planning across the region. Lessons learned from the pilot can inform future expansion of the network to additional localities and critical facilities throughout the Crater region.

Action Components:

Partner with state agencies and academic institutions; establish data-sharing protocols; integrate data into emergency management; develop guidance for using data in planning efforts; create a digital dashboard with real-time information; pilot in a locality.

Primary Goals:

- Improve Hazard Preparedness, Response, and Recovery
- Advance Regional Collaboration and Coordination

Priority Rating:

Medium.

Hazards Addressed:

All Hazards.

Estimated Cost:

Capacity Building/Study: High (Greater than $250k)

Type of Action:

- Data, Tools, and Decision Support
- Regional Coordination and Partnerships
- Emergency Preparedness and Response.

Implementation Readiness: Medium-term.

Medium-term to establish partnerships, assess monitoring needs, and deploy or integrate stations; ongoing data management and application.

Responsible Entity:

Crater PDC – Environment, Economic Development, & Housing.

Potential Partners:

Crater PDC member localities; PerryWeather; academic institutions; National Weather Service (NWS); state climatology offices; Virginia Department of Emergency Management (VDEM); public works, utilities, and emergency management departments.

Partner Action:

Participate in regional coordination; support placement or hosting of monitoring equipment where appropriate; integrate weather data into local emergency management, stormwater planning, infrastructure operations, and resilience planning efforts.

Source:

Action Development Workshop

Grant Application Pathway

- **Likely Funder:** FEMA Emergency Management Performance Grant (EMPG) Program; Virginia Community Flood Preparedness Fund (CFPF); NOAA weather and climate monitoring grants; academic or research partnerships.
- **Grant Type:** Capital/equipment grant (CFPF Project Grant) paired with a capacity-building grant for data integration.
- **Anticipated Match:** CFPF Project Grants generally require a local match (historically around 10%–20% depending on locality fiscal stress designation).
- **Required Supporting Data:** Network design concept with gap areas/station locations; partnership commitment letters (academic, NWS, VDEM); data-sharing protocol outline.
- **Immediate Next Step:** Reach out to a regional academic partner and NWS Wakefield within the next quarter to scope the network and confirm partnership interest.

Crater Partner Action (CPDC-6): Develop and Implement a Regional Debris Management Strategy

Work collaboratively with neighboring localities, regional partners, and state agencies to develop and maintain a coordinated regional debris management strategy for natural disasters and major emergencies. The strategy will establish shared procedures for debris clearance, staging, disposal, contractor procurement, and mutual aid, and include pre identified debris management sites, priority clearance routes, environmental safeguards, and documentation protocols to support FEMA reimbursement. Development of this strategy will also be in compliance with Virginia Community Flood Preparedness Fund (CFPF) requirements, which require a debris management strategy to be included within a resilience plan.

Action Components:	Responsible Entity:
Identify and map priority debris clearance routes; evaluate temporary debris staging and storage; develop standardized debris management procedures and documentation templates.	Crater PDC – Environment, Economic Development, & Housing.
Primary Goals:	**Source**
• Improve Hazard Preparedness, Response, and Recovery • Build Local and Regional Capacity	Capacity and Needs Assessment.

Priority Rating:

Medium.

Hazards Addressed:

All Hazards.

Potential Partners:

Crater PDC member localities; local public works and solid waste departments; emergency management offices; Virginia Department of Emergency management (VDEM); Virginia Department of Environmental Quality (DEQ); state transportation agencies; debris management contractors.

Estimated Cost:

Capacity Building/Study: Medium ($100k to $250k)

Type of Action:

- Emergency Preparedness and Response
- Regional Coordination and Partnerships
- Policy and Planning

Partner Action:

Localities can participate in regional debris management planning; identify local priority clearance routes and potential debris management sites; adopt standardized debris procedures and documentation practices; integrate the regional debris management strategy into local emergency operations and recovery planning.

Implementation Readiness Near-term.

Near-term to develop the regional debris management strategy and incorporate it into the resilience plan updates; ongoing updates, coordination, and exercises to maintain readiness.

Grant Application Pathway

- **Likely Funder:** FEMA Emergency Management Performance Grant (EMPG) Program and Hazard Mitigation Grant Program (HMGP); Virginia Community Flood Preparedness Fund (CFPF).
- **Grant Type:** Planning grant for emergency management capacity (strategy development).
- **Anticipated Match:** EMPG typically requires a 50% local match (in-kind staff time generally eligible).
- **Required Supporting Data:** Inventory of existing debris procedures; candidate debris management sites; priority clearance route maps; public works/solid waste points of contact.
- **Immediate Next Step:** Schedule a kickoff coordination call with emergency management and public works staff within 60 days to begin the strategy outline required for CFPF compliance.

Crater Partner Action (CPDC-7): Centralize and Strengthen Regional GIS Data for Resilience Planning

Coordinate the centralization and standardization of key GIS datasets across Crater PDC member localities to support consistent planning, emergency management, and resilience decision-making. Utilize the regional vulnerability assessment as a foundational dataset that can be regularly updated by Crater PDC and member localities in coordination with resilience plan updates.

Develop and maintain a shared regional GIS dashboard that integrates hazard data, infrastructure and critical facilities, natural resources and conservation lands, and socioeconomic indicators. Provide technical assistance to allow data compatibility, routine updates, and appropriate data sharing. This effort will enhance local and regional capacity for analysis, public communication, grant readiness, and coordinated decision-making, while respecting local data ownership and governance.

Action Components:

Identify and prioritize core regional GIS datasets; develop a shared regional GIS framework; inventory Crater PDC assets and relevant hazard information.

Responsible Entity:

Crater PDC – Environment, Economic Development, & Housing.

Primary Goals:

- Enhance Data, Tools, and Decision-Making Capacity
- Advance Regional Collaboration and Coordination

Potential Partners:

Crater PDC member localities; local GIS, planning, emergency management, and public works staff; Virginia Department of Emergency Management (VDEM); Virginia Department of Conservation and Recreation (DCR); state GIS or data offices; academic partners.

Priority Rating:

Medium.

Hazards Addressed:

Flooding.

Estimated Cost:

Capacity Building/Study: Medium ($100k to $250k)

Partner Action:

Participate in regional data coordination efforts; share priority GIS datasets using agreed upon standards; integrate regional GIS products into local planning, emergency management, capital improvement planning, and public communication efforts.

Type of Action:

- Data, Tools, and Decision Support
- Regional Coordination and Partnerships
- Technical Assistance and Capacity Building

Implementation Readiness:	Medium-term

Near-term to identify priority datasets and establish data standards; medium-term to develop and deploy the regional GIS framework; ongoing maintenance and update.

Source:

Capacity and Needs Assessment.

Grant Application Pathway

- **Likely Funder:** Virginia Community Flood Preparedness Fund (CFPF); FEMA Emergency Management Performance Grant (EMPG) Program and Building Resilience Infrastructure and Communities (BRIC).
- **Grant Type:** Capacity-building / planning grant
- **Anticipated Match:** BRIC C&CB activities typically require a 25% non-federal match (10% for community disadvantage-designated applicants).
- **Required Supporting Data:** Inventory of GIS datasets by locality and format; data-sharing agreement template; defined dashboard scope.
- **Immediate Next Step:** Complete a dataset inventory across the eleven localities within two quarters to support a BRIC C&CB sub-application through VDEM.

Crater Partner Action (CPDC-8): Coordinate Resilient Economic Development and Workforce Initiatives

Advance resilient economic development within the Crater region by coordinating with local economic development departments to attract and support a diverse mix of industries, green jobs, and workforce training programs that strengthen the regional economy and reduce reliance on any single sector. Integrate resilience criteria, such as business continuity planning, climate ready facilities, and workforce adaptability, into economic development incentive packages to improve the community's capacity to withstand and recover from natural and man made disasters.

Action Components:

Economic diversification and industry targeting; resilience criteria within incentive packages; business continuity planning support; partnerships with workforce and training institutions.

Responsible Entity:

Crater PDC – Environment, Economic Development, & Housing.

Primary Goals:

- Build Local and Regional Capacity
- Support Economic Resilience and Workforce Development

Source

Committee Engagement Results, Action Development Workshop

Priority Rating:

Low.

Hazards Addressed:

All Hazards.

Potential Partners:

Localities; local economic development departments; community colleges and academic institutions; regional workforce boards (e.g., Crater Regional Workforce Development Board); private employers.

Estimated Cost:

Capacity Building/Study: Medium ($100k to $250k)

Type of Action:

- Policy and Planning
- Programs and Implementation

Partner Action:

Assist the PDC in identifying potential target industries and businesses by aligning local land use, site readiness, and incentive programs to provide prime locations and competitive advantages for these employers.

Implementation Readiness	Medium-term.

Grant Application Pathway

- **Likely Funder:** US Economic Development Administration (EDA) Public Works and Economic Adjustment Assistance programs; Virginia Department of Workforce Development and Advancement (DWDA) workforce grants; Virginia Business Ready Sites Program.
- **Grant Type:** Economic development planning/implementation grant
- **Anticipated Match:** EDA generally requires a non-federal match (commonly 20–50% depending on program and area distress designation).
- **Required Supporting Data:** Updated CEDS alignment narrative; inventory of target industries and site readiness; resilience criteria for incentive packages.
- **Immediate Next Step:** Confirm CEDS alignment within the next quarter and identify the most site-ready locality to anchor a pilot incentive package.

Crater Partner Action (CPDC-9): Develop Regional Watershed Models for Each Watershed

Develop standardized, regional-scale watershed models for the portions of the Chesapeake Bay Watershed and the Southern Rivers (Chowan Basin/Albemarle Sound) Watershed Crater PDC is within to better understand flood behavior, stormwater dynamics, and future climate impacts. These models will provide a consistent technical foundation for risk assessment, infrastructure planning, and hazard mitigation across jurisdictional boundaries.

Action Components:

Incorporate current and future climate conditions, land use changes, and upstream/downstream impacts; develop hydrologic and hydraulic (H&H) models for each major watershed in the Crater region.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Enhance Data, Tools, and Decision-Making Capacity
- Advance Regional Collaboration and Coordination.

Priority Rating:

Low.

Hazards Addressed:

Flooding.

Estimated Cost:

Capacity Building/Study: Medium ($100k to $250k)

Type of Action:

- Policy and Planning
- Data, Tools, and Decision Support
- Regional Coordination and Partnerships

Implementation Readiness: Long-term.

Responsible Entity:

Crater PDC – Environment, Economic Development, & Housing.

Potential Partners:

Crater PDC member localities; Virginia Department of Environmental Quality (DEQ); Virginia Department of Conservation and Recreation (DCR); US Geological Survey (USGS); academic hydrology/ engineering programs; local stormwater and public works departments.

Partner Action:

Utilize the watershed models for local-level planning decisions and projects.

Source:

Committee Engagement Results

Grant Application Pathway

- **Likely Funder:** Virginia Community Flood Preparedness Fund (CFPF) – Study Grant; FEMA Building Resilience Infrastructure and Communities (BRIC); USGS cooperative water science partnerships.
- **Grant Type:** Flood study / modeling grant
- **Anticipated Match:** CFPF Study Grants generally require a local match (CFPF match requirements vary by locality fiscal stress designation).
- **Required Supporting Data:** Compiled rainfall, soils, land cover, and drainage infrastructure data; inventory of existing H&H models/studies; defined study boundary and scope.
- **Immediate Next Step:** Select the highest-priority watershed within the next quarter and scope a phase-one H&H study for a CFPF Study Grant application.

Crater Partner Action (CPDC-10): Conduct a Regional Resilient Housing and Land Suitability Study

Evaluate housing vulnerability to flooding and other hazards while identifying safer, more resilient areas for future housing development. The study will guide land use decisions, reduce risk exposure, support equitable access to safe and affordable housing, and consider barriers to resilience, such as heirs' property, where applicable.

Action Components:

Housing stock needs assessment; Parcel scale vulnerability assessment; Evaluation of heirs' property resilience considerations.

Responsible Entity:

Crater PDC – Environment, Economic Development, & Housing.

Primary Goals:

- Support Economic Resilience and Workforce Development
- Promote Equitable and Resilient Communities
- Strengthen Natural Systems and Land Use Resilience.

Source

Committee Engagement Results, Action Development Workshop

Priority Rating:

Low.

Hazards Addressed:

All Hazards.

Potential Partners:

Localities; Virginia Housing; Virginia Department of Housing and Community Development (DHCD); Housing nonprofits; Economic development organizations.

Estimated Cost:

Capacity Building/Study: Medium ($100k to $250k)

Type of Action:

- Policy and Planning
- Programs and Implementation

Partner Action:

Localities can provide Crater PDC on information regarding current and future housing stock needs and identify where heirs' property may present resilience challenges. Work with Crater PDC to identify locations for housing development.

Implementation Readiness	Long-term.

Grant Application Pathway

- **Likely Funder:** Virginia Community Flood Preparedness Fund (CFPF) – Capacity Building and Planning Grant; Virginia Housing Innovations in Manufactured Housing and planning grant programs; Virginia DHCD planning grants.
- **Grant Type:** Housing planning / land suitability study grant.
- **Anticipated Match:** DHCD planning grant match varies by program year; CFPF capacity building and planning grants are generally non-matching for localities with limited capacity.
- **Required Supporting Data:** Regional housing stock inventory; parcel-level vulnerability data layered with the regional vulnerability assessment; preliminary identification of localities with known heirs' property prevalence.
- **Immediate Next Step:** Scope the study boundary and data needs with member localities within two quarters and identify a lead locality or joint-application structure.

7.3. Actions for All Localities

The actions identified in this section are intended to guide each locality in advancing resilience in a way that strengthens not only individual communities, but the region as a whole. These actions are applicable to all eleven localities, allowing jurisdictions to pursue implementation independently while maintaining alignment with shared regional priorities. At the same time, they are designed to foster collaboration, creating opportunities for localities to exchange best practices, leverage collective expertise, and coordinate across boundaries where systems and risks are interconnected.

The matrix below summarizes all nine locality-led regional actions. Full detail, including the grant application pathway for each action, are found in the following action sheets.

Table 7.2. Crater PDC Action Summary Matrix

ID	Action Title	Cost	Priority (Prelim.)	Implementation Readiness
REG-1	Develop a Locality-Specific Resilient Schools Plan	Medium - High	Medium (preliminary)	Medium-term
REG-2	Support Energy Resilient Design through Standard Design Guidelines	Low	Low (preliminary)	Near-term
REG-3	Regional Energy Workforce and Assessments for Home Improvement Program	Medium - High	Medium (preliminary)	Medium-term
REG-4	Advance Resilience Hub Planning in Coordination with PlanRVA and Crater PDC	Low	Medium (preliminary)	Near-term
REG-5	Support Land Acquisition for Conservation of Open Space and Natural Resources	Low	Medium (preliminary)	Medium-term
REG-6	Utilize Vulnerability Assessment Results for Infrastructure Upgrades and Site-Specific Assessments	High	High (preliminary)	Medium-term
REG-7	Conduct a Regional Flood Risk Study Beyond FEMA-Mapped Floodplains Using Hydrologic and Hydraulic (H&H) Modeling	High	High (preliminary)	Near-term
REG-8	Strengthen Regional Collaboration on Multi-Jurisdictional Projects	Low-High	High (preliminary)	Near-term
REG-9	Prioritize Emergency Planning Using Vulnerability Assessment Results	Low-High	High (preliminary)	Near-term

Regional Action (REG-1): Develop a Locality Specific Resilient Schools Plan

Develop resilience plans for schools within the locality that are vulnerable to flooding, extreme heat, wildfire, or other hazards, using regionally coordinated standards where available. Plans should address facility hardening, heat mitigation improvements, safe evacuation routes, upgraded HVAC and air quality systems, and protocols to maintain learning continuity during hazard disruptions, with coordination among school divisions and emergency management partners.

Action Components:

Conduct school facility vulnerability assessments; identify preparedness and retrofit needs through site visits; integrate schools into emergency and resilience planning efforts and capital improvement plans.

Responsible Entity:

Member Localities – Floodplain Staff, Department of Public Works, and/or Local School Divisions

Primary Goals:

- Improve Hazard Preparedness, Response, and Recovery
- Strengthen Infrastructure and Build Environment Resilience.

Potential Partners:

Crater PDC; emergency management staff, Virginia Department of Emergency Management (VDEM), school boards, public works.

Priority Rating:

Medium.

Hazards Addressed:

All Hazards.

Partner Action:

Coordinate identification of vulnerable schools based on results from hazard exposure; provide technical assistance on best practices or support on integration into planning efforts.

Estimated Cost:

Capacity Building/Study: Medium ($100k to $250k) for assessment, Project: Medium to High (Greater than $750k) for retrofits and upgrades to facilities.

Type of Action:

- Policy and Planning
- Programs and Implementation

Source:

Vulnerability Assessment; Action Development Workshop

Implementation Readiness: Medium-term.

Medium-term for identification and site visits; far-term for planning efforts and retrofits.

Grant Application Pathway

- **Likely Funder:** Virginia Community Flood Preparedness Fund (CFPF), FEMA Emergency Management Performance Grant (EMPG) Program and Building Resilience Infrastructure and Communities (BRIC).
- **Grant Type:** Planning grant for facility vulnerability assessment, followed by a capital mitigation grant for retrofits.
- **Anticipated Match:** CFPF capacity building and planning grants are generally non-matching for localities with limited capacity
- **Required Supporting Data:** List of school facilities in mapped/modeled hazard areas; coordination agreement with the school division; preliminary facility condition information.
- **Immediate Next Step:** Coordinate with the school division within the next quarter to identify hazard-exposed facilities

Regional Action (REG-2): Support Energy Resilient Design through Standard Design Guidelines

Update local zoning ordinances and development guidelines to incorporate and standardize design practices that support energy resilience in new residential, commercial, and public buildings while maintaining public safety. Focus on integrating energy-resilient design through zoning-based requirements and guidance, such as solar-ready site planning, EV-ready infrastructure, future electrification capacity, and provisions for backup power, while also addressing first responder safety considerations. Coordinate with regional partners to align approaches and promote consistency across jurisdictions.

Action Components:	Responsible Entity:
Review local codes; incorporate energy-resilient design elements; align with state building code updates.	Member Localities –Department of Public Works, Housing Development, and/or Environment / Energy Department.
Primary Goals:	**Source**
• Build Local and Regional Capacity • Promote Equitable and Resilient Communities	Action Development Workshop

Priority Rating:

Low.

Hazards Addressed:

All Hazards.

Potential Partners:

Crater PDC; building officials, utility companies, Virginia Clean Cities, Electrifying Virginia, Drive Electric VA, Virginia Energy Connect, Virginia Solar Alliance.

Estimated Cost:

Capacity Building/Study: Low (Less than $100k)

Type of Action:

- Policy and Planning
- Programs and Implementation

Partner Action:

Provide coordination support between state and regional agencies working on clean energy efforts and localities; provide technical assistance on building code guidelines.

Implementation Readiness	Near-term.

Near-term, aligned with code update cycles.

Grant Application Pathway

- **Likely Funder:** Virginia Tax Credit, Virginia Clean Cities – EV Charging Assistance Program (EVCAP).
- **Grant Type:** Technical assistance / small implementation grant.
- **Anticipated Match:** Varies by EVCAP funding cycle. Ordinance-update work itself is typically budgeted through locality operating funds, not grant-funded.
- **Required Supporting Data:** Current zoning/building code language on energy systems; target code sections (solar-ready, EV-ready, backup power); regional utility coordination contact.
- **Immediate Next Step:** Identify target code sections and consult with Crater PDC on a model ordinance template within the next code-update cycle.

Regional Action (REG-3): Regional Energy Workforce and Assessments for Home Improvement Program

Support development of local energy workforce training and residential assessment programs to build capacity for energy resilience and expand access to home energy improvements. Partner with workforce providers to train residents and contractors, provide no-cost or reduced-cost home energy assessments, particularly for low- and moderate-income households, and connect homeowners to available rebates and assistance programs. The home improvement program should be based on pursuing green building principles, including energy efficiency, weatherization, and resilience upgrades.

Action Components:

Conduct an assessment of current housing stock needs and vulnerability; home improvement guides.

Primary Goals:

- Build Local and Regional Capacity
- Promote Equitable and Resilient Communities
- Support Economic Resilience and Workforce Development

Priority Rating:

Medium.

Hazards Addressed:

All Hazards.

Estimated Cost:

Capacity Building / Study: Low (Less than $100k)

Type of Action:

- Residential Adaptation Tool
- Programs and Implementation
- Public Education and Engagement

Implementation Readiness: Medium-term.

Near-term for assessment; long-term implementation.

Responsible Entity:

Member Localities – Department of Housing Development and/or Community Development.

Potential Partners:

Crater PDC; housing departments; nonprofits; Everblue; Dominion Energy

Partner Action:

Crater PDC should coordinate with the localities and neighboring jurisdictions to share best practices and align program approaches for greater regional impact.

Source:

Action Development Workshop

Grant Application Pathway

- **Likely Funder:** Virginia Department of Housing and Community Development (DHCD) – Weatherization Assistance Program; Energy Efficiency and Conservation Block Grant (EECBG).
- **Grant Type:** Program implementation grant (assessments and retrofits) plus workforce training partnership.
- **Anticipated Match:** DHCD weatherization programs may not require a local cash match, but require program compliance capacity; EECBG has no local match requirement.
- **Required Supporting Data:** Housing stock needs and income-eligibility data for the target area; workforce training provider commitment; estimated households served in a pilot phase.
- **Immediate Next Step:** Identify a target neighborhood or income-eligible population within the next quarter and confirm intake capacity.

Regional Action (REG-4): Advance Resilience Hub Planning in Coordination with Plan RVA and Crater PDC

Coordinate with Plan RVA, Crater PDC, and regional partners to incorporate a resilience hub model into locality emergency preparedness, community facilities planning, and long term resilience efforts. Identify existing or potential hub locations that can provide power, cooling or heating, communications, supplies, and social services during emergencies, particularly in underserved or high risk areas. Align locality investments, facility upgrades, and outreach efforts with the regional resilience hub framework to maximize consistency, effectiveness, and regional connectivity.

Action Components:

Review local codes; incorporate energy-resilient design elements; align with state, Work from a pilot program in one locality; align with state building code updates. building code updates.

Responsible Entity:

Member Localities – Department of Emergency Management and/or Parks and Community Facilities, in coordination with Crater PDC.

Primary Goals:

- Improve Hazard Preparedness, Response, and Recovery
- Strengthen Infrastructure and Build Environment Resilience.

Source

Action Development Workshop

Priority Rating:

Medium.

Hazards Addressed:

All Hazards.

Potential Partners:

Member Localities – Department of Emergency Management and/or Parks and Community Facilities, in coordination with Crater PDC.

Estimated Cost:

Capacity Building / Study: Low (Less than $100k) for identification of locations and planning efforts

Type of Action:

- Policy and Planning
- Regional Coordination and Partnerships.

Implementation Readiness Near-term.

Partner Action:

Crater PDC should provide coordination support between state and regional agencies working on clean energy efforts and localities; provide technical assistance on building code guidelines.

Grant Application Pathway

- **Likely Funder:** Virginia CFPF; FEMA Regional Catastrophic Preparedness Grant Program.
- **Grant Type:** Regional planning grant.
- **Anticipated Match:** Cost-share requirements vary by award; CFPF capacity building and planning grants are generally non-matching for localities with limited capacity.
- **Required Supporting Data:** Candidate resilience hub site inventory (underserved/high-risk area facilities); coordination record with Plan RVA's regional hub framework; identified pilot locality.
- **Immediate Next Step:** Identify 2–3 candidate resilience hub facilities within the next quarter and coordinate with Crater PDC and Plan RVA to align the pilot.

Regional Action (REG-5): Support Land Acquisition for Conservation of Open Space and Natural Resources

Develop and promote programs, partnerships, and funding strategies to support the acquisition of priority lands for conservation, including open space and regionally significant natural features such as rivers, wetlands, forests, and ecological corridors. Encourage Crater PDC member localities, land trusts, and state agencies to identify and acquire high-value parcels, especially along river corridors like the Appomattox River, to protect water quality, reduce flood risk, and preserve habitat. Provide planning guidance and technical assistance to help localities prioritize acquisitions and align projects with available funding programs.

Action Components:

Identify priority conservation lands; support fee-simple land acquisition and conservation easements; align acquisitions with state and regional funding programs.

Responsible Entity:

Member Localities – Department of Recreation / Conservation and/or Environment / Energy Department.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Advance Regional Collaboration and Coordination

Potential Partners:

Crater PDC; Virginia Department of Conservation and Recreation (DCR); Virginia Department of Environmental Quality (DEQ); regional land trusts; watershed organizations; local planning commissions.

Priority Rating:

Low.

Hazards Addressed:

Flooding & Extreme Heat.

Estimated Cost:

Capacity Building / Study: Low (Less than $100k) for guidance, Project: High (Greater than $1.5M) for property acquisitions

Partner Action:

Crater PDC should help identify parcels based on vulnerability assessment results and linking localities with funding sources.

Type of Action:

- Policy and Planning
- Technical Assistance and Capacity Building

Source:

Vulnerability Assessment; Action Development Workshop

Implementation Readiness: Medium-term.

Near-term for acquisitions (depending on funding and willing sellers); ongoing as opportunities arise.

Grant Application Pathway

- **Likely Funder:** Virginia Land Conservation Foundation (VLCF), Virginia Outdoors Foundation (VOF), National Fish and Wildlife Foundation (NFWF) National Coastal Resilience Fund (NCRF).
- **Grant Type:** Land acquisition / conservation easement grant.
- **Anticipated Match:** VLCF requires a 50% local match for localities and nonprofit land trusts; NCRF match is not strictly required, though leveraged funding strengthens applications.
- **Required Supporting Data:** Priority parcel list from vulnerability assessment results (flood/heat exposure layered with conservation value); landowner willingness status; estimated acquisition cost.
- **Immediate Next Step:** Identify 1–2 priority parcels along a river corridor with Crater PDC and a regional land trust within two quarters and confirm landowner interest.

Regional Action (REG-6): Utilize Vulnerability Assessment Results for Infrastructure Upgrades and Site-Specific Assessments

Utilize the results of the regional vulnerability assessment to guide infrastructure upgrades and conduct site-specific assessments that address identified risks. This action focuses on applying vulnerability data to inform capital improvement planning, prioritize high-risk assets, and support targeted studies of critical infrastructure and facilities. By using a consistent, data-driven approach, localities can direct investments to locations most exposed to flooding, extreme heat, storms, and other hazards, improving infrastructure performance and long-term resilience. Crater PDC will support implementation by coordinating data use, providing technical assistance, and promoting alignment across jurisdictions.

Action Components:

Apply vulnerability data to capital planning; conduct site-specific studies; prioritize upgrades.

Primary Goals:

- Improve Hazard Preparedness, Response, and Recovery
- Strengthen Infrastructure and Built Environment Resilience

Responsible Entity:

Member Localities –Department of Public Works, and/or Engineering

Priority Rating:

High.

Hazards Addressed:

All Hazards.

Potential Partners:

Crater PDC; public works; utility companies; Virginia Department of Transportation (VDOT); Virginia Department of Emergency Management (VDEM)

Estimated Cost:

Project: High (Greater than $1.5M)

Partner Action:

Provide coordination on vulnerability assessment data; provide technical assistance; align local efforts with regional priorities and funding opportunities.

Type of Action:

- Data, Tools, and Decision Support
- Emergency Preparedness and Response

Implementation Readiness: Medium-term.

Source:

Action Development Workshop

Grant Application Pathway

- **Likely Funder:** Virginia Community Flood Preparedness Fund (CFPF) – Project Grant; FEMA Building Resilience Infrastructure and Communities (BRIC)
- **Grant Type:** Capital mitigation project grant (with a site-specific study as the recommended first phase).
- **Anticipated Match:** 25% non-federal match for BRIC (10% for community disadvantage-designated applicants). CFPF Project Grants generally require a local match (historically around 10%–20% depending on locality fiscal stress designation).
- **Required Supporting Data:** Ranked list of high-risk infrastructure assets from the vulnerability assessment; BCA inputs for the top-ranked asset; site-specific engineering assessment or pre-design.
- **Immediate Next Step:** Select the highest-priority asset within the next quarter and commission a site-specific engineering assessment.

Regional Action (REG-7): Conduct a Regional Flood Risk Study Beyond FEMA-Mapped Floodplains Using Hydrologic and Hydraulic (H&H) Modeling

Conduct a regional flood risk study using advanced hydrologic and hydraulic (H&H) modeling to identify areas susceptible to flooding that fall outside currently mapped FEMA Flood Hazard Zones. Develop calibrated watershed-scale hydrologic models to simulate rainfall–runoff processes using updated precipitation data (e.g., NOAA Atlas 14), soil conditions, land cover, and antecedent moisture. Pair these with detailed hydraulic models (e.g., HEC-RAS 1D/2D) to simulate flood depths, extents, velocities, and backwater effects across riverine, tributary, and urban drainage systems.

Action Components:

Compiled updated rainfall data, historical flooding reports, and local drainage information; conduct watershed-scale and localized hydrologic and hydraulic modeling; use results to inform planning, capital improvement prioritization, emergency operations, and public outreach.

Responsible Entity:

Member Localities –Department of Public Works, and/or Engineering

Primary Goals:

- Improve Hazard Preparedness, Response, and Recovery
- Enhance Data, Tools, and Decision-Making Capacity

Source

Action Development Workshop

Priority Rating:

High.

Hazards Addressed:

All Hazards.

Potential Partners:

Crater PDC; public works; utility companies; Virginia Department of Transportation (VDOT); Virginia Department of Emergency Management (VDEM).

Estimated Cost:

Study / Capacity Building: High (Greater than $250k)

Type of Action:

- Data, Tools, and Decision Support
- Emergency Preparedness and Response

Partner Action:

Provide coordination on vulnerability assessment data; provide technical assistance; align local efforts with regional priorities and funding opportunities.

Implementation Readiness	Medium-term.

Grant Application Pathway

- **Likely Funder:** Virginia Community Flood Preparedness Fund (CFPF) – Project Grant; FEMA Building Resilience Infrastructure and Communities (BRIC).
- **Grant Type:** Capital mitigation project grant (with a site-specific study as the recommended first phase).
- **Anticipated Match:** 25% non-federal match for BRIC (10% for community disadvantage-designated applicants). CFPF Project Grants generally require a local match (historically around 10%–20% depending on locality fiscal stress designation).
- **Required Supporting Data:** Ranked list of high-risk infrastructure assets from the vulnerability assessment; BCA inputs for the top-ranked asset; site-specific engineering assessment or pre-design
- **Immediate Next Step:** Select the highest-priority asset within the next quarter and commission a site-specific engineering assessment.

Regional Action (REG-8): Strengthen Regional Collaboration on Multi-Jurisdictional Projects

Continue to participate in and pursue regional collaboration with bordering localities on shared projects, such as recreational trails, greenways, and watershed initiatives, to improve connectivity, leverage shared resources, and advance mutually beneficial resilience and quality of life outcomes.

Action Components:

Continue and expand collaboration among neighboring localities on shared initiatives; advance joint projects; pursue joint funding opportunities; share data, lessons learned, and best practices to support long-term regional resilience.

Responsible Entity:

Member Localities –Planning Department, in coordination with Crater PDC.

Primary Goals:

- Advance Regional Collaboration and Coordination
- Strengthen Natural Systems and Land Use Resilience

Potential Partners:

Crater PDC; neighboring localities; public works; parks and recreation departments; regional land trusts and watershed organizations

Priority Rating:	Hazards Addressed:	Partner Action:
High.	All Hazards.	Facilitate interjurisdictional coordination; convene partner; assist with project scoping and regional grants applications.

Estimated Cost:

Project: Low to High (depending on project types)

Type of Action:

- Policy and Planning
- Programs and Implementation
- Regional Coordination and Capacity Building

Source:

Action Development Workshop

Implementation Readiness: Near-term.

Grant Application Pathway

- **Likely Funder:** Virginia Recreational Trails Program (RTP); National Fish and Wildlife Foundation (NFWF) National Coastal Resilience Fund (for watershed-focused joint projects); Virginia Community Flood Preparedness Fund (CFPF) – Capacity Building and Planning Grant.
- **Grant Type:** Capital/implementation grant for the joint project itself (CFPF Capacity Building and Planning Grant remains appropriate for the underlying coordination function).
- **Anticipated Match:** 20% non-federal match for RTP; NCRF not strictly required, though leveraged funding strengthens applications; CFPF capacity building and planning grants are generally non-matching for localities with limited capacity
- **Required Supporting Data:** List of current/proposed multi-jurisdictional initiatives; identified lead applicant locality or Crater PDC as convener; letters of support from participating localities
- **Immediate Next Step:** Convene neighboring localities within the next quarter to prioritize one near-term shared project and confirm the lead applicant

Regional Action (REG-9): Prioritize Emergency Planning Using Vulnerability Assessment Results

Use the results of vulnerability and exposure assessments to prioritize emergency planning and investment through radius based and network level analysis of critical infrastructure. Develop weighted asset maps that account for both asset vulnerability and the populations served, emphasizing facilities that support vulnerable communities (e.g., nursing and care facilities, grocery stores, pharmacies, cooling centers, fuel providers, and community services). Incorporate transportation and access modeling (road network analysis) to identify pinch points and single-access routes that are vulnerable to flooding and other hazards and may isolate communities. This approach promotes emergency preparedness efforts address service continuity for essential needs, not solely traditionally defined “critical” facilities.

Incorporate local drainage infrastructure (stormwater systems, culverts, ditches), terrain data (LiDAR), and historical flood observations to improve model accuracy and capture localized flooding conditions not reflected in FEMA mapping. Evaluate multiple storm scenarios, including current conditions and future conditions (e.g., increased rainfall intensity, land use change), to identify unmapped floodplains, residual risk areas, and compound flooding risks.

Action Components:

Use vulnerability and exposures assessment results to inform emergency planning and investment; conduct radius-based and network-level analysis of critical and essential infrastructure.

Responsible Entity:

Member Localities –Department of Emergency Management.

Primary Goals:

- Enhance Data, Tools, and Decision-Making Capacity
- Promote Equitable and Resilient Communities

Source

Action Development Workshop

Priority Rating:

High.

Hazards Addressed:

All Hazards.

Potential Partners:

Crater PDC; public works; Virginia Department of Emergency Management (VDEM); Virginia Department of Transportation (VDOT); Virginia Department of Environmental Quality (DEQ).

Estimated Cost:

Project: Low to High (depending on project type)

Type of Action:	Partner Action:
• Data , Tools, and Decision Support • Technical Assistance and Capacity Building • Emergency Preparedness and Response	Provide coordination and support for vulnerability data use; develop regional mapping tools; align local emergency regional priorities and funding opportunities.
Implementation Readiness	Near-term.

Grant Application Pathway

- **Likely Funder:** Virginia Community Flood Preparedness Fund (CFPF) – Capacity Building and Planning Grant
- **Grant Type:** Planning / data analysis grant
- **Anticipated Match:** CFPF capacity building and planning grants are generally non-matching for localities with limited capacity.
- **Required Supporting Data:** Vulnerability and exposure assessment results (already available regionally); essential community facility inventory (nursing/care facilities, grocery stores, pharmacies, cooling centers); road network data for access/pinch-point analysis.
- **Immediate Next Step:** Compile the essential-facility inventory within the next quarter, with Crater PDC GIS support, to begin weighted asset mapping ahead of a CFPF application.

8.0 LOCALITY RESILIENCE PLANS

Chapter 8 presents tailored resilience plans for each of the region's eleven localities. While designed to function as stand-alone summaries of community-specific conditions, vulnerabilities, and recommended actions, all locality plans were developed using a consistent regional planning process and framework. Accordingly, these plans should be reviewed in conjunction with the regional methodology, vulnerability assessment, and action framework presented in earlier chapters to provide a comprehensive understanding of the planning approach, underlying assumptions, and regional coordination priorities.

8.0 LOCALITY RESILIENCE PLANS 1

8.1. Charles City CC-1

8.2. Chesterfield County CF-1

8.3. Colonial Heights CH-1

8.4. Dinwiddie County DW-1

8.5. Emporia EP-1

8.6. Greensville County GV-1

8.7. Hopewell HW-1

8.8. Petersburg PB-1

8.9. Prince George County PG-1

8.10. Surry County SR-1

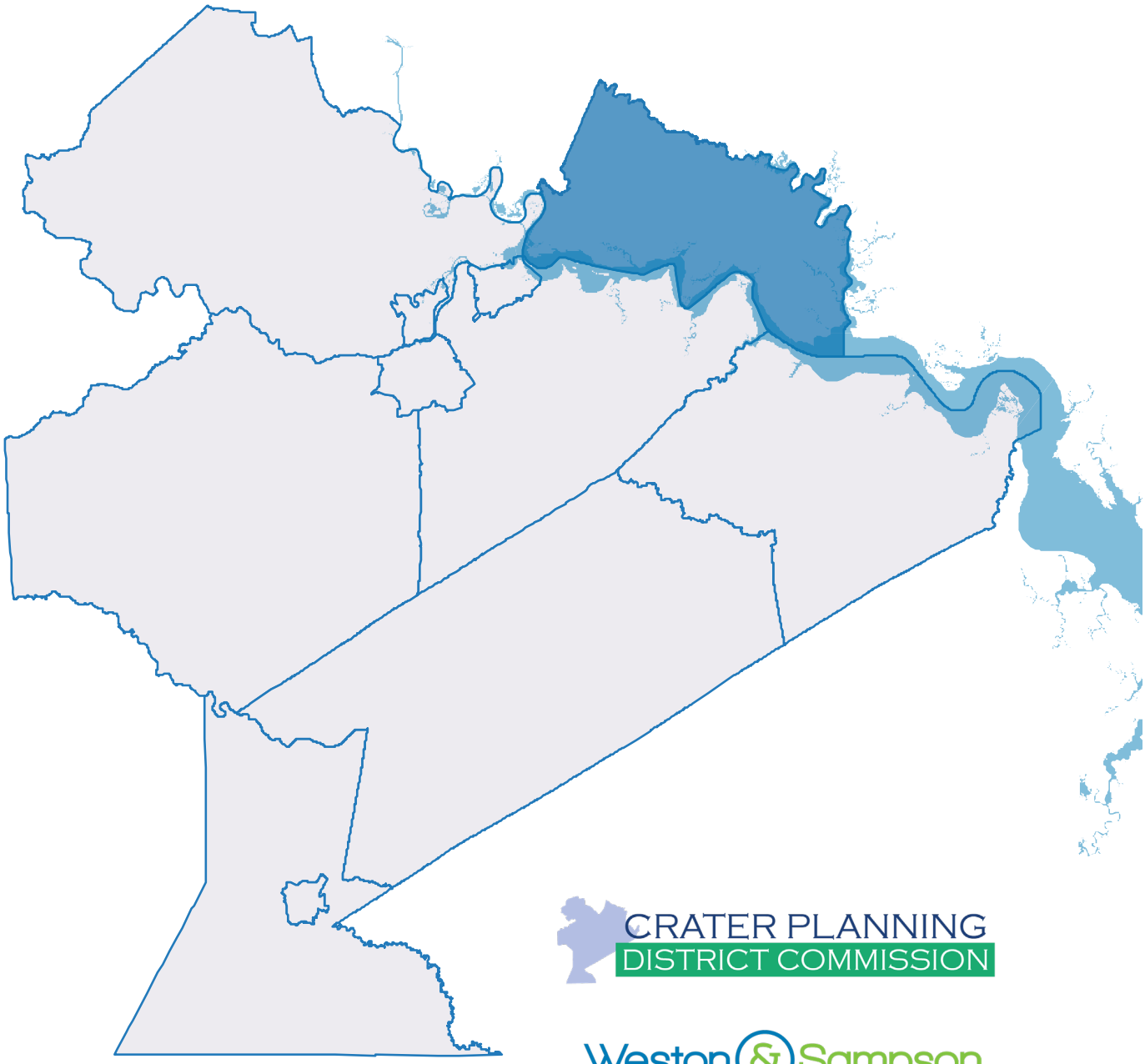
8.11. Sussex County SS-1

Charles City County

Resilience Plan

Version 1.0 | September 2026

Locality Chapter of the Crater PDC Regional Resilience Plan



CRATER PLANNING DISTRICT COMMISSION

Weston & Sampson

TABLE OF CONTENTS

This chapter presents the locality-specific resilience objectives for Charles City County as part of Chapter 8: Locality Resilience Plans of the Crater PDC Regional Resilience Plan. It provides a structured overview of local conditions, risks, and actions to support resilience planning and implementation.

8.1 CHARLES CITY RESILIENCE PLAN

CC.1. Introduction and Vision ..... CC - 3

CC.2. Demographics ..... CC - 3

CC.3. Challenges and Strengths ..... CC - 5

CC.4. Capacity and Needs ..... CC - 6

CC.5. Overview of Environmental Conditions ..... CC - 8

CC.6. Floodplain Management and Flood Risk Identification ..... CC - 8

CC.7. Vulnerability Assessment Results ..... CC - 10

CC.8. Actions ..... CC - 16

For additional context on regional priorities, cross-jurisdictional strategies, and Crater PDC–wide resilience objectives, users should refer to the comprehensive Crater PDC Regional Resilience Plan, of which this chapter is one locally focused component. Other components of the plan include:

- Regional vision, goals, and a planning framework for resilience across the Crater Planning District.
- A regional profile describing environmental, economic, infrastructure, and community characteristics.
- An assessment of existing local and regional resilience plans and initiatives.
- A capacity-building roadmap identifying institutional, technical, and organizational needs.
- Results from regional steering committee engagement and workshops.
- A regional vulnerability assessment, including an asset inventory, methodology, and findings.
- Regional actions for implementation by Crater PDC and cross-jurisdictional actions applicable to all localities.
- A regional debris management strategy to support post-disaster response and recovery.
- A plan maintenance framework and supporting appendices.

CC.1. Introduction and Vision

Charles City County is one of the oldest counties in Virginia, established in 1634 as one of the original eight shires of the Virginia colony, with a history closely tied to agriculture, plantation settlement, and transportation along the James River. The county contains numerous historic plantations, churches, and cultural landscapes that reflect centuries of continuous land use, including several properties and districts listed on the National Register of Historic Places, such as Berkeley Plantation and Westover Plantation (National Register of Historic Places). These historic resources remain visible today through preserved agricultural lands, riverfront estates, and rural road networks that have experienced limited structural change over time.

This long-standing historical context directly influences contemporary planning priorities. Rather than focusing on large-scale growth, Charles City County emphasizes preservation of farms and forests outside designated Development Centers and Neighborhood Service Areas to protect historic landscapes and environmentally sensitive land (Charles City County Comprehensive Plan, 2014). The Comprehensive Plan frames land conservation, water quality protection, and careful management of development as essential to maintaining both the county's cultural heritage and its long-term climate resilience (Charles City County Comprehensive Plan, 2014).

As a part of the visioning process for the Crater PDC Regional Resilience Plan, steering committee members from Charles City County developed the following vision statement:

> ***Charles City County envisions a resilient future where communities are safe from flooding, natural resources are protected, and sustainable growth preserves the county's cultural and rural identity for generations to come.***

CC.2. Demographics

Charles City County is characterized by a small, aging population and predominantly rural housing landscape. The county has approximately 6,773 residents and a median age of 52.6, making it one of the oldest populations in the region. More than one-quarter of residents are age 65 or older, a trend that may shape future needs related to housing, healthcare, transportation, and community services. While the county's median household income is relatively strong at $70,339, approximately 11.4 percent of residents live below the poverty level, indicating that economic challenges persist for portions of the population. Educational attainment also remains below statewide averages, with only 16 percent of residents holding a bachelor's degree or higher

With a median age of 52.6, Charles City County has one of the oldest populations in the Crater region.

Housing patterns further reinforce the county's rural character. Homeownership is especially high at 85.7 percent, and median gross rent remains lower than statewide levels, reflecting a housing market dominated by owner-occupied homes with comparatively limited diversity in housing options (U.S. Census Bureau, Decennial Census, 2020).

Table CC.1 U.S. Census Bureau Statistics Comparison.

U.S. Census Bureau Statistic	Charles City County	Crater PDC	Virginia
Land area	182.9 square miles	2,487.5 square miles	39,481.4 square miles
Population and people			
Total Population	6,773	556,840	8,631,393
Median Age	52.6	40.9	39.4
Population that is 65 years and older	26.2%	18.6%	17.6%
Without Health Care Coverage	5.1%	6.4%	6.9%
Income and Poverty			
Median Household Income	$70,339	$69,698	$92,090
Poverty	11.4%	12.9%	9.7%
Education			
Bachelor's Degree or Higher	16.0%	22.3%	43.3%
School Enrolled Population in Kindergarten to 12th Grade	67.4%	70.7%	65.6%
Employment			
Local, State, and Federal Gov. Workers	18.8%	20.7%	20.6%
Avg. Travel Time to Work	34.0 min	29.3 min	28.3 min
Employment Rate	56.3%	53.6%	61.1%
Housing			
Median Gross Rent	$1,076	$1,177	$1,646
Homeownership Rate	85.7%	66.5%	67.1%
Total Housing Units	3,269	232,007	3,746,211
Total Households	2,947	217,220	3,449,307
Families and Living Arrangements			
Children under 18 years old	14.6%	20.6%	21.3%

U.S. Census Bureau Statistic	Charles City County	Crater PDC	Virginia
Race and Ethnicity			
American Indian and Alaska Native alone	448	2,822	40,007
Asian alone	38	15,795	615,436
African American	2,836	163,453	1,607,581
Hispanic or Latino (of any race)	101	52,020	908,749
Native Hawaiian and Other Pacific Islander alone	6	491	7,156
Not Hispanic or Latino	2,997	294,878	5,058,363
Some Other Race	75	28,897	446,650
Two or More Races	342	37,564	705,707
White	3,028	302,764	5,208,856

CC.3. Challenges and Strengths

Charles City County faces several challenges relevant to resilience planning. Highly erodible and permeable soils are widespread across the county, contributing to erosion, sedimentation, and water quality concerns, particularly in areas with steep slopes or on-site septic systems. The county relies entirely on groundwater for water supply, and increased groundwater withdrawal raises concerns about long-term availability and potential saltwater intrusion from the James River. Planning documents also identify aging infrastructure, limited telecommunications access, and a relatively small economic base as constraints that can affect emergency response, service delivery, and implementation capacity (Charles City County Comprehensive Plan, 2014).

At the same time, Charles City County has important strengths that support long-term resilience. Extensive agricultural and forested lands provide natural flood storage, erosion control, and ecosystem services that reduce exposure to environmental hazards. The county has a strong regulatory framework for protecting water quality, including stormwater management ordinances and regulations that comply with the Virginia Chesapeake Bay Preservation Act. Wetland banking efforts have resulted in hundreds of acres of restored or protected wetlands, and conservation easements and floodplain overlay districts further limit development in high-risk areas. Ongoing coordination with regional partners supports access to technical assistance, data, and planning resources that enhance the county's ability to address resilience challenges despite limited local capacity (Charles City County Comprehensive Plan, 2014).

CC.4. Capacity and Needs

One of the first steps within the planning process for the Crater PDC Regional Resilience Plan was performing a capacity and needs assessment for resilience planning. The capacity strengths and challenges revealed within the capacity and needs assessment were integrated into actions for Crater PDC to initiate and next steps for localities. These actions can be found in Chapter 4. Capacity Building Roadmap and serve as foundational actions Crater PDC and localities should pursue in tandem with the other actions within this plan. This survey was directly informed by the capacity and needs assessment questionnaire provided during the beginning of the planning process, which gathered detailed input from local staff on existing roles, resource gaps, technical needs, and challenges related to climate resilience, funding, infrastructure, and intergovernmental coordination. This section provides a snapshot summary of Charles City County identified challenges as they relate to resilience planning.

REGIONAL COORDINATION & SUPPORT



Resilience Coordination with Other Localities
- Yes, mutual aid agreements with neighboring jurisdictions

Identified Support Needs
- Grant writing and funding support
- Data and mapping tools
- Training programs and capacity building

INFRASTRUCTURE & OPERATIONS



Primary Public Assets Impacted by Hazards
- Roads and transportation systems
- Water supply systems

Redundancy Plans
- Some redundancy measures are in place (e.g., generator at the high school)

FINANCIAL RESOURCES

Identified Financial Challenges
- Limited local funding
- Lack of matching funds
- Difficulty accessing state and federal grants
- Grant application capacity constraints

HUMAN & INSTITUTIONAL CAPACITY



Relevant Staff Positions
None specific to resilience planning only. Responsibilities are shared across multiple roles.

Relevant Departments
Planning/Zoning; Emergency Management

Identified Staff Capacity Needs
- Additional full-time staff

TECHNICAL ASSISTANCE & TRAINING NEEDS



Identified Training Needs

- GIS mapping and data analysis for flood risk assessment
- Grant writing and funding strategy
- Assessment of critical asset vulnerabilities
- Development of local resilience planning recommendations
- Policy and ordinance development for resilience

POLICY & PLANNING



Land Use, Zoning Ordinances, and Plans

- Required floodplain overlay district
- Would benefit from model ordinances or policy recommendations related to resilience

Identified Barriers for Resilience Efforts

- Political will or support; significant public education is needed to build support for initiatives
- Lack of funding
- Technical expertise or staff constraints

DISASTER RESPONSE CAPACITY



Emergency Operations or Disaster Response

- Regional Hazard Mitigation Plan (2022)
- Emergency Operations Plan, adopted in 2025

Responsible Agencies / Departments

- Emergency Management
- Fire/Rescue
- Public Works
- Police/Sheriff's Department

Enrollment in FEMA Community Rating System

Not currently enrolled.

Identified Challenges for Disaster Response

- Staffing shortages
- Lack of funding for emergency preparedness
- Insufficient emergency shelter capacity

Identified Disaster Response Needs

- Additional response resources
- Increased funding for emergency preparedness
- Staff training in disaster response protocols
- Improved coordination with regional and state agencies
- Post-disaster recovery planning and support

CC.5. Overview of Environmental Conditions

Charles City County experiences a range of environmental conditions influenced by its riverine setting, rural land use patterns, and exposure to severe weather. Flooding is a recurring hazard, particularly along low lying roads and areas adjacent to rivers. Significant flood events in the past have demonstrated the County's vulnerability to heavy rainfall and slow moving storms. During these events, portions of Route 5 and other local roadways were closed due to flooding, washed out roadways, and sinkholes. While Charles City County is less densely developed than some neighboring jurisdictions, its transportation network and rural infrastructure are sensitive to intense rainfall and prolonged flooding, leading to repeated disruptions and maintenance challenges (Plan RVA; Crater PDC, 2022).

Compared to more urbanized areas in the Crater region, Charles City County is less exposed to extreme wind losses from tropical storms due to lower overall development density. However, tornadoes, winter weather, and severe thunderstorms remain ongoing risks. County data indicate recurring tornado activity resulting in cumulative damages, as well as winter weather events that cause regular, though relatively modest, annualized losses. Charles City County also experiences drought conditions periodically, with impacts primarily affecting agriculture and natural resources rather than built infrastructure. Hail and lightning events occur infrequently but contribute to localized property damage (Plan RVA; Crater PDC, 2022).



86% of the County's woodland communities are classified as high wildfire risk, reflecting its extensive forest cover and rural development pattern.

Wildfire risk is a notable environmental concern in Charles City County, particularly within woodland residential areas. From 1995 to 2020, the County recorded the highest number of wildfires in the Crater region during the most recent five year period, and approximately 86 percent of its woodland communities are classified as high wildfire risk. This risk reflects the County's extensive forest cover and rural development pattern. Along the County's shoreline, environmental conditions also present opportunities for nature based management. The Charles City County Shoreline Management Plan prepared by VIMS found that nearly 85% of the County's shoreline could be managed through enhanced riparian buffers or marsh restoration, indicating strong potential for approaches that improve shoreline stability, water quality, and flood resilience while maintaining the County's natural character (Plan RVA; Crater PDC, 2022).

CC.6. Floodplain Management and Flood Risk Identification

As part of the Virginia Department of Conservation and Recreation (DCR) Resilience Plan requirements, localities must document administrative procedures for tracking and managing

Substantial Improvement (SI) and Substantial Damage (SD) determinations for structures located within Special Flood Hazard Areas (SFHAs), as well as identify Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties. This section summarizes these requirements as they relate to Charles City County and highlights the relevant provisions contained within the County's floodplain ordinance, associated regulatory documents, and information documented in the PlanRVA–Crater PDC Multi-Regional Hazard Mitigation Plan (2022). The purpose of this review is to verify the County's existing administrative framework and identify opportunities to strengthen floodplain management and support long-term resilience planning efforts.

Why it matters: Identifying and tracking flood-prone properties helps communities better understand flood risk, prioritize mitigation investments, reduce future damages, strengthen resilience, and guide long-term land use and development decisions.

CC.6.1 Floodplain Ordinance and Regulatory Framework

Charles City County has adopted a floodplain ordinance (Ordinance No. 01-2022) that is compliant with the National Flood Insurance Program (NFIP), as it regulates development within FEMA-mapped Special Flood Hazard Areas (SFHAs), requires permits, and designates a Floodplain Administrator to enforce compliance and maintain required records. The ordinance was recently updated in 2022, reflecting current FEMA Flood Insurance Rate Maps (FIRM dated April 20, 2022) and incorporating updated regulatory provisions. The ordinance exceeds minimum NFIP standards in several areas, including the requirement for 18 inches of freeboard above base flood elevation for residential and non-residential structures, the incorporation of hydrologic and hydraulic (H&H) analysis requirements for floodway encroachments, and provisions allowing the locality to regulate local flood hazard areas not mapped on FEMA FIRMs. The ordinance also establishes administrative procedures for tracking and managing substantial improvement and substantial damage determinations for structures located within Special Flood Hazard Areas (SFHAs). The Floodplain Administrator is responsible for determining whether damaged structures meet the substantial damage threshold and whether improvements constitute substantial improvements under NFIP regulations. The ordinance requires review of cumulative improvements over a rolling five-year period, maintains the 50 percent market value threshold for substantial improvement determinations, requires documentation supporting permits and determinations to be permanently retained, and directs the Floodplain Administrator to notify property owners of substantially damaged structures and ensure repairs are brought into compliance with current floodplain standards.

Strengths of the floodplain ordinance include alignment with state code, use of best available data (including preliminary FEMA data and locally derived flood information), and comprehensive technical standards that improve resilience beyond minimum compliance. However, potential gaps include continued reliance on FEMA mapping as a regulatory baseline (despite allowance for local data), possible limitations in staffing or technical capacity given the option to delegate or contract administration, and no explicit linkage to CRS participation or higher-order resilience planning tools.

CC.6.2 Flood Risk Identification SFHAs

Under the National Flood Insurance Program (NFIP), a repetitive loss property is defined as a property for which two or more flood insurance claims of at least $1,000 have been paid within any 10-year period.

Severe repetitive loss (SRL) properties represent a subset of these structures and indicate a higher level of risk and recurring damage. These properties are defined as those that have either:

- At least **four NFIP** claims exceeding $5,000 each, or
- At least **two claims** where the total payouts exceed the building's value.

i

Repetitive loss (RL) properties are structures that have experienced multiple instances of flood-related damage over time.

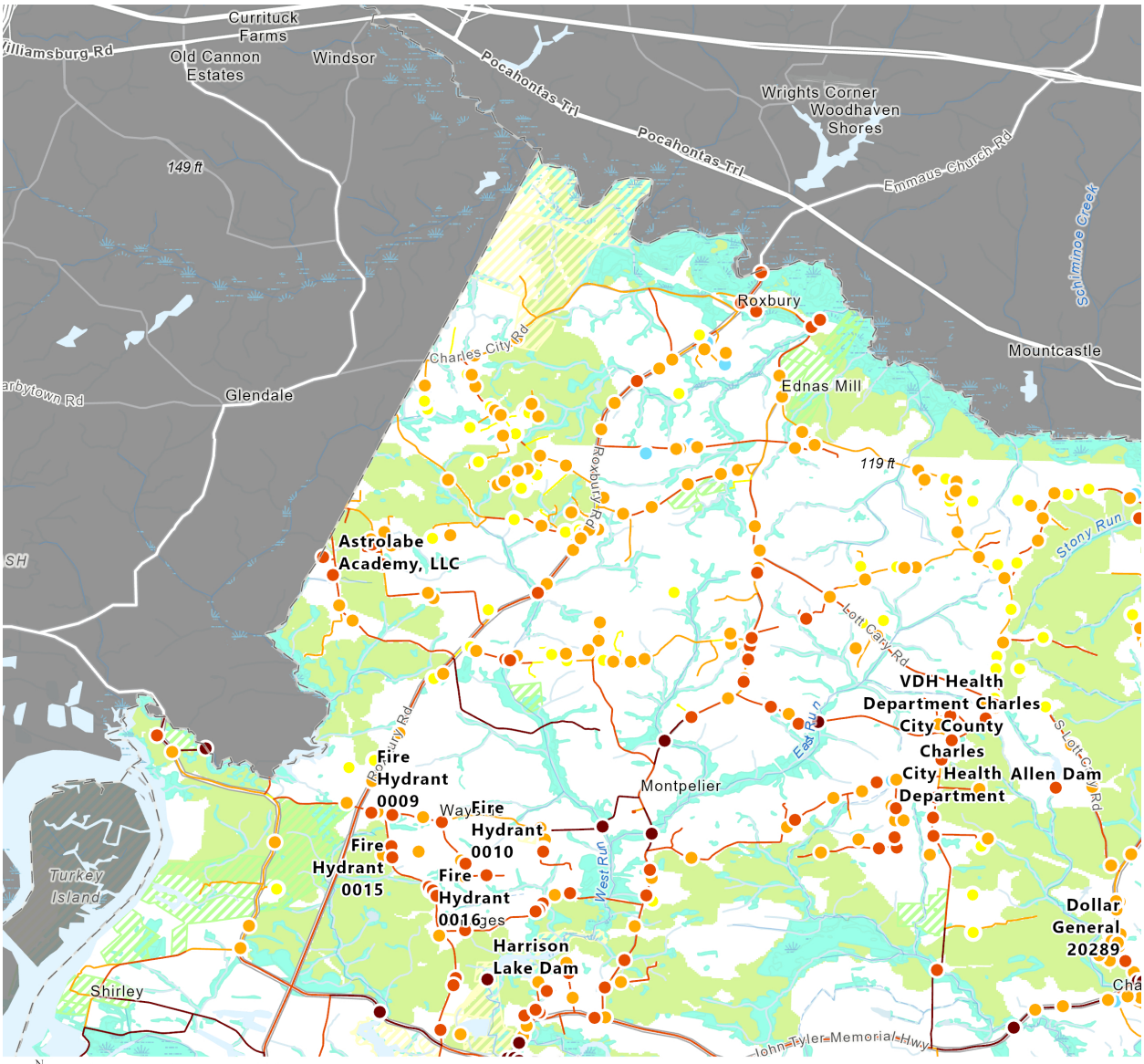
While NFIP data tracks many RL and SRL properties, these designations may not capture all instances of recurring flood impacts. Repetitive flooding can and often does occur outside of mapped Special Flood Hazard Areas (SFHAs), particularly due to stormwater, drainage issues, or localized flooding. As a result, communities are encouraged to identify, track, and address all repetitive flood impacts, regardless of NFIP designation, to better understand risk patterns and inform mitigation strategies. According to the Richmond-Crater Hazard Mitigation Plan (2022), Charles City County has 0 RL properties and 0 SRL properties as defined by the NFIP. There are no known RL and SRL properties outside of the Special Flood Hazard Areas (SFHA) as well.

CC.7. Vulnerability Assessment Results

Another foundational element of the Crater PDC Regional Resilience Plan was a region-wide vulnerability assessment performed across the Crater region. The vulnerability assessment results in this section have been parsed out to only include findings relevant to Charles City County. The vulnerability assessment conducted for the Crater PDC Regional Resilience Plan evaluated how each locality is exposed to multiple hazards, including rainfall (pluvial) flooding, riverine (fluvial) flooding, storm surge, extreme heat, and wildfire risk. The vulnerability assessment also evaluated sensitivity through the social vulnerability index. The results for the Charles City County vulnerability assessment identified flooding, particularly from rainfall (pluvial), and wildfire as the primary risk to critical assets. Storm surge was also identified as a primary risk to roadways in the County.

For the methodology of this vulnerability assessment, including data sources, indicator selection, and scoring, please refer to Appendix B. Crater PDC Vulnerability Assessment. For the region-wide assessment and hazard information, please refer to Chapter 6. Vulnerability Assessment.

Vulnerability in Charles City County is not evenly distributed across the county. The asset vulnerability maps (Figures CC.1 - 4) show higher concentrations of High and Very High vulnerability assets along the James River shoreline near Berkeley Plantation and Westover Plantation, along the Route 5 corridor, and throughout portions of the Chickahominy River corridor. These areas contain concentrations of transportation infrastructure, water and wastewater facilities, community assets, and other critical infrastructure exposed to one or more climate hazards.



Crater PDC Regional Resilience Plan

Charles City County Asset Vulnerability Scores

Legend

Scored Assets Vulnerability	Roadways Vulnerability	
Very Low	Very Low	Charles City Boundary
Low	Low	Rivers
Moderate	Moderate	Conservation Land
High	High	Easement
Very High	Very High	Wetlands
		Natural Land Network

CPDC Weston & Sampson

Vulnerability scores were developed as part of the vulnerability assessment for the Crater PDC Regional Resilience Plan. Only assets identified as having high or very high vulnerability are labeled on the map. Due to the sensitivity and quantity of these assets, septic systems, transmission towers, culverts, bridges, and roads were excluded from labeling.

Figure CC.1 Charles City County Asset Vulnerability Map

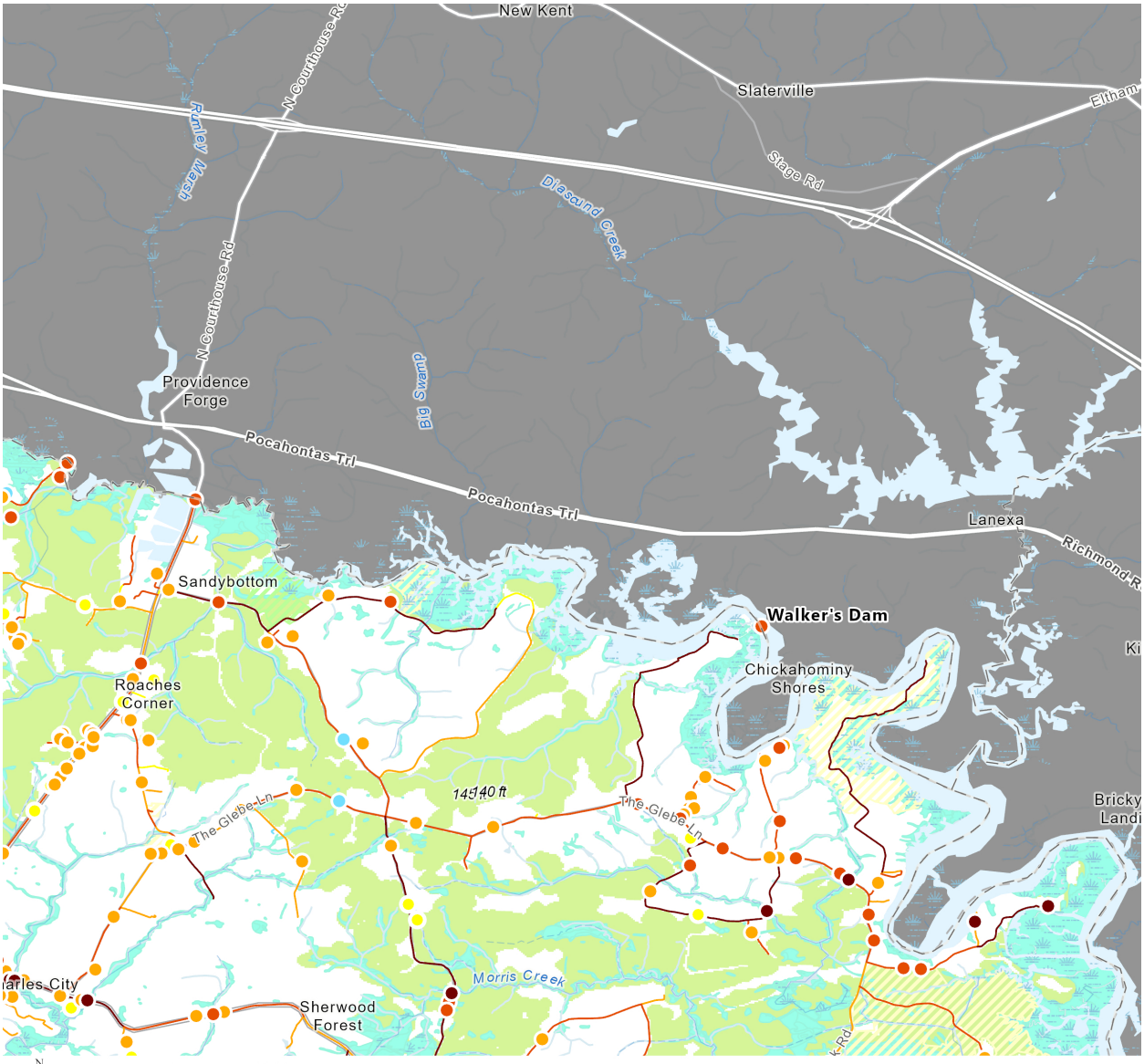


Figure CC.2 Charles City County Asset Vulnerability Map

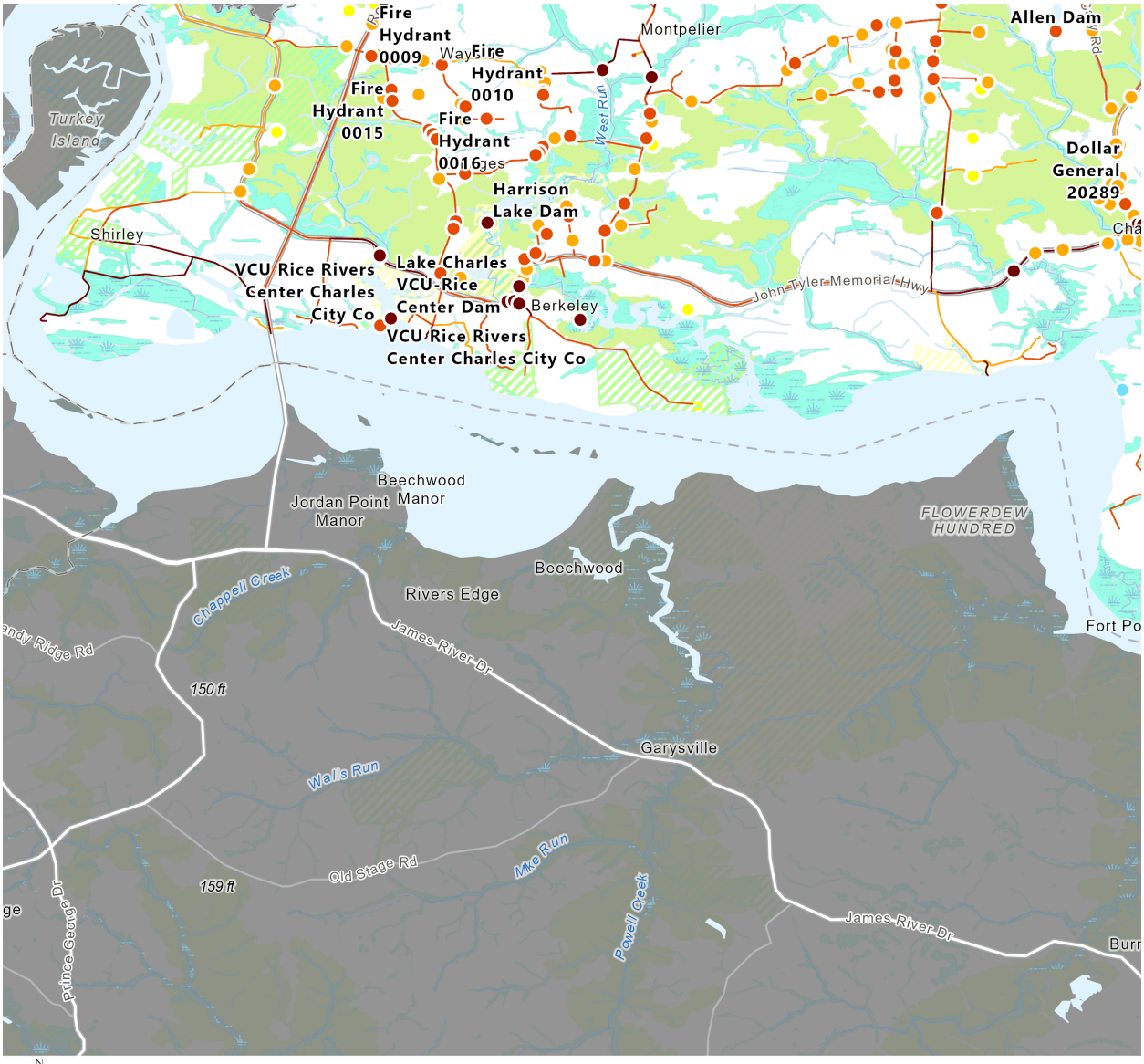
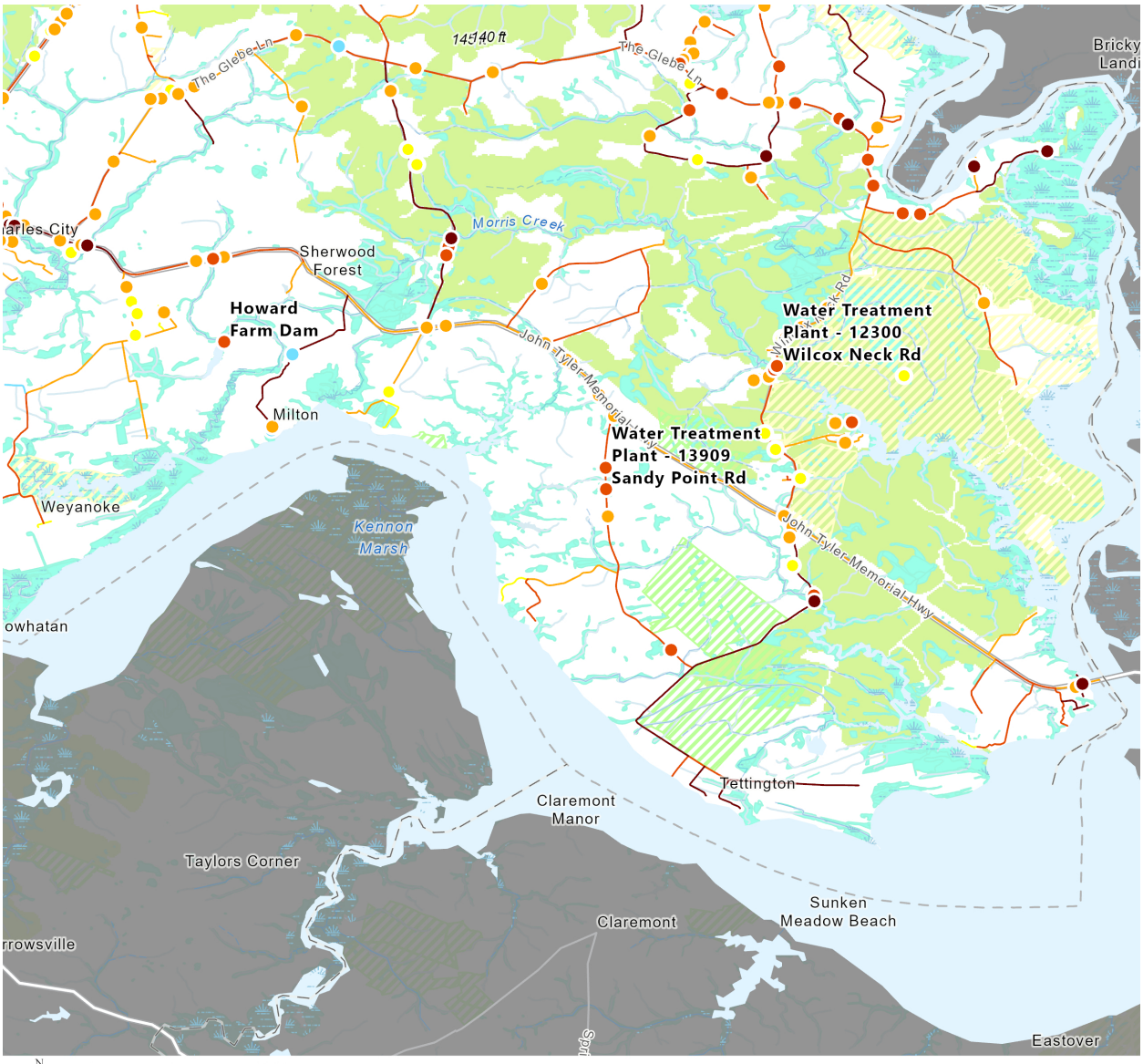


Figure CC.3 Charles City County Asset Vulnerability Map



Vulnerability scores were developed as part of the vulnerability assessment for the Crater PDC Regional Resilience Plan. Only assets identified as having high or very high vulnerability are labeled on the map. Due to the sensitivity and quantity of these assets, septic systems, transmission towers, culverts, bridges, and roads were excluded from labeling.

Figure CC.4 Charles City County Asset Vulnerability Map

Additional vulnerable assets are distributed throughout the county where transportation corridors and public facilities intersect flood-prone riverine landscapes.

A total of 730 built infrastructure assets (excluding roadways) and 490 roadway segments were evaluated. Charles City County has assets within the following categories Water and Wastewater (76.2%), followed by Transportation (8.6%), Emergency Services / Community Assets (5.8%), Communications (4.2%), Government Facilities (3.7%), Food and Agriculture (0.8%), Energy (0.4%), and Financial Services and Healthcare and Public Health (each 0.1%). Because asset counts vary significantly by category, the analysis emphasizes the percentage of assets within each category that are ranked as having High or Very High vulnerability. Categories with the greatest proportions of highly vulnerable assets are discussed below. Figure CC.5 illustrates the distribution of vulnerability scores across all asset categories, including roadways.

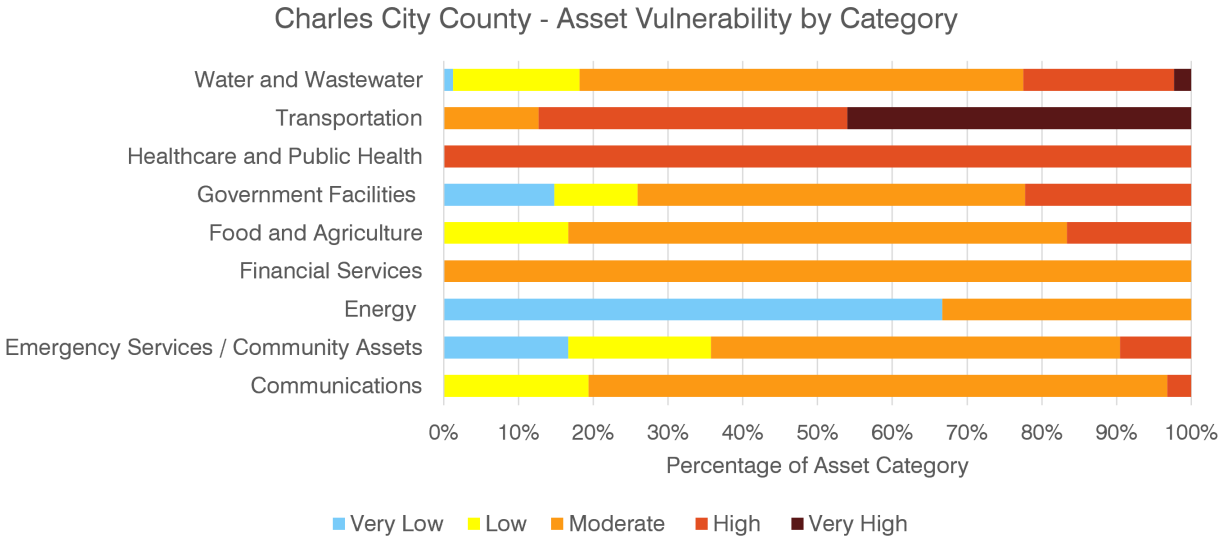


Figure CC.5 Vulnerability Score by Asset Category

CC.7.1 Healthcare and Public Health

Healthcare and Public Health emerged as a notable vulnerability concern despite representing only a single assessed asset. The Charles City Health Department received a High vulnerability score due to its exposure to rainfall-driven flooding, wildfire risk, and its location within an area of elevated social vulnerability. Because the Health Department serves an important role in emergency response and public health services, disruptions to the facility could affect community recovery and access to essential services during hazard events. These findings support continued evaluation of critical facility resilience and emergency preparedness capacity.

CC.7.2 Transportation

Transportation infrastructure emerged as one of the County's most significant vulnerability concerns. Roads, bridges, and culverts frequently intersect floodplains associated with the James and Chickahominy River systems, increasing the likelihood of access disruptions during flood events. Mill Trail Road received the highest vulnerability score in the County, while Tylers Mill Road and Sandy Point Road were also identified as highly vulnerable. In addition to flooding,

Transportation disruptions can have widespread impacts on residents, visitors, and access to essential destinations.

many transportation assets are exposed to wildfire and extreme heat. Because these corridors provide access to communities, public facilities, and recreational destinations, disruptions can have widespread impacts on residents and visitors. These findings directly informed actions focused on reducing flood risk at recreational amenities (CC-2) and expanding river monitoring and flood infrastructure along the James and Chickahominy Rivers (CC-3).

CC.7.3 Water and Wastewater

Water and wastewater infrastructure also demonstrated elevated vulnerability within Charles City County. Water treatment facilities, clustered septic systems, and dam infrastructure located near the James River and along corridors such as the John Tyler Memorial Highway received some of the highest vulnerability scores due to exposure to flooding, wildfire, and other hazards. The Lake Charles VCU-Rice Center Dam and Harrison Lake Dam were among the highest scoring assets in this category. These facilities are critical for protecting public health, environmental quality, and community resilience. The findings informed actions focused on elevating septic systems in flood-prone areas (CC-1) and strengthening flood monitoring and stormwater management practices to reduce future risks.

The vulnerability assessment findings directly informed Charles City County's resilience actions. Transportation vulnerabilities along river corridors support actions to reduce flood risk at recreational amenities (CC-2) and expand monitoring and flood infrastructure along the James and Chickahominy Rivers (CC-3). Vulnerabilities affecting water, wastewater, and septic infrastructure informed efforts to elevate septic systems in flood-prone areas (CC-1). The County's extensive agricultural and forested landscapes, combined with exposure to wildfire hazards, support actions focused on climate-smart agriculture (CC-4), stewardship of privately owned forest lands (CC-5), and increased resources for wildfire response (CC-6). Together, these actions address the key vulnerabilities identified through the assessment and help strengthen Charles City County's long-term resilience.

CC.8. Actions

The Crater PDC Regional Resilience Plan contains tailored resilience actions for each of the 11 localities within the Crater PDC, actions for Crater PDC to strengthen local and regional capacity, and consistent region-wide actions each of the 11 localities. The following section only contains tailored actions for Charles City County. Actions that Crater PDC is tasked with pursuing, that may be useful for locality-level support and next steps, as well as, region-wide actions Charles City County could pursue are found in Chapter 7. Regional Actions within the Crater PDC Regional Resilience Plan.

Table CC.2 below summarizes the resilience actions developed for Charles City County through the regional resilience planning process. These actions were primarily identified during an Action Development Workshop held in spring 2026 and informed by stakeholder engagement, best practices, the Regional Hazard Mitigation Plan, and relevant comprehensive plans.

Table CC.2 Action Item Key for Charles City County

ID	Action Title	Responsible Entity	Estimated Cost	Priority
CC-1	Elevate Septic Systems in Flood-Prone Areas	Charles City Department of Public Works	Medium (Project)	Medium
CC-2	Reduce Flood Risk for Recreational Amenities	Charles City Department of Parks and Recreation	Medium (Project)	Medium
CC-3	Expand James River and Chickahominy River Monitoring and Flood Infrastructure	Charles City Department of Public Works	Medium (Project)	Medium
CC-4	Support Climate-Smart Agriculture	Charles City Economic Development Department	Medium (Study/ Capacity Building)	Low
CC-5	Protect and Steward Privately Owned Forest Lands	Charles City Planning Department and/ or Economic Development Department	High (Study/ Capacity Building)	Medium
CC-6	Increase Resources Used to Fight Wildfire	Charles City Department of Fire and Emergency Services	Medium (Project)	Medium

Action Key

Below is the action key used to develop each of the tailored action descriptions presented in this section of the plan.

Action Components: Key considerations for action development and implementation.

Primary Goals: The broader resilience goal(s) or objective(s) that the action supports. These actions include the following:

- Strengthen Natural Systems and Land Use Resilience
- Improve Hazard Preparedness, Response, and Recovery
- Enhance Data, Tools, and Decision-Making Capacity
- Build Local and Regional Capacity
- Advance Regional Collaboration and Coordination
- Increase Public Awareness and Community Engagement
- Promote Equitable and Resilient Communities
- Strengthen Infrastructure and Built Environment Resilience
- Support Economic Resilience and Workforce Development

Priority Rating: An assessment of the relative importance or urgency of the action in relationship to the other actions in the plan. For these ratings, steering committee feedback throughout the planning process was prioritized. Actions were prioritized based off the capacity and needs assessment, ability to be funded through Virginia CFPF, and best practices. These ratings have not been through a scoring or ranking exercise by the Steering Committee. Localities are encouraged to confirm, adjust, or reprioritize ratings to reflect local conditions, capacity, and funding timelines before using them to sequence implementation or grant applications.

Hazards Addressed: The climate or hazard risks the action is intended to help mitigate or manage. These include the following:

- Flooding (pluvial/rainfall, fluvial/riverine, and/or storm surge)
- Extreme Heat
- Wildfires
- Extreme Storms and/or Winter Weather
- All hazards – *addresses each hazard group*

Estimated Timeline: A general timeframe for implementation (short, medium, or long term) from the action kickoff to end.

- Short-term: 1-2 years
- Medium-term: 2-4 years
- Long-term: 5 or more years

Source: The origin of the action, such as stakeholder input, workshop activities, existing plans, or best practices.

Type of Action: The general action type, or means of implementation that fall under the following:

- Policy and Planning
- Programs and Implementation
- Capital Projects and Infrastructure
- Data, Tools, and Decision Support
- Technical Assistance and Capacity Building
- Regional Coordination and Partnerships
- Public Education and Engagement
- Emergency Preparedness and Response
- Nature-Based Solutions
- Expand Recreational Access to Foster Stewardship
- Residential Adaptation Tool

Responsible Entity: The primary organization or jurisdiction responsible for leading the action.

Potential Partners: Additional agencies, organizations, or stakeholders that could support or collaborate on implementation.

Partner Action: Actions either the PDC, localities, or other listed stakeholders should engage in during or after the action is completed to further maintain or manage desired outcomes.

Potential Funding Sources: Possible state, federal, regional, or local funding mechanisms that could support action implementation, management, or maintenance. Common funding sources for these actions are Virginia Community Flood Preparedness Fund (CFPF) and FEMA Hazard Mitigation Grant (HMG). Identification of a funding source does not guarantee project eligibility, funding availability, award selection, or future program continuity. Funding requirements, priorities, and availability may change over time and should be verified during project development and grant application.

Estimated Cost: A high level cost range (low, medium, high). For capacity building / studies versus project actions, there are two different ranges used depending on the project type.

Cost	Studies / Capacity Building	Projects
Low	Less than $100 k	Less than $750 k
Medium	$100 k to $250 k	$750 k to $1.5 M
High	Greater than $250 k	Greater than $1.5 M

Charles City Action 1 (CC-1): Elevate Septic Systems in Flood-Prone Areas

Require elevation or other climate resilient siting measures for onsite septic systems in coastal and flood prone areas, prioritizing high exposure locations such as areas near the John Tyler Memorial Highway. Appropriate siting measures may include elevating system components, increasing separation distances from seasonal high groundwater tables, avoiding placement within high-risk flood hazard areas where feasible, and incorporating system designs that maintain functionality during and after flood events. This action aligns with recent Virginia legislation directing the Department of Health to incorporate climate change considerations into onsite septic regulations, including flooding and groundwater conditions, as part of a comprehensive regulatory update.

Action Components:

Identify flood-prone and high-exposure areas with existing or planned onsite septic systems; update local requirements to require septic elevation; coordinate with the Virginia Department of Health (VDH) guidance.

Responsible Entity:

Charles City Department of Public Works.

Primary Goals:

- Protect Public Health and Water Quality
- Improve Hazard Preparedness, Response, and Recovery.

Potential Partners:

Crater PDC; Virginia Department of Health (VDH); housing departments; onsite system installers; environmental health professionals.

Priority Rating:

Medium.

Hazards Addressed:

Flooding.

Partner Action:

Support regional coordination between coastal communities with flood-prone septic systems, provide technical guidance and best practices, and share vulnerability assessment results on flood-prone septic systems.

Estimated Cost:

Project: Medium ($750k - $1.5M).

Type of Action:

- Programs and Implementation
- Residential Adaptation

Source:

Vulnerability Assessment; Committee Engagement Results; Action Development Workshop

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for identification of systems; long-term for system replacement or upgrades.

Potential Funding Source: Virginia Department of Health's Septic and Well Assistance Program (SWAP), EPA Clean Water State Revolving Fund (CWSRF), EPA Nonpoint Source Section 319 Grant.

Charles City Action 2 (CC-2): Reduce Flood Risk for Recreational Amenities

Locate new trails, boat launches, and recreational amenities outside high-risk flood zones where feasible, and elevate or harden critical access points to provide safe and reliable recreational use, including at locations such as the Chickahominy Wildlife Management Area and the Morris Creek Boat Ramp. Incorporate educational signage that explains flood risk, resilience design features, and the role these facilities can play during emergencies, such as access for first responders, evacuations, or post-event recovery.

Action Components:

Identify existing and planned recreational trails; monitor flood prone areas and identify opportunities to strengthen; incorporate educational and interpretive signage opportunities.

Responsible Entity:

Charles City Department of Parks and Recreation.

Primary Goals:

- Protect Public Health and Water Quality
- Improve Hazard Preparedness, Response, and Recovery
- Expand Recreational Access to Foster Stewardship

Potential Partners:

Crater PDC; Public Works Department, Economic Development Department, Tourism Department, Virginia Department of Conservation and Recreation (DCR).

Priority Rating:

Medium.

Hazards Addressed:

Flooding.

Partner Action:

Support regional coordination, share best practices for flood resilient recreational design, assist with site prioritization using vulnerability data, help develop educational signage content, and support alignment with funding and grant opportunities.

Estimated Cost:

Project: Medium ($750k - $1.5M).

Type of Action:

- Capital Projects and Infrastructure
- Public Education and Engagement

Source:

Vulnerability Assessment; Committee Engagement Results; Action Development Workshop

Timeline:



Short-term for planning and site evaluation; medium to long-term for design, construction, and retrofits.

Potential Funding Source:

Virginia CFPF – Project Grant, Land and Water Conservation Fund (LWCF), Virginia Recreation Trails (RTP).

Charles City Action 3 (CC-3): Expand James River and Chickahominy River Monitoring and Flood Infrastructure

Install river gauges along the James River and Chickahominy River, enhancing data integration with regional and state systems, and evaluating opportunities to upgrade or add supporting flood infrastructure such as warning signage, access controls, and protective features at vulnerable locations. Expanded monitoring will strengthen flood modeling, inform infrastructure and land-use decisions, support timely emergency response and evacuation planning, and improve long-term climate adaptation and resilience planning for river-adjacent communities and assets.

Action Components:

Identify gaps in existing river and flood monitoring coverage; install or expand river gauges and support infrastructure; evaluate opportunities for complementary flood warning infrastructure.

Primary Goals:

- Protect Public Health and Water Quality
- Improve Hazard Preparedness, Response, and Recovery
- Expand Recreational Access to Foster Stewardship

Priority Rating:

Medium.

Hazards Addressed:

Flooding.

Estimated Cost:

Project: Medium ($750k - $1.5M).

Type of Action:

- Data, Tools, and Decision Support
- Emergency Preparedness and Response

Timeline:



Short-term for assessment and coordination with partners; medium to long-term for installation and upgrades.

Responsible Entity:

Charles City Department of Public Works.

Potential Partners:

Crater PDC; Department of Fire and Emergency Services, National Weather Service (NWS); U.S. Geological Survey (USGS); Virginia Department of Emergency Management (VDEM); Virginia Department of Conservation and Recreation (DCR); academic or research institutions, including VCU's Rice Rivers Center.

Partner Action:

Coordinate regional monitoring efforts by identifying priority monitoring locations, supporting data integration and funding alignment, and promoting consistent use of monitoring data in local planning and emergency response.

Source:

Vulnerability Assessment; Committee Engagement Results; Action Development Workshop

Potential Funding Source:

Virginia CFPF – Project Grant, FEMA Emergency Management Performance Grant (EMPG) Program.

Charles City Action 4 (CC-4): Support Climate-Smart Agriculture

Support the diversification and resilience of the County's food supply chains to prepare for impacts from changing seasons, extreme weather events, and market disruptions. Promote local food production by encouraging the use of innovative agricultural technologies, supporting farmers in adapting to longer growing seasons, and facilitating access to technical assistance and resources. Strengthen local and regional markets for locally grown food through partnerships, marketing initiatives, and distribution opportunities, helping provide reliable food access, economic stability for producers, and long term food security for County residents.

Action Components:

Support diversification of agricultural production and local food supply chains; assist farms in adapting through partnership with agricultural alliances and organizations.

Primary Goals:

- Support Economic Resilience and Workforce Development
- Promote Equitable and Resilient Communities
- Advance Regional Collaboration and Coordination

Priority Rating:

Low.

Hazards Addressed:

All Hazards.

Estimated Cost:

Study/Capacity Building: Medium ($100k to $250k).

Type of Action:

- Programs and Implementation
- Technical Assistance and Capacity Building

Timeline:



Short-term for program outreach and assistance; long-term for implementation and ongoing support for farmers.

Responsible Entity:

Charles City Economic Development Department.

Potential Partners:

Crater PDC; Alliance to Advance Climate-Smart Agriculture; Colonial Soil and Water Conservation District; Virginia Cooperative Extension; USDA; local farmers and producers; regional food hubs; nonprofit agricultural organizations

Partner Action:

Provide regional coordination, share best practices and resources for climate-smart agriculture, assist with identifying funding opportunities, support partnership across jurisdictions in the Colonial Soil and Water Conservation District.

Source:

Vulnerability Assessment; Committee Engagement Results; Action Development Workshop

Potential Funding Source: Alliance to Advance Climate-Smart Agriculture

Charles City Action 5 (CC-5): Protect and Steward Privately Owned Forest Lands

Support the long term conservation and sustainable management of Charles City County's largely privately owned forestlands by promoting voluntary conservation tools, forest management plans, and landowner assistance programs. Coordinate with state forestry agencies and conservation partners to maintain forest cover, reduce fragmentation, and preserve ecosystem services such as flood mitigation, carbon storage, and wildlife habitat.

Action Components:

Promote voluntary conservation tools; support landowner participation in state and federal forest management; encourage practices that maintain forest cover.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Build Local and Regional Capacity
- Advance Regional Collaboration and Coordination

Priority Rating:

Medium.

Hazards Addressed:

All Hazards.

Estimated Cost:

Study/Capacity Building: High (Greater than $250k).

Type of Action:

- Technical Assistance and Capacity Building

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for program outreach, education, and landowner assistance; long-term implementation through stewardship.

Responsible Entity:

Charles City Planning Department and/or Economic Development Department.

Potential Partners:

Crater PDC; Virginia Department of Forestry (VDOF); Colonial Soil and Water Conservation District; Virginia Cooperative Extension; land trusts; private forest landowners; conservation non-profits.

Partner Action:

Provide regional coordination and technical support, share best practices for private forest stewardship, assist with mapping and identification of priority forestlands, support grant and funding alignment, and facilitate collaboration across jurisdictions and conservation partners.

Source:

Vulnerability Assessment; Committee Engagement Results; Action Development Workshop

Potential Funding Source:

Virginia Department of Forestry (VDOF); USDA Natural Resources Conservation Service (NRCS) programs; Virginia Land Conservation Foundation (VLDCF); NFWF

Charles City Action 6 (CC-6): Increase Resources Used to Fight Wildfire

Reduce rural wildfire risk by expanding and modernizing resources for wildfire prevention, detection, and response. This includes increasing access to firefighting water supplies through dry hydrants and improved drafting locations, enhancing suppression equipment such as brush trucks, tankers, and portable pumps, and strengthening personnel capacity through staffing, training, and mutual aid coordination. Additional investments may include improved access to remote or wooded areas, enhanced communications and situational awareness tools, and coordination with land management agencies for fuel reduction and preparedness planning. These efforts can reduce response times, limit fire spread, protect homes and natural resources, and improve community safety in high-risk rural and woodland areas.

Action Components:

Expand access to firefighting water sources through installation of dry hydrants and improved drafting locations; acquire or upgrade wildfire specific equipment such as brush trucks, tankers, portable pumps, and protective gear; strengthen personnel capacity through staffing, training, and mutual aid coordination.

Primary Goals:

- Improve Hazard Preparedness, Response, and Recovery

Priority Rating:

Medium.

Hazards Addressed:

Wildfire.

Estimated Cost:

Project: Medium ($750k - $1.5M).

Type of Action:

- Programs and Implementation
- Emergency Preparedness and Response

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for equipment acquisition, installation, and training.

Responsible Entity:

Charles City Department of Fire and Emergency Services

Potential Partners:

Crater PDC; Virginia Department of Forestry (VDOF); Virginia Department of Emergency Management (VDEM); neighboring fire departments; Colonial Soil and Water Conservation District; volunteer fire companies

Partner Action:

Support regional coordination and peer learning among fire and emergency service providers, assist with identifying funding opportunities, share best practices for wildfire prevention and suppression, and help align wildfire risk data from the Regional HMP with local preparedness and capital planning efforts.

Source:

Vulnerability Assessment; PlanRVA-Crater PDC Regional Hazard Mitigation Plan (2022)

Potential Funding Source:

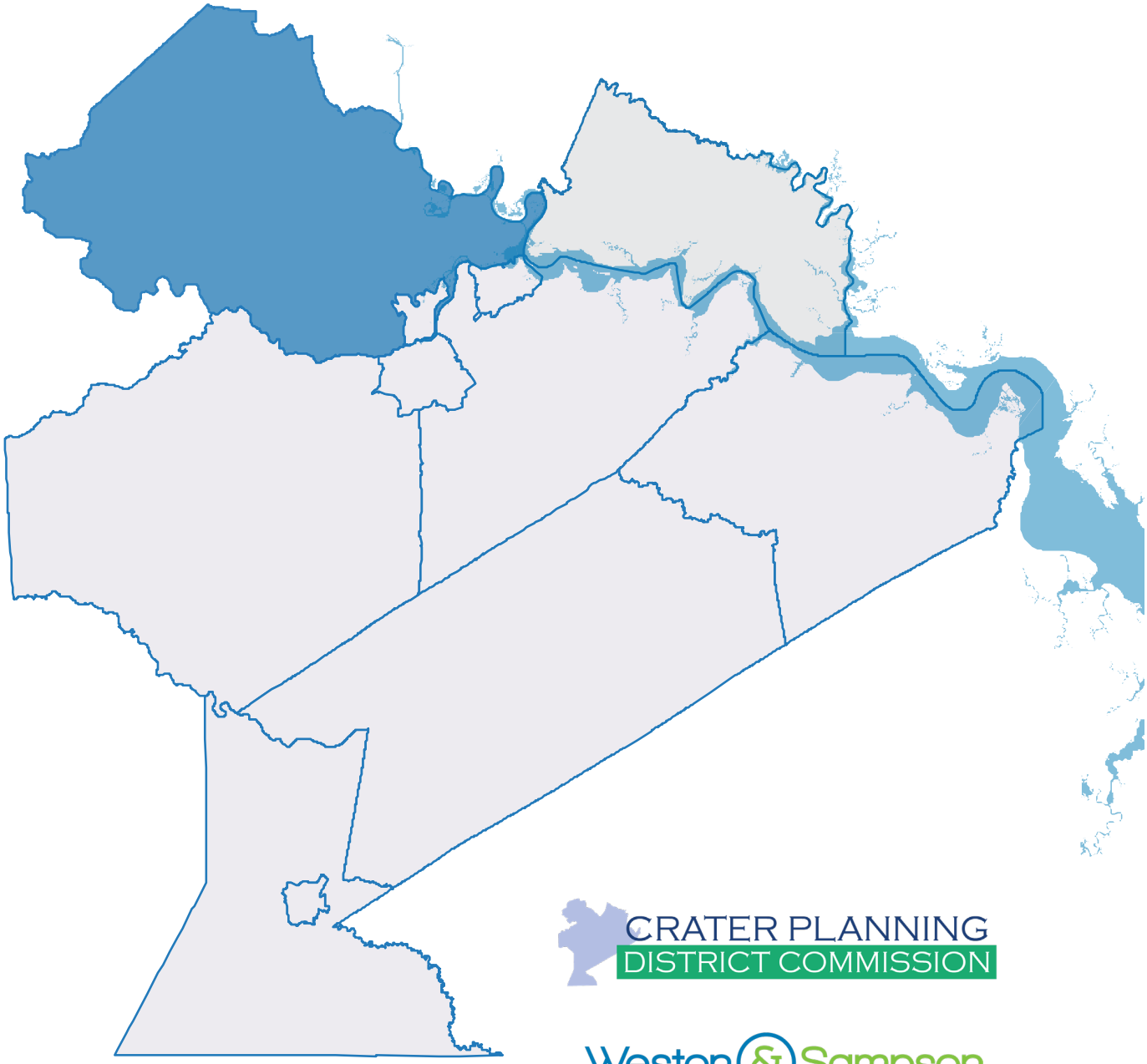
Virginia Department of Forestry wildfire suppression and prevention grants; FEMA Assistance to Firefighters Grant

Chesterfield County

Resilience Plan

Version 1.0 | September 2026

Locality Chapter of the Crater PDC Regional Resilience Plan



CRATER PLANNING DISTRICT COMMISSION

Weston & Sampson

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This chapter presents the locality-specific resilience objectives for Chesterfield County as part of Chapter 8: Locality Resilience Plans of the Crater PDC Regional Resilience Plan. It provides a structured overview of local conditions, risks, and actions to support resilience planning and implementation.

8.2 CHESTERFIELD COUNTY RESILIENCE PLAN

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For additional context on regional priorities, cross-jurisdictional strategies, and Crater PDC–wide resilience objectives, users should refer to the comprehensive Crater PDC Regional Resilience Plan, of which this chapter is one locally focused component. Other components of the plan include:

- Regional vision, goals, and a planning framework for resilience across the Crater Planning District.
- A regional profile describing environmental, economic, infrastructure, and community characteristics.
- An assessment of existing local and regional resilience plans and initiatives.
- A capacity-building roadmap identifying institutional, technical, and organizational needs.
- Results from regional steering committee engagement and workshops.
- A regional vulnerability assessment, including an asset inventory, methodology, and findings.
- Regional actions for implementation by Crater PDC and cross-jurisdictional actions applicable to all localities.
- A regional debris management strategy to support post-disaster response and recovery.
- A plan maintenance framework and supporting appendices.

CF.1. Introduction and Vision

Chesterfield County is the largest and most geographically diverse jurisdiction within the Crater Planning District, encompassing more than 423 square miles that range from dense suburban neighborhoods to rural landscapes, river corridors, and protected natural areas. The county's growth has been shaped by its proximity to the Richmond metropolitan area, resulting in a development pattern that combines residential communities, employment centers, transportation infrastructure, and significant environmental resources. Rather than being centered around a single downtown, Chesterfield has evolved as a collection of historic villages, suburban neighborhoods, employment centers, and commercial corridors that together form a diverse and interconnected county (Chesterfield County Comprehensive Plan, 2025). The county contains extensive water and natural resource assets, including the James River, Swift Creek Reservoir, Lake Chesdin, and large tracts of forested land that support drinking water supply, recreation, and habitat conservation. Chesterfield also manages one of the largest park and trail systems in the region, with major destinations such as Pocahontas State Park, riverfront access points, and greenway corridors that contribute to quality of life and environmental stewardship (Chesterfield County Comprehensive Plan, 2025).

Planning in Chesterfield emphasizes long-term management of growth, protection of natural systems, and coordination across departments and partner agencies. The comprehensive plan highlights the integration of environmental resources into development, recognizing streams, wetlands, reservoirs, and forested lands as essential components of community well-being and economic stability (Chesterfield County Comprehensive Plan, 2025). This systems-based approach positions the county to address resilience through land use policy, infrastructure investment, and sustainable practices at a scale that few jurisdictions in the region manage.

As a part of the visioning process for the Crater PDC Regional Resilience Plan, steering committee members from Chesterfield County developed the following vision statement:

> ***Chesterfield County will be a vibrant and sustainable place where resilient infrastructure, healthy neighborhoods, and abundant green spaces create a safe, welcoming, and thriving community that is well prepared for future environmental and climate-related challenges.***

CF.2. Demographics

Chesterfield County has a population of approximately 364,548 residents, with a median age of 39.2 years, closely aligned with the statewide average). About 16.8 percent of residents are age 65 or older, reflecting steady growth in the senior population that has implications for housing, transportation, and emergency services. Median household income is $101,543, exceeding the Virginia median and indicating comparatively strong economic conditions across much of the county.

School-age students make up nearly three-quarters of Chesterfield County's enrolled student population, emphasizing the vital role of K-12 education in the community.

Educational attainment is high, with 45.7 percent of residents holding a bachelor's degree or higher, and over 74 percent of enrolled students attending kindergarten through twelfth grade. Housing characteristics further reflect stability, including a 75.7 percent homeownership rate and a large housing stock distributed across suburban and semi-rural settings. While overall poverty rates are relatively low at 7.2 percent, the size and diversity of the county mean that vulnerability varies significantly by location and population group, reinforcing the importance of targeted resilience strategies (U.S. Census Bureau, Decennial Census, 2020).



Photo CF.1 Pocahontas State Park, Chesterfield County. By Scenic Corner (Adobe Stock Image)

Table CF.1 U.S. Census Bureau Statistics Comparison.

U.S. Census Bureau Statistic	Chesterfield County	Crater PDC	Virginia
Land area	423.5 square miles	2,487.5 square miles	39,481.4 square miles
Population and people			
Total Population	364,548	556,840	8,631,393
Median Age	39.2	40.9	39.4
Population that is 65 years and older	16.8%	18.6%	17.6%
Without Health Care Coverage	7.0%	6.4%	6.9%
Income and Poverty			
Median Household Income	$101,543	$69,698	$92,090
Poverty	7.2%	12.9%	9.7%
Education			
Bachelor's Degree or Higher	45.7%	22.3%	43.3%
School Enrolled Population in Kindergarten to 12th Grade	74.3%	70.7%	65.6%
Employment			
Local, State, and Federal Gov. Workers	19.8%	20.7%	20.6%
Avg. Travel Time to Work	28.1 min	29.3 min	28.3 min
Employment Rate	64.2%	53.6%	61.1%
Housing			
Median Gross Rent	$1,732	$1,177	$1,646
Homeownership Rate	75.7%	66.5%	67.1%
Total Housing Units	151,853	232,007	3,746,211
Total Households	147,465	217,220	3,449,307
Families and Living Arrangements			
Children under 18 years old	23.4%	20.6%	21.3%

U.S. Census Bureau Statistic	Chesterfield County	Crater PDC	Virginia
Race and Ethnicity			
American Indian and Alaska Native alone	1,589	2,822	40,007
Asian alone	13,185	15,795	615,436
African American	83,107	163,453	1,607,581
Hispanic or Latino (of any race)	40,236	52,020	908,749
Native Hawaiian and Other Pacific Islander alone	246	491	7,156
Not Hispanic or Latino	210,881	294,878	5,058,363
Some Other Race	23,175	28,897	446,650
Two or More Races	26,956	37,564	705,707
White	216,290	302,764	5,208,856

CF.3. Challenges and Strengths

Chesterfield County's scale presents both challenges and opportunities for resilience planning. Managing flood risk, stormwater, and water quality across multiple watersheds requires coordinated policy, enforcement, and capital investment. The county contains critical water resources including the James River, Swift Creek Reservoir, Lake Chesdin, and extensive wetland systems, all of which require careful regulation to protect drinking water supply, ecological health, and downstream communities, such as Hopewell and Prince George County (Chesterfield County Comprehensive Plan, 2025). Portions of the county are also located within the Eastern Virginia Groundwater Management Area, adding another layer of complexity to long-term water resource planning (Chesterfield County Comprehensive Plan, 2025).

At the same time, Chesterfield demonstrates strong institutional capacity and a mature policy framework that supports resilience. The county has adopted a green infrastructure approach that treats natural systems as essential infrastructure, integrating conservation lands, floodplains, and stream buffers into land use and zoning decisions (Chesterfield County Comprehensive Plan, 2025). Approximately 19,400 acres of land are protected through public ownership or conservation easements, including Pocahontas State Park, Chesterfield State Forest, and wildlife management areas (Chesterfield County Comprehensive Plan, 2025). The Zoning Ordinance restricts development in floodplains, protects wetlands, and requires Natural Resource Inventories for proposed development, embedding resilience considerations directly into everyday planning and permitting processes (Chesterfield County Comprehensive Plan, 2025).

Regional coordination further strengthens Chesterfield's resilience capacity. The County works with partners such as the Richmond Regional Planning District Commission, the Appomattox River Water Authority, and regional hazard mitigation planning efforts to align infrastructure, emergency response, and environmental management strategies across jurisdictional boundaries. These systems, policies, and partnerships position Chesterfield County as a regional leader in operational resilience and long-term environmental protection.

CF.4. Capacity and Needs

One of the first steps within the planning process for the Crater PDC Regional Resilience Plan was performing a capacity and needs assessment for resilience planning. The capacity strengths and challenges revealed within the capacity and needs assessment were integrated into actions for Crater PDC to initiate and next steps for localities. These actions can be found in Chapter 4. Capacity Building Roadmap and serve as foundational actions Crater PDC and localities should pursue in tandem with the other actions within this plan. This survey was directly informed by the capacity and needs assessment questionnaire provided during the beginning of the planning process, which gathered detailed input from local staff on existing roles, resource gaps, technical needs, and challenges related to climate resilience, funding, infrastructure, and intergovernmental coordination. This section provides a snapshot summary of Chesterfield County identified challenges as they relate to resilience planning.

REGIONAL COORDINATION & SUPPORT



Resilience Coordination with Other Localities
Engages with PlanRVA and Crater PDC.

POLICY & PLANNING



Land Use, Zoning Ordinances, and Plans

- Zoning ordinance has an environmental standards article (floodplain management, BPA, stormwater management).
- Would benefit from model ordinances or policy recommendations related to resilience.

TECHNICAL ASSISTANCE & TRAINING NEEDS



Identified Training Needs

- Assessment of critical asset vulnerabilities.
- Development of local resilience planning recommendations.
- Policy and ordinance development for resilience.

INFRASTRUCTURE & OPERATIONS



None identified as a part of this assessment.

FINANCIAL RESOURCES

Identified Financial Challenges
Uneven funding across departments for resilience-related activities.

DISASTER RESPONSE CAPACITY

Emergency Operations or Disaster Response

- Regional Hazard Mitigation Plan (2022).
- Emergency Operations Plan (June 2024) addressing man-made and natural disasters.

Responsible Agencies / Departments

Emergency Management, Fire/Rescue.

Emergency Coordination

Informal coordination as needed.

Enrollment in FEMA Community Rating System (CRS)

Not enrolled in CRS.

HUMAN & INSTITUTIONAL CAPACITY

Relevant Staff Positions

- Environmental Engineering Division Staff
- Stormwater Program Staff / Engineers
- Floodplain Administrator
- Development Review Engineer
- Emergency Management Coordinator

Relevant Departments

Planning, Emergency Management, Environmental Engineering, Utilities, Transportation, Community Development, Fire and EMS, Police, Public Safety (umbrella including Fire/EMS & Emergency Management), Parks and Recreation, General Services, Budget and Management, Economic Development, Community Engagement and Resources, Human Services, Mental Health Support Services

Identified Staff Capacity Needs

Need for interdepartmental collaboration and additional staff.

CF.5. Overview of Environmental Conditions

Chesterfield County's environmental conditions are strongly shaped by its location along the James River and its network of tributaries. Floodplain land within the County is primarily used for parks, open space, and buffered residential development, reflecting efforts to limit intensive development in high risk areas. Despite these measures, Chesterfield County has experienced frequent flood events driven by heavy rainfall, saturated soils, and slow moving storm systems. Major flooding incidents in May and June 2018, June 2019, and August 2020 resulted in numerous road closures, water rescues, and infrastructure impacts throughout the County, including along Otterdale Road, Enon Church Road, Route 10, Old Hundred Road, Turner Road, and Mount Hermon Road. These events highlight Chesterfield's vulnerability to flash flooding and riverine flooding, particularly in low lying transportation corridors and developed areas adjacent to waterways (Plan RVA; Crater PDC, 2022).

Flood risk in Chesterfield County is compounded by the County's relatively high level of development compared to surrounding jurisdictions. Between 1993 and 2020, Chesterfield County experienced the highest number of recorded flood events in the Richmond-Crater region, 41 events, with documented property damages exceeding $287,000, in addition to crop losses. The County also has one of the highest concentrations of repetitive loss and severe repetitive loss properties in the Richmond Crater region, particularly along Falling Creek and unnamed tributaries near commercial and residential centers such as the Chippenham Mall area and neighborhoods near Old Gun Road and Cherokee Road. HAZUS modeling indicates that Chesterfield County has one of the highest projected numbers of structures expected to be damaged during a 100 year flood event, underscoring the significance of flood exposure in densely developed portions of the County (Plan RVA; Crater PDC, 2022).

Beyond flooding, Chesterfield County is exposed to a range of additional environmental hazards that influence overall resilience. Severe thunderstorms and tropical systems pose a combined wind and flood risk, with Chesterfield County recording the highest annualized losses from 100 year wind events in the region, estimated at more than $2.2 million annually. These storms frequently result in downed trees, widespread power outages, and property damage, as evidenced by the June 2010 thunderstorm that caused major tree damage and structural collapse within residential neighborhoods. Winter weather also presents challenges, with significant snow and ice events disrupting utilities, transportation, and commerce; Chesterfield County has among the highest average annual damages from winter storms in the region. Additionally, severe thunderstorms



Chesterfield County has among the highest average annual damages from winter storms in the region.

producing large hail and lightning strikes have caused repeated residential fires, roof damage, and infrastructure impacts, highlighting the County's exposure to multiple, compounding environmental hazards that require coordinated mitigation, infrastructure planning, and emergency preparedness efforts (Plan RVA; Crater PDC, 2022).

CF.6. Floodplain Management and Flood Risk Identification

As part of the Virginia Department of Conservation and Recreation (DCR) Resilience Plan requirements, localities must document administrative procedures for tracking and managing Substantial Improvement (SI) and Substantial Damage (SD) determinations for structures located within Special Flood Hazard Areas (SFHAs), as well as identify Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties. This section summarizes these requirements as they relate to Chesterfield County and highlights the relevant provisions contained within the County's floodplain ordinance, associated regulatory documents, and information documented in the PlanRVA–Crater PDC Multi-Regional Hazard Mitigation Plan (2022). The purpose of this review is to verify the County's existing administrative framework and identify opportunities to strengthen floodplain management and support long-term resilience planning efforts.

Why it matters: Identifying and tracking flood-prone properties helps communities better understand flood risk, prioritize mitigation investments, reduce future damages, strengthen resilience, and guide long-term land use and development decisions.

CF.6.1 Floodplain Ordinance and Regulatory Framework

Chesterfield County has adopted a floodplain ordinance (Chapter 19, Division 1. Floodplain Management Districts and Dam Break Inundation Zones; 2024) that is compliant with the National Flood Insurance Program (NFIP), as it regulates development within FEMA-mapped Special Flood Hazard Areas (SFHAs), requires permits, and designates the Director of Environmental Engineering as the County's Floodplain Management Administrator to enforce compliance and maintain required records. The ordinance was updated in 2024 to reflect current FEMA Flood Insurance Rate Maps (FIRM dated May 8, 2024) and incorporate updated state and federal floodplain management requirements.

The ordinance exceeds minimum NFIP standards in several areas, including a one-foot freeboard requirement for new and substantially improved residential and nonresidential structures, restrictions on development within floodways, requirements for elevation certificates, development setbacks from flood hazard areas, and the use of best available flood hazard data, including preliminary FEMA mapping and locally identified flood-prone areas where applicable. The ordinance also incorporates hydrologic and hydraulic (H&H) analyses when necessary to support development review, floodplain boundary revisions, and Letters of Map Revision, helping ensure that flood risk information remains current and technically defensible.

Additionally, the ordinance demonstrates a strong administrative structure and enforcement framework, including clearly defined permitting requirements, inspection authority, permanent record keeping requirements, and enforcement mechanisms such as stop work orders, violation notices, and corrective actions. The designation of the Director of Environmental Engineering as Floodplain Management Administrator centralizes responsibility and supports consistent implementation. The ordinance also establishes formal procedures for tracking and managing substantial improvement and substantial damage determinations for structures within SFHAs. The Floodplain Management Administrator is responsible for determining whether structures have been substantially damaged, notifying property owners of compliance requirements, maintaining records supporting such determinations, coordinating with state and federal agencies when needed, and assisting owners with NFIP Increased Cost of Compliance documentation. Structures undergoing improvements or repairs equal to or exceeding 50 percent of their value must be brought into full compliance with current floodplain management standards. These provisions suggest robust administrative capacity for maintaining NFIP compliance and managing flood risk over time.

Strengths include strong alignment with state and federal requirements, integration of floodplain management into broader land use and development review processes, use of best available data, a freeboard requirement that exceeds minimum NFIP standards, restrictions on floodway encroachments, and comprehensive administrative procedures for permitting, recordkeeping, substantial damage determinations, and FEMA coordination. Potential gaps include continued

reliance on FEMA mapping as the primary regulatory baseline despite the availability of local flood hazard information, possible limitations associated with implementation across multiple departments and technical review functions, and the absence of participation in the Community Rating System (CRS), which limits opportunities for enhanced resilience incentives and NFIP premium reductions for policyholders.

CF.6.2 Flood Risk Identification SFHAs

Repetitive loss (RL) properties are structures that have experienced multiple instances of flood-related damage over time. Under the National Flood Insurance Program (NFIP), a repetitive loss property is defined as a property for which two or more flood insurance claims of at least $1,000 have been paid within any 10-year period.

Severe repetitive loss (SRL) properties represent a subset of these structures and indicate a higher level of risk and recurring damage. These properties are defined as those that have either:

- At least four NFIP claims exceeding $5,000 each, or
- At least two claims where the total payouts exceed the building's value.

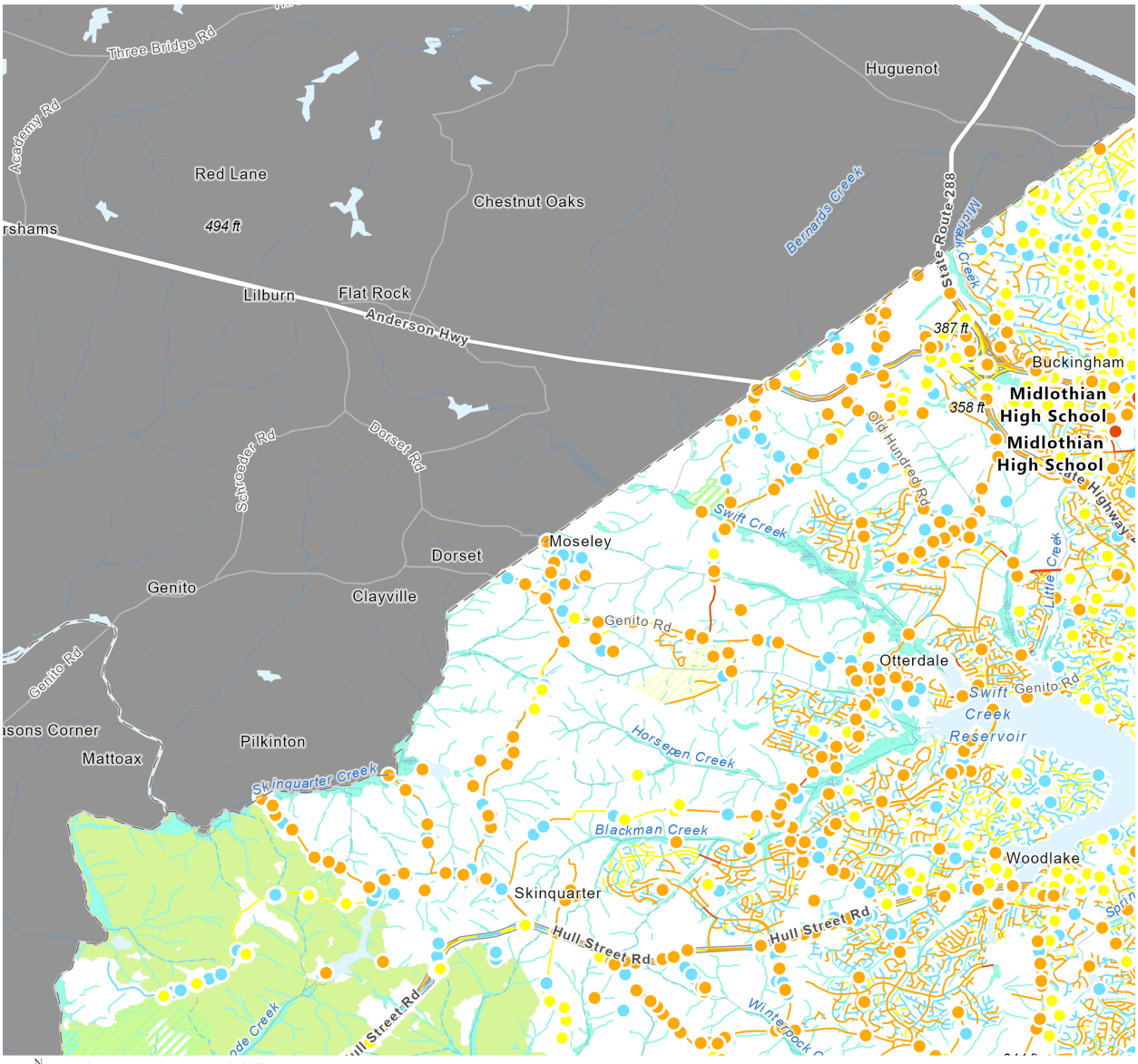
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Repetitive loss (RL) properties are structures that have experienced multiple instances of flood-related damage over time.

While NFIP data tracks many RL and SRL properties, these designations may not capture all instances of recurring flood impacts. Repetitive flooding can and often does occur outside of mapped Special Flood Hazard Areas (SFHAs), particularly due to stormwater, drainage issues, or localized flooding. As a result, communities are encouraged to identify, track, and address all repetitive flood impacts, regardless of NFIP designation, to better understand risk patterns and inform mitigation strategies. According to the Richmond-Crater Hazard Mitigation Plan (2022), Chesterfield County has 25 RL and 7 SRL as defined by the NFIP. There are no known RL and SRL properties outside of the Special Flood Hazard Areas (SFHA) as well.

CF.7. Vulnerability Assessment Results

Another foundational element of the Crater PDC Regional Resilience Plan was a vulnerability assessment performed across the Crater region. The vulnerability assessment results in this section have been parsed out to only include findings relevant to Chesterfield County. The vulnerability assessment conducted for the Crater PDC Regional Resilience Plan evaluated how each locality is exposed to multiple hazards, including rainfall (pluvial) flooding, riverine (fluvial) flooding, storm surge, extreme heat, and wildfire risk. The vulnerability assessment also evaluated sensitivity through the social vulnerability index. The results for the Chesterfield County vulnerability assessment identified flooding, particularly riverine and pluvial, as the primary risk to critical assets. Several assets scoring Very High vulnerability are also impacted by coastal flooding. Vulnerability in Chesterfield County is not evenly distributed across the county. The asset vulnerability maps (Figures CF.1 - 6) show higher concentrations of High and Very High vulnerability assets along the James River corridor, around Swift Creek Reservoir, and throughout the Chester, Enon, and Route 1 development corridors.



Crater PDC Regional Resilience Plan

Chesterfield County Asset Vulnerability Scores

Legend

Point Assets Vulnerability	Roadways Vulnerability	
Very Low	Very Low	Chesterfield Boundary
Low	Low	Rivers
Moderate	Moderate	Conservation Land
High	High	Easement
Very High	Very High	Wetlands
		Natural Land Network

CPDC Weston & Sampson

Vulnerability scores were developed as part of the vulnerability assessment for the Crater PDC Regional Resilience Plan. Only assets identified as having high or very high vulnerability are labeled on the map. Due to the sensitivity and quantity of these assets, septic systems, transmission towers, culverts, bridges, and roads were excluded from labeling.

Figure CF.1 Chesterfield County Asset Vulnerability Map

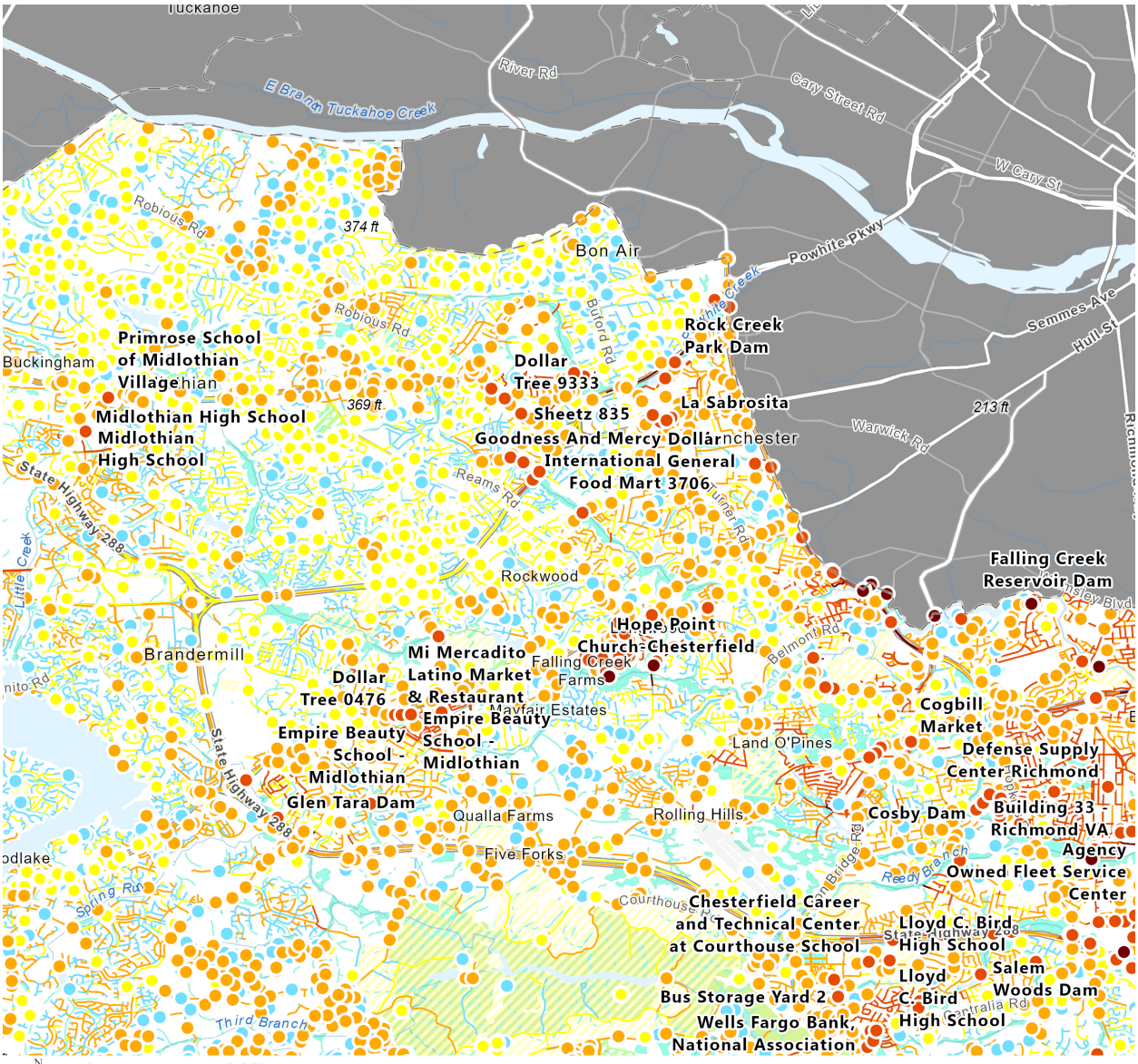


Figure CF.2 Chesterfield County Asset Vulnerability Map

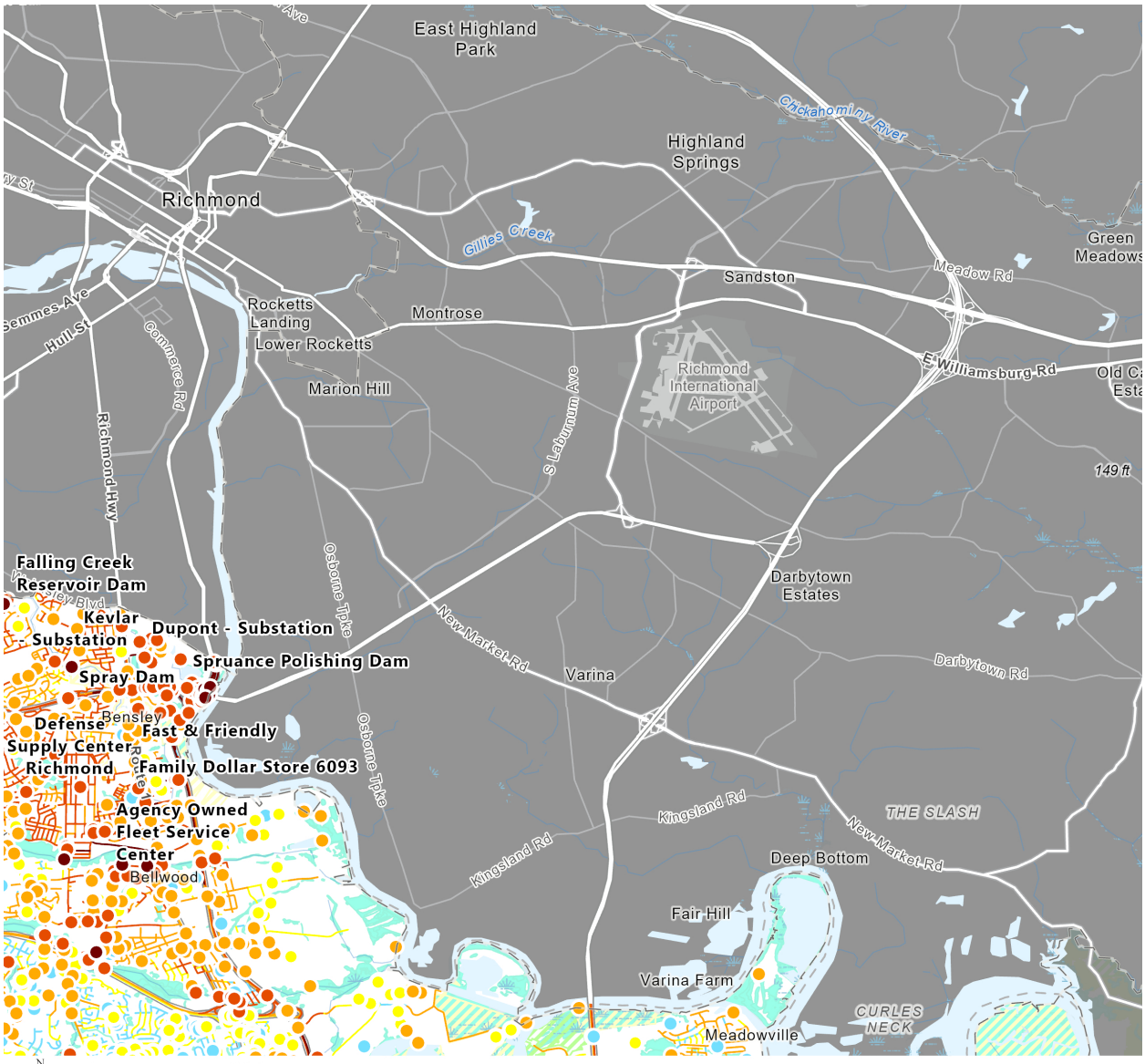
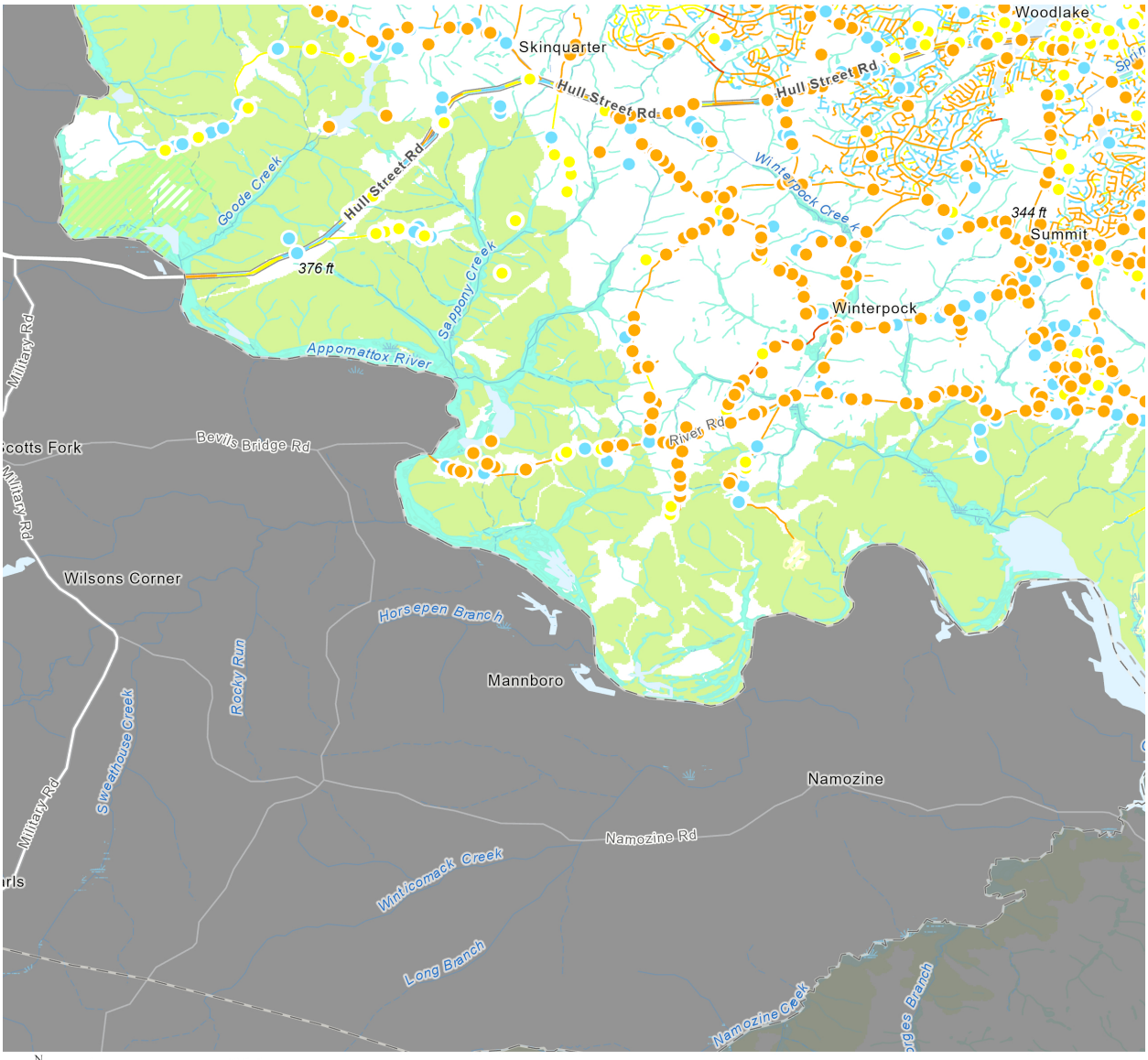


Figure CF.3 Chesterfield County Asset Vulnerability Map



Vulnerability scores were developed as part of the vulnerability assessment for the Crater PDC Regional Resilience Plan. Only assets identified as having high or very high vulnerability are labeled on the map. Due to the sensitivity and quantity of these assets, septic systems, transmission towers, culverts, bridges, and roads were excluded from labeling.

Figure CF.4 Chesterfield County Asset Vulnerability Map

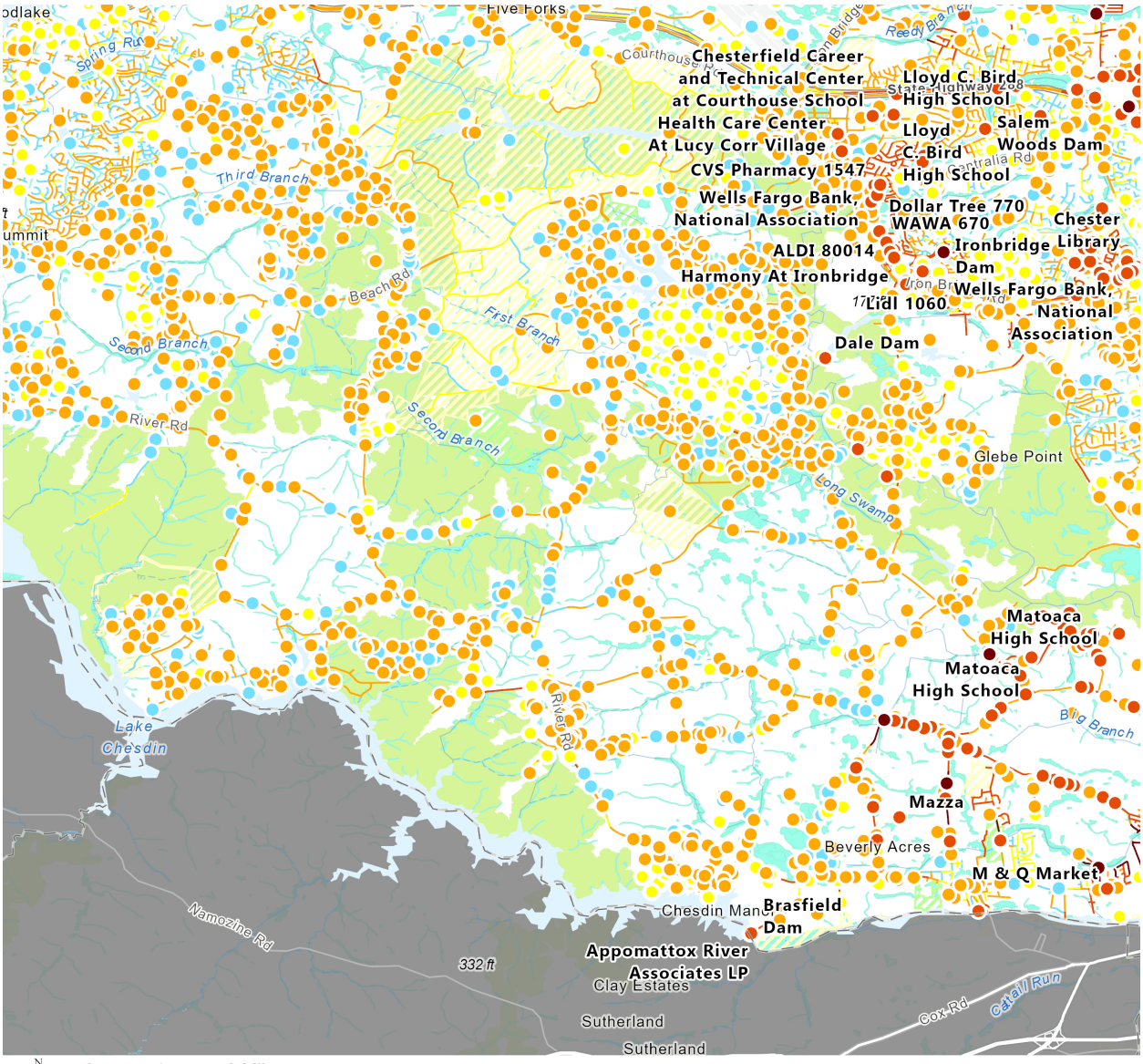
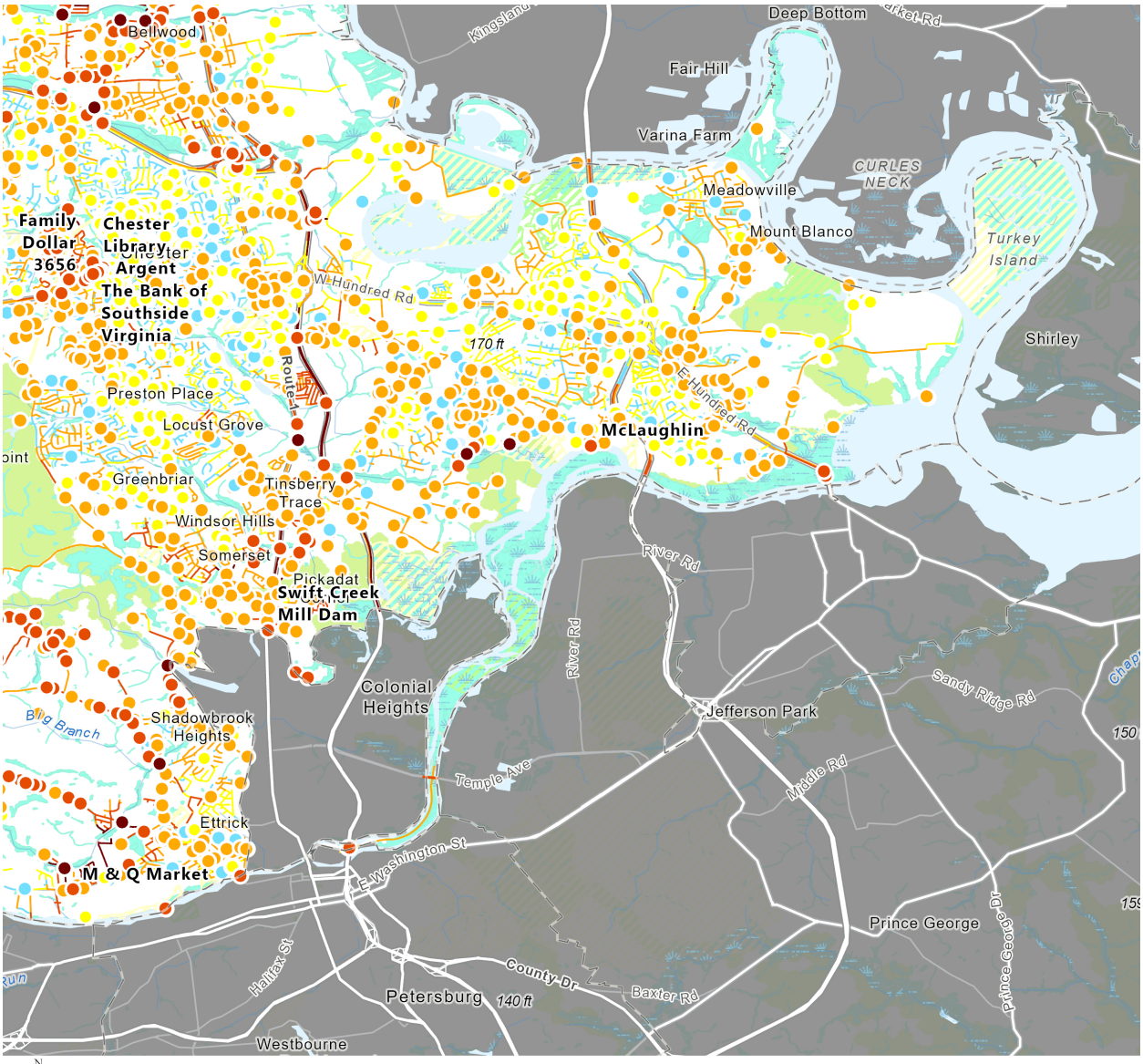


Figure CF.5 Chesterfield County Asset Vulnerability Map



Vulnerability scores were developed as part of the vulnerability assessment for the Crater PDC Regional Resilience Plan. Only assets identified as having high or very high vulnerability are labeled on the map. Due to the sensitivity and quantity of these assets, septic systems, transmission towers, culverts, bridges, and roads were excluded from labeling.

Figure CF.6 Chesterfield County Asset Vulnerability Map

These areas contain concentrations of transportation infrastructure, utility facilities, public buildings, and community-serving assets exposed to one or more climate hazards. Additional vulnerable assets are distributed where major transportation routes cross stream valleys, floodplains, and other environmentally sensitive areas.

A total of 15,873 built infrastructure assets (excluding roadways) and 25,282 roadway segments were evaluated. In Chesterfield County, the majority of non-roadway built assets are classified as Water and Wastewater (82.2%), followed by Transportation (5.2%), Communications (4.0%), Government Facilities (2.5%), Emergency Services / Community Assets (2.2%), Food and Agriculture (1.8%), Energy (0.8%), Financial Services (0.7%), and Healthcare and Public Health (0.6%). Because the total asset counts vary significantly by category, the analysis emphasizes the percentage of assets within each category that are ranked as having High or Very High vulnerability. Categories with the greatest portion of highly vulnerable assets are discussed below. Figure CF.7 illustrates the distribution of vulnerability scores across all asset categories, including roadways.

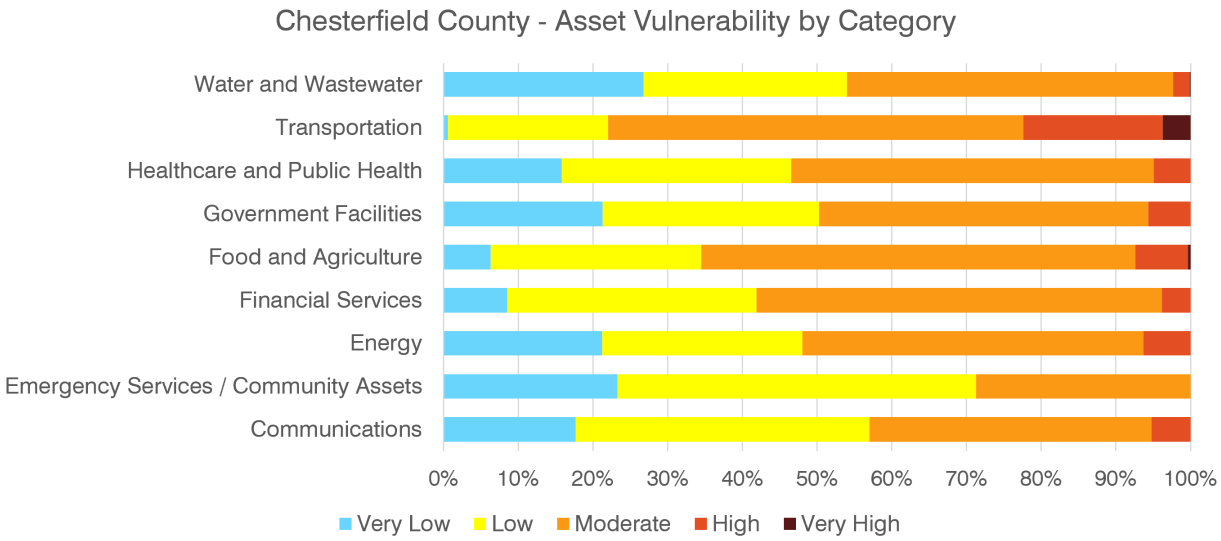


Figure CF.7 Vulnerability Score by Asset Category

CF.7.1 Transportation

Transportation infrastructure emerged as one of the County's most significant vulnerability concerns. The transportation network includes roadway segments, bridges, culverts, rail infrastructure, aviation facilities, and passenger rail stations that support movement throughout the County and the broader region. The highest scoring transportation assets included segments of Iron Bridge Road, Hull Street Road, Chippenham Parkway, and Ravensbourne Drive. These assets are exposed to multiple hazards including pluvial flooding, riverine flooding, wildfire, and extreme heat. Because these corridors provide critical connections for residents, businesses, emergency services, and regional travel, disruptions can have cascading impacts across multiple sectors. These findings support resilience actions focused on reducing flood impacts along critical infrastructure and recreational corridors, including improvements associated with the Appomattox River Trail and evaluations of flood-prone infrastructure.

CF.7.2 Food and Agriculture

Food and Agriculture assets also demonstrated elevated vulnerability within Chesterfield County. The highest scoring assets included food assistance providers, grocery retailers, pharmacies, and convenience stores that support both daily community needs and emergency response operations. Hope Point Church–Chesterfield Food Bank received a Very High vulnerability score, while other highly vulnerable assets included Cogbill Market, Lidl 1060, CVS Pharmacy 2011, and Sheetz 835. These facilities were primarily exposed to pluvial flooding, although some were also vulnerable to wildfire and extreme heat. Because many of these facilities provide access to food, medicine, and emergency assistance, interruptions in their operations could disproportionately affect residents who rely on nearby services during and after disasters. These findings reinforce the importance of actions that protect natural resources, reduce flood risk, and improve community resilience through conservation and land management partnerships.

CF.7.3 Energy

Energy infrastructure also showed elevated vulnerability, particularly at the Dupont Substation and Appomattox River Associates LP Power Plant, which are exposed to riverine flooding, wildfire, and extreme heat. These findings support actions that promote energy-resilient, solar-ready, and EV-ready development.

The vulnerability assessment findings directly informed Chesterfield County's resilience actions. Transportation and flood-related vulnerabilities support actions to improve stormwater infrastructure and drainage capacity (CF-8), enhance flood resilience along the Appomattox River Trail (CF-6), and evaluate dam conditions and associated risks (CF-7). Vulnerabilities affecting healthcare and community-serving facilities informed the recommendation to conduct facility-level vulnerability assessments for medical and health facilities (CF-3). Risks to food access, water quality, and natural systems support efforts to elevate septic systems in flood-prone areas (CF-2) and strengthen conservation partnerships through a public-private conservation toolkit (CF-1). Finally, widespread exposure to extreme heat and energy system vulnerabilities informed actions focused on energy-resilient construction (CF-4) and expanding tree canopy and green infrastructure through a heat equity analysis (CF-5). Together, these actions address the key vulnerabilities identified through the assessment while improving infrastructure resilience, protecting public health, and supporting Chesterfield County's long-term resilience goals.

CF.8. Actions

The Crater PDC Regional Resilience Plan contains tailored resilience actions for each of the 11 localities within the Crater PDC, actions for Crater PDC to strengthen local and regional capacity, and consistent region-wide actions each of the 11 localities. The following section only contains tailored actions for Chesterfield County. Actions that Crater PDC is tasked with pursuing, that may be useful for locality-level support and next steps, as well as, region-wide actions Chesterfield County could pursue are found in Chapter 7. Regional Actions within the Crater PDC Regional Resilience Plan.

Table CF.2 below summarizes the resilience actions developed for Chesterfield County through the regional resilience planning process. These actions were primarily identified during an Action Development Workshop held in spring 2026 and informed by stakeholder engagement, best practices, the Regional Hazard Mitigation Plan, and relevant comprehensive plans.

Table CF.2 Action Item Key for Chesterfield County

ID	Action Title	Responsible Entity	Estimated Cost	Priority
CF-1	Support Public-Private Conservation Partnership through a Toolkit	Chesterfield Environmental Engineering	Medium (Study/ Capacity Building)	Medium
CF-2	Elevate Septic Systems in Flood-Prone Areas	Chesterfield Department of Public Works	Low–High (Policy to Upgrades)	Medium
CF-3	Conduct a Facility-Level Vulnerability Assessment for Medical and Health Facilities	Chesterfield Department of Public Works	Medium (Study/ Capacity Building)	Medium
CF-4	Incentivize Solar-Ready, EV-Ready, and Energy-Resilient Construction	Chesterfield Planning Department and Building Inspection Department	High (Study/ Capacity Building)	Medium
CF-5	Increase Urban Tree Canopy and Green Infrastructure through Heat Equity Analysis	Chesterfield Planning Department and Environmental Engineering Department	Medium (Study/ Capacity Building)	High
CF-6	Enhance Flood Resilience and Safety Along the Appomattox River Trail	Chesterfield Department of Parks and Recreation	Low (Project)	Low
CF-7	Evaluate Conditions of Dams and Determine Potential Risks	Chesterfield Public Works Department	Medium (Study/ Capacity Building)	Medium
CF-8	Conduct a Stormwater Inventory and Make Drainage and Stormwater System Improvements	Chesterfield Public Works Department and/or Emergency Management	Medium (Project)	Medium

Action Key

Below is the action key used to develop each of the tailored action descriptions presented in this section of the plan.

Action Components: Key considerations for action development and implementation.

Primary Goals: The broader resilience goal(s) or objective(s) that the action supports. These actions include the following:

- Strengthen Natural Systems and Land Use Resilience
- Improve Hazard Preparedness, Response, and Recovery
- Enhance Data, Tools, and Decision-Making Capacity
- Build Local and Regional Capacity
- Advance Regional Collaboration and Coordination
- Increase Public Awareness and Community Engagement
- Promote Equitable and Resilient Communities
- Strengthen Infrastructure and Built Environment Resilience
- Support Economic Resilience and Workforce Development

Priority Rating: An assessment of the relative importance or urgency of the action in relationship to the other actions in the plan. For these ratings, steering committee feedback throughout the planning process was prioritized. Actions were prioritized based off the capacity and needs assessment, ability to be funded through Virginia CFPF, and best practices. These ratings have not been through a scoring or ranking exercise by the Steering Committee. Localities are encouraged to confirm, adjust, or reprioritize ratings to reflect local conditions, capacity, and funding timelines before using them to sequence implementation or grant applications.

Hazards Addressed: The climate or hazard risks the action is intended to help mitigate or manage. These include the following:

- Flooding (pluvial/rainfall, fluvial/riverine, and/or storm surge)
- Extreme Heat
- Wildfires
- Extreme Storms and/or Winter Weather
- All hazards – *addresses each hazard group*

Estimated Timeline: A general timeframe for implementation (short, medium, or long term) from the action kickoff to end.

- Short-term: 1-2 years
- Medium-term: 2-4 years
- Long-term: 5 or more years

Source: The origin of the action, such as stakeholder input, workshop activities, existing plans, or best practices.

Type of Action: The general action type, or means of implementation that fall under the following:

- Policy and Planning
- Programs and Implementation
- Capital Projects and Infrastructure
- Data, Tools, and Decision Support
- Technical Assistance and Capacity Building
- Regional Coordination and Partnerships
- Public Education and Engagement
- Emergency Preparedness and Response
- Nature-Based Solutions
- Expand Recreational Access to Foster Stewardship
- Residential Adaptation Tool

Responsible Entity: The primary organization or jurisdiction responsible for leading the action.

Potential Partners: Additional agencies, organizations, or stakeholders that could support or collaborate on implementation.

Partner Action: Actions either the PDC, localities, or other listed stakeholders should engage in during or after the action is completed to further maintain or manage desired outcomes.

Potential Funding Sources: Possible state, federal, regional, or local funding mechanisms that could support action implementation, management, or maintenance. Common funding sources for these actions are Virginia Community Flood Preparedness Fund (CFPF) and FEMA Hazard Mitigation Grant (HMG). Identification of a funding source does not guarantee project eligibility, funding availability, award selection, or future program continuity. Funding requirements, priorities, and availability may change over time and should be verified during project development and grant application.

Estimated Cost: A high level cost range (low, medium, high). For capacity building / studies versus project actions, there are two different ranges used depending on the project type.

Cost	Studies / Capacity Building	Projects
Low	Less than $100 k	Less than $750 k
Medium	$100 k to $250 k	$750 k to $1.5 M
High	Greater than $250 k	Greater than $1.5 M

Chesterfield Action 1 (CF-1): Support Public-Private Conservation Partnership through a Toolkit

Develop a Public–Private Conservation Toolkit to support collaboration among Chesterfield County, landowners, and private partners in preserving environmental resources. The toolkit will provide guidance on conservation and open space easements, including agricultural, forest, riparian, and habitat easements; model easement language; landowner and public responsibilities; and available tax incentives and funding sources. It will also showcase dual-purpose land uses, such as farmland preservation with public trails and floodplain conservation that supports recreation, to advance conservation and resilience goals through voluntary partnerships.

Action Components:

Develop a visual and thorough toolkit that compiles conservation and open-space easement options; provide model easement language; include illustrative examples of dual-purpose land uses.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Expand Recreational Access to Foster Stewardship

Priority Rating:

Medium.

Hazards Addressed:

All Hazards.

Estimated Cost:

Study/Capacity Building: Medium ($100k to $250k).

Type of Action:

- Programs and Implementation
- Regional Coordination and Partnerships

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for toolkit development; ongoing for uses, updates, and application across planning efforts.

Responsible Entity:

Chesterfield Environmental Engineering

Potential Partners:

Crater PDC; Alliance to Advance Climate-Smart Agriculture; Colonial Soil and Water Conservation District; Virginia Cooperative Extension; USDA; local farmers and producers; regional food hubs; nonprofit agricultural organizations

Partner Action:

Provide regional coordination, develop and share the conservation toolkit with other localities, and promote peer learning and application of best practices across localities in the Crater region.

Source:

Chesterfield Comprehensive Plan; Action Development Workshop.

Potential Funding Source:

Virginia Community Flood Preparedness Fund (CFPF) – Capacity Building & Planning, Virginia Outdoors Foundation (VOF), National Fish and Wildlife Foundation (NFWF) National Coastal Resilience Fund (NCRF)

Chesterfield Action 2 (CF-2): Elevate Septic Systems in Flood-Prone Areas

Require elevation or other climate resilient siting measures for onsite septic systems in coastal and flood prone areas, prioritizing high exposure locations, such as near Ruffin Mill Road. Appropriate siting measures may include elevating system components, increasing separation distances from seasonal high groundwater tables, avoiding placement within high-risk flood hazard areas where feasible, and incorporating system designs that maintain functionality during and after flood events. This action aligns with recent Virginia legislation directing the Department of Health to incorporate climate change considerations into onsite septic regulations, including flooding and groundwater conditions, as part of a comprehensive regulatory update.

Action Components:

Identify flood-prone and high-exposure areas with existing or planned onsite septic systems; update local requirements to require septic elevation; coordinate with the Virginia Department of Health (VDH) guidance.

Responsible Entity:

Chesterfield Department of Public Works

Primary Goals:

- Protect Public Health and Water Quality
- Improve Hazard Preparedness, Response, and Recovery.

Potential Partners:

Crater PDC; Virginia Department of Health (VDH); housing departments; onsite system installers; environmental health professionals.

Priority Rating:

Medium.

Hazards Addressed:

Flooding.

Partner Action:

Support regional coordination between coastal communities with flood-prone septic systems, provide technical guidance and best practices, and share vulnerability assessment results on flood-prone septic systems.

Estimated Cost:

Project: Medium ($750k - $1.5M).

Type of Action:

- Programs and Implementation
- Residential Adaptation

Source:

Vulnerability Assessment; Committee Engagement Results; Action Development Workshop

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for identification of systems; long-term for system replacement or upgrades.

Potential Funding Source: Virginia Department of Health's Septic and Well Assistance Program (SWAP), EPA Clean Water State Revolving Fund (CWSRF), EPA Nonpoint Source Section 319 Grant.

Chesterfield Action 3 (CF-3): Conduct a Facility-Level Vulnerability Assessment for Medical and Health Facilities

Conduct vulnerability assessments for nursing homes, assisted living facilities, group homes, and other facilities serving vulnerable populations. Based on findings, implement resilience measures such as floodproofing, drainage improvements, backup power, life-safety enhancements, and updated evacuation and continuity plans. Pursue available funding to support upgrades that reduce flood risk and strengthen operational continuity during hazard events.

Action Components:

Utilize the regional vulnerability results to identify hazard-prone facilities; prioritize facilities that serve low-mobility or medically vulnerability populations; conduct facility-level vulnerability assessments to evaluate exposure to flooding and other hazards.

Primary Goals:

- Improve Hazard Preparedness, Response, and Recovery
- Strengthen Infrastructure and Built Environment Resilience

Priority Rating:

Medium.

Hazards Addressed:

All Hazards.

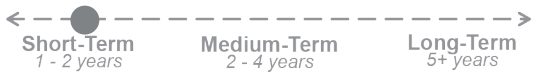
Estimated Cost:

Study/Capacity Building: Medium ($100k to $250k).

Type of Action:

- Emergency Preparedness and Response
- Capital Projects and Infrastructure

Timeline:



Short-term for facility identification and vulnerability assessments; medium to long-term for upgrades.

Responsible Entity:

Chesterfield Department of Public Works

Potential Partners:

Crater PDC; Virginia Department of Health (VDH); emergency management; local health systems.

Partner Action:

Facilitate coordination between healthcare institutions, emergency management agencies, and local governments to identify vulnerabilities, share resources, pursue funding opportunities for resilience upgrades, and strengthen regional preparedness for hazard events.

Source:

Vulnerability Assessment; Committee Engagement Results; Action Development Workshop

Potential Funding Source:

U.S. Department of Health and Human Services - Hospital Preparedness Program (HPP); USDA Community Facilities Direct Loan & Grant Program; The Rural Health Transformation Program (RHTP)

Chesterfield Action 4 (CF-4): Incentivize Solar-Ready, EV-Ready, and Energy-Resilient Construction

Encourage voluntary adoption of solar-ready roofing, EV-ready infrastructure, and expanded electrical capacity through incentives such as expedited permitting, density bonuses, fee reductions, grants, rebates, and public-private partnerships. Support implementation through technical assistance, design templates, and pilot projects, while coordinating with fire, building, and emergency management departments to ensure energy resilience measures align with life-safety objectives.

Action Components:

Establish incentive-based approaches for solar-ready roofing, EV-ready infrastructure, and expanded electrical capacity; support pilot projects; provide technical assistance and guidance for builders and developers.

Primary Goals:

- Promote Equitable and Resilient Communities
- Strengthen Infrastructure and Built Environment Resilience

Priority Rating:

Medium.

Hazards Addressed:

All Hazards.

Estimated Cost:

Study/Capacity Building: High (Greater than $250k).

Type of Action:

- Policy and Planning
- Programs and Implementation

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for development of incentives, guidance, and pilot program; Long-term for voluntary adoption and integration.

Responsible Entity:

Chesterfield County Community Development

Potential Partners:

Crater PDC; Economic Development Department; Environmental Engineering; Fire and Emergency Management Department; Virginia Clean Cities; local utilities; builders and developers; housing authorities; energy service providers.

Partner Action:

Support regional coordination on incentive program design, share best practices and model frameworks, identify applicable funding and incentive opportunities, and facilities peer learning among localities.

Source:

Vulnerability Assessment; Committee Engagement Results; Action Development Workshop

Potential Funding Source:

EPA's Solar for All Program; U.S. Department of Energy's Solar Energy Technologies Office (SETO), Virginia Clean Cities and Virginia Energy EV Charging Assistance Program (EVCAP)

Chesterfield Action 5 (CF-5): Increase Urban Tree Canopy and Green Infrastructure through Heat Equity Analysis

Conduct a heat equity analysis to identify neighborhoods and populations most vulnerable to extreme heat, considering factors such as land cover, tree canopy gaps, impervious surfaces, building density, historical disinvestment, and concentrations of heat sensitive populations. Use the results to prioritize targeted tree planting, preservation of existing mature trees, and integration of green infrastructure, such as green streets, rain gardens, and shade structures, in areas facing disproportionate heat exposure.

Action Components:

Conduct a heat equity analysis in ArcGIS Pro using Landsat 8 or site-specific data; prioritize tree planting based on current canopy and surface temperatures; coordinate with capital improvement plan.

Primary Goals:

- Promote Equitable and Resilient Communities
- Promote Nature-Based Solutions

Priority Rating:

High.

Hazards Addressed:

Extreme Heat & Flooding

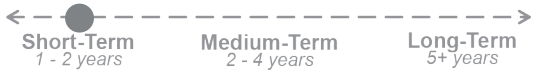
Estimated Cost:

Study/Capacity Building: Medium ($100k to $250k).

Type of Action:

- Data, Tools, and Decision Support
- Nature-Based Solutions

Timeline:



Short-term for heat equity analysis and prioritization; medium to long term for implementation of tree canopy.

Responsible Entity:

Chesterfield County Planning Department and Environmental Engineering Department.

Potential Partners:

Crater PDC; Economic Development Department; Environmental Engineering; Fire and Emergency Management Department; Virginia Clean Cities; local utilities; builders and developers; housing authorities; energy service providers.

Partner Action:

Support regional coordination on heat equity strategies by providing technical guidance, data tools, best practices, funding support, and peer learning opportunities for localities implementing heat resilience initiatives.

Source:

Vulnerability Assessment; Committee Engagement Results; Action Development Workshop

Potential Funding Source:

Virginia CFPF – Study, Department of Forestry (DOF) Urban and Community Forestry Program.

Chesterfield Action 6 (CF-6): Enhance Flood Resilience and Safety Along the Appomattox River Trail

Develop and implement a strategy to reduce flood impacts along the Appomattox River Trail through nature-based solutions and risk awareness measures. Prioritize riparian buffer restoration, floodplain reconnection, and natural flood storage to reduce erosion, improve water quality, and lessen flooding. Complement these efforts with targeted signage and public education to communicate flood risks and discourage trail use during unsafe conditions. FOLAR can support this action through riparian restoration, stewardship, outreach, and public education on flood risks and buffer restoration benefits.

Action Components:

Identify trail segments, access points, and adjacent facilities along the Appomattox River Trail that are prone to flooding; implement flood monitoring and notification systems to support timely trail closures and public safety; improve flood warning signage.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience.
- Promote Nature-Based Solutions

Priority Rating:

Low.

Hazards Addressed:

Flooding.

Estimated Cost:

Project: Low (Less than $750k)

Type of Action:

- Expand Recreational Access to Foster Stewardship
- Policy and Planning

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Medium-term for identification of flood-prone segments, signage improvements, and protocol development.

Responsible Entity:

Chesterfield Department of Parks and Recreation

Potential Partners:

Crater PDC; Neighboring localities; Emergency Management Department; Public Works Department; trail advocacy groups, such as Friends of the Lower Appomattox River (FOLAR).

Partner Action:

Support regional coordination on flood-resilient trail planning, share best practices for flood monitoring, trail closure notification, and public safety communications, and disseminate vulnerability assessment findings related to riverine infrastructure.

Source:

Vulnerability Assessment; Committee Engagement Results; Action Development Workshop

Potential Funding Source:

Virginia CFPF – Project Grant, Land and Water Conservation Fund (LWCF), Virginia Recreation Trails (RTP).

Chesterfield Action 7 (CF-7): Evaluate Conditions of Dams and Determine Potential Risks

Evaluate the role of dams within the County and watershed from an emergency management and resilience perspective, including potential flood risks, operational considerations during extreme precipitation events, and downstream impacts. Integrate dam status, monitoring, and failure scenarios into emergency response plans, evacuation planning, and public communication protocols.

Action Components:

Support regional coordination on dam safety and flood risk planning, facilitate data sharing on dam conditions and downstream vulnerabilities, and promote consistent integration of dam failure scenarios into emergency management and resilience plans.

Responsible Entity:

Chesterfield Public Works Department.

Primary Goals:

- Improve Hazard Preparedness, Response, and Recovery
- Strengthen Infrastructure and Built Environment Resilience.

Potential Partners:

Crater PDC; Fire and Emergency Management Services Department; Planning Department; Virginia Energy.

Priority Rating:

Medium.

Hazards Addressed:

Flooding.

Partner Action:

Support regional coordination on dam safety and flood risk planning, facilitate data sharing on dam conditions and downstream vulnerabilities, and promote consistent integration of dam failure scenarios into emergency management and resilience plans.

Estimated Cost:

Study/Capacity Building: Medium ($100k to $250k).

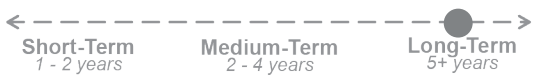
Type of Action:

- Programs and Implementation
- Emergency Preparedness and Response

Source:

Vulnerability Assessment; Committee Engagement Results; Action Development Workshop

Timeline:



Potential Funding Source: FEMA Hazard Mitigation Grant Program (HMGP); FEMA Building Resilient Infrastructure and Communities (BRIC); Virginia Department of Energy dam safety assistance; local capital and planning funds.

Chesterfield Action 8 (CF-8): Conduct a Stormwater Inventory, Assess System Capacity, and Better Understand Future Impacts + Make Drainage and Stormwater System Improvements Through Grey Infrastructure Upgrades and Green Infrastructure Projects

Improve the County's stormwater system to reduce flooding in vulnerable neighborhoods and critical corridors. Prioritize projects such as roadway elevations, drainage improvements, and stormwater infrastructure upgrades, particularly along Otterdale Road and the Otterdale Branch, Horsepen Creek, and Blackman Creek watersheds. Where feasible, encourage nature-based solutions to reduce flood risk, improve water quality, and enhance long-term resilience.

Action Components:

Identify and map flood-prone neighborhoods, critical corridors, and repetitive loss areas; install new drainage infrastructure in areas lacking adequate stormwater management systems.

Primary Goals:

- Promote Nature-Based Solutions
- Strengthen Infrastructure and Built Environment Resilience.

Priority Rating:

Medium.

Hazards Addressed:

Flooding.

Estimated Cost:

Project: Medium ($750k - $1.5M).

Type of Action:

- Programs and Implementation
- Emergency Preparedness and Response

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Responsible Entity:

Chesterfield Public Works Department and/or Emergency Management

Potential Partners:

Crater PDC; Virginia Department of Environmental Quality (DEQ); Chesapeake Bay Foundation; Timmons Group; engineering consultants; local schools and community organizations.

Partner Action:

Support local stormwater resilience efforts by providing technical assistance, watershed data and modeling resources, guidance on stormwater best management practices, and access to state funding programs.

Source:

Crater PDC-PlanRVA Regional HMP 2022

Potential Funding Source:

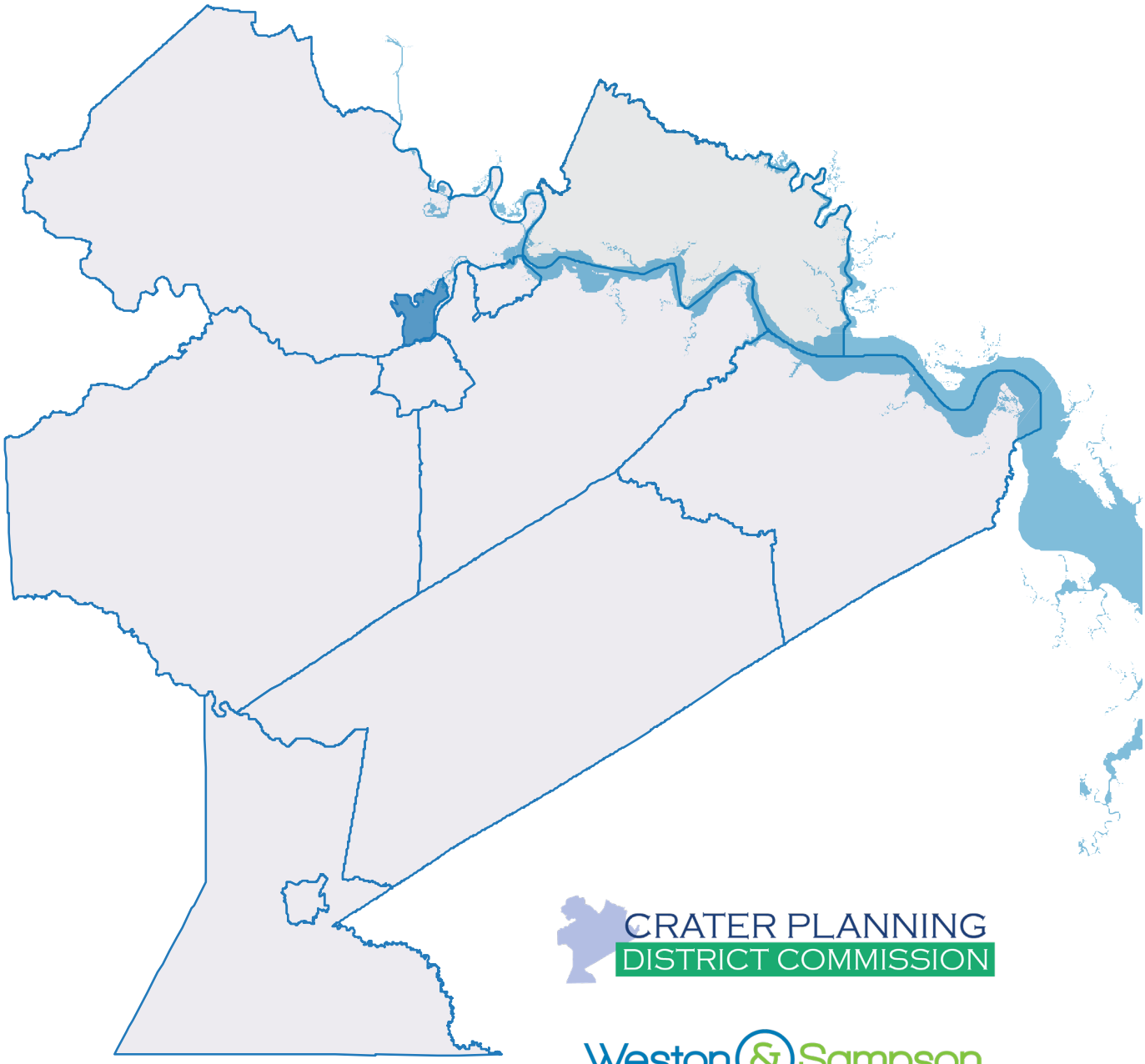
Virginia Community Flood Preparedness Fund (CFPF); Virginia DEQ Stormwater Local Assistance Fund (SLAF); EPA Clean Water State Revolving Fund (CWSRF); EPA Nonpoint Source Section 319 Grant.

Colonial Heights

Resilience Plan

Version 1.0 | September 2026

Locality Chapter of the Crater PDC Regional Resilience Plan



CRATER PLANNING DISTRICT COMMISSION

Weston & Sampson

TABLE OF CONTENTS

This chapter presents the locality-specific resilience objectives for City of Colonial Heights as part of Chapter 8: Locality Resilience Plans of the Crater PDC Regional Resilience Plan. It provides a structured overview of local conditions, risks, and actions to support resilience planning and implementation.

8.3 COLONIAL HEIGHTS RESILIENCE PLAN

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For additional context on regional priorities, cross-jurisdictional strategies, and Crater PDC–wide resilience objectives, users should refer to the comprehensive Crater PDC Regional Resilience Plan, of which this chapter is one locally focused component. Other components of the plan include:

- Regional vision, goals, and a planning framework for resilience across the Crater Planning District.
- A regional profile describing environmental, economic, infrastructure, and community characteristics.
- An assessment of existing local and regional resilience plans and initiatives.
- A capacity-building roadmap identifying institutional, technical, and organizational needs.
- Results from regional steering committee engagement and workshops.
- A regional vulnerability assessment, including an asset inventory, methodology, and findings.
- Regional actions for implementation by Crater PDC and cross-jurisdictional actions applicable to all localities.
- A regional debris management strategy to support post-disaster response and recovery.
- A plan maintenance framework and supporting appendices.

CH.1. Introduction and Vision

Colonial Heights is a small independent city whose history has been shaped by its strategic location along the Appomattox River. Originally part of Chesterfield County, the community traces its origins to early colonial settlement in the 1600s and later became the site of significant events during both the American Revolution and the Civil War. The city's name itself originated during the Revolutionary War when French troops under the Marquis de Lafayette occupied the heights overlooking Petersburg, and today that history is preserved through landmarks such as Violet Bank Museum and the Old Brick House, which remain important symbols of the city's heritage (City of Colonial Heights Comprehensive Plan, 2021).

Today, Colonial Heights is a mature community where most land has already been developed, shifting planning priorities away from outward expansion and toward reinvestment, redevelopment, and preservation of existing neighborhoods. The Comprehensive Plan emphasizes maintaining the city's small-town character while strengthening commercial corridors, encouraging mixed-use redevelopment, improving housing opportunities, protecting historic and natural resources, and enhancing quality of life for residents. These priorities position Colonial Heights to build resilience by balancing economic revitalization with preservation of the community's established identity and infrastructure (City of Colonial Heights Comprehensive Plan, 2021).

As a part of the visioning process for the Crater PDC Regional Resilience Plan, steering committee members from Colonial Heights developed the following vision statement:

> ***"The City of Colonial Heights will be an exceptional place to live, work, and visit, cherishing its safe and clean neighborhoods, green spaces, and historic heritage, while growing as a thriving and inclusive community that protects the safety and wellbeing of residents, local businesses, and visitors in the event of natural hazards."***

Colonial Heights developed as a twentieth-century suburban community shaped by its proximity to the Appomattox River, Fort Lee, and the broader Richmond metropolitan area. While the area has earlier agricultural roots, much of the city's growth occurred during and after World War II, as military expansion and regional industrial activity drove residential development and population growth. This history has resulted in a community characterized by planned neighborhoods, automobile-oriented commercial corridors, and a strong emphasis on local services and family-oriented amenities (City of Colonial Heights, 2024).

Today, Colonial Heights functions as a stable residential city with a well-defined local identity, supported by schools, parks, civic institutions, and neighborhood-scale commercial areas. The City's planning approach focuses on maintaining neighborhood character, reinvesting in aging infrastructure, and supporting incremental improvements rather than large-scale redevelopment (City of Colonial Heights Comprehensive Plan, 2021). Natural features associated with the Appomattox River and local stream systems remain important community assets, providing recreational opportunities while also shaping flood risk and stormwater management considerations. Together, the City's development history and current planning priorities reflect a focus on long-term stewardship, operational resilience, and quality of life for residents.

CH.2. Demographics

Colonial Heights has an estimated population of 18,170 residents and a median age of 38.5 years, which is below the statewide median and suggests a comparatively younger population than many surrounding localities. While approximately 18.3 percent of residents are age 65 or older, the city maintains a relatively balanced age distribution overall. In particular, 73.4 percent of residents are school aged, working aged, or otherwise within prime family-supporting age groups, reinforcing the importance of schools, neighborhood services, healthcare access, and safe transportation networks throughout the city.

Economic conditions in Colonial Heights are relatively stable compared to neighboring communities. Median household income is $76,250, placing the city above many nearby localities, although still below the Virginia median. Educational attainment is also comparatively strong for the region, with nearly 30 percent of residents holding a bachelor's degree or higher.

Housing characteristics further reflect an established and largely stable residential community. Approximately 68.1 percent of housing units are owner occupied, while rental costs remain relatively moderate compared to statewide averages. Together, these trends indicate a community that continues to attract and retain families while maintaining a more affordable housing market than many parts of Virginia (U.S. Census Bureau, Decennial Census, 2020).

Table CH.1 U.S. Census Bureau Statistics Comparison.

U.S. Census Bureau Statistic	Colonial Heights City	Crater PDC	Virginia
Land area	7.5 square miles	2,487.5 square miles	39,481.4 square miles
Population and people			
Total Population	18,170	556,840	8,631,393
Median Age	38.5	40.9	39.4
Population that is 65 years and older	18.3%	18.6%	17.6%
Without Health Care Coverage	7.4%	6.4%	6.9%
Income and Poverty			
Median Household Income	$76,250	$69,698	$92,090
Poverty	9.6%	12.9%	9.7%
Education			
Bachelor's Degree or Higher	29.5%	22.3%	43.3%

U.S. Census Bureau Statistic	Colonial Heights City	Crater PDC	Virginia
School Enrolled Population in Kindergarten to 12th Grade	73.4%	70.7%	65.6%
Employment			
Local, State, and Federal Gov. Workers	22.6%	20.7%	20.6%
Avg. Travel Time to Work	23.8 min	29.3 min	28.3 min
Employment Rate	61.9%	53.6%	61.1%
Housing			
Median Gross Rent	$1,162	$1,177	$1,646
Homeownership Rate	68.1%	66.5%	67.1%
Total Housing Units	8,126	232,007	3,746,211
Total Households	7,545	217,220	3,449,307
Families and Living Arrangements			
Children under 18 years old	24.1%	20.6%	21.3%
Race and Ethnicity			
American Indian and Alaska Native alone	42	2,822	40,007
Asian alone	579	15,795	615,436
African American	2,915	163,453	1,607,581
Hispanic or Latino (of any race)	1,276	52,020	908,749
Native Hawaiian and Other Pacific Islander alone	13	491	7,156
Not Hispanic or Latino	12,409	294,878	5,058,363
Some Other Race	542	28,897	446,650
Two or More Races	1,427	37,564	705,707
White	12,652	302,764	5,208,856



Photo CH.1 Sunset over Appomattox River. By Andrew Zimmerman (Adobe Stock Image)

CH.3. Challenges and Strengths

From a resilience perspective, Colonial Heights faces challenges related to infrastructure maintenance, stormwater management, and staffing capacity. Regional assessments indicate that limited municipal staffing constrains the ability to advance specialized resilience initiatives, pursue grant funding, and coordinate long-term adaptation strategies alongside routine service delivery (Crater Planning District Commission Capacity Building Roadmap, 2025). Heavy rainfall events and localized flooding affect roadway segments, drainage systems, and public facilities, particularly in areas with older stormwater infrastructure and near the Appomattox River (Building Resilience in Virginia's Crater Region Report, 2022).

At the same time, Colonial Heights benefits from several strengths that support resilience planning. High homeownership rates and stable residential neighborhoods contribute to community continuity and investment in property maintenance. The city's compact size allows for efficient service delivery and coordination across departments, while ongoing collaboration with the Crater PDC supports regional flood mitigation efforts and the potential to participate in

programs such as the Federal Emergency Management Agency's Community Rating System (Crater Planning District Commission Capacity Building Roadmap, 2025). Together, these factors position Colonial Heights to incrementally strengthen resilience through infrastructure upgrades, regional coordination, and targeted capacity building

CH.4. Capacity and Needs

One of the first steps within the planning process for the Crater PDC Regional Resilience Plan was performing a capacity and needs assessment for resilience planning. The capacity strengths and challenges revealed within the capacity and needs assessment were integrated into actions for Crater PDC to initiate and next steps for localities. These actions can be found in Chapter 4. Capacity Building Roadmap and serve as foundational actions Crater PDC and localities should pursue in tandem with the other actions within this plan. This survey was directly informed by the capacity and needs assessment questionnaire provided during the beginning of the planning process, which gathered detailed input from local staff on existing roles, resource gaps, technical needs, and challenges related to climate resilience, funding, infrastructure, and intergovernmental coordination. This section provides a snapshot summary of the challenges identified by Colonial Heights as they relate to resilience planning.

REGIONAL COORDINATION & SUPPORT

None identified during this planning process.

FINANCIAL RESOURCES

Identified Financial Challenges
- Limited local funding
- Grant application capacity constraints

INFRASTRUCTURE & OPERATIONS

Primary Public Assets Impacted by Hazards
Roads and transportation systems; Parks; Walmart

DISASTER RESPONSE CAPACITY

Emergency Operations or Disaster Response
- Regional Hazard Mitigation Plan (2022)
- Emergency Operations Plan, adopted in 2025

Responsible Agencies / Departments
- Emergency Management
- Fire/Rescue
- Public Works
- Police/Sheriff's Department

Enrollment in FEMA Community Rating System
Not currently enrolled.

POLICY & PLANNING



Land Use, Zoning Ordinances, and Plans
- Floodplain ordinance
- Would benefit from comprehensive plan resilience strategies to address state code requirements and model ordinance or policy recommendations related to resilience.

Identified Barriers for Resilience Efforts
- Technical expertise or staff constraints

HUMAN & INSTITUTIONAL CAPACITY



Relevant Staff Positions
None specific to resilience planning only. Responsibilities are shared across multiple roles.

Relevant Departments
Planning/Zoning; Public Works / Stormwater; Emergency Management

Identified Staff Capacity Needs
- Additional full-time staff
- Technical support
- Cross training of existing staff
- Consultants / contracted services

TECHNICAL ASSISTANCE & TRAINING NEEDS



Identified Training Needs
- GIS mapping and data analysis for flood risk assessment
- Grant writing and funding strategy
- Assessment of critical asset vulnerabilities
- Development of local resilience planning recommendations
- Policy and ordinance development for resilience
- Certified Floodplain Manager (CFM)
- Emergency response planning
- Nature-based solutions for flood mitigation
- Grant application and financial management for resilience projects
- Community engagement strategies for resilience

CH.5. Overview of Environmental Conditions

Colonial Heights is located at the Fall Line, where the Piedmont transitions to the Coastal Plain, creating variations in elevation and drainage that shape local environmental conditions and hazard exposure. The City is bounded to the south and east by the Appomattox River, a major regional waterway, and to the north by Swift Creek, a large tributary with a substantial upstream watershed. Old Town Creek flows through the City to the Appomattox River, traversing developed

areas and contributing to localized flood risk. These waterways define much of Colonial Heights' floodplain geography and influence patterns of development and environmental vulnerability (Plan RVA; Crater PDC, 2022).

Flooding is the most frequent natural hazard affecting Colonial Heights, particularly along riverine and stream corridors. The City contains multiple FEMA designated floodplains and floodways and has identified four repetitive loss areas, all associated with Swift Creek and Old Town Creek. Historic flooding during tropical systems, including Hurricane Isabel (2003) and intense rainfall events such as August 2020, has resulted in property damage and emergency responses. In



Hurricane Irene (2011) caused widespread power outages and wind damage in Colonial Heights.

response, the City continues to consider voluntary floodplain acquisition and mitigation strategies to reduce long term flood risk, protect natural floodplain functions, and limit repetitive losses in high risk areas (Plan RVA; Crater PDC, 2022).

Colonial Heights is also vulnerable to severe weather, including high wind events, tropical storms, and tornadoes. Hurricane Irene (2011) caused widespread power outages and wind damage, while the August 6, 1993 tornado remains one of the most significant disasters in the City's history, resulting in fatalities, injuries, and extensive commercial damage. While wildfire risk is limited, one woodland adjacent residential area has been identified as having elevated fire risk during dry conditions (Plan RVA; Crater PDC, 2022).

CH.6. Floodplain Management and Flood Risk Identification

As part of the Virginia Department of Conservation and Recreation (DCR) Resilience Plan requirements, localities must document administrative procedures for tracking and managing Substantial Improvement (SI) and Substantial Damage (SD) determinations for structures located within Special Flood Hazard Areas (SFHAs), as well as identify Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties. This section summarizes these requirements as they relate to Colonial Heights and highlights the relevant provisions contained within the City's floodplain



Why it matters: Identifying and tracking flood-prone properties helps communities better understand flood risk, prioritize mitigation investments, reduce future damages, strengthen resilience, and guide long-term land use and development decisions.

ordinance, associated regulatory documents, and information documented in the PlanRVA–Crater PDC Multi-Regional Hazard Mitigation Plan (2022). The purpose of this review is to verify the City's existing administrative framework and identify opportunities to strengthen floodplain management

CH.6.1 Floodplain Ordinance and Regulatory Framework

Colonial Heights has adopted floodplain management regulations through its Floodplain Overlay District (§ 286-320), consistent with the National Flood Insurance Program (NFIP) and authorized under § 15.2-2280 of the Code of Virginia. The ordinance establishes a comprehensive regulatory framework governing development within Special Flood Hazard Areas (SFHAs) as delineated on FEMA Flood Insurance Rate Maps (FIRMs), including the effective maps from January 11, 2024.

The ordinance applies to all development within Special Flood Hazard Areas and requires compliance before development, redevelopment, or land disturbance occurs. It establishes multiple flood hazard districts with tailored standards, strong variance procedures, and flood risk protections. The ordinance exceeds minimum NFIP requirements through a one-foot freeboard standard, requiring residential structures to be elevated at least one foot above base flood elevation and nonresidential structures to be elevated or floodproofed to one foot above base flood elevation.

The ordinance demonstrates a strong administrative structure and enforcement framework, including clearly defined permitting requirements, inspection authority, permanent recordkeeping requirements, and enforcement mechanisms such as stop work orders, violation notices, corrective actions, and penalties for noncompliance. The Zoning Administrator serves as the Floodplain Administrator, centralizing responsibility for floodplain management and supporting consistent implementation across the City. The ordinance also establishes formal procedures for tracking and managing substantial improvement and substantial damage determinations for structures within Special Flood Hazard Areas (SFHAs). The Floodplain Administrator is responsible for determining whether structures have been substantially damaged, notifying property owners of permitting and compliance requirements, maintaining permanent records supporting these determinations, coordinating with state and federal agencies when necessary, and assisting property owners with documentation required for NFIP Increased Cost of Compliance (ICC) coverage. The ordinance further requires that structures undergoing repairs, reconstruction, or improvements equal to or exceeding 50 percent of their market value be brought into full compliance with current floodplain management regulations and the Virginia Uniform Statewide Building Code.

Strengths of this ordinance include strong alignment with current state and federal floodplain management requirements, a one-foot freeboard standard, robust administrative and enforcement procedures, comprehensive substantial damage determination processes, use of best available flood hazard data, and integration with broader environmental protection programs. Potential gaps include continued reliance on current FEMA-based flood risk information, limited incorporation of future climate projections, a relatively modest freeboard requirement compared to emerging best practices, lack of CRS participation, and limited emphasis on broader long-term adaptation and resilience strategies beyond regulatory compliance.

CH.6.2 Flood Risk Identification SFHAs

Repetitive loss (RL) properties are structures that have experienced multiple instances of flood-related damage over time. Under the National Flood Insurance Program (NFIP), a repetitive loss property is defined as a property for which two or more flood insurance claims of at least $1,000 have been paid within any 10-year period.

Severe repetitive loss (SRL) properties represent a subset of these structures and indicate a higher level of risk and recurring damage. These properties are defined as those that have either:

- At least **four NFIP** claims exceeding $5,000 each, or
- At least **two claims** where the total payouts exceed the building's value.

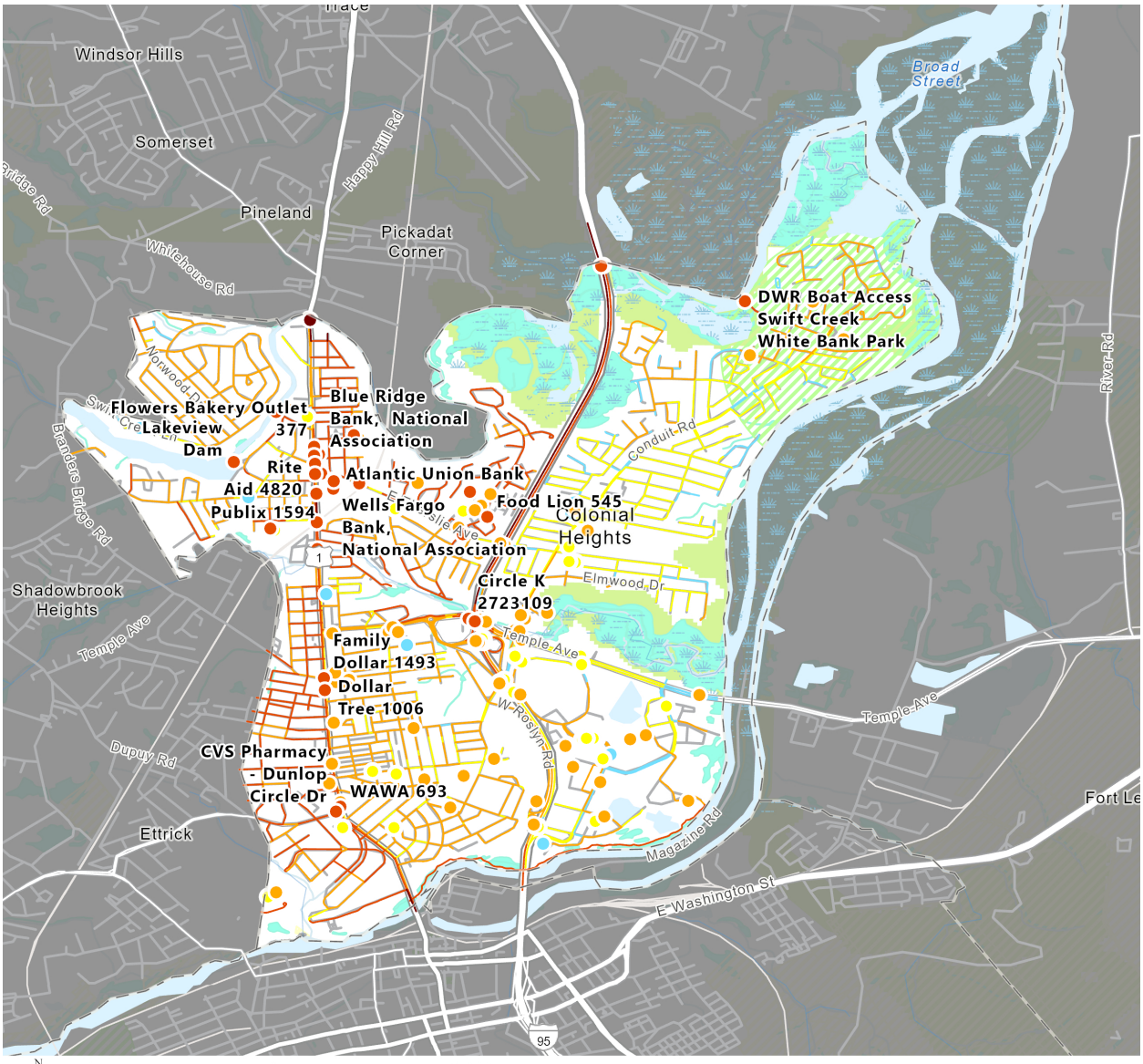
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>
> **Repetitive loss (RL)** properties are structures that have experienced multiple instances of flood-related damage over time.

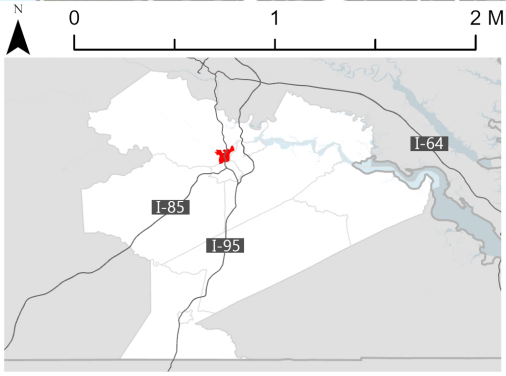
While NFIP data tracks many RL and SRL properties, these designations may not capture all instances of recurring flood impacts. Repetitive flooding can and often does occur outside of mapped Special Flood Hazard Areas (SFHAs), particularly due to stormwater, drainage issues, or localized flooding. As a result, communities are encouraged to identify, track, and address all repetitive flood impacts, regardless of NFIP designation, to better understand risk patterns and inform mitigation strategies. According to the Richmond-Crater Hazard Mitigation Plan (2022), Colonial Heights has 12 RL properties and 3 SRL properties as defined by the NFIP. No known RL or SRL properties have been identified outside Special Flood Hazard Areas.

CH.7. Vulnerability Assessment Results

Another foundational element of the Crater PDC Regional Resilience Plan was a region-wide vulnerability assessment performed across the Crater region. The vulnerability assessment results in this section have been parsed out to only include findings relevant to Colonial Heights. The vulnerability assessment conducted for the Crater PDC Regional Resilience Plan evaluated how each locality is exposed to multiple hazards, including rainfall (pluvial) flooding, riverine (fluvial) flooding, storm surge, extreme heat, and wildfire risk. The vulnerability assessment also evaluated sensitivity through the social vulnerability index. The vulnerability assessment for Colonial Heights identified flooding, particularly from rainfall (pluvial), and wildfire as the primary risk to critical assets. Storm surge was also identified as a primary risk to roadways in the City.

For the methodology of this vulnerability assessment, including data sources, indicator selection, and scoring, please refer to Appendix B. Vulnerability Assessment Methodology and Scoring Framework. For the region-wide assessment and hazard information, please refer to Chapter 6. Vulnerability Assessment. Vulnerability in Colonial Heights is not evenly distributed across the city. The asset vulnerability map (Figure CH.1) shows higher concentrations of High and Very





Crater PDC Regional Resilience Plan

Colonial Heights Asset Vulnerability Scores

Legend

Point Assets Vulnerability
- Very Low
- Low
- Moderate
- High
- Very High

Roadways Vulnerability
- Very Low
- Low
- Moderate
- High
- Very High

- Colonial Heights Boundary
- Rivers
- Conservation Land
- Easement
- Wetlands
- Natural Land Network

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Vulnerability scores were developed as part of the vulnerability assessment for the Crater PDC Regional Resilience Plan. Only assets identified as having high or very high vulnerability are labeled on the map. Due to the sensitivity and quantity of these assets, septic systems, transmission towers, culverts, bridges, and roads were excluded from labeling.

Figure CH.1 Colonial Heights Asset Vulnerability Map

High vulnerability assets along the Appomattox River corridor, near the Boulevard and Temple Avenue commercial corridors, and around transportation and utility infrastructure connecting the city to Petersburg and Chesterfield County.

A total of 237 built infrastructure assets (excluding roadways) and 1,445 roadway segments were evaluated. Most built assets (21%) fall within the Water and Wastewater category, followed by Communications (18%), Transportation (17%), Government Facilities (14%), Food and Agriculture (11%), Emergency Services/ Community Assets (7%), Financial Services (5%), Healthcare and Public Health (5%), and Energy (2%). Because total asset counts vary significantly by category,

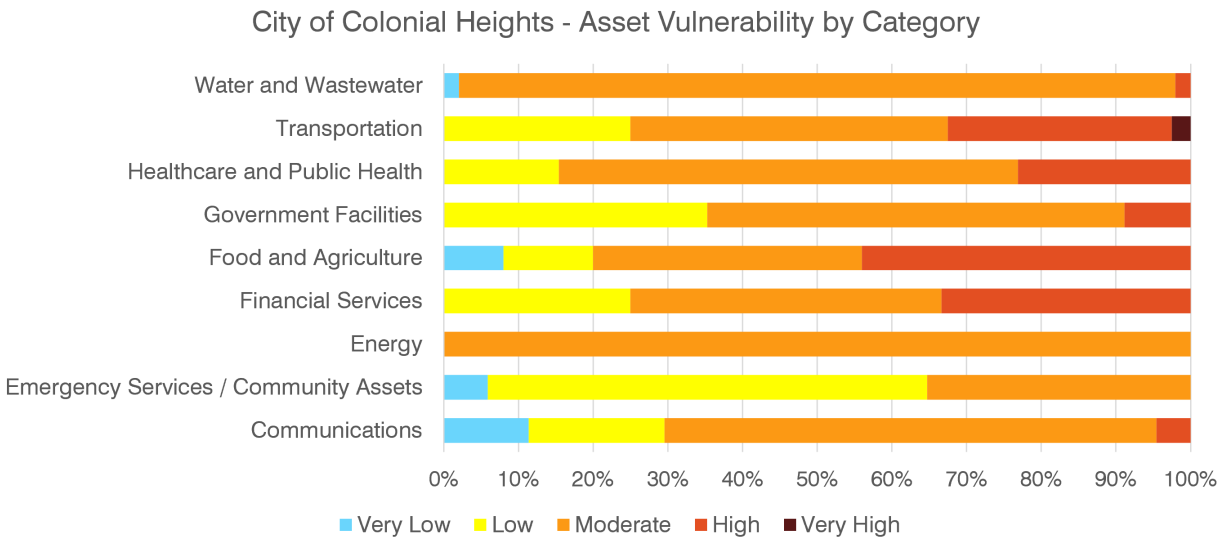


Figure CH.2 Vulnerability Score by Asset Category

the analysis emphasizes the percentage of assets within each category that are ranked as having High or Very High vulnerability. Categories with the greatest proportions of highly vulnerable assets are discussed below. Figure CH.2 illustrates the distribution of vulnerability scores across all asset categories, including roadways.

CH.7.1 Food and Agriculture

Food and Agriculture assets emerged as one of the most vulnerable asset categories in Colonial Heights. High-scoring assets included SNAP retailers and other businesses that provide access to food and essential goods, including Flowers Bakery Outlet 377, Publix 1594, and Walgreens 0492. These facilities were widely exposed to pluvial flooding, while some were also exposed to wildfire and extreme heat. Many of these assets are located in areas with elevated social vulnerability, increasing the potential impacts of service disruptions during hazard events. These findings support actions that expand urban tree canopy, improve stormwater management, and promote community-scale green infrastructure to reduce flooding and heat-related risks.

CH.7.2 Financial Services

Financial Services assets also demonstrated elevated vulnerability within the City. High-scoring assets included Blue Ridge Bank, Wells Fargo, Touchstone Bank, and Atlantic Union Bank. These facilities were exposed to both pluvial flooding and extreme heat, creating the potential for service disruptions that could affect residents and businesses. Although the category contains relatively few assets, maintaining access to financial services can support community recovery and economic stability following hazard events. Continued investment in stormwater improvements and flood mitigation measures can help reduce risks to these facilities and the services they provide.

CH.7.3 Transportation

Transportation infrastructure emerged as another significant vulnerability concern. Highly vulnerable assets included bridges, roadway segments, and railroad bridges throughout the City. Bridge 091, a segment of Interstate 95 Southbound, and a segment of Jefferson Davis Highway were among the highest scoring transportation assets. Transportation infrastructure is widely exposed to pluvial flooding, while roadway segments are additionally vulnerable to extreme heat. Because these corridors provide critical connections for residents, businesses, and regional travel, disruptions can have impacts that extend beyond the immediate area. These findings directly informed actions focused on expanding urban tree canopy, implementing nature-based solutions, improving stormwater management, and enhancing resilience along the Appomattox River Trail.

The vulnerability assessment findings directly informed Colonial Heights' resilience actions. Flooding and extreme heat impacts to transportation infrastructure, commercial areas, and community-serving assets support implementation of a citywide urban greening strategy (CH-1), expanded stormwater infrastructure improvements (CH-4), and sustainable landscaping and gardening education programs (CH-6). Vulnerabilities associated with the Appomattox River corridor informed actions focused on riparian buffer protection and restoration (CH-2), support for living shoreline projects (CH-3), and enhanced flood resilience along the Appomattox River Trail (CH-5). Together, these actions address the City's key vulnerabilities while improving stormwater management, reducing heat exposure, protecting water quality, and strengthening long-term community resilience.

CH.8. Actions

The Crater PDC Regional Resilience Plan contains tailored resilience actions for each of the 11 localities within the Crater PDC, actions for Crater PDC to strengthen local and regional capacity, and consistent region-wide actions each of the 11 localities. The following section only contains tailored actions for Colonial Heights. Actions that Crater PDC is tasked with pursuing, that may be useful for locality-level support and next steps, as well as, region-wide actions Colonial Heights could pursue are found in Chapter 7. Regional Actions within the Crater PDC Regional Resilience Plan.

Table CH.2 below summarizes the resilience actions developed for City of Colonial Heights through the regional resilience planning process. These actions were primarily identified during an Action Development Workshop held in spring 2026 and informed by stakeholder engagement, best practices, the Regional Hazard Mitigation Plan, and relevant comprehensive plans.

Table CH.2 Action Item Key for Colonial Heights

ID	Action Title	Responsible Entity	Estimated Cost	Priority
CH-1	Implement a Citywide Urban Greening Strategy	Public Works and/or Parks and Recreation	Medium (Project)	Medium
CH-2	Enforce and Restore Chesapeake Bay Riparian Buffer Protections	Planning Department and/or Public Works	Medium (Study/ Capacity Building)	Medium
CH-3	Support Living Shoreline Projects Through Cost-Share Opportunities	Public Works and/or Planning Department	High (Study/ Capacity Building)	Medium
CH-4	Conduct a Stormwater Inventory and Make Drainage and Stormwater System Improvements	Public Works and/or Parks and Recreation	Medium (Project)	High
CH-5	Enhance Flood Resilience and Safety Along the Appomattox River Trail	Public Works and/or Parks and Recreation	Low (Project)	Low
CH-6	Partner with VA Cooperative Extension on Resident Sustainable Gardening and Landscape Training	Parks and Recreation and/or Planning Department	Medium (Study/ Capacity Building)	Low

Action Key

Below is the action key used to develop each of the tailored action descriptions presented in this section of the plan.

Action Components: Key considerations for action development and implementation.

Primary Goals: The broader resilience goal(s) or objective(s) that the action supports. These actions include the following:

- Strengthen Natural Systems and Land Use Resilience
- Improve Hazard Preparedness, Response, and Recovery
- Enhance Data, Tools, and Decision-Making Capacity
- Build Local and Regional Capacity
- Advance Regional Collaboration and Coordination
- Increase Public Awareness and Community Engagement
- Promote Equitable and Resilient Communities
- Strengthen Infrastructure and Built Environment Resilience
- Support Economic Resilience and Workforce Development

Priority Rating: An assessment of the relative importance or urgency of the action in relationship to the other actions in the plan. For these ratings, steering committee feedback throughout the planning process was prioritized. Actions were prioritized based off the capacity and needs assessment, ability to be funded through Virginia CFPF, and best practices. These ratings have not been through a scoring or ranking exercise by the Steering Committee. Localities are encouraged to confirm, adjust, or reprioritize ratings to reflect local conditions, capacity, and funding timelines before using them to sequence implementation or grant applications.

Hazards Addressed: The climate or hazard risks the action is intended to help mitigate or manage. These include the following:

- Flooding (pluvial/rainfall, fluvial/riverine, and/or storm surge)
- Extreme Heat
- Wildfires
- Extreme Storms and/or Winter Weather
- All hazards – *addresses each hazard group*

Estimated Timeline: A general timeframe for implementation (short, medium, or long term) from the action kickoff to end.

- Short-term: 1-2 years
- Medium-term: 2-4 years
- Long-term: 5 or more years

Source: The origin of the action, such as stakeholder input, workshop activities, existing plans, or best practices.

Type of Action: The general action type, or means of implementation that fall under the following:

- Policy and Planning
- Programs and Implementation
- Capital Projects and Infrastructure
- Data, Tools, and Decision Support
- Technical Assistance and Capacity Building
- Regional Coordination and Partnerships
- Public Education and Engagement
- Emergency Preparedness and Response
- Nature-Based Solutions
- Expand Recreational Access to Foster Stewardship
- Residential Adaptation Tool

Responsible Entity: The primary organization or jurisdiction responsible for leading the action.

Potential Partners: Additional agencies, organizations, or stakeholders that could support or collaborate on implementation.

Partner Action: Actions either the PDC, localities, or other listed stakeholders should engage in during or after the action is completed to further maintain or manage desired outcomes.

Potential Funding Sources: Possible state, federal, regional, or local funding mechanisms that could support action implementation, management, or maintenance. Common funding sources for these actions are Virginia Community Flood Preparedness Fund (CFPF) and FEMA Hazard Mitigation Grant (HMG). Identification of a funding source does not guarantee project eligibility, funding availability, award selection, or future program continuity. Funding requirements, priorities, and availability may change over time and should be verified during project development and grant application.

Estimated Cost: A high level cost range (low, medium, high). For capacity building / studies versus project actions, there are two different ranges used depending on the project type.

Cost	Studies / Capacity Building	Projects
Low	Less than $100 k	Less than $750 k
Medium	$100 k to $250 k	$750 k to $1.5 M
High	Greater than $250 k	Greater than $1.5 M

Colonial Heights Action 1 (CH-1): Implement a Citywide Urban Greening Strategy

Increase the number of trees and landscape plantings in public parks, business corridors, rights-of-way, gateways, medians, and other public spaces across the City, with a focus on native and climate-appropriate species. Prioritize areas with high pedestrian activity and heat exposure to improve shade, walkability, air quality, stormwater management, and ecosystem health. Implement complementary heat-mitigation and flood-resilience strategies along key corridors such as the Boulevard, including expanded tree canopy, reflective or cool pavement, cool roofing, and additional green infrastructure. Develop a comprehensive citywide landscaping plan to identify priority planting locations

Action Components:

Focus on heat-vulnerable neighborhoods, high-pedestrian corridors, and underserved areas, while incorporating complementary measures such as cool pavement and cool roofing.

Primary Goals:

- Protect Public Health and Water Quality
- Promote Nature-Based Solutions

Priority Rating:

Medium.

Hazards Addressed:

Flooding & Extreme Heat.

Estimated Cost:

Project: Medium ($750k - $1.5M).

Type of Action:

- Programs and Implementation
- Nature-Based Solutions

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Medium for plan development and species selection; Long-term for phased implementation.

Responsible Entity:

City of Colonial Heights Department of Public Works and/or Parks and Recreation

Potential Partners:

Crater PDC; Virginia Department of Forestry (VDOF); Virginia Cooperative Extension; local health department; community organizations and neighborhood associations.

Partner Action:

Share regional heat vulnerability and canopy coverage data; provide guidance on species selection and urban forestry best practices; assist with identification of funding opportunities and coordination with state forestry programs.

Source:

Vulnerability Assessment; Committee Engagement Results; Action Development Workshop

Potential Funding Source:

Virginia CFPF – Capacity Building; Virginia Department of Forestry urban forestry grants (including DOF arborist position grants); USDA Urban and Community Forestry Program; EPA Environmental Justice grants.

Colonial Heights Action 2 (CH-2): Enforce and Restore Chesapeake Bay Riparian Buffer Protections

Protect water quality, reduce runoff, prevent erosion, and preserve sensitive shoreline and aquatic ecosystems by continuing to enforce Chesapeake Bay Preservation Regulations requiring riparian buffers within Resource Protection Areas (RPAs) and Resource Management Areas (RMAs). Complement ongoing enforcement with a comprehensive assessment of existing riparian buffer conditions to identify degraded or absent areas, and implement targeted restoration efforts at priority locations to improve water quality, reduce erosion, mitigate flooding, and enhance habitat connectivity.

Action Components:

Continue enforcement of Chesapeake Bay Preservation Regulations for RPAs and RMAs; conduct a systematic assessment of existing riparian buffer conditions to identify degraded or absent areas; prioritize restoration

Primary Goals:

- Protect Public Health and Water Quality
- Promote Nature-Based Solutions

Priority Rating:

Medium.

Hazards Addressed:

Flooding.

Estimated Cost:

Study/Capacity Building: Medium ($100k to $250k).

Type of Action:

- Policy and Planning
- Nature-Based Solutions

Timeline:



Medium-term for enforcement continuation and buffer assessment; Long-term for restoration implementation.

Responsible Entity:

City of Colonial Heights Planning Department and/or Department of Public Works

Potential Partners:

Crater PDC; Virginia Department of Environmental Quality (DEQ); Virginia Department of Conservation and Recreation (DCR); Chesapeake Bay Foundation; watershed organizations

Partner Action:

Provide regional coordination on riparian buffer mapping and restoration priorities; share best practices and model language; assist with identification of funding opportunities and alignment with regional conservation efforts.

Source:

Vulnerability Assessment; Committee Engagement Results; Action Development Workshop

Potential Funding Source:

Virginia Community Flood Preparedness Fund (CFPF) – Capacity Building and Planning; Virginia DEQ Stormwater Local Assistance Fund (SLAF); National Fish and Wildlife Foundation (NFWF) National Coastal Resilience Fund (NCRF); Virginia Outdoors Foundation (VOF).

Colonial Heights Action 3 (CH-3): Support Living Shoreline Projects through Cost-Share Opportunities

Evaluate and pursue cost-share opportunities and funding partnerships to support the construction of living shorelines, encouraging the use of nature-based solutions to reduce erosion, enhance habitat, and improve shoreline resilience to flooding and sea-level rise. Proactively identify and pursue state, federal, and regional grant programs that can offset project costs, and engage with regional partners and conservation organizations to maximize funding leverage and technical support for living shoreline implementation.

Action Components:

Identify priority shoreline sites for living shoreline projects, pursue funding opportunities, engage conservation and technical partners, and coordinate regionally to maximize flood resilience and habitat benefits.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Promote Nature-Based Solutions

Priority Rating:

Medium.

Hazards Addressed:

Flooding.

Estimated Cost:

Study/Capacity Building: High (Greater than $250k).

Type of Action:

- Programs and Implementation
- Technical Assistance and Capacity Building

Timeline:



Medium-term for enforcement continuation and buffer assessment; Long-term for restoration implementation.

Responsible Entity:

City of Colonial Heights Department of Public Works and/or Planning Department

Potential Partners:

Crater PDC; Virginia Department of Environmental Quality (DEQ); Virginia Department of Conservation and Recreation (DCR); Chesapeake Bay Foundation; The Nature Conservancy (TNC); National Fish and Wildlife Foundation (NFWF); U.S. Army Corps of Engineers.

Partner Action:

Provide regional coordination on riparian buffer mapping and restoration priorities; share best practices and model language; assist with identification of funding opportunities and alignment with regional conservation efforts.

Source:

Comprehensive Plan; Action Development Workshop.

Potential Funding Source:

NFWF National Coastal Resilience Fund (NCRF); Virginia Community Flood Preparedness Fund (CFPF); DEQ Nonpoint Source CWA Section 319 Funding; Virginia Conservation Assistance Program; NOAA Habitat Restoration grants ; EPA Clean Water State Revolving Fund (CWSRF).

Colonial Heights Action 4 (CH-4): Conduct a Stormwater Inventory, Assess System Capacity, and Better Understand Future Impacts + Make Drainage and Stormwater System Improvements Through Grey Infrastructure Upgrades and Green Infrastructure Projects

Inventory and assess existing stormwater BMPs, curb and gutter systems, and related infrastructure to identify maintenance needs, performance gaps, and flood mitigation opportunities. Use the results to prioritize and pursue funding for a demonstration BMP project in a public park that showcases nature-based stormwater solutions, provides community benefits, and serves as an educational resource.

Action Components:

Identify and map flood-prone neighborhoods, critical corridors, and repetitive loss areas; install new drainage infrastructure in areas lacking adequate stormwater management systems.

Primary Goals:

- Promote Nature-Based Solutions
- Strengthen Infrastructure and Built Environment Resilience.

Priority Rating:

High.

Hazards Addressed:

Flooding.

Estimated Cost:

Project: Medium ($750k - $1.5M).

Type of Action:

- Programs and Implementation
- Data, Tools, And Decision Support

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Responsible Entity:

City of Colonial Heights Department of Public Works and/or Parks and Recreation

Potential Partners:

Crater PDC; Virginia Department of Environmental Quality (DEQ); Chesapeake Bay Foundation; Timmons Group; engineering consultants; local schools and community organizations.

Partner Action:

Support local stormwater resilience efforts by providing technical assistance, watershed data and modeling resources, guidance on stormwater best management practices, and access to state funding programs.

Source:

Action Development Workshop.

Potential Funding Source:

Virginia Community Flood Preparedness Fund (CFPF) implementation funds; Virginia DEQ Stormwater Local Assistance Fund (SLAF); EPA Clean Water State Revolving Fund (CWSRF); EPA Nonpoint Source Section 319 Grant.

Colonial Heights Action 5 (CH-5): Enhance Flood Resilience and Safety Along the Appomattox River Trail

Develop and implement a strategy to reduce flood impacts along the Appomattox River Trail through nature-based solutions and risk awareness measures. Prioritize riparian buffer restoration, floodplain reconnection, and natural flood storage to reduce erosion, improve water quality, and lessen flooding. Complement these efforts with targeted signage and public education to communicate flood risks and discourage trail use during unsafe conditions. FOLAR can support this action through riparian restoration, stewardship, outreach, and public education on flood risks and buffer restoration benefits.

Action Components:

Identify trail segments, access points, and adjacent facilities along the Appomattox River Trail that are prone to flooding; implement flood monitoring and notification systems to support timely trail closures and public safety; improve flood warning signage.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience.
- Promote Nature-Based Solutions

Priority Rating:

Low.

Hazards Addressed:

Flooding.

Estimated Cost:

Project: Low (Less than $750k)

Type of Action:

- Expand Recreational Access to Foster Stewardship
- Policy and Planning

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Medium-term for identification of flood-prone segments, signage improvements, and protocol development.

Responsible Entity:

City of Colonial Heights Department of Public Works and/or Parks and Recreation

Potential Partners:

Crater PDC; Neighboring localities; Emergency Management Department; Public Works Department; trail advocacy groups, such as Friends of the Lower Appomattox River (FOLAR).

Partner Action:

Support regional coordination on flood-resilient trail planning, share best practices for flood monitoring, trail closure notification, and public safety communications, and disseminate vulnerability assessment findings related to riverine infrastructure.

Source:

Vulnerability Assessment; Committee Engagement Results; Action Development Workshop

Potential Funding Source:

Virginia CFPF – Project Grant, Land and Water Conservation Fund (LWCF), Virginia Recreation Trails (RTP).

Colonial Heights Action 6 (CH-6): Partner with VA Cooperative Extension on Resident Sustainable Gardening and Landscape Training

Partner with the Virginia Cooperative Extension to provide training and educational resources for City residents on sustainable gardening and landscaping techniques that support stormwater management, reduce runoff, improve soil health, enhance pollinator habitat, and beautify neighborhoods. Coordinate outreach to prioritize underserved communities and neighborhoods with high heat or flooding exposure, and align program content with the City's urban tree canopy and green infrastructure goals.

Action Components:

Establish a partnership with Virginia Cooperative Extension to provide sustainable gardening and landscaping training for residents, focusing on underserved and heat- or flood-vulnerable areas. Align training with the City's urban canopy and green infrastructure goals and take home resources.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience.
- Promote Nature-Based Solutions

Priority Rating:

Low.

Hazards Addressed:

Flooding & Extreme Heat.

Estimated Cost:

Study/Capacity Building: Medium ($100k to $250k).

Type of Action:

- Public Education and Engagement
- Nature-Based Solutions

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for partnership establishment and curriculum development; ongoing for program delivery and updates.

Responsible Entity:

City of Colonial Heights Department of Parks and Recreation and/or Planning Department

Potential Partners:

Crater PDC; Virginia Cooperative Extension; local schools; neighborhood associations; community organizations; Virginia Department of Forestry (VDOF).

Partner Action:

Support regional coordination with Virginia Cooperative Extension; share educational materials and program templates across member localities; assist with outreach targeting and alignment with regional resilience education efforts.

Source:

Vulnerability Assessment; Committee Engagement Results; Action Development Workshop

Potential Funding Source:

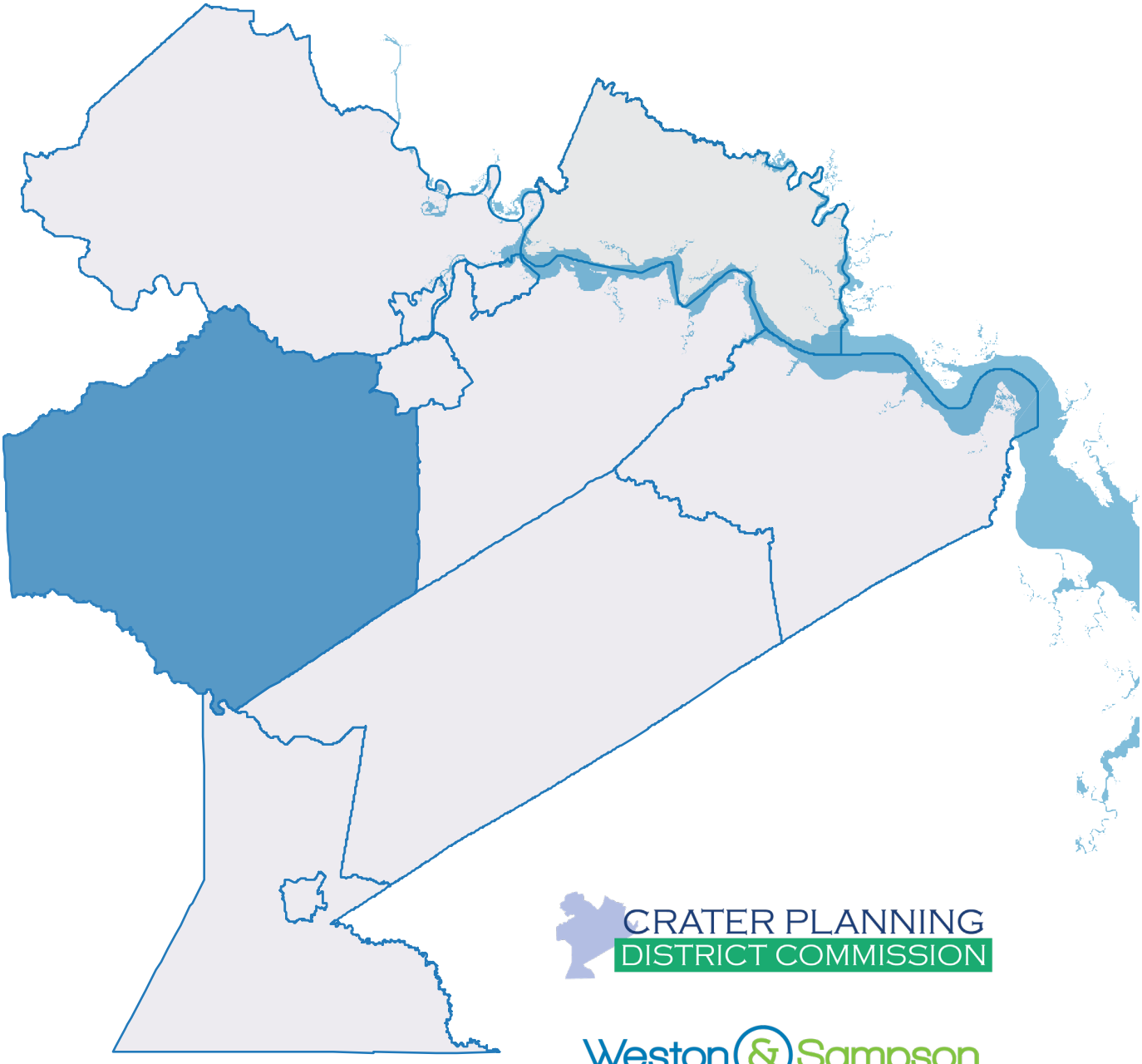
Virginia Community Flood Preparedness Fund (CFPF) – Capacity Building; USDA Urban and Community Forestry Program; EPA Environmental Justice grants.

Dinwiddie County

Resilience Plan

Version 1.0 | September 2026

Locality Chapter of the Crater PDC Regional Resilience Plan



CRATER PLANNING DISTRICT COMMISSION

Weston & Sampson

TABLE OF CONTENTS

This chapter presents the locality-specific resilience objectives for Dinwiddie County as part of Chapter 8: Locality Resilience Plans of the Crater PDC Regional Resilience Plan. It provides a structured overview of local conditions, risks, and actions to support resilience planning and implementation.

8.4 DINWIDDIE COUNTY RESILIENCE PLAN

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For additional context on regional priorities, cross-jurisdictional strategies, and Crater PDC–wide resilience objectives, users should refer to the comprehensive Crater PDC Regional Resilience Plan, of which this chapter is one locally focused component. Other components of the plan include:

- Regional vision, goals, and a planning framework for resilience across the Crater Planning District.
- A regional profile describing environmental, economic, infrastructure, and community characteristics.
- An assessment of existing local and regional resilience plans and initiatives.
- A capacity-building roadmap identifying institutional, technical, and organizational needs.
- Results from regional steering committee engagement and workshops.
- A regional vulnerability assessment, including an asset inventory, methodology, and findings.
- Regional actions for implementation by Crater PDC and cross-jurisdictional actions applicable to all localities.
- A regional debris management strategy to support post-disaster response and recovery.
- A plan maintenance framework and supporting appendices.

DW.1. Introduction and Vision

Dinwiddie County has long been shaped by its network of rural communities, transportation corridors, and strategic location between the Richmond region and Southside Virginia. The county's long association with transportation infrastructure, including early rail corridors and later highway development, has shaped settlement patterns that are dispersed but strongly tied to travel routes and service centers. This history continues to influence where growth occurs today, with residential and commercial activity clustering near existing roads and community hubs rather than forming large population centers (Dinwiddie County Comprehensive Plan, 2024).

Today, Dinwiddie is composed of connected communities that support agriculture, manufacturing, transportation and distribution, and regional commuting. Community identity is closely linked to local schools, volunteer organizations, and long-established neighborhoods, which play an important role in maintaining social cohesion across a wide geographic area. The comprehensive plan emphasizes: strengthening these community centers; supporting locally based economic activity; and improving access to services while preserving the county's open landscapes and working lands (Dinwiddie County Comprehensive Plan, 2024). This development pattern creates both opportunities and challenges for resilience, particularly related to transportation access, emergency response coverage, and infrastructure investment.

As a part of the visioning process for the Crater PDC Regional Resilience Plan, steering committee members from Dinwiddie County developed the following vision statement:

> ***Dinwiddie County will strengthen its resilience by protecting its forests, farms, waterways, and historic landscapes while directing growth to areas with strong infrastructure to keep communities safe from flooding and other natural hazards.***

DW.2. Demographics

Dinwiddie County has an estimated population of 27,947 residents and a median age of 43.4 years, which is slightly higher than the statewide median and reflects a gradually aging population. Approximately 18.7 percent of residents are age 65 or older, indicating growing importance of healthcare access, mobility, and services that support older adults. At the same time, the county continues to support many working families, with nearly 69 percent of enrolled students attending kindergarten through twelfth grade. This balance between older residents and family households reinforces the need for reliable schools, transportation networks, and community services across the county.

78.2% of homes in Dinwiddie County are owner-occupied, reflecting the county's rural character and strong tradition of homeownership.

Economic conditions in Dinwiddie County are relatively stable compared to many rural communities in the region. Median household income is $83,898, while approximately 10.7 percent of residents live below the poverty level. The share of residents without health insurance is 6.5 percent, slightly below the Virginia average. Educational attainment remains more modest, however, with 20.5 percent of residents holding a bachelor's degree or higher.

Housing patterns reflect the county's rural character and dispersed development pattern. Approximately 78.2 percent of housing units are owner occupied, with housing stock dominated by single-family detached homes located throughout rural neighborhoods and small community centers. Residents also experience relatively long average commute times of 32.7 minutes, highlighting the county's continued reliance on employment centers outside its boundaries and the importance of regional transportation connections (U.S. Census Bureau, Decennial Census, 2020).



Photo DW.1 Petersburg National Battlefield. Zack Frank (Adobe Stock Image)

Table DW.1. U.S. Census Bureau Statistics Comparison.

U.S. Census Bureau Statistic	Dinwiddie County	Crater PDC	Virginia
Land area	503.8 square miles	2,487.5 square miles	39,481.4 square miles
Population and people			
Total Population	27,947	556,840	8,631,393
Median Age	43.4	40.9	39.4
Population that is 65 years and older	18.7%	18.6%	17.6%
Without Health Care Coverage	6.5%	6.4%	6.9%
Income and Poverty			
Median Household Income	$83,898	$69,698	$92,090
Poverty	10.7%	12.9%	9.7%
Education			
Bachelor's Degree or Higher	20.5%	22.3%	43.3%
School Enrolled Population in Kindergarten to 12th Grade	68.9%	70.7%	65.6%
Employment			
Local, State, and Federal Gov. Workers	24.9%	20.7%	20.6%
Avg. Travel Time to Work	32.7 min	29.3 min	28.3 min
Employment Rate	58.2%	53.6%	61.1%
Housing			
Median Gross Rent	$1,242	$1,177	$1,646
Homeownership Rate	78.2%	66.5%	67.1%
Total Housing Units	11,896	232,007	3,746,211
Total Households	10,427	217,220	3,449,307
Families and Living Arrangements			
Children under 18 years old	20.1%	20.6%	21.3%

U.S. Census Bureau Statistic	Dinwiddie County	Crater PDC	Virginia
Race and Ethnicity			
American Indian and Alaska Native alone	125	2,822	40,007
Asian alone	126	15,795	615,436
African American	8,177	163,453	1,607,581
Hispanic or Latino (of any race)	1,128	52,020	908,749
Native Hawaiian and Other Pacific Islander alone	3	491	7,156
Not Hispanic or Latino	17,346	294,878	5,058,363
Some Other Race	636	28,897	446,650
Two or More Races	1,364	37,564	705,707
White	17,516	302,764	5,208,856

Source: U.S. Census Bureau 2020 Decennial Census.

DW.3. Challenges and Strengths

Dinwiddie County faces resilience challenges associated with its rural geography and infrastructure capacity. Flooding from heavy rainfall, localized drainage issues, and impacts to rural roadways and culverts are recurring concerns, particularly where stormwater systems are limited or outdated (Dinwiddie County Comprehensive Plan, 2024). Dispersed development also creates challenges for emergency response times, utility service expansion, and evacuation planning during extreme weather events. The comprehensive plan identifies aging infrastructure and the need for continued investment in water, sewer, and transportation systems as key barriers to long-term resilience (Dinwiddie County Comprehensive Plan, 2024).

At the same time, Dinwiddie County benefits from extensive natural land cover that provides environmental protection and stormwater absorption, reducing impervious surface impacts compared to more urbanized localities. Agricultural lands, forested tracts, and wetlands play a role in flood mitigation, groundwater recharge, and ecosystem stability (Dinwiddie County Comprehensive Plan, 2024). The county also participates in regional coordination through the Crater PDC, which supports access to technical assistance, planning tools, and grant opportunities that small rural governments may not be able to pursue independently.

The capacity and needs assessment notes that Dinwiddie, like several rural localities in the Crater region, faces constraints related to staffing, grant preparation, and technical expertise, which can

limit the ability to implement resilience projects even when funding opportunities exist. However, strong regional partnerships and increasing interest in shared technical resources present opportunities to strengthen resilience planning through coordinated infrastructure improvements, emergency preparedness initiatives, and land conservation strategies that align with the county's rural character.

DW.4. Capacity and Needs

One of the first steps within the planning process for the Crater PDC Regional Resilience Plan was performing a capacity and needs assessment for resilience planning. The capacity strengths and challenges revealed within the capacity and needs assessment were integrated into actions for Crater PDC to initiate and next steps for localities. These actions can be found in Chapter 4. Capacity Building Roadmap and serve as foundational actions Crater PDC and localities should pursue in tandem with the other actions within this plan. This survey was directly informed by the capacity and needs assessment questionnaire provided during the beginning of the planning process, which gathered detailed input from local staff on existing roles, resource gaps, technical needs, and challenges related to climate resilience, funding, infrastructure, and intergovernmental coordination. This section provides a snapshot summary of the challenges identified by Dinwiddie County related to resilience planning.

POLICY & PLANNING

Identified Barriers for Resilience Efforts
Limited resilience capacity.

INFRASTRUCTURE & OPERATIONS

Impacted by flooding and wildfire risk.

FINANCIAL RESOURCES

The County has not previously obtained any grants related to resilience.

Identified Financial Challenges
- Need grant funding that can address a variety of development needs in the County.
- No stormwater utility fee.
- Forestry is the biggest industry in the County.

REGIONAL COORDINATION & SUPPORT

None identified as a part of this planning process.

TECHNICAL ASSISTANCE & TRAINING NEEDS

None identified as a part of this planning process.

DISASTER RESPONSE CAPACITY

The Middle School is the shelter for the County.

Responsible Agencies / Departments
- Social Services Department
- Fire Department

HUMAN & INSTITUTIONAL CAPACITY

Relevant Staff Positions
Floodplain Administrator (Interim); County Engineer

Relevant Departments
Environmental Engineering Department; Planning Department; Social Services Department

Identified Staff Capacity Needs
Staffing turnover from the environmental engineering department.

DW.5. Overview of Environmental Conditions

Dinwiddie County is a predominantly rural jurisdiction, with land use characterized by agriculture, forestry, and scattered residential development. The County is divided by the Fall Zone into two physiographic provinces: the Piedmont to the west and the Coastal Plain to the east. Approximately three-fourths of the County lies within the Piedmont, where rolling topography and narrow river floodplains generally limit the extent of large scale flooding, while the flatter, wetter soils of the Coastal Plain in the eastern portion of the County tend to deter intensive development. Much of the County's open space is actively managed timberland, with an estimated 73 percent of land area under forest or timber production, particularly in the western half of the County (Plan RVA; Crater PDC, 2022).

Flood risk in Dinwiddie County is most pronounced in the northeastern portion of the County, which is also the most densely populated area. County staff have identified that flooding issues occur in specific areas, including the Lake Jordan subdivision, the Route 1 and Food Lion area, and along Cat Tail Run, where flooding can cut off access routes and hinder the provision of emergency and essential services. Several large creeks traverse the County and contribute to localized flood hazards, including Stony Creek, which flows through the Town of Stony Creek after forming from White Oak Creek and Butterwood Creek. Stony Creek is approximately 21 miles long and is a tributary of the Nottoway River, which drains the majority of the County. While many flood prone areas lie outside mapped 100-year floodplains, their proximity to creeks and low lying terrain still presents recurring access and drainage challenges (Plan RVA; Crater PDC, 2022).

Beyond flooding, Dinwiddie County is exposed to a range of weather related hazards, including hurricanes, high wind events, tornadoes, winter storms, and wildfires. The County has historically experienced some of the highest hurricane related damages in the region. Tornadoes, while infrequent, have caused property damage, power outages, and injuries, with multiple documented events since 2011. Wildfire risk is also a notable concern due to extensive forested land; Dinwiddie County has several high fire risk communities, with hundreds of homes located in or near wooded



73% of Dinwiddie County's land area is forested or managed for timber production, shaping the county's rural character while contributing to wildfire risk.

areas. Seasonal winter weather events, including snow, ice, and freezing conditions, further contribute to hazard exposure and can disrupt transportation and essential services (Plan RVA; Crater PDC, 2022).

DW.6. Floodplain Management and Flood Risk Identification

As part of the Virginia Department of Conservation and Recreation (DCR) Resilience Plan requirements, localities must document administrative procedures for tracking and managing Substantial Improvement (SI) and Substantial Damage (SD) determinations for structures located within Special Flood Hazard Areas (SFHAs), as well as identify Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties. This section summarizes these requirements as they relate to Dinwiddie County and highlights the relevant provisions contained within the County's floodplain ordinance, associated regulatory documents, and information documented in the PlanRVA–Crater PDC Multi-Regional Hazard Mitigation Plan (2022). The purpose of this review is to verify the County's existing administrative framework and identify opportunities to strengthen floodplain management and support long-term resilience planning efforts.

Why it matters: Identifying and tracking flood-prone properties helps communities better understand flood risk, prioritize mitigation investments, reduce future damages, strengthen resilience, and guide long-term land use and development decisions.

DW.6.1 Floodplain Ordinance and Regulatory Framework

Dinwiddie County has adopted a floodplain ordinance (Ord. of 5-31-22 [A-22-4], § (1)) that is compliant with the National Flood Insurance Program (NFIP), as it regulates development within FEMA-mapped Special Flood Hazard Areas (SFHAs), requires zoning permits for all floodplain development, and designates the zoning administrator as the Floodplain Administrator responsible for implementation, interpretation, and enforcement. The ordinance was comprehensively updated in 2022 and is based on FEMA Flood Insurance Rate Maps (FIRM dated June 1, 2022) and corresponding Flood Insurance Study (FIS), incorporating current federal and state regulatory requirements. The ordinance exceeds minimum NFIP standards in several areas, including the requirement for 12 inches (1 foot) of freeboard above base flood elevation for residential and non-residential structures, the application of hydrologic and hydraulic (H&H) engineering analyses for floodway and floodplain encroachments, and provisions allowing the County to regulate

locally identified flood hazard areas not delineated on FEMA FIRMs using best available data. Additionally, the ordinance includes detailed permitting requirements, plan review, inspection authority, recordkeeping in perpetuity, and enforcement mechanisms such as stop-work orders, penalties, and nuisance abatement, indicating generally robust enforcement capacity despite allowance for delegation or contractual administration.

The ordinance demonstrates a strong administrative structure and enforcement framework, including clearly defined permitting requirements, inspection authority, permanent recordkeeping requirements, and enforcement mechanisms such as violation notices, stop work orders, corrective actions, penalties, and the ability to declare noncompliant structures a public nuisance. The Zoning Administrator serves as the Floodplain Administrator and is responsible for administering and enforcing all floodplain management requirements, including permit review, inspections, coordination with FEMA and state agencies, map updates, and maintenance of floodplain records in perpetuity. The ordinance also establishes formal procedures for tracking and managing substantial improvement and substantial damage determinations for structures located within Special Flood Hazard Areas (SFHAs). The Floodplain Administrator is responsible for determining whether structures have been substantially damaged, notifying property owners of permitting and compliance requirements, maintaining records supporting those determinations, coordinating with federal, state, and local agencies as needed, and assisting property owners with documentation necessary for NFIP Increased Cost of Compliance (ICC) claims. In addition to the standard 50 percent substantial improvement threshold, the ordinance requires consideration of cumulative improvements over a rolling five-year period when evaluating compliance for existing structures within floodplain areas. Structures undergoing substantial improvement or substantial damage must be brought into compliance with current floodplain management standards.

Strengths of the ordinance include close alignment with Virginia state law, integration of multiple data sources (including preliminary FEMA data and locally derived flood information), clear technical standards for elevation, floodproofing, and construction practices, and comprehensive provisions for managing substantial damage and improvements. However, potential gaps include continued reliance on FEMA mapping as the primary regulatory baseline and no explicit reference to Community Rating System (CRS) participation or broader resilience planning frameworks beyond regulatory compliance.

DW.6.2 Flood Risk Identification SFHAs

Repetitive loss (RL) properties are structures that have experienced multiple instances of flood-related damage over time. Under the National Flood Insurance Program (NFIP), a repetitive loss property is defined as a property for which two or more flood insurance claims of at least $1,000 have been paid within any 10-year period.

Severe repetitive loss (SRL) properties represent a subset of these structures and indicate a higher level of risk and recurring damage. These properties are defined as those that have either:

- At least **four NFIP** claims exceeding $5,000 each, or
- At least **two claims** where the total payouts exceed the building's value.

While NFIP data tracks many RL and SRL properties, these



Repetitive loss (RL) properties are structures that have experienced multiple instances of flood-related damage over time.

designations may not capture all instances of recurring flood impacts. Repetitive flooding can and often does occur outside of mapped Special Flood Hazard Areas (SFHAs), particularly due to stormwater, drainage issues, or localized flooding. As a result, communities are encouraged to identify, track, and address all repetitive flood impacts, regardless of NFIP designation, to better understand risk patterns and inform mitigation strategies. According to the Richmond-Crater Hazard Mitigation Plan (2022), Dinwiddie County has 0 RL and 0 SRL properties as defined by the NFIP. There are no known RL and SRL properties outside of the Special Flood Hazard Areas (SFHA) as well.

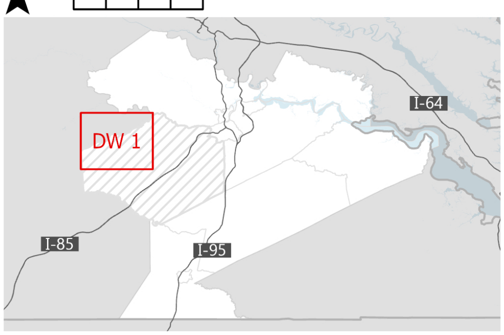
DW.7. Vulnerability Assessment Results

Another foundational element of the Crater PDC Regional Resilience Plan was a region-wide vulnerability assessment performed across the Crater region. The vulnerability assessment results in this section have been parsed out to only include findings relevant to Dinwiddie County. The vulnerability assessment conducted for the Crater PDC Regional Resilience Plan evaluated how each locality is exposed to multiple hazards, including rainfall (pluvial) flooding, riverine (fluvial) flooding, storm surge, extreme heat, and wildfire risk. The vulnerability assessment also evaluated sensitivity through the social vulnerability index. The vulnerability assessment for Dinwiddie identified flooding, particularly from rainfall (pluvial), and wildfire as the primary risk to critical assets. Storm surge was also identified as a primary risk to roadways in the County.

For the methodology of this vulnerability assessment, including data sources, indicator selection, and scoring, please refer to Appendix B. Vulnerability Assessment Methodology and Scoring Framework. For the region-wide assessment and hazard information, please refer to Chapter 6. Vulnerability Assessment.

Vulnerability in Dinwiddie County is not evenly distributed across the county. The asset vulnerability maps (Figures DW.1 - 4) show higher concentrations of High and Very High vulnerability assets near Dinwiddie Courthouse, along the Interstate 85 and U.S. Route 1 corridors, and within the communities of McKenney and Sutherland. These areas contain concentrations of transportation infrastructure, community facilities, utilities, and public assets exposed to one or more climate hazards. Additional vulnerable assets are distributed along stream crossings and transportation corridors throughout the county.





Crater PDC Regional Resilience Plan

Dinwiddie County Asset Vulnerability Scores

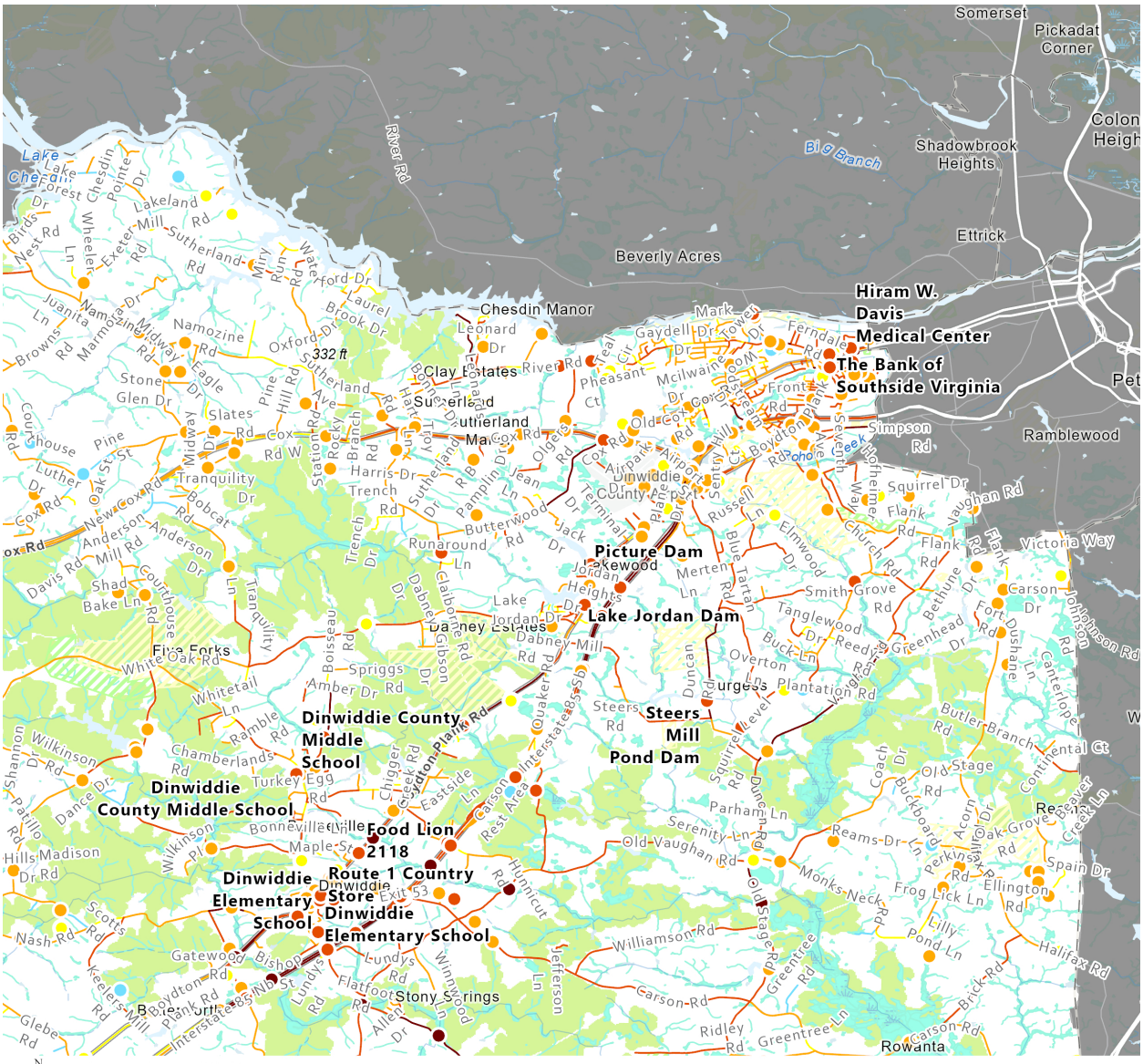
Legend

Scored Assets	Roadways	
Vulnerability	Vulnerability	Dinwiddie Boundary
Very Low	Very Low	Rivers
Low	Low	Conservation Land
Moderate	Moderate	Easement
High	High	Wetlands
Very High	Very High	Natural Land Network

CPDC Weston & Sampson

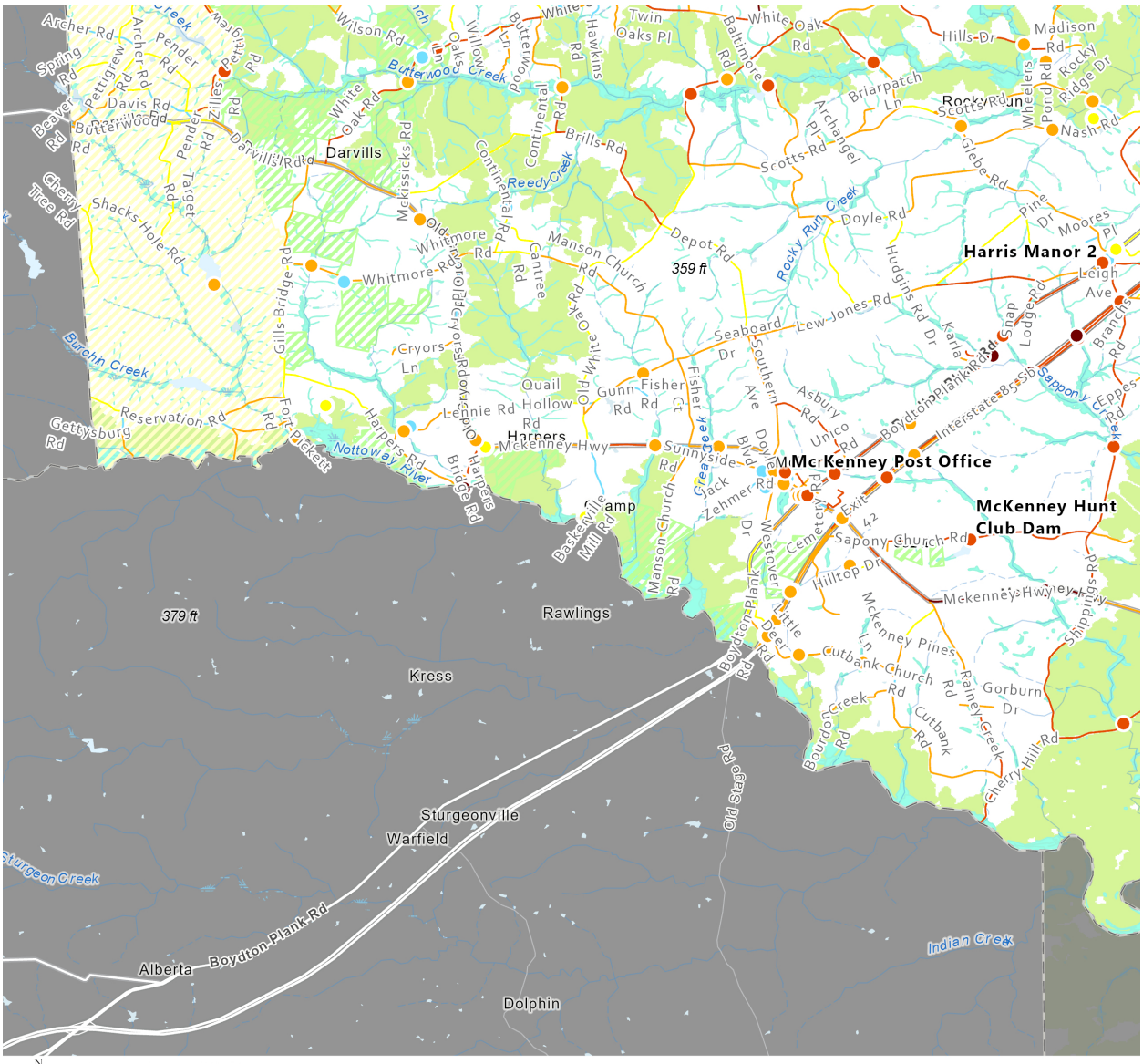
Vulnerability scores were developed as part of the vulnerability assessment for the Crater PDC Regional Resilience Plan. Only assets identified as having high or very high vulnerability are labeled on the map. Due to the sensitivity and quantity of these assets, septic systems, transmission towers, culverts, bridges, and roads were excluded from labeling.

Figure DW.1 Dinwiddie County Asset Vulnerability Map



Vulnerability scores were developed as part of the vulnerability assessment for the Crater PDC Regional Resilience Plan. Only assets identified as having high or very high vulnerability are labeled on the map. Due to the sensitivity and quantity of these assets, septic systems, transmission towers, culverts, bridges, and roads were excluded from labeling.

Figure DW.2 Dinwiddie County Asset Vulnerability Map



Crater PDC Regional Resilience Plan

Dinwiddie County Asset Vulnerability Scores

Legend

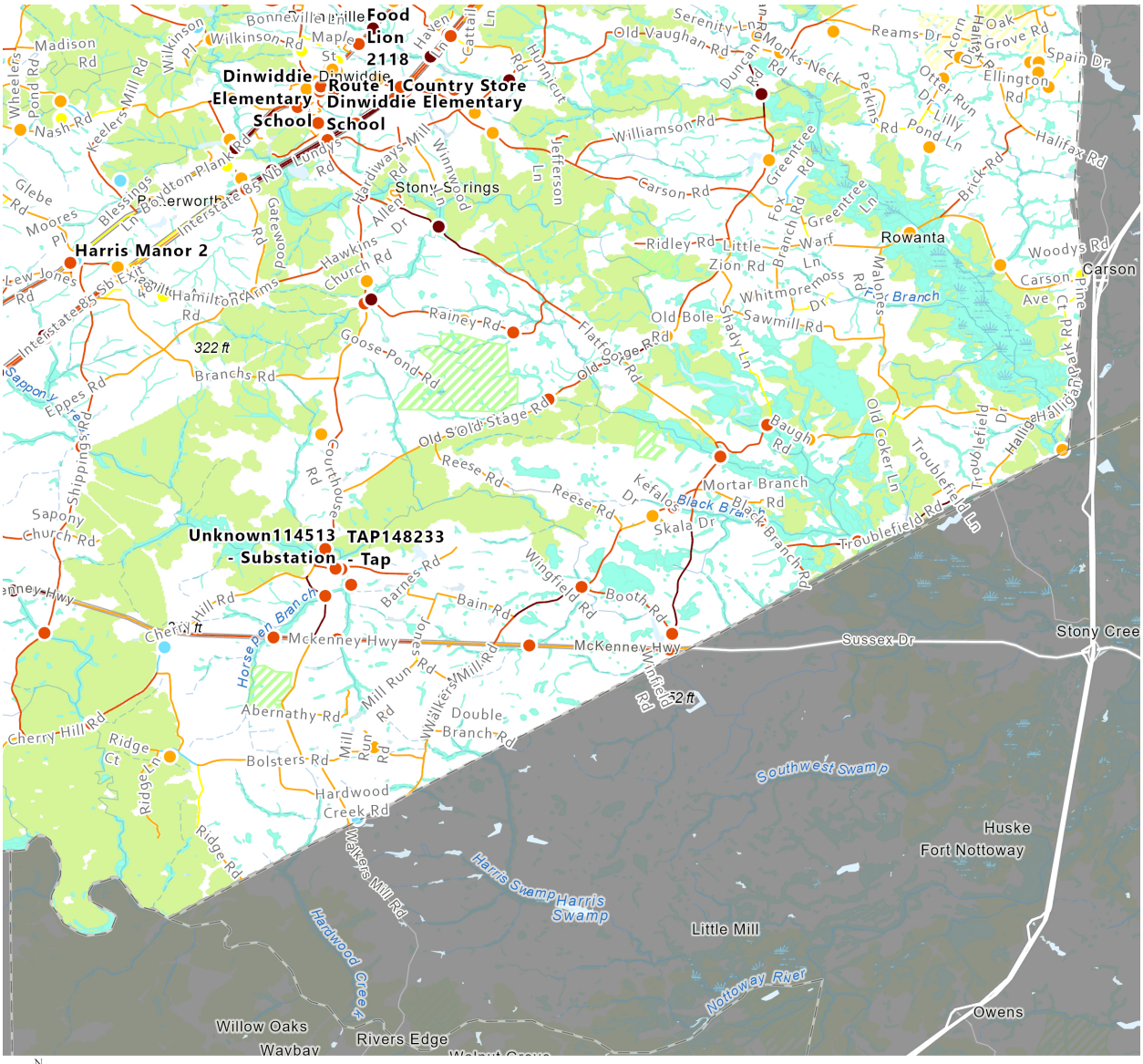
Scored Assets
Vulnerability
- Very Low
- Low
- Moderate
- High
- Very High

Roadways
Vulnerability
- Very Low
- Low
- Moderate
- High
- Very High

- Dinwiddie Boundary
- Rivers
- Conservation Land
- Easement
- Wetlands
- Natural Land Network

Vulnerability scores were developed as part of the vulnerability assessment for the Crater PDC Regional Resilience Plan. Only assets identified as having high or very high vulnerability are labeled on the map. Due to the sensitivity and quantity of these assets, septic systems, transmission towers, culverts, bridges, and roads were excluded from labeling.

Figure DW.3 Dinwiddie County Asset Vulnerability Map



Crater PDC Regional Resilience Plan

Dinwiddie County Asset Vulnerability Scores

Legend

Scored Assets Vulnerability	Roadways Vulnerability	
Very Low	Very Low	Dinwiddie Boundary
Low	Low	Rivers
Moderate	Moderate	Conservation Land
High	High	Easement
Very High	Very High	Wetlands
		Natural Land Network

CPDC Weston & Sampson

Vulnerability scores were developed as part of the vulnerability assessment for the Crater PDC Regional Resilience Plan. Only assets identified as having high or very high vulnerability are labeled on the map. Due to the sensitivity and quantity of these assets, septic systems, transmission towers, culverts, bridges, and roads were excluded from labeling.

Figure DW.4 Dinwiddie County Asset Vulnerability Map

A total of 237 built infrastructure assets (excluding roadways) and 1,445 roadway segments were evaluated. Most built assets (21%) fall within the Water and Wastewater category, followed by Communications (18%), Transportation (17%), Government Facilities (14%), Food and Agriculture (11%), Emergency Services/ Community Assets (7%), Financial Services (5%), Healthcare and Public Health (5%), and Energy (2%). Because asset counts vary significantly by category, the analysis emphasizes the percentage of assets within each category that are ranked as having High or Very High vulnerability. Categories with the greatest proportions of highly vulnerable assets are discussed below. Figure DW.5 illustrates the distribution of vulnerability scores across all asset categories, including roadways.

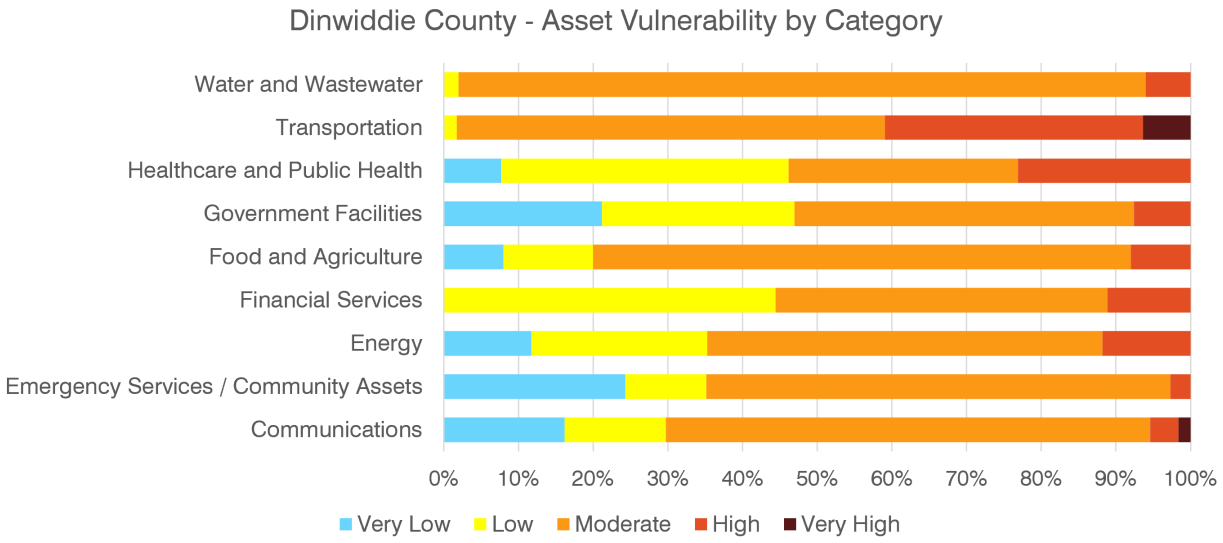


Figure DW.5 Vulnerability Score by Asset Category

DW.7.1 Transportation

Transportation infrastructure emerged as one of Dinwiddie County's most significant vulnerability concerns. Highly vulnerable assets included bridges, culverts, and roadway segments throughout the county. Segments of Interstate 85 Northbound, Butterwood Road, and Old Stage Road received some of the highest vulnerability scores due to their exposure to pluvial flooding, with additional exposure to wildfire and extreme heat. Because these corridors support regional travel, emergency response, and access to community facilities, disruptions can have impacts that extend beyond the immediate area. These findings support actions focused on reducing flood impacts through nature-based solutions, improving flood awareness, and enhancing resilience along recreational and transportation corridors.

Transportation infrastructure is among Dinwiddie County's most vulnerable asset groups, with key roadways, bridges, and culverts exposed to flooding, wildfire, and extreme heat.

DW.7.2 Healthcare and Public Health

Healthcare and Public Health assets also demonstrated elevated vulnerability within Dinwiddie County. High-scoring assets included Harris Manor 2, Dinwiddie Drug Store, and Hiram W. Davis Medical Center. These facilities are exposed to pluvial flooding and are located in areas with elevated social vulnerability, while some also face wildfire or extreme heat risks. Because these facilities provide essential healthcare, long-term care, and pharmacy services, disruptions during hazard events could significantly affect vulnerable populations. These findings directly informed actions focused on maintaining emergency shelter readiness and strengthening resilience and clinical continuity at Hiram W. Davis Medical Center through facility hardening, backup power improvements, and emergency preparedness measures.

DW.7.3 Energy

Energy infrastructure emerged as another key vulnerability concern. Two substations and switching stations received High vulnerability scores due to their exposure to riverine flooding, pluvial flooding, and wildfire. These facilities are critical to maintaining reliable electric service for residents, businesses, healthcare facilities, and emergency operations. Disruptions to power infrastructure can have cascading effects across multiple sectors, particularly during severe weather events. These findings directly informed an action to harden critical power infrastructure through site-specific vulnerability assessments and targeted protective upgrades designed to improve system reliability and reduce outage risks.

The vulnerability assessment findings directly informed Dinwiddie County's resilience actions. Transportation vulnerabilities support efforts to improve flood resilience through nature-based solutions and enhanced flood awareness along the Appomattox River Trail (DW-1) and other public facilities (DW-5). Vulnerabilities affecting healthcare facilities informed actions to maintain emergency shelter readiness (DW-4) and strengthen resilience at Hiram W. Davis Medical Center (DW-7). Risks to critical utility infrastructure support the action to harden power infrastructure against flooding, extreme heat, and other hazards (DW-2). Additionally, the County's exposure to flooding, wildfire, and broader community resilience challenges informed actions focused on food system resilience (DW-3) and forest management to reduce wildfire risk (DW-6). Together, these actions address the key vulnerabilities identified through the assessment and support Dinwiddie County's long-term resilience goals.

DW.8. Actions

The Crater PDC Regional Resilience Plan contains tailored resilience actions for each of the 11 localities within the Crater PDC, actions for Crater PDC to strengthen local and regional capacity, and consistent region-wide actions each of the 11 localities. The following section only contains tailored actions for Dinwiddie County. Actions that Crater PDC is tasked with pursuing, that may be useful for locality-level support and next steps, as well as, region-wide actions Dinwiddie County could pursue are found in Chapter 7. Regional Actions within the Crater PDC Regional Resilience Plan.

Table DW.2 below summarizes the resilience actions developed for Dinwiddie County through the regional resilience planning process. These actions were primarily identified during an Action Development Workshop held in spring 2026 and informed by stakeholder engagement, best practices, the Regional Hazard Mitigation Plan, and relevant comprehensive plans.

Table DW.2 Action Item Key for Dinwiddie County

ID	Action Title	Responsible Entity	Estimated Cost	Priority
DW-1	Enhance Flood Resilience and Safety Along the Appomattox River Trail	Dinwiddie County Parks and Recreation	Low (Project)	Low
DW-2	Harden Critical Power Infrastructure Against Climate Hazards	Dinwiddie Public Works and Utility Suppliers	High (Project)	High
DW-3	Strengthen Community Food System Resilience	Dinwiddie Planning Department and Social Services Department	Medium (Study/ Capacity Build-ing)	Medium
DW-4	Maintain Emergency Shelter Readiness at Dinwiddie Middle School	Dinwiddie Social Services / Emergency Management Department	Low (Project)	Medium
DW-5	Implement Pilot Na-ture-Based Solutions and Park Wayfinding Program	Dinwiddie County Parks and Recreation	Low (Project)	Medium
DW-6	Protect and Manage Forest Lands to Reduce Wildfire Risk	Dinwiddie Fire & EMS / Emergency Management	High (Project)	High
DW-7	Strengthen Resilience and Clinical Continuity at Hiram W. Davis Medical Center	Dinwiddie Social Services Department and Hiram W. Davis Medical Center	Medium (Project)	High

Action Key

Below is the action key used to develop each of the tailored action descriptions presented in this section of the plan.

Action Components: Key considerations for action development and implementation.

Primary Goals: The broader resilience goal(s) or objective(s) that the action supports. These actions include the following:

- Strengthen Natural Systems and Land Use Resilience
- Improve Hazard Preparedness, Response, and Recovery
- Enhance Data, Tools, and Decision-Making Capacity
- Build Local and Regional Capacity
- Advance Regional Collaboration and Coordination
- Increase Public Awareness and Community Engagement
- Promote Equitable and Resilient Communities
- Strengthen Infrastructure and Built Environment Resilience
- Support Economic Resilience and Workforce Development

Priority Rating: An assessment of the relative importance or urgency of the action in relationship to the other actions in the plan. For these ratings, steering committee feedback throughout the planning process was prioritized. Actions were prioritized based off the capacity and needs assessment, ability to be funded through Virginia CFPF, and best practices. These ratings have not been through a scoring or ranking exercise by the Steering Committee. Localities are encouraged to confirm, adjust, or reprioritize ratings to reflect local conditions, capacity, and funding timelines before using them to sequence implementation or grant applications.

Hazards Addressed: The climate or hazard risks the action is intended to help mitigate or manage. These include the following:

- Flooding (pluvial/rainfall, fluvial/riverine, and/or storm surge)
- Extreme Heat
- Wildfires
- Extreme Storms and/or Winter Weather
- All hazards – *addresses each hazard group*

Estimated Timeline: A general timeframe for implementation (short, medium, or long term) from the action kickoff to end.

- Short-term: 1-2 years
- Medium-term: 2-4 years
- Long-term: 5 or more years

Source: The origin of the action, such as stakeholder input, workshop activities, existing plans, or best practices.

Type of Action: The general action type, or means of implementation that fall under the following:

- Policy and Planning
- Programs and Implementation
- Capital Projects and Infrastructure
- Data, Tools, and Decision Support
- Technical Assistance and Capacity Building
- Regional Coordination and Partnerships
- Public Education and Engagement
- Emergency Preparedness and Response
- Nature-Based Solutions
- Expand Recreational Access to Foster Stewardship
- Residential Adaptation Tool

Responsible Entity: The primary organization or jurisdiction responsible for leading the action.

Potential Partners: Additional agencies, organizations, or stakeholders that could support or collaborate on implementation.

Partner Action: Actions either the PDC, localities, or other listed stakeholders should engage in during or after the action is completed to further maintain or manage desired outcomes.

Potential Funding Sources: Possible state, federal, regional, or local funding mechanisms that could support action implementation, management, or maintenance. Common funding sources for these actions are Virginia Community Flood Preparedness Fund (CFPF) and FEMA Hazard Mitigation Grant (HMG). Identification of a funding source does not guarantee project eligibility, funding availability, award selection, or future program continuity. Funding requirements, priorities, and availability may change over time and should be verified during project development and grant application.

Estimated Cost: A high level cost range (low, medium, high). For capacity building / studies versus project actions, there are two different ranges used depending on the project type.

Cost	Studies / Capacity Building	Projects
Low	Less than $100 k	Less than $750 k
Medium	$100 k to $250 k	$750 k to $1.5 M
High	Greater than $250 k	Greater than $1.5 M

Dinwiddie Action 1 (DW-1): Enhance Flood Resilience and Safety Along the Appomattox River Trail

Develop and implement a strategy to reduce flood impacts along the Appomattox River Trail through nature-based solutions and risk awareness measures. Prioritize riparian buffer restoration, floodplain reconnection, and natural flood storage to reduce erosion, improve water quality, and lessen flooding. Complement these efforts with targeted signage and public education to communicate flood risks and discourage trail use during unsafe conditions. FOLAR can support this action through riparian restoration, stewardship, outreach, and public education on flood risks and buffer restoration benefits.

Action Components:

Identify trail segments, access points, and adjacent facilities along the Appomattox River Trail that are prone to flooding; implement flood monitoring and notification systems to support timely trail closures and public safety; improve flood warning signage.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience.
- Promote Nature-Based Solutions

Priority Rating:

Low.

Hazards Addressed:

Flooding.

Estimated Cost:

Project: Low (Less than $750k)

Type of Action:

- Expand Recreational Access to Foster Stewardship
- Policy and Planning

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Medium-term for identification of flood-prone segments, signage improvements, and protocol development.

Responsible Entity:

Dinwiddie County Parks and Recreation

Potential Partners:

Crater PDC; Neighboring localities; Emergency Management Department; Public Works Department; trail advocacy groups, such as Friends of the Lower Appomattox River (FOLAR).

Partner Action:

Support regional coordination on flood-resilient trail planning, share best practices for flood monitoring, trail closure notification, and public safety communications, and disseminate vulnerability assessment findings related to riverine infrastructure.

Source:

Vulnerability Assessment; Committee Engagement Results; Action Development Workshop

Potential Funding Source:

Virginia CFPF – Project Grant, Land and Water Conservation Fund (LWCF), Virginia Recreation Trails (RTP).

Dinwiddie Action 2 (DW-2): Harden Critical Power Infrastructure Against Natural Hazards.

Utilize the existing vulnerability assessment to identify the exposure and sensitivity of critical power infrastructure to flooding, extreme heat, and related hazards. Based on these findings, harden critical power assets through targeted protective upgrades. Measures may include elevating or waterproofing control equipment, installing flood barriers, improving site drainage, adding sump pumps with backup power, providing shade or cooling for sensitive components, and enabling remote switching and monitoring to maintain service continuity during hazard events.

Action Components:

Site-specific vulnerability assessments through site visits and hazard exposure; identify improvements needed for critical facilities.

Responsible Entity:

Dinwiddie Public Works and Utility Suppliers

Potential Partners:

Crater PDC; Dinwiddie Emergency Services / Social Services; Dominion Energy.

Primary Goals:

- Improve Hazard Preparedness, Response, and Recovery
- Strength Infrastructure and Built Environment Resilience

Priority Rating:

Low.

Hazards Addressed:

All Hazards.

Partner Action:

Support utility coordination and competitive grant development for facilities.

Estimated Cost:

Project: Low (Less than $750k)

Type of Action:

- Data, Tools, and Decision Support
- Emergency Preparedness and Response

Source:

Comprehensive Plan, Action Development Workshop, Vulnerability Assessment

Timeline:



Potential Funding Source: Virginia Community Flood Preparedness Fund (CFPF) - Project; FEMA BRIC; DOE Grid Resilience Grants.

Dinwiddie Action 3 (DW-3): Strengthen Community Food System Resilience

Establish a community food resilience program in partnership with local farmers, schools, and nonprofit organizations to expand farmers markets, support community gardens, and develop shared food hubs. Prioritize access in underserved neighborhoods and create disaster-ready food storage and distribution networks to improve food security during emergencies and long-term disruptions.

Action Components:

Establish partnerships with local farmers, schools, and nonprofit organizations to expand farmers markets and support community gardens; identify and develop shared food hub locations prioritizing underserved neighborhoods; and develop disaster-ready food

Responsible Entity:

Dinwiddie Public Works and Utility Suppliers

Primary Goals:

- Promote Equitable and Resilient Communities
- Support Economic Resilience and Workforce Development.

Potential Partners:

Crater PDC; local farmers and producers; local nonprofits; Virginia Cooperative Extension; USDA; regional food hubs; community organizations.

Priority Rating:

Medium.

Hazards Addressed:

All Hazards.

Partner Action:

Provide regional coordination and share best practices for community food resilience programming; assist with identification of funding opportunities; support cross-jurisdictional partnerships with farmers, food hubs, and nonprofit organizations.

Estimated Cost:

Study/Capacity Building: Medium (Less than $100k).

Type of Action:

- Policy and Planning
- Public Education and Engagement.

Source:

Action Development Workshop

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for partnership development and program outreach; medium- to long- term for food hub development.

Potential Funding Source:

USDA Community Facilities Program; Virginia Cooperative Extension grants; FEMA Emergency Management Performance Grant (EMPG) Program; Virginia Community Flood Preparedness Fund (CFPF) - Capacity Building & Planning; Alliance to Advance Climate-Smart Agriculture; local foundation and nonprofit funding.

Dinwiddie Action 4 (DW-4): Maintain Emergency Shelter Readiness at Dinwiddie Middle School

Maintain Dinwiddie County Middle School as an emergency shelter by scheduling continued inspection and certification by the Virginia Department of Health (VDH) and coordinating regularly with emergency management staff to confirm shelter readiness, life safety compliance, and operational capacity during hazard events.

Action Components:

Develop a routine inspection and certification schedule; Life safety system maintenance; Staff training and coordination; Shelter operations planning.

Responsible Entity:

Dinwiddie County Social Services / Emergency Management Department

Primary Goals:

- Improve Hazard Preparedness, Response, and Recovery
- Build Local and Regional Capacity

Potential Partners:

Crater PDC; Dinwiddie County Public Schools; Virginia Department of Health

Priority Rating:

Medium.

Hazards Addressed:

All Hazards.

Partner Action:

Provide regional support and tie into resilience hub programming if relevant. Assist with best practices and coordination.

Estimated Cost:

Study/Capacity Building: Low (Less than $100k)

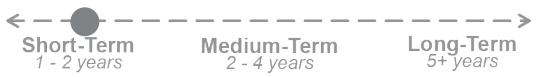
Type of Action:

- Policy and Planning
- Public Education and Engagement.

Source:

Action Development Workshop

Timeline:



Short-term for planning and initial inspection; ongoing for shelter maintenance.

Potential Funding Source:

Virginia Emergency Shelter Upgrade Assistance Grant Fund (FY 26); FEMA Emergency Food and Shelter Program (EFSP); HUD Emergency Solutions Grants (ESG).

Dinwiddie Action 5 (DW-5): Implement Pilot Nature-Based Solutions and Park Wayfinding Program

Design and construct a pilot rain garden or other nature-based solution in a selected County park or public site to demonstrate stormwater management, flood reduction, and environmental benefits. Pair the pilot project with an interpretive signage and e signage program, particularly in historic parks and selected high visibility locations, to educate residents and visitors about green infrastructure, local history, and ecological function. Install coordinated wayfinding signage to more clearly identify recreation sites, improve navigation, and encourage greater park usage. Support these improvements through increased advertising and promotion of existing parks and recreation amenities.

Action Components:

Rain garden or similar green infrastructure pilot; interpretive signage and e-signage; coordinated wayfinding system public outreach and park promotion.

Responsible Entity:

Dinwiddie County Parks and Recreation.

Primary Goals:

- Promote Nature-Based Solutions
- Increase Public Awareness and Community Engagement

Potential Partners:

Crater PDC; Dinwiddie County Planning Department and Engineering Department; Virginia Department of Conservation and Recreation (DCR).

Priority Rating:

Medium.

Hazards Addressed:

Flooding & Extreme Heat.

Partner Action:

Support design coordination, messaging, and regional branding.

Estimated Cost:

Project: Low (Less than $750k)

Type of Action:

- Technical Assistance and Capacity Building
- Public Engagement and Engagement.

Source:

Comprehensive Plan; Committee Engagement Results

Timeline:



Short-term for planning pilot NBS and signage; ongoing for maintenance of the pilot NBS.

Potential Funding Source:

Virginia CFPF; DEQ Stormwater Local Assistance Fund; Virginia Tourism Corporation (VTC) Tourism Wayfinding Program.

Dinwiddie Action 6 (DW-6): Protect and Manage Forest Lands to Reduce Wildfire Risk

Implement proactive forest management and wildfire risk reduction practices in high risk woodland areas. This action will focus on promoting fuel reduction strategies such as controlled burns, mechanical thinning, and debris management, particularly near residential areas and critical infrastructure. The County will also support landowner education, encourage participation in state forestry assistance programs, and prioritize wildfire mitigation in designated high fire risk communities to protect the County's timber economy, reduce wildfire damages, and enhance community safety.

Action Components:

Fuel reduction through controlled burns and thinning; defensible space near homes and infrastructure through FireWise design; Landowner education and technical assistance.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Improve Hazard Preparedness, Response, and Recovery.

Priority Rating:

High.

Hazards Addressed:

Wildfire.

Estimated Cost:

Project: High ($1.5M or higher).

Type of Action:

- Programs and Implementation
- Emergency Preparedness and Response

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Responsible Entity:

Dinwiddie County Fire & EMS / Emergency Management.

Potential Partners:

Crater PDC; Dinwiddie County Planning Department and Parks & Recreation Department; Virginia Department of Forestry (VDOF); timber companies; private landowners.

Partner Action:

Assist with regional coordination and grant identification.

Source:

Comprehensive Plan

Potential Funding Source: Alliance to Advance Climate-Smart Agriculture

Dinwiddie Action 7 (DW-7): Strengthen Resilience and Clinical Continuity at Hiram W. Davis Medical Center

Implement a comprehensive facility hardening and clinical continuity package for Hiram W. Davis Medical Center, including perimeter drainage and inlet protection, elevation or sealing of critical mechanical systems, deployable entry barriers, heat-reflective and shaded roof or façade upgrades, expanded cooling zones, and enhanced HVAC capacity and filtration. Integrate redundant backup power through generators or solar-plus-storage systems and update evacuation and shelter-in-place plans with regular training and drills to ensure uninterrupted care during hazard events.

Action Components:

Flood and heat hardening measures; backup power and solar-plus-storage; HVAC and filtration upgrades; Updated evacuation and shelter plans.

Responsible Entity:

Dinwiddie County Social Services Department and Hiram W. Davis Medical Center.

Primary Goals:

- Protect Public Health and Water Quality
- Improve Hazard Preparedness , Response, and Recovery.

Potential Partners:

Crater PDC; Dinwiddie Fire & EMS / Emergency Management; City of Petersburg; Virginia Department of Health (VDH).

Priority Rating:

High.

Hazards Addressed:

All Hazards.

Partner Action:

Support funding strategy development and integration into regional resilience initiatives.

Estimated Cost:

Project: Medium ($750k to $1.5M).

Type of Action:

- Technical Assistance and Capacity Building
- Emergency Preparedness and Response

Source:

Comprehensive Plan

Timeline:



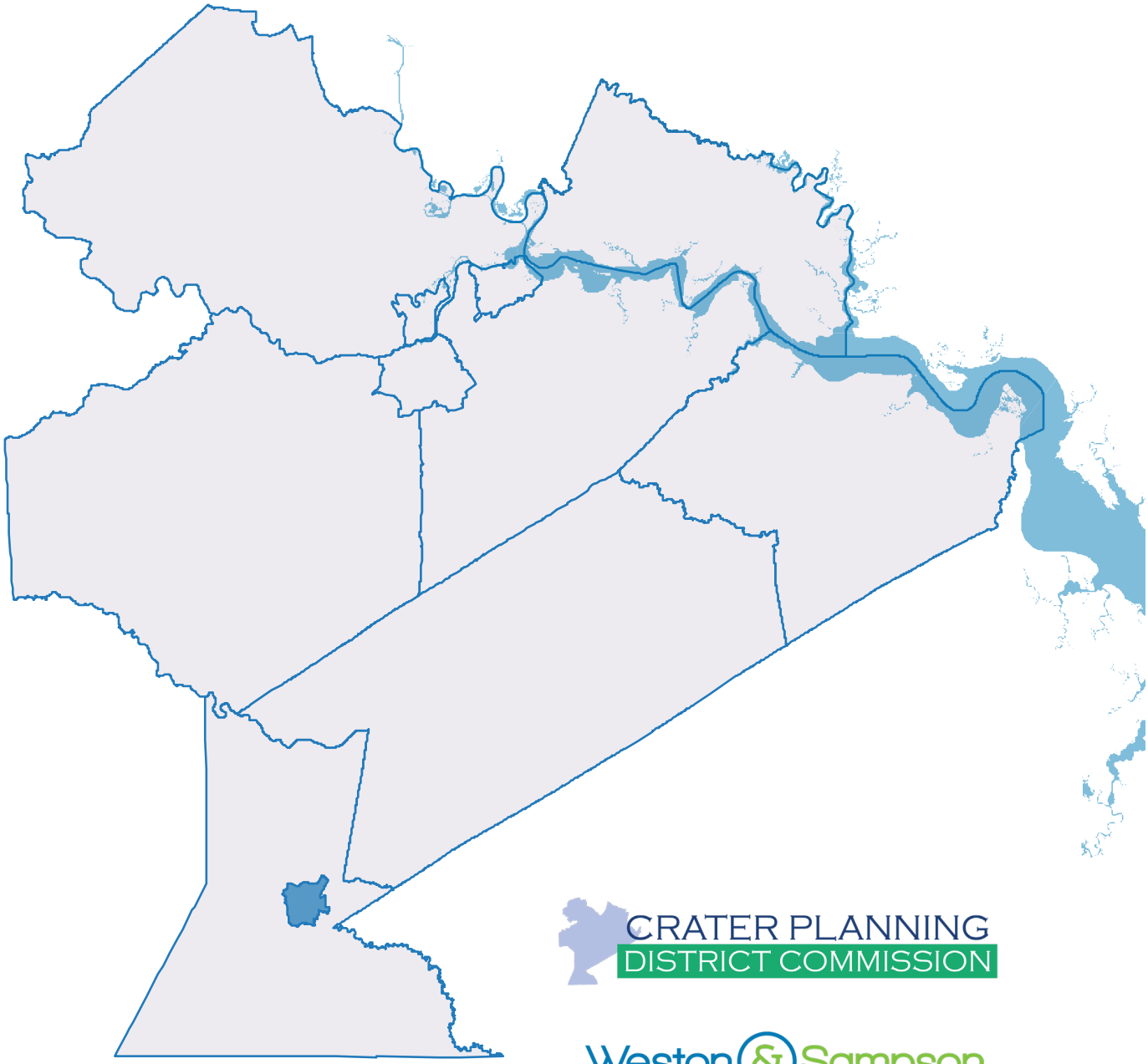
Potential Funding Source: Virginia CFPF; FEMA Hazard Mitigation Assistance (HMA) Programs; Pre-Disaster Mitigation Grant Program (PDM); Hospital Preparedness Program (HPP); Public Health Emergency Preparedness (PHEP) Program.

Emporia

Resilience Plan

Version 1.0 | September 2026

Locality Chapter of the Crater PDC Regional Resilience Plan



CRATER PLANNING DISTRICT COMMISSION

Weston & Sampson

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This chapter presents the locality-specific resilience objectives for City of Emporia as part of Chapter 8: Locality Resilience Plans of the Crater PDC Regional Resilience Plan. It provides a structured overview of local conditions, risks, and actions to support resilience planning and implementation.

8.5 EMPORIA RESILIENCE PLAN

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For additional context on regional priorities, cross-jurisdictional strategies, and Crater PDC–wide resilience objectives, users should refer to the comprehensive Crater PDC Regional Resilience Plan, of which this chapter is one locally focused component. Other components of the plan include:

- Regional vision, goals, and a planning framework for resilience across the Crater Planning District.
- A regional profile describing environmental, economic, infrastructure, and community characteristics.
- An assessment of existing local and regional resilience plans and initiatives.
- A capacity-building roadmap identifying institutional, technical, and organizational needs.
- Results from regional steering committee engagement and workshops.
- A regional vulnerability assessment, including an asset inventory, methodology, and findings.
- Regional actions for implementation by Crater PDC and cross-jurisdictional actions applicable to all localities.
- A regional debris management strategy to support post-disaster response and recovery.
- A plan maintenance framework and supporting appendices.

EP.1. Introduction and Vision

Emporia is an incorporated city within Greensville County that has roots as a crossroads of commerce and community long before its incorporation, evolving from the neighboring towns of Hicksford and Belfield into a unified city in 1887. Positioned at the confluence of transportation routes and the banks of the Meherrin River, Emporia's growth was shaped by its role as a regional trading center and service hub for surrounding agricultural areas, as well as a stop on early rail lines (City of Emporia Comprehensive Plan, 2015). This layered identity continues to influence the city's character, from its historic downtown storefronts to community institutions and riverfront green spaces.

Over time, Emporia has balanced its small-city scale with the needs of a dynamic regional economy. Local civic investments in parks, riverfront access, and public facilities reflect active community participation in shaping the city's future, while its comprehensive plan emphasizes maintaining neighborhood stability, reinvesting in aging infrastructure, and preserving natural resources along the Meherrin River corridor (City of Emporia Comprehensive Plan, 2015). These qualities give Emporia both a sense of rootedness in its historical development and a platform for thoughtful planning that considers identity, quality of life, and resilience to future environmental and economic challenges.

As a part of the visioning process for the Crater PDC Regional Resilience Plan, steering committee members from Emporia developed the following vision statement:

> ***We envision a resilient Emporia where modern infrastructure and thoughtful planning ensure our ability to endure and adapt to the challenges posed by a changing climate.***

EP.2. Demographics

Emporia has an estimated population of 5,766 residents and a median age of 39.5 years, closely aligning with the statewide median and reflecting a relatively balanced age distribution overall. Approximately 18.4 percent of residents are age 65 or older, however, indicating a somewhat higher concentration of seniors than many communities in the Crater region and reinforcing the importance of accessible healthcare, transportation, and community support services. At the same time, nearly 80 percent of school-enrolled residents are in kindergarten through twelfth grade, highlighting the need to support students' daily access to education through well-coordinated infrastructure, transportation networks, and community services.



Nearly 80% of Emporia's school-enrolled population is in kindergarten through twelfth grade.

Economic conditions in Emporia remain more constrained than much of Virginia. Median household income is $49,375, significantly below the statewide median of $92,090, while approximately 13.5 percent of residents live below the poverty level, exceeding the statewide poverty rate of 9.7 percent. Educational attainment is also comparatively limited, with 15.2 percent of residents holding a bachelor's degree or higher. Together, these trends point to ongoing economic and workforce challenges that may influence long-term community stability and access to opportunity.

Housing patterns in Emporia differ notably from many surrounding rural localities. The city has a homeownership rate of 38.4 percent, reflecting a predominantly rental housing market and a more transient or economically constrained residential base. This housing profile, combined with lower incomes and higher poverty rates, highlights the importance of maintaining affordable, stable housing options and reliable community services for residents (U.S. Census Bureau, Decennial Census, 2020).



Photo EP.1 Emporia Train Station. (Adobe Stock Image)

Table EP.1 U.S. Census Bureau Statistics Comparison.

U.S. Census Bureau Statistic	Emporia	Crater PDC	Virginia
Land area	6.9 square miles	2,487.5 square miles	39,481.4 square miles
Population and people			
Total Population	5,766	556,840	8,631,393
Median Age	39.5	40.9	39.4
Population that is 65 years and older	18.4%	18.6%	17.6%
Without Health Care Coverage	3.9%	6.4%	6.9%
Income and Poverty			
Median Household Income	$49,375	$69,698	$92,090
Poverty	13.5%	12.9%	9.7%
Education			
Bachelor's Degree or Higher	15.2%	22.3%	43.3%
School Enrolled Population in Kindergarten to 12th Grade	79.8%	70.7%	65.6%
Employment			
Local, State, and Federal Gov. Workers	16.1%	20.7%	20.6%
Avg. Travel Time to Work	23.8 min	29.3 min	28.3 min
Employment Rate	50.5%	53.6%	61.1%
Housing			
Median Gross Rent	$1,076	$1,177	$1,646
Homeownership Rate	38.4%	66.5%	67.1%
Total Housing Units	2,824	232,007	3,746,211
Total Households	2,219	217,220	3,449,307
Families and Living Arrangements			
Children under 18 years old	27.0%	20.6%	21.3%

U.S. Census Bureau Statistic	Emporia	Crater PDC	Virginia
Race and Ethnicity			
American Indian and Alaska Native alone	42	2,822	40,007
Asian alone	579	15,795	615,436
African American	2,915	163,453	1,607,581
Hispanic or Latino (of any race)	1,276	52,020	908,749
Native Hawaiian and Other Pacific Islander alone	6	491	7,156
Not Hispanic or Latino	12,409	294,878	5,058,363
Some Other Race	542	28,897	446,650
Two or More Races	1,427	37,564	705,707
White	12,652	302,764	5,208,856

Source: U.S. Census Bureau 2020 Decennial Census.

EP.3. Challenges and Strengths

Emporia faces several challenges that shape its resilience needs. The Meherrin River and surrounding low-lying areas contribute to localized flooding and drainage issues, including areas surrounding the Low Ground Road, that require targeted stormwater improvements (Improving Resilience in Emporia StoryMap, 2025). Approximately 21 percent of the city's land area lies within the 100-year floodplain, creating ongoing risk to areas near the river corridor (City of Emporia Comprehensive Plan, 2015). The city's smaller staffing capacity places operational pressure on departments that manage stormwater, utilities, and emergency response, which can slow the pace of grant applications and resilience project implementation (Improving Resilience in Emporia StoryMap, 2025).

Despite these challenges, Emporia has meaningful strengths that support future resilience planning. The city owns and operates its water treatment plant, wastewater system, and reservoir facilities, providing local control over essential water services that many small jurisdictions do not manage independently (City of Emporia Comprehensive Plan, 2015). Recreation areas and open space along the Meherrin River, including parkland and public access points, offer opportunities for greenway development, nature-based flood mitigation, and conservation programming. Coordination with Greensville County and the Crater PDC can also support regional hazard planning and provide a framework for shared services and funding pursuits, which strengthens long-term capacity (Improving Resilience in Emporia StoryMap, 2025).

EP.4. Capacity and Needs

One of the first steps within the planning process for the Crater PDC Regional Resilience Plan was performing a capacity and needs assessment for resilience planning. The capacity strengths and challenges revealed within the capacity and needs assessment were integrated into actions for Crater PDC to initiate and next steps for localities. These actions can be found in Chapter 4. Capacity Building Roadmap and serve as foundational actions Crater PDC and localities should pursue in tandem with the other actions within this plan. This survey was directly informed by the capacity and needs assessment questionnaire provided during the beginning of the planning process, which gathered detailed input from local staff on existing roles, resource gaps, technical needs, and challenges related to climate resilience, funding, infrastructure, and intergovernmental coordination. This section provides a snapshot summary of Emporia identified challenges as they relate to resilience planning.

REGIONAL COORDINATION & SUPPORT



Identified Support Needs

- Grant writing and funding support
- Data & mapping tools
- Training programs and capacity building
- Infrastructure and engineering expertise
- Resilience planning and policy guidance

INFRASTRUCTURE & OPERATIONS



Significant Climate-Related Impacts

- Flooding during heavy rain events
- Fire in South Hill

Primary Public Assets Impacted by Hazards

- Roads and transportation systems
- Water supply systems
- Stormwater management infrastructure

Redundancy Plans

- Onsite generators

FINANCIAL RESOURCES

Utilized state funding in the past

Identified Financial Challenges

- Limited Local Funding
- Grant application capacity constraints

POLICY & PLANNING



Would benefit from comprehensive plan resilience strategies to address state code requirements and model ordinances or policy recommendations related to resilience.

Identified Barriers for Resilience Efforts

- Lack of funding
- Technical expertise or staffing constraints

HUMAN & INSTITUTIONAL CAPACITY

Relevant Staff Positions

- City Manager
- Emergency Services Coordinator

Identified Staff Capacity Needs

- Technical support
- Cross-training of existing staff
- Consultants / contracted services

TECHNICAL ASSISTANCE & TRAINING NEEDS

Climate Resilience Data / Tools Used

FEMA Flood Insurance Rate Maps (FIRMs)

Identified Training Needs

- Assessment of critical asset vulnerabilities
- Grant writing and funding strategy support
- Development of local resilience planning recommendations
- Policy and ordinance development for resilience

DISASTER RESPONSE CAPACITY

Emergency Operations or Disaster Response

Regional Hazard Mitigation Plan (2022), Emergency Operations Plan

Responsible Agencies / Departments

Emergency Management, Fire/Rescue, Public Works, Police/Sheriff's Department

Identified Challenges for Disaster Response

Staffing shortages, Lack of funding for emergency preparedness, Insufficient emergency shelter capacity, Need for improved coordination with neighboring localities

Identified Disaster Response Needs

Additional response resources, Increased funding for emergency preparedness, Staff training in disaster response protocols, Improved coordination with regional and state agencies, Post-disaster recovery planning and support

EP.5. Overview of Environmental Conditions

Emporia is located at the Fall Line, where the Piedmont transitions to the Coastal Plain, a physiographic boundary that influences local topography and hydrology. The Meherrin River flows southeast through the center of the City and is the primary natural feature shaping Emporia's environmental conditions and hazard exposure. The river channel is generally well defined, with vegetated overbank areas that provide some natural flood storage but also create flood prone conditions during high water events. Fall Run, a smaller stream, borders the City's southern corporate limits and contributes to localized drainage and flooding concerns in adjacent areas (Plan RVA; Crater PDC, 2022).

Emporia exhibits a typical urban development pattern compared to the largely rural character of surrounding Greensville County. As of 2014, approximately 44 percent of land within the City limits was vacant or underdeveloped, though a significant portion of this land contains site constraints such as floodplains or steep slopes that limit development potential. Vacant and developable lands are primarily concentrated along Route 58 and East Atlantic Avenue on the eastern edge of the City and northward toward the City's northern boundary. These physical constraints influence growth patterns and elevate the importance of incorporating flood aware and resilient design into future development and infill projects (Plan RVA; Crater PDC, 2022).

Flooding and severe weather represent the most significant natural hazard concerns for Emporia. The City contains one identified repetitive loss area, with moderate risk associated with suspected backwater flooding near the Route 58 bridge over a tributary of Metcalf Branch, portions of which lie in FEMA Zone A without detailed flood studies. While Emporia experiences lower overall wind damages than more urbanized parts of the region, tornadoes and winter storms remain notable hazards. Tornado activity in and near Emporia has caused property damage and minor commercial impacts, and the City lies within a regional area that has experienced an increased frequency of tornadoes since 1950. Winter weather events, including heavy snowfall such as



Tornado activity in and near Emporia has caused property damage and minor commercial impacts.

the December 2010 storm, further affect transportation and services. Although Emporia contains several woodland communities, wildfire risk is generally low, and environmental resilience efforts are largely focused on flood risk management, storm preparedness, and safe redevelopment of constrained lands (Plan RVA; Crater PDC, 2022).

EP.6. Floodplain Management and Flood Risk Identification

As part of the Virginia Department of Conservation and Recreation (DCR) Resilience Plan requirements, localities must document administrative procedures for tracking and managing Substantial Improvement (SI) and Substantial Damage (SD) determinations for structures located within Special Flood Hazard Areas (SFHAs), as well as identify Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties. This section summarizes these requirements as they relate to Emporia and highlights the relevant provisions contained within the City's floodplain ordinance, associated regulatory documents, and information documented in the PlanRVA–Crater PDC Multi-Regional Hazard Mitigation Plan (2022). The purpose of this review is to verify the City's existing administrative framework and identify opportunities to strengthen floodplain management and support long-term resilience planning efforts.

Why it matters: Identifying and tracking flood-prone properties helps communities better understand flood risk, prioritize mitigation investments, reduce future damages, strengthen resilience, and guide long-term land use and development decisions.

EP.6.1 Floodplain Ordinance and Regulatory Framework

Emporia has adopted a Zoning and Subdivision Ordinance (effective July 1, 2024) that includes a Flood Hazard Overlay District (FH) and is designed to be consistent with the National Flood Insurance Program (NFIP), as it regulates development within FEMA-mapped Special Flood Hazard Areas (SFHAs) and requires permits and technical submissions. Development within flood hazard zones is governed by specific provisions addressing permitted uses, application requirements, elevation and construction standards, and design criteria for utilities and infrastructure, providing consistency with FEMA mapping and flood risk reduction practices. The ordinance also requires submission of technical data, adherence to Flood Insurance Rate Maps (FIRMs), and allows for map revisions through formal processes, indicating the use of best available data and coordination with federal standards.

Additionally, the ordinance establishes a comprehensive administrative framework for floodplain management through the designated Flood Hazard Overlay District (FH) Administrator. The Administrator is responsible for reviewing permit applications to determine whether proposed development is located within Special Flood Hazard Areas (SFHAs), interpreting floodplain boundaries, reviewing elevation and flood hazard information, ensuring compliance with floodplain development standards, and verifying that all required federal, state, and local permits have been obtained. The ordinance also provides inspection authority, authorizes the issuance of permits and Notices of Violation, and requires corrective actions when noncompliance is identified. Robust recordkeeping requirements are established, including the permanent maintenance of Flood Insurance Studies (FIS), Flood Insurance Rate Maps (FIRMs), Letters of Map Change, elevation certificates, permit documentation, variance records, and enforcement actions. The Administrator is further responsible for determining whether structures within SFHAs have been substantially damaged, notifying property owners of compliance obligations, coordinating with state and federal agencies, and assisting property owners with documentation related to National Flood Insurance Program (NFIP) Increased Cost of Compliance claims. The ordinance requires that new construction and substantial improvements meet current floodplain management standards, including elevation and floodproofing requirements, and establishes procedures for tracking substantial damage and substantial improvement determinations.

Strengths of Emporia's regulatory framework include strong alignment with the Code of Virginia, detailed permitting and site plan requirements that incorporate floodplain considerations, integration of flood hazard overlay zoning into broader land use regulations, and clear enforcement procedures. However, potential gaps include continued reliance on FEMA FIRMs as the primary regulatory basis, limited explicit discussion of higher standards such as freeboard requirements beyond minimum elevation standards and no participation in the Community Rating System (CRS).

EP.6.2 Flood Risk Identification SFHAs

Repetitive loss (RL) properties are structures that have experienced multiple instances of flood-related damage over time. Under the National Flood Insurance Program (NFIP), a repetitive loss property is defined as a property for which two or more flood insurance claims of at least $1,000 have been paid within any 10-year period.

Severe repetitive loss (SRL) properties represent a subset of these structures and indicate a higher level of risk and recurring damage. These properties are defined as those that have either:

- At least **four NFIP** claims exceeding $5,000 each, or
- At least **two claims** where the total payouts exceed the building's value.

While NFIP data tracks many RL and SRL properties, these designations may not capture all instances of recurring flood impacts. Repetitive flooding can and often does occur outside of mapped Special Flood Hazard Areas (SFHAs), particularly due to stormwater, drainage issues, or localized flooding. As a result, communities are encouraged to identify, track, and address all repetitive flood impacts, regardless of NFIP designation, to better understand risk patterns and inform mitigation strategies. According to the Richmond-Crater Hazard Mitigation Plan (2022), Emporia has 1 RL property and no SRL properities as defined by the NFIP. There are no known RL and SRL properties outside of the Special Flood Hazard Areas (SFHA) as well.

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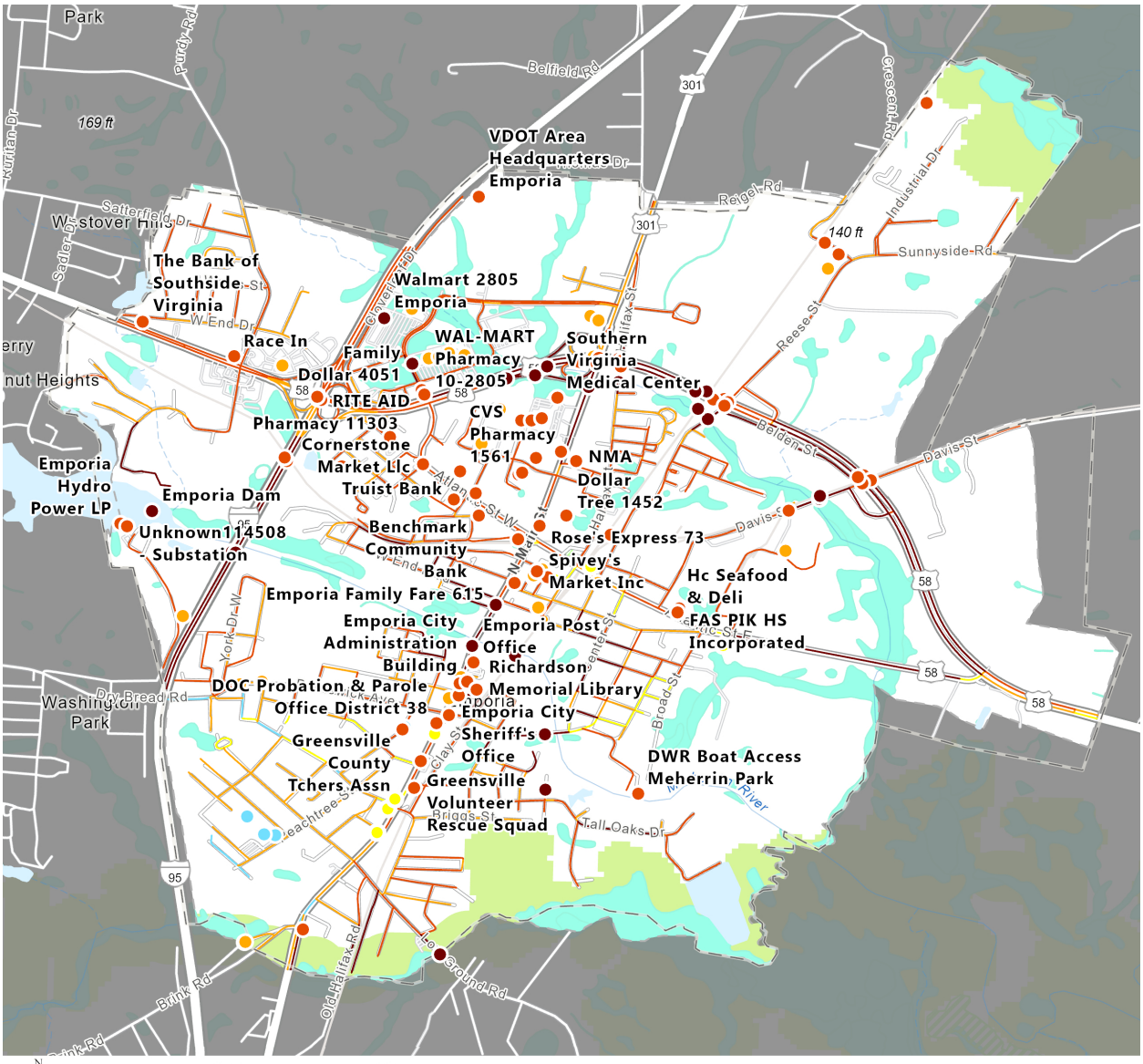
Repetitive loss (RL) properties are structures that have experienced multiple instances of flood-related damage over time.

EP.7. Vulnerability Assessment Results

Another foundational element of the Crater PDC Regional Resilience Plan was a region-wide vulnerability assessment performed across the Crater region. The vulnerability assessment results in this section have been parsed out to only include findings relevant to Emporia. The vulnerability assessment conducted for the Crater PDC Regional Resilience Plan evaluated how each locality is exposed to multiple hazards, including rainfall (pluvial) flooding, riverine (fluvial) flooding, storm surge, extreme heat, and wildfire risk. The vulnerability assessment also evaluated sensitivity through the social vulnerability index. The vulnerability assessment for Emporia identified flooding, particularly from rainfall (pluvial), and wildfire as the primary risks to critical assets. Assets were also exposed to riverine flooding and extreme heat. There was no exposure to coastal flooding in Emporia.

For the methodology of this vulnerability assessment, including data sources, indicator selection, and scoring, please refer to Appendix B. Vulnerability Assessment Methodology and Scoring Framework. For the region-wide assessment and hazard information, please refer to Chapter 6. Vulnerability Assessment.

Vulnerability in Emporia is not evenly distributed across the city. The asset vulnerability map (Figure EP.1) shows higher concentrations of High and Very High vulnerability assets within the downtown area, along the Interstate 95 corridor, and near the U.S. Route 58 commercial corridor. These areas contain concentrations of transportation infrastructure, utilities, community facilities, and public services exposed to one or more climate hazards. Additional vulnerable assets occur where major transportation routes and developed areas intersect flood-prone drainage systems.



Crater PDC Regional Resilience Plan

Emporia Asset Vulnerability Scores

Legend

Point Assets Vulnerability	Roadways Vulnerability	
Very Low	Very Low	Emporia Boundary
Low	Low	Rivers
Moderate	Moderate	Conservation Land
High	High	Easement
Very High	Very High	Wetlands
		Natural Land Network

Vulnerability scores were developed as part of the vulnerability assessment for the Crater PDC Regional Resilience Plan. Only assets identified as having high or very high vulnerability are labeled on the map. Due to the sensitivity and quantity of these assets, septic systems, transmission towers, culverts, bridges, and roads were excluded from labeling.

Figure EP.1 Emporia Asset Vulnerability Map

A total of 167 built infrastructure assets (excluding roadways) and 605 roadway segments were evaluated. Non-roadway built assets in Emporia are primarily concentrated in Transportation (32.3%), followed by Communications (21.0%), Government Facilities (15.0%), Food and Agriculture (10.2%), Emergency Services / Community Assets (6.6%), Healthcare and Public Health (6.0%), Energy (4.2%), Financial Services (4.2%), and Water and Wastewater (0.6%). Because asset counts vary significantly by category, the analysis emphasizes the percentage of assets within each category that are ranked as having High or Very High vulnerability. Categories with the greatest proportions of highly vulnerable assets are discussed below. Figure EP.2 illustrates the distribution of vulnerability scores across all asset categories, including roadways.

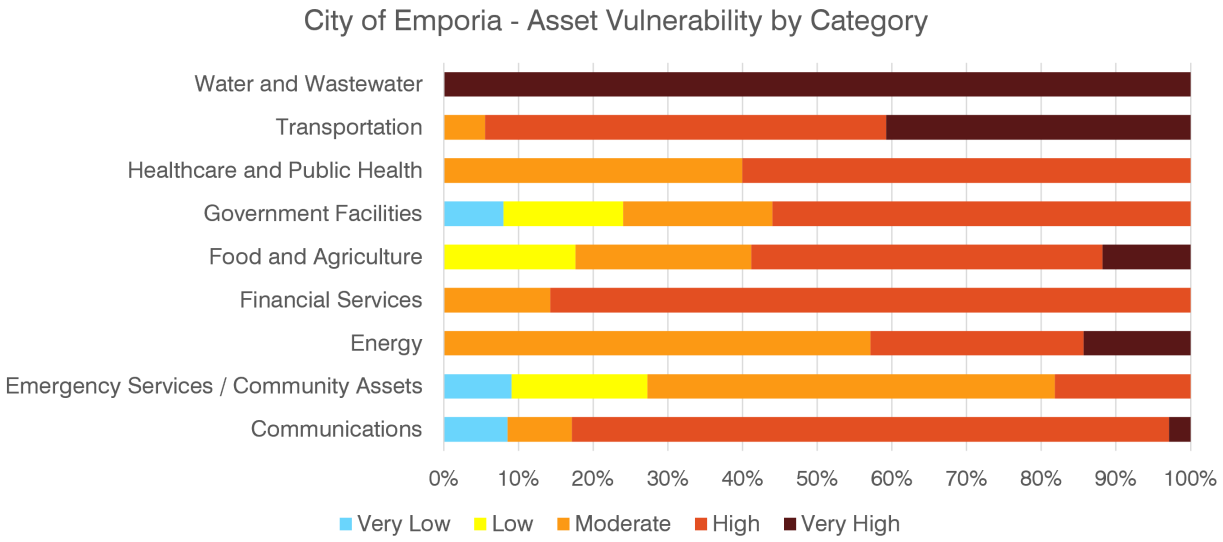


Figure EP.2 Vulnerability Score by Asset Category

EP.7.1 Water and Wastewater

Water and wastewater infrastructure emerged as a significant vulnerability concern despite representing only a single assessed asset. The Emporia Dam received a Very High vulnerability score due to its exposure to riverine flooding, pluvial flooding, and wildfire, as well as its location within an area of elevated social vulnerability. As a critical piece of infrastructure, impacts to the dam could affect public safety, water management, and broader community resilience. These findings support actions focused on improving stormwater management, understanding system capacity, and identifying opportunities to reduce flood risk through both infrastructure improvements and nature-based solutions.

EP.7.2 Financial Services

Financial Services assets also demonstrated elevated vulnerability within the City. Highly vulnerable assets included Benchmark Community Bank, Truist Bank, The Bank of Southside Virginia, First-Citizens Bank & Trust Company, and Greensville County Teachers Association. These facilities were exposed to pluvial flooding, wildfire, and social vulnerability factors. Because financial institutions support residents, businesses, and post-disaster recovery efforts, service

disruptions could have broader economic impacts. These findings reinforce the importance of reducing localized flood risk, strengthening stormwater systems, and incorporating resilience considerations into future infrastructure investments.

EP.7.3 Communications

Communications infrastructure emerged as another key vulnerability concern. Highly vulnerable assets included land mobile private transmission towers and broadcast towers that support communication services throughout the City. Private Tower 0931 received the highest vulnerability score within this category. Many communications facilities were exposed to pluvial flooding and wildfire, while some were also vulnerable to riverine flooding and extreme heat. Because communication systems are critical during emergencies and disaster response, disruptions could affect public safety, emergency coordination, and community recovery efforts. These findings support efforts to better integrate emergency management and resilience planning while improving understanding of critical facility service areas and infrastructure dependencies.

The vulnerability assessment findings directly informed Emporia's resilience actions. Flood-related vulnerabilities affecting the Emporia Dam, communications infrastructure, and other critical assets support efforts to conduct a citywide drainage and stormwater assessment (EP-1), evaluate the feasibility of a stormwater utility (EP-2), and identify public lands that can support conservation and stormwater management (EP-3). Exposure to extreme heat and flooding across developed areas informed the recommendation to expand urban tree canopy in heat-vulnerable neighborhoods (EP-4). Vulnerabilities affecting critical facilities and communications infrastructure also support efforts to integrate emergency management and resilience planning through service area analysis and emergency preparedness improvements (EP-5). Together, these actions address Emporia's key vulnerabilities while improving flood resilience, protecting critical infrastructure, and strengthening long-term community resilience.

EP.8. Actions

The Crater PDC Regional Resilience Plan contains tailored resilience actions for each of the 11 localities within the Crater PDC, actions for Crater PDC to strengthen local and regional capacity, and consistent region-wide actions each of the 11 localities. The following section only contains tailored actions for Emporia. Actions that Crater PDC is tasked with pursuing, that may be useful for locality-level support and next steps, as well as, region-wide actions Emporia could pursue are found in Chapter 7. Regional Actions within the Crater PDC Regional Resilience Plan.

Table EP.2 below summarizes the resilience actions developed for City of Emporia through the regional resilience planning process. These actions were primarily identified during an Action Development Workshop held in spring 2026 and informed by stakeholder engagement, best practices, the Regional Hazard Mitigation Plan, and relevant comprehensive plans.

Table EP.2 Action Item Key for Emporia

ID	Action Title	Responsible Entity	Estimated Cost	Priority
EP-1	Conduct a Stormwater Inventory and Make Drainage and Stormwater System Improvements	Public Works	Medium (Project)	High
EP-2	Conduct a Stormwater Utility Feasibility Study	Public Works and/or City Administration	Low to High (Study to Utility Establishment)	Medium
EP-3	Identify Public Lands for Conservation and Stormwater Management	Planning and/or Public Works	Low to High (Inventory to Capital Improvements)	Medium
EP-4	Expand Urban Tree Canopy in Heat-Vulnerable Areas	Public Works and/or Parks and Recreation	Medium (Project)	Medium
EP-5	Integrate Emergency Planning with Resilience Planning Priorities	Emergency Management and Planning Departments	Low (Study/ Capacity Building)	High
EP-6	Increase Resources Used to Fight Wildfire	Emporia Department of Fire and Emergency Services	Medium (Project)	Medium

Action Key

Below is the action key used to develop each of the tailored action descriptions presented in this section of the plan.

Action Components: Key considerations for action development and implementation.

Primary Goals: The broader resilience goal(s) or objective(s) that the action supports. These actions include the following:

- Strengthen Natural Systems and Land Use Resilience
- Improve Hazard Preparedness, Response, and Recovery
- Enhance Data, Tools, and Decision-Making Capacity
- Build Local and Regional Capacity
- Advance Regional Collaboration and Coordination
- Increase Public Awareness and Community Engagement
- Promote Equitable and Resilient Communities
- Strengthen Infrastructure and Built Environment Resilience
- Support Economic Resilience and Workforce Development

Priority Rating: An assessment of the relative importance or urgency of the action in relationship to the other actions in the plan. For these ratings, steering committee feedback throughout the planning process was prioritized. Actions were prioritized based off the capacity and needs assessment, ability to be funded through Virginia CFPF, and best practices. These ratings have not been through a scoring or ranking exercise by the Steering Committee. Localities are encouraged to confirm, adjust, or reprioritize ratings to reflect local conditions, capacity, and funding timelines before using them to sequence implementation or grant applications.

Hazards Addressed: The climate or hazard risks the action is intended to help mitigate or manage. These include the following:

- Flooding (pluvial/rainfall, fluvial/riverine, and/or storm surge)
- Extreme Heat
- Wildfires
- Extreme Storms and/or Winter Weather
- All hazards – *addresses each hazard group*

Estimated Timeline: A general timeframe for implementation (short, medium, or long term) from the action kickoff to end.

- Short-term: 1-2 years
- Medium-term: 2-4 years
- Long-term: 5 or more years

Source: The origin of the action, such as stakeholder input, workshop activities, existing plans, or best practices.

Type of Action: The general action type, or means of implementation that fall under the following:

- Policy and Planning
- Programs and Implementation
- Capital Projects and Infrastructure
- Data, Tools, and Decision Support
- Technical Assistance and Capacity Building
- Regional Coordination and Partnerships
- Public Education and Engagement
- Emergency Preparedness and Response
- Nature-Based Solutions
- Expand Recreational Access to Foster Stewardship
- Residential Adaptation Tool

Responsible Entity: The primary organization or jurisdiction responsible for leading the action.

Potential Partners: Additional agencies, organizations, or stakeholders that could support or collaborate on implementation.

Partner Action: Actions either the PDC, localities, or other listed stakeholders should engage in during or after the action is completed to further maintain or manage desired outcomes.

Potential Funding Sources: Possible state, federal, regional, or local funding mechanisms that could support action implementation, management, or maintenance. Common funding sources for these actions are Virginia Community Flood Preparedness Fund (CFPF) and FEMA Hazard Mitigation Grant (HMG). Identification of a funding source does not guarantee project eligibility, funding availability, award selection, or future program continuity. Funding requirements, priorities, and availability may change over time and should be verified during project development and grant application.

Estimated Cost: A high level cost range (low, medium, high). For capacity building / studies versus project actions, there are two different ranges used depending on the project type.

Cost	Studies / Capacity Building	Projects
Low	Less than $100 k	Less than $750 k
Medium	$100 k to $250 k	$750 k to $1.5 M
High	Greater than $250 k	Greater than $1.5 M

Emporia Action 1 (EP-1): Conduct a Stormwater Inventory, Assess System Capacity, and Better Understand Future Impacts + Make Drainage and Stormwater System Improvements Through Grey Infrastructure Upgrades and Green Infrastructure Projects

Conduct a comprehensive citywide drainage study to identify chronic flooding areas, stormwater system capacity constraints, and priority locations for drainage improvements, capital investments, and green infrastructure. The study should document existing drainage conditions, map flood-prone developed areas, and evaluate system performance under both current and future climate conditions.

Action Components:

Complete a detailed inventory and assessment of the City's underground storm sewer system, including system extent, pipe condition, capacity, and connectivity. Identify deficiencies, aging infrastructure, and high-priority areas for maintenance or replacement.

Primary Goals:

- Promote Nature-Based Solutions
- Strengthen Infrastructure and Built Environment Resilience.

Priority Rating:

High.

Hazards Addressed:

Flooding.

Estimated Cost:

Project: Medium ($750k - $1.5M).

Type of Action:

- Programs and Implementation
- Data, Tools, And Decision Support

Timeline:

Short-Term
1 - 2 years

Medium-Term
2 - 4 years

Long-Term
5+ years

Responsible Entity:

City of Emporia Department of Public Works

Potential Partners:

Crater PDC; Virginia Department of Environmental Quality (DEQ); Chesapeake Bay Foundation; Timmons Group; engineering consultants; local schools and community organizations.

Partner Action:

Support local stormwater resilience efforts by providing technical assistance, watershed data and modeling resources, guidance on stormwater best management practices, and access to state funding programs.

Source:

Action Development Workshop.

Potential Funding Source:

Virginia Community Flood Preparedness Fund (CFPF) implementation funds; Virginia DEQ Stormwater Local Assistance Fund (SLAF); EPA Clean Water State Revolving Fund (CWSRF); EPA Nonpoint Source Section 319 Grant.

Emporia Action 2 (EP-2): Conduct a Stormwater Utility Feasibility Study

Complete a stormwater utility feasibility study to evaluate the potential of establishing a dedicated funding mechanism to support stormwater system maintenance, capital improvements, green infrastructure investment, and long-term flood mitigation needs. The study should assess current funding gaps, examine comparable utility structures in peer localities, evaluate rate structures and revenue potential, and identify legal and administrative requirements for utility establishment. Findings will inform the City's long-term financial strategy for stormwater resilience and improve the City's readiness to pursue state and federal grant funding.

Action Components:

Assess stormwater funding gaps and maintenance needs; evaluate the feasibility of a stormwater utility, including legal, administrative, and financial considerations; review peer utility models; and develop recommendations for utility structure, governance, and phased implementation.

Responsible Entity:

City of Emporia Department of Public Works and/or City Administration.

Primary Goals:

- Strengthen Infrastructure and Built Environment Resilience.
- Build Local and Regional Capacity

Potential Partners:

Crater PDC; Virginia Department of Environmental Quality (DEQ); Virginia Department of Conservation and recreation (DCR); peer localities with established stormwater utilities.

Priority Rating:

Medium.

Hazards Addressed:

All Hazards.

Partner Action:

Provide technical assistance and peer examples from comparable localities; assist with benchmarking and research on stormwater utility models; help connect the City with state agency guidance and funding resources.

Estimated Cost:

Study/Capacity Building: Low (Less than $100k) for Study / Project: High (greater than $1.5 M) for establishment.

Type of Action:

- Programs and Implementation
- Data, Tools, And Decision Support

Source:

Action Development Workshop.

Timeline:



Potential Funding Source: Virginia Community Flood Preparedness Fund (CFPF); Virginia DEQ Stormwater Local Assistance Fund (SLAF); local general fund for study costs.

Emporia Action 3 (EP-3): Identify Public Lands for Conservation and Stormwater Management

Conduct a systematic review of City-owned and publicly controlled lands to identify parcels suitable for conservation, green infrastructure, and stormwater management uses. Prioritize sites that can support flood mitigation, water quality improvements, habitat protection, and public recreation while reducing impervious surfaces or capturing runoff from adjacent developed areas. Integrate findings into capital improvement planning, open space preservation efforts, and future site-specific green infrastructure projects.

Action Components:

Assess City-owned and public parcels for conservation and green infrastructure opportunities; prioritize sites for easements, stormwater retrofits, and habitat restoration based on flood risk and community vulnerability; and integrate findings into capital improvement and open space planning.

Responsible Entity:

City of Emporia Planning Department and/or Department of Public Works.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Protect Public Health and Water Quality

Potential Partners:

Crater PDC; Virginia Department of Conservation and Recreation (DCR); Virginia Department of Environmental Quality (DEQ); Chesapeake Bay Foundation; local land trusts; watershed

Priority Rating:

Medium.

Hazards Addressed:

Flooding.

Partner Action:

Assist with GIS mapping and identification of priority parcels; provide technical guidance on conservation tools and funding options; coordinate regional alignment for parcels with cross-jurisdictional significance.

Estimated Cost:

Study/Capacity Building: Low (Less than $100k) for inventory: High (greater than $1.5 M) for acqusition(s).

Type of Action:

- Nature-Based Solutions
- Data, Tools, And Decision Support

Source:

Action Development Workshop.

Timeline:



Potential Funding Source:

Virginia Community Flood Preparedness Fund (CFPF); Virginia Outdoors Foundation (VOF); National Fish and Wildlife Foundation (NFWF) National Coastal Resilience Fund (NCRF); EPA Clean Water State Revolving Fund (CWSRF).

Emporia Action 4 (EP-4): Expand Urban Tree Canopy in Heat-Vulnerable Areas

Increase urban tree cover through targeted planting in heat-vulnerable neighborhoods, preservation of existing mature trees, and integration of green infrastructure to reduce urban heat island effects, improve air quality, manage stormwater naturally, and enhance long-term community resilience. Prioritize planting sites based on canopy coverage gaps, heat exposure data, proximity to vulnerable populations, and site conditions including soil health, available growing space, and infrastructure conflicts. Coordinate species selection with local health departments to ensure

Action Components:

Conduct a heat equity analysis in ArcGIS Pro using Landsat 8 or site-specific data; prioritize tree planting based on current canopy and surface temperatures; coordinate with capital improvement plan.

Primary Goals:

- Promote Equitable and Resilient Communities
- Promote Nature-Based Solutions

Priority Rating:

Medium.

Hazards Addressed:

Extreme Heat & Flooding

Estimated Cost:

Project: Medium ($750k to $1.5M)

Type of Action:

- Data, Tools, and Decision Support
- Nature-Based Solutions

Timeline:



Short-term for heat equity analysis and prioritization; medium to long term for implementation of tree canopy.

Responsible Entity:

City of Emporia Department of Public Works and/or Parks and Recreation.

Potential Partners:

Crater PDC; local health department; Virginia Department of Forestry (VDOF); Virginia Cooperative Extension; community organizations and neighborhood associations; local schools.

Partner Action:

Share regional heat vulnerability and canopy data; provide urban forestry guidance, including species selection and best practices; and assist with funding identification and coordination with state forestry programs.

Source:

Vulnerability Assessment; Committee Engagement Results; Action Development Workshop

Potential Funding Source:

Virginia CFPF – Project, Department of Forestry (DOF) Urban and Community Forestry Program.

Emporia Action 5 (EP-5): Integrate Emergency Planning with Resilience Planning Priorities

Strengthen the connection between the City's emergency management functions and its resilience planning efforts by ensuring that critical facility service areas, user sheds, and emergency response coverage are explicitly incorporated into resilience analyses and capital investment decisions. Conduct a service area analysis to understand which populations rely on critical facilities (such as emergency services, medical facilities, community centers, and utilities) and how facility access, road network vulnerability, and service coverage intersect with hazard risk and vulnerable populations.

Action Components:

Assess service areas for critical facilities, identify coverage gaps and vulnerabilities, integrate findings into emergency operations and resilience planning, and establish ongoing coordination between emergency management and planning departments.

Primary Goals:

- Improve Hazard Preparedness, Response, and Recovery
- Strengthen Infrastructure and Built Environment Resilience

Priority Rating:

High.

Hazards Addressed:

All Hazards.

Estimated Cost:

Study / Capacity Building: Low (less than $100k)

Type of Action:

- Data, Tools, and Decision Support
- Nature-Based Solutions

Timeline:



Short-term for service area mapping; medium-term for plan integration and recommendations.

Responsible Entity:

City of Emporia Emergency Management and Planning Departments.

Potential Partners:

Crater PDC; Virginia Department of Emergency Management (VDEM); local public works and utilities; health and social services departments.

Partner Action:

Provide regional GIS and vulnerability data to support service area analysis; assist with methodology and technical guidance; help align City findings with regional emergency management coordination and planning frameworks.

Source:

Action Development Workshop

Potential Funding Source:

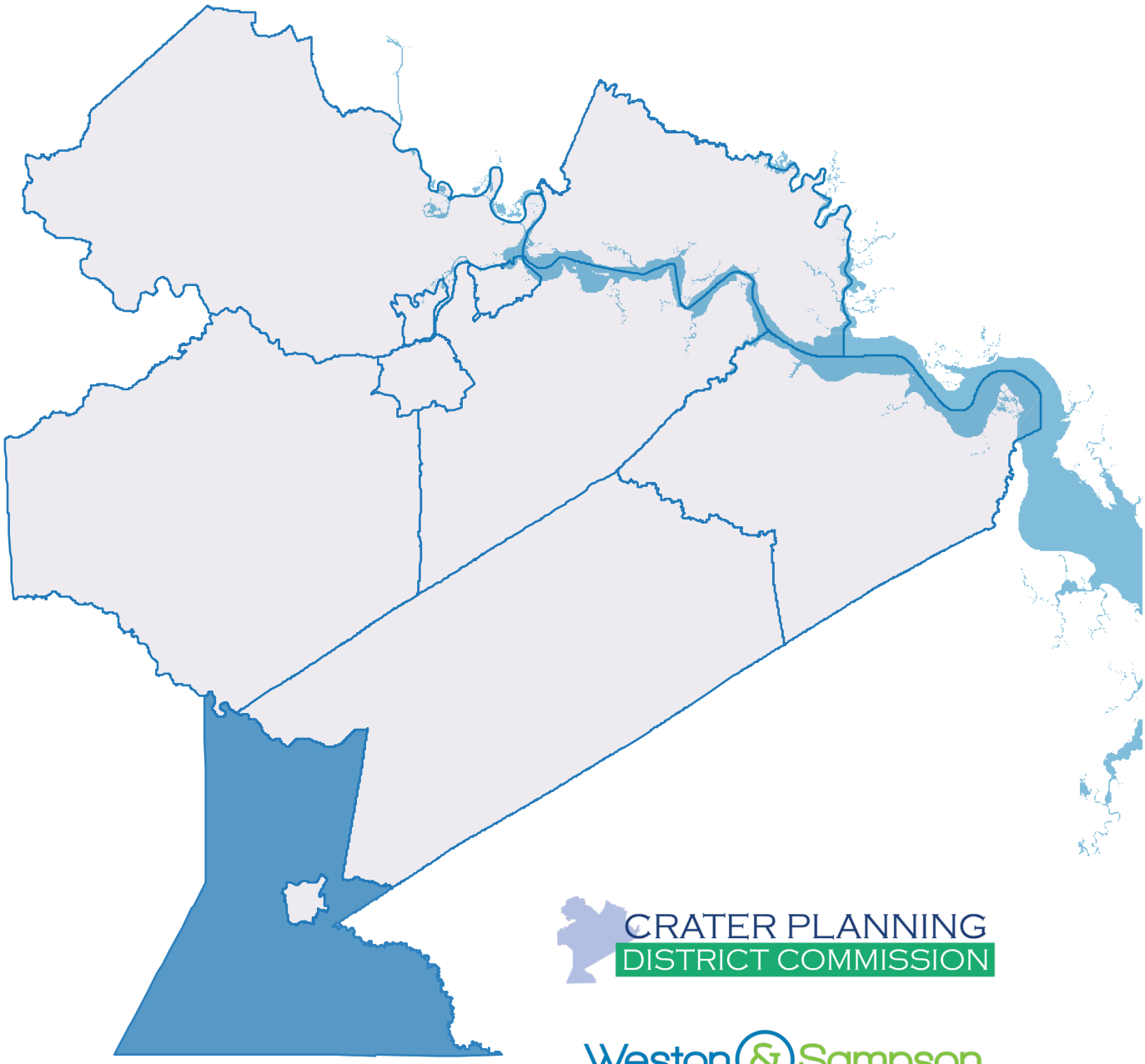
Virginia Community Flood Preparedness Fund (CFPF); FEMA Emergency Management Performance Grant (EMPG) Program; FEMA Building Resilient Infrastructure and Communities (BRIC).

Greensville County

Resilience Plan

Version 1.0 | September 2026

Locality Chapter of the Crater PDC Regional Resilience Plan



CRATER PLANNING DISTRICT COMMISSION

Weston & Sampson

TABLE OF CONTENTS

This chapter presents the locality-specific resilience objectives for Greensville County as part of Chapter 8: Locality Resilience Plans of the Crater PDC Regional Resilience Plan. It provides a structured overview of local conditions, risks, and actions to support resilience planning and implementation.

8.6 GREENSVILLE COUNTY RESILIENCE PLAN

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GV.3. Challenges and Strengths ..... GV - 5

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For additional context on regional priorities, cross-jurisdictional strategies, and Crater PDC–wide resilience objectives, users should refer to the comprehensive Crater PDC Regional Resilience Plan, of which this chapter is one locally focused component. Other components of the plan include:

- Regional vision, goals, and a planning framework for resilience across the Crater Planning District.
- A regional profile describing environmental, economic, infrastructure, and community characteristics.
- An assessment of existing local and regional resilience plans and initiatives.
- A capacity-building roadmap identifying institutional, technical, and organizational needs.
- Results from regional steering committee engagement and workshops.
- A regional vulnerability assessment, including an asset inventory, methodology, and findings.
- Regional actions for implementation by Crater PDC and cross-jurisdictional actions applicable to all localities.
- A regional debris management strategy to support post-disaster response and recovery.
- A plan maintenance framework and supporting appendices.

GV.1. Introduction and Vision

Greensville County developed as an agricultural and transportation-oriented county serving Southside Virginia, with settlement patterns historically shaped by farming, forestry, and rail and roadway connections rather than concentrated urban growth (Greensville County Comprehensive Plan, 2023). The county's landscape remains dominated by working lands, forested areas, and small rural communities, reflecting a long-standing reliance on land-based industries and dispersed development. Emporia functions as the county seat and primary service center, while much of the surrounding county retains a rural character defined by agricultural use and low-density residential development (Greensville County Comprehensive Plan, 2023).

This historical development pattern continues to influence modern planning priorities. The comprehensive plan emphasizes preservation of agricultural lands, protection of natural resources, and coordination of growth with available infrastructure and services to support long-term sustainability (Greensville County Comprehensive Plan, 2023). Regional planning documents also note the importance of balancing emerging land uses, including energy development and industrial activity, with protection of community character and environmental systems in a county with limited staffing and infrastructure capacity.

As a part of the visioning process for the Crater PDC Regional Resilience Plan, steering committee members from Greensville County developed the following vision statement:

> ***Greensville County will strengthen its ability to withstand and adapt to environmental, economic, and social challenges by protecting natural resources, investing in reliable infrastructure, and supporting safe, healthy, and connected communities while preserving its rural character and promoting long-term prosperity.***

GV.2. Demographics

Greensville County has a population of approximately 11,391 residents, with a median age of 39.9, closely aligning with the statewide average. About 16.2 percent of the population is age 65 or older. Median household income is $56,759, and approximately 13.5 percent of residents live below the poverty line, exceeding the Virginia average. Educational attainment is lower than statewide levels, with 13.8 percent of residents holding a bachelor's degree or higher. Housing is largely owner-occupied, with a homeownership rate of 69.0 percent and relatively low median gross rent compared to the state (U.S. Census Bureau, Decennial Census, 2020).

Approximately 13.5% of residents live below the poverty line, indicating ongoing economic challenges for some households within the county.

Table GV.1 U.S. Census Bureau Statistics Comparison.

U.S. Census Bureau Statistic	Greensville County	Crater PDC	Virginia
Land area	295.4 square miles	2,487.5 square miles	39,481.4 square miles
Population and people			
Total Population	11,391	556,840	8,631,393
Median Age	39.9	40.9	39.4
Population that is 65 years and older	16.2%	18.6%	17.6%
Without Health Care Coverage	6.2%	6.4%	6.9%
Income and Poverty			
Median Household Income	$56,759	$69,698	$92,090
Poverty	13.5%	12.9%	9.7%
Education			
Bachelor's Degree or Higher	13.8%	22.3%	43.3%
School Enrolled Population in Kindergarten to 12th Grade	70.0%	70.7%	65.6%
Employment			
Local, State, and Federal Gov. Workers	22.9%	20.7%	20.6%
Avg. Travel Time to Work	24.2 min	29.3 min	28.3 min
Employment Rate	40.5%	53.6%	61.1%
Housing			
Median Gross Rent	$960	$1,177	$1,646
Homeownership Rate	69.0%	66.5%	67.1%
Total Housing Units	4,012	232,007	3,746,211
Total Households	3,092	217,220	3,449,307
Families and Living Arrangements			
Children under 18 years old	16.3%	20.6%	21.3%

U.S. Census Bureau Statistic	Greensville County	Crater PDC	Virginia
Race and Ethnicity			
American Indian and Alaska Native alone	30	2,822	40,007
Asian alone	333	15,795	615,436
African American	6,657	163,453	1,607,581
Hispanic or Latino (of any race)	276	52,020	908,749
Native Hawaiian and Other Pacific Islander alone	0	491	7,156
Not Hispanic or Latino	4,217	294,878	5,058,363
Some Other Race	49	28,897	446,650
Two or More Races	258	37,564	705,707
White	4,364	302,764	5,208,856

Source: U.S. Census Bureau 2020 Decennial Census.

GV.3. Challenges and Strengths

Greensville County faces several challenges relevant to resilience planning. A dispersed population and limited infrastructure increase the cost of maintaining roads, utilities, and emergency services across a large geographic area. Higher poverty rates and lower employment levels compared to statewide averages may limit household capacity to prepare for and recover from extreme weather. Planning documents also note the need to balance emerging land uses, such as solar energy development, with preservation of agricultural lands and open space (Greensville County Comprehensive Plan, 2023).

At the same time, Greensville County possesses notable strengths that support long-term resilience. Extensive agricultural and forested lands provide natural flood storage, stormwater absorption, and ecosystem services that reduce exposure to environmental hazards. The county has identified protection of ecologically sensitive areas and coordination with regional partners, including the Crater PDC, as key strategies for strengthening capacity and advancing shared resilience goals. Strong ties between local government, community groups, and regional organizations create a foundation for collaborative planning and implementation of future resilience actions (Greensville County Comprehensive Plan, 2023).

GV.4. Capacity and Needs

One of the first steps within the planning process for the Crater PDC Regional Resilience Plan was performing a capacity and needs assessment for resilience planning. The capacity strengths and challenges revealed within the capacity and needs assessment were integrated into actions for Crater PDC to initiate and next steps for localities. These actions can be found in Chapter 4. Capacity & Needs Assessment and serve as foundational actions Crater PDC and localities should pursue in tandem with the other actions within this plan. This survey was directly informed by the capacity and needs assessment questionnaire provided during the beginning of the planning process, which gathered detailed input from local staff on existing roles, resource gaps, technical needs, and challenges related to climate resilience, funding, infrastructure, and intergovernmental coordination. For Greensville, this survey was completed through an hour-long interview in spring 2026. This section provides a snapshot summary of Greensville County identified challenges as they relate to resilience planning.

HUMAN & INSTITUTIONAL CAPACITY



Relevant Staff Positions

- County Administrator
- Emergency Services Coordinator
- Planning and Zoning Staff

DISASTER RESPONSE CAPACITY



The County maintains a local Emergency Operations Plan (EOP).

Emergency Services coordinates planning, preparedness, response, and recovery activities for natural and human-caused disasters

REGIONAL COORDINATION & SUPPORT



No information provided as a part of this planning process.

TECHNICAL ASSISTANCE & TRAINING NEEDS



No information provided as a part of this planning process.

POLICY & PLANNING



No information provided as a part of this planning process.

INFRASTRUCTURE & OPERATIONS



No information provided as a part of this planning process.

FINANCIAL RESOURCES

No information provided as a part of this planning process.

GV.5. Overview of Environmental Conditions

Greensville County experiences a range of environmental conditions shaped by its rural character, extensive forest and wetland coverage, and its location within the Meherrin and Nottoway River basins. Flooding is a recurring hazard, particularly in low lying areas, along river corridors, and in locations with poor drainage. The County's topography, which transitions from rolling hills to flatter coastal plain conditions, contributes to localized flooding and stormwater challenges, especially during heavy rainfall events and slow moving storms. While development is relatively limited compared to more urban jurisdictions, scattered residential patterns and reliance on roadway networks make transportation infrastructure vulnerable to periodic flooding and washouts (Plan RVA; Crater PDC, 2022).

Compared to more urbanized areas in the region, Greensville County is less exposed to large scale structural losses from severe wind events due to lower development density. However, the County remains susceptible to hazards such as severe thunderstorms, tornadoes, and winter weather, which can result in power outages, road closures, and localized damage. Drought conditions and extreme heat also occur periodically, with primary impacts on agriculture, forestry, and water resources rather than densely built infrastructure (Plan RVA; Crater PDC, 2022).

Wildfire risk is an ongoing concern in Greensville County due to its substantial forest cover and rural development pattern, particularly in areas where residential properties interface with woodland.



Extensive forest cover and rural development patterns contribute to ongoing wildfire risk in Greensville County.

In addition, the County's extensive wetlands, floodplains, and natural systems present both risks and opportunities. Although they may contribute to flooding constraints, they also provide natural flood storage, water quality benefits, and resilience functions (Plan RVA; Crater PDC, 2022).

GV.6. Floodplain Management and Flood Risk Identification

As part of the Virginia Department of Conservation and Recreation (DCR) Resilience Plan requirements, localities must document administrative procedures for tracking and managing Substantial Improvement (SI) and Substantial Damage (SD) determinations for structures located within Special Flood Hazard Areas (SFHAs), as well as identify Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties. This section summarizes these requirements as they relate to Greensville County and highlights the relevant provisions contained within the County's floodplain ordinance, associated regulatory documents, and information documented in the PlanRVA–Crater PDC Multi-Regional Hazard Mitigation Plan (2022). The purpose of this review is to verify

the County's existing administrative framework and identify opportunities to strengthen floodplain management and support long-term resilience planning efforts.

Why it matters: Identifying and tracking flood-prone properties helps communities better understand flood risk, prioritize mitigation investments, reduce future damages, strengthen resilience, and guide long-term land use and development decisions.

GV.6.1 Floodplain Ordinance and Regulatory Framework

Greensville County, Virginia has historically regulated floodplain development through Article 10 of its Zoning Ordinance (adopted 1992, as amended in 2025), which established a Floodplain Overlay District governing development within FEMA-mapped Special Flood Hazard Areas (SFHAs). The ordinance is structured to meet the requirements of the National Flood Insurance Program (NFIP), including regulation of land disturbance and construction in flood-prone areas, the requirement to obtain permits for development activities, and the designation of a Floodplain Administrator responsible for implementation, interpretation of floodplain boundaries, and maintenance of records. The ordinance incorporates FEMA Flood Insurance Rate Maps (FIRMs) as the regulatory basis for identifying flood hazard areas and guiding development standards, consistent with NFIP participation requirements.

In 2025, Greensville County adopted Resolution 26-15 to replace its existing floodplain ordinance and incorporate updated FEMA flood hazard mapping. Approved on September 2, 2025, the ordinance aligns local regulations with current FEMA studies and flood risk conditions and was submitted to Virginia Department of Conservation and Recreation (DCR) and FEMA for review. The updated ordinance includes elevation and floodproofing standards, floodway development restrictions, and procedures for substantial improvement and substantial damage determinations.

The Floodplain Administrator is responsible for administering and enforcing NFIP requirements, including determining substantial improvement and substantial damage compliance. For existing structures located within the Special Flood Hazard Area, repairs, alterations, additions, and other improvements must be evaluated to determine whether they constitute a substantial improvement. If the cumulative cost of improvements over a five-year period equals or exceeds 50 percent of the structure's market value, the structure must be brought into compliance with current floodplain management requirements. This may include elevating, floodproofing, or otherwise modifying the structure to meet applicable standards.

Strengths of Greensville County's regulatory framework include its participation in the NFIP through Article 10, its integration of floodplain management into the zoning ordinance, and its proactive update in 2025 to incorporate revised FEMA data. Within the floodplain ordinance is the ability for the County to identify and regulate local flood hazard or ponding areas that are not delineated on the FIRM as a "Local Flood Hazard Map". Additionally, there is the distinction of the "Floodway District", where an AE Zone is delineated and the "Approximated Floodplain District" where the one percent annual chance flood elevation is approximated. Floodplain Districts are overlays to existing underlying districts as a part of the zoning ordinance map.

GV.6.2 Flood Risk Identification SFHAs

Repetitive loss (RL) properties are structures that have experienced multiple instances of flood-related damage over time. Under the National Flood Insurance Program (NFIP), a repetitive loss property is defined as a property for which two or more flood insurance claims of at least $1,000 have been paid within any 10-year period.

Severe repetitive loss (SRL) properties represent a subset of these structures and indicate a higher level of risk and recurring damage. These properties are defined as those that have either:

- At least four NFIP claims exceeding $5,000 each, or
- At least two claims where the total payouts exceed the building's value.

i

Repetitive loss (RL) properties are structures that have experienced multiple instances of flood-related damage over time.

While NFIP data tracks many RL and SRL properties, these designations may not capture all instances of recurring flood impacts. Repetitive flooding can and often does occur outside of mapped Special Flood Hazard Areas (SFHAs), particularly due to stormwater, drainage issues, or localized flooding. As a result, communities are encouraged to identify, track, and address all repetitive flood impacts, regardless of NFIP designation, to better understand risk patterns and inform mitigation strategies. According to the Richmond-Crater Hazard Mitigation Plan (2022), Greensville County has no RL and SRL as defined by the NFIP. There are no known RL and SRL properties outside of the Special Flood Hazard Areas (SFHA) as well.

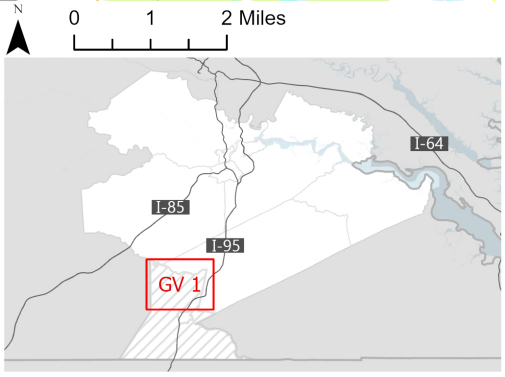
GV.7. Vulnerability Assessment Results

Another foundational element of the Crater PDC Regional Resilience Plan was a region-wide vulnerability assessment performed across the Crater region. The vulnerability assessment results in this section have been parsed out to only include findings relevant to Greensville County. The vulnerability assessment conducted for the Crater PDC Regional Resilience Plan evaluated how each locality is exposed to multiple hazards, including rainfall (pluvial) flooding, riverine (fluvial) flooding, storm surge, extreme heat, and wildfire risk. The vulnerability assessment also evaluated sensitivity through the social vulnerability index. The vulnerability assessment for Greensville identified flooding, particularly from rainfall (pluvial), wildfire, and heat as the primary risks to critical assets. Assets were also exposed to riverine flooding. There was no exposure to coastal flooding in Greensville.

For the methodology of this vulnerability assessment, including data sources, indicator selection, and scoring, please refer to Appendix B. Vulnerability Assessment Methodology and Scoring Framework. For the region-wide assessment and hazard information, please refer to Chapter 6. Vulnerability Assessment.

Vulnerability in Greensville County is not evenly distributed across the county. The asset vulnerability maps (Figures GV.1-3) show higher concentrations of High and Very High vulnerability assets surrounding the Emporia urban area, along the Interstate 95 corridor, and along Cattail Creek.





Crater PDC Regional Resilience Plan

Greensville County Asset Vulnerability Scores

Legend

Scored Assets Vulnerability	Roadways Vulnerability	
Very Low	Very Low	Greensville Boundary
Low	Low	Rivers
Moderate	Moderate	Conservation Land
High	High	Easement
Very High	Very High	Wetlands
		Natural Land Network

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Vulnerability scores were developed as part of the vulnerability assessment for the Crater PDC Regional Resilience Plan. Only assets identified as having high or very high vulnerability are labeled on the map. Due to the sensitivity and quantity of these assets, septic systems, transmission towers, culverts, bridges, and roads were excluded from labeling.

Figure GV.1 Greensville County Asset Vulnerability Map

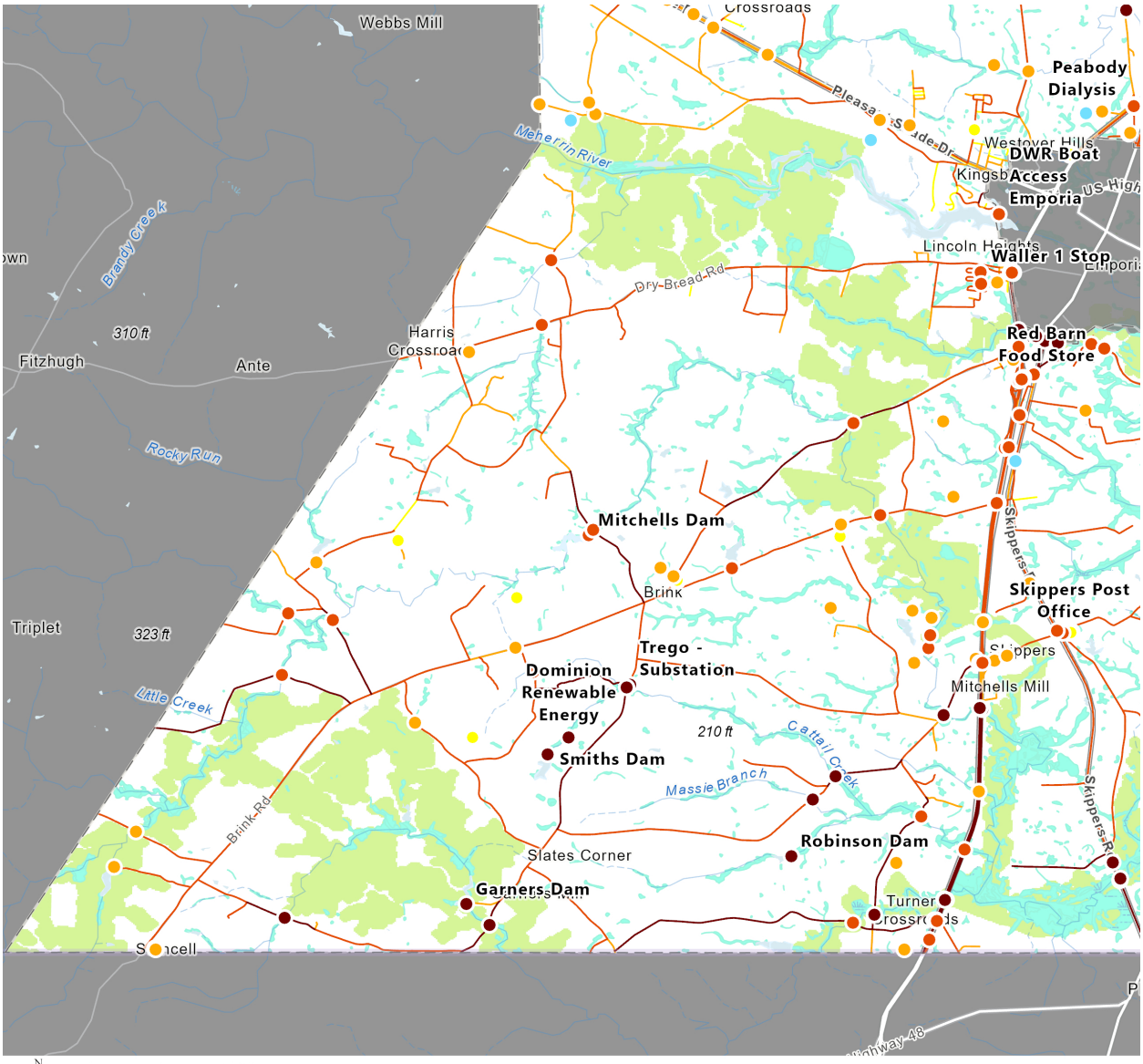


Figure GV.2 Greensville County Asset Vulnerability Map

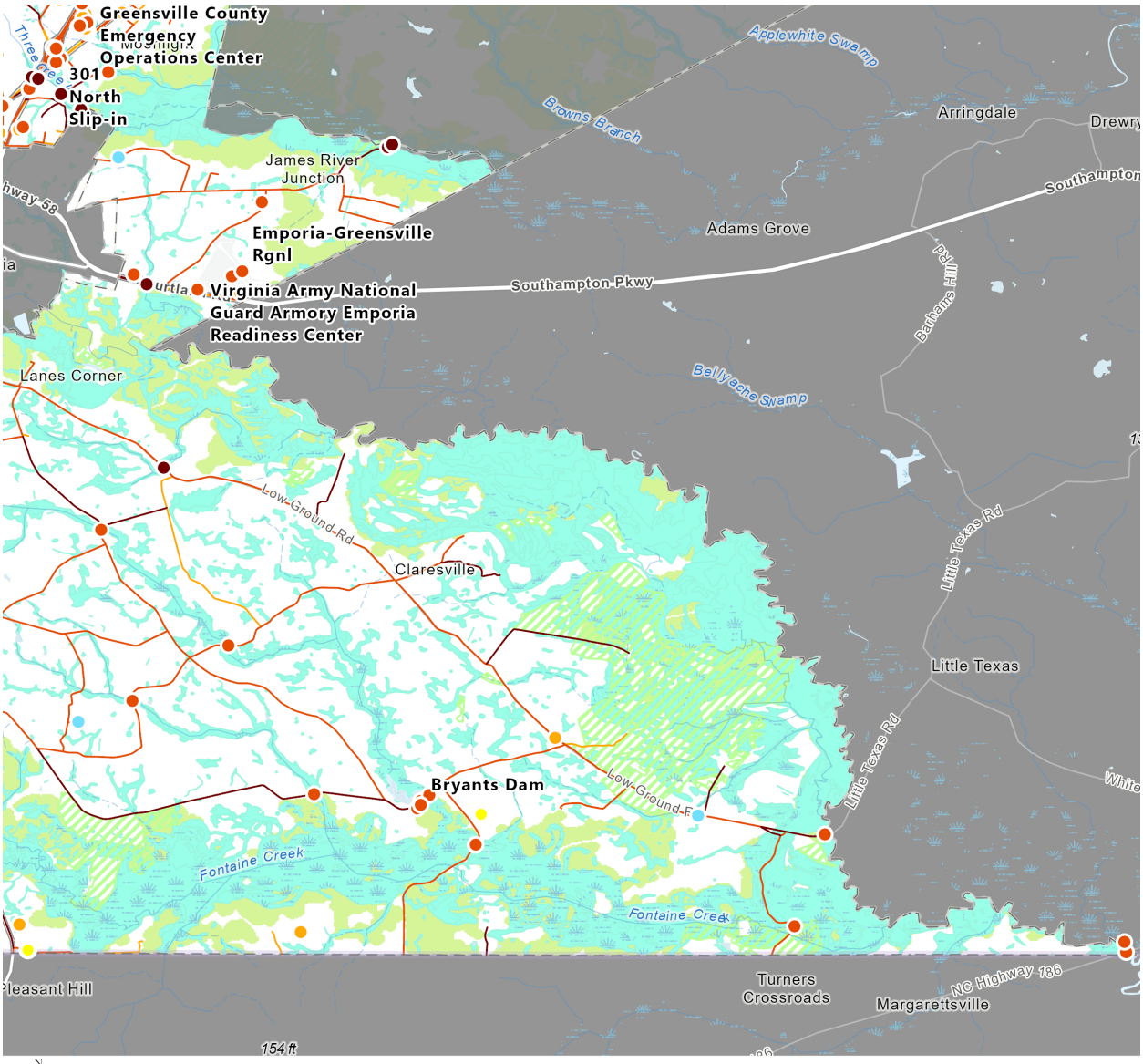


Figure GV.3 Greensville County Asset Vulnerability Map

These areas contain concentrations of transportation assets, public facilities, utilities, and community-serving infrastructure exposed to one or more climate hazards. Additional vulnerable assets are located along stream corridors and rural transportation networks throughout the county.

A total of 400 built infrastructure assets (excluding roadways) and 749 roadway segments were evaluated. Non-roadway built assets in Greensville County are primarily concentrated in Transportation category (48.8%), followed by Communications (26.0%), Government Facilities (9.5%), Emergency Services / Community Assets (4.8%), Water and Wastewater (4.0%), Energy (3.8%), Food and Agriculture (2.0%), Financial Services (0.8%), and Healthcare and Public Health (0.5% Because asset counts vary significantly by category, the analysis emphasizes the percentage of assets within each category that are ranked as having High or Very High vulnerability. Categories with the greatest proportions of highly vulnerable assets are discussed below. Figure GV.4 illustrates the distribution of vulnerability scores across all asset categories, including roadways.

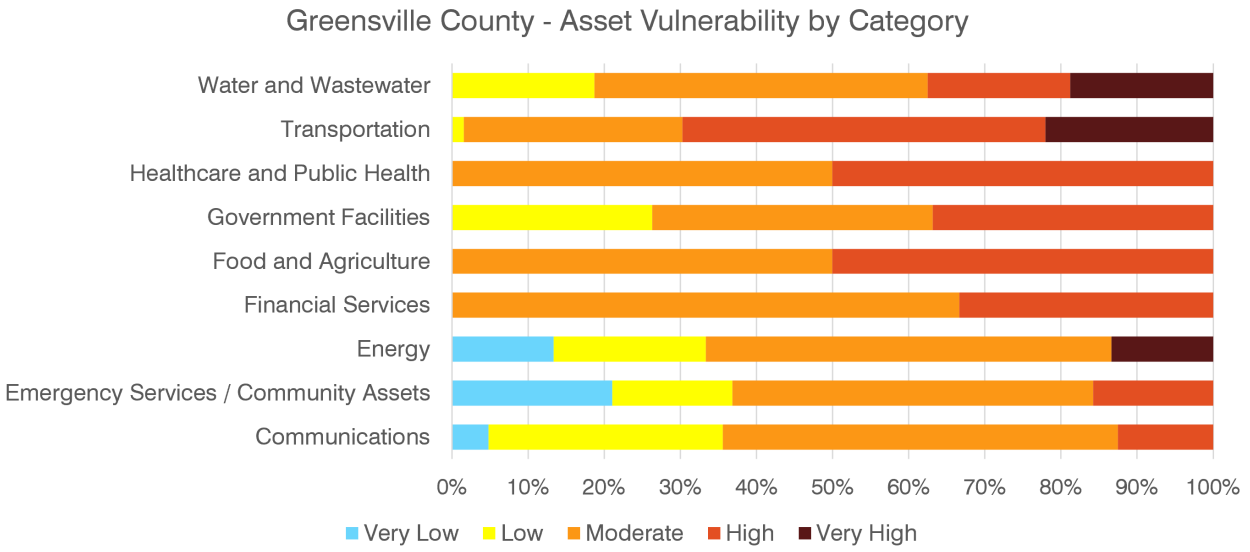


Figure GV.4 Vulnerability Score by Asset Category

GV.7.1 Transportation

Transportation infrastructure emerged as one of Transportation infrastructure emerged as Greensville County's most significant vulnerability concern. Highly vulnerable assets included bridges, culverts, railroad bridges, and roadway segments throughout the County. Segments of Brink Road, Skippers Road, and Cattail Creek Road received some of the highest vulnerability scores due to their exposure to pluvial flooding, riverine flooding, wildfire, and extreme heat. Because these corridors provide access to homes, businesses, public facilities, and emergency services, disruptions can affect both mobility and public safety. These findings support actions focused on improving flood awareness at vulnerable road crossings, restoring natural floodplain functions, and enhancing flood resilience along recreational and transportation corridors.

GV.7.2 Healthcare and Public Health

Healthcare and Public Health assets also demonstrated elevated vulnerability within Greensville County. Although the category contains only two assets, Peabody Dialysis emerged as one of the highest scoring facilities due to its exposure to pluvial flooding, wildfire risk, and its location within an area of elevated social vulnerability. Because healthcare facilities provide essential services to residents during emergencies and day-to-day operations, disruptions can disproportionately affect vulnerable populations and complicate emergency response efforts. These findings reinforce the importance of reducing flood risks and maintaining reliable access to critical community services..

GV.7.3 Food and Agriculture

Food and Agriculture assets emerged as another key vulnerability concern. The highest scoring assets in this category were SNAP retailers, including Waller 1 Stop, which was identified as the most vulnerable asset. These facilities were primarily exposed to pluvial flooding and wildfire and were also located in areas with elevated social vulnerability. Because many residents rely on these businesses for access to food and essential goods, disruptions during hazard events could affect community recovery and daily needs. These findings support actions that strengthen agricultural resilience, protect working lands, and improve the County's ability to withstand and recover from hazard events.

The vulnerability assessment findings directly informed Greensville County's resilience actions. Flood risks affecting transportation infrastructure and developed areas support actions to improve drainage and post-flood recovery efforts (GV-6), install high-water mark signage at vulnerable crossings (GV-4), and increase recreational access through more resilient trail and water access improvements (GV-2). Vulnerabilities associated with flooding and water quality informed actions to elevate septic systems in flood-prone areas (GV-1) and restore riparian buffers and floodplain wetlands along the Meherrin River (GV-3). The County's vulnerability to flooding, wildfire, and impacts to food systems also supports actions to develop Agricultural and Forestal Districts (GV-5) and improve landscaping standards through the use of native vegetation and nature-based solutions (GV-7). Together, these actions address the key vulnerabilities identified through the assessment while improving flood resilience, protecting critical services, and strengthening Greensville County's long-term resilience.

GV.8. Actions

The Crater PDC Regional Resilience Plan contains tailored resilience actions for each of the 11 localities within the Crater PDC, actions for Crater PDC to strengthen local and regional capacity, and consistent region-wide actions each of the 11 localities. The following section only contains tailored actions for Greensville County. Actions that Crater PDC is tasked with pursuing, that may be useful for locality-level support and next steps, as well as, region-wide actions GreensvilleCounty could pursue are found in Chapter 7. Regional Actions within the Crater PDC Regional Resilience Plan.

Table GV.2 below summarizes the resilience actions developed for Greensville County through the regional resilience planning process. These actions were primarily identified during an Action Development Workshop held in spring 2026 and informed by stakeholder engagement, best practices, the Regional Hazard Mitigation Plan, and relevant comprehensive plans.

Table GV.2 Action Item Key for Greensville County

ID	Action Title	Responsible Entity	Estimated Cost	Priority
GV-1	Elevate Septic Systems in Flood-Prone Areas	Public Works	Medium (Project)	Medium
GV-2	Increase Recreational Opportunities and Access	Parks and Recreation	Medium (Project)	Medium
GV-3	Restore Riparian Buffers and Floodplain Wetlands along the Meherrin River	Planning Department with Chowan Basin Soil & Water Conservation District	Low (Project)	High
GV-4	Install High Water Mark Signage in Flood-Prone Areas	Planning Department in coordination with Public Works	Low (Project)	High
GV-5	Develop Agricultural and Forestal Districts	Planning Department	Low (Project)	Medium
GV-6	Improve Drainage in Flood-prone Areas	Planning Department in coordination with Public Works	Medium (Project)	Medium
GV-7	Improve and Develop Landscaping Requirements and Standards	Parks and Recreation in coordination with Planning Department	Medium (Capacity Building)	Low

Action Key

Below is the action key used to develop each of the tailored action descriptions presented in this section of the plan.

Action Components: Key considerations for action development and implementation.

Primary Goals: The broader resilience goal(s) or objective(s) that the action supports. These actions include the following:

- Strengthen Natural Systems and Land Use Resilience
- Improve Hazard Preparedness, Response, and Recovery
- Enhance Data, Tools, and Decision-Making Capacity
- Build Local and Regional Capacity
- Advance Regional Collaboration and Coordination
- Increase Public Awareness and Community Engagement
- Promote Equitable and Resilient Communities
- Strengthen Infrastructure and Built Environment Resilience
- Support Economic Resilience and Workforce Development

Priority Rating: An assessment of the relative importance or urgency of the action in relationship to the other actions in the plan. For these ratings, steering committee feedback throughout the planning process was prioritized. Actions were prioritized based off the capacity and needs assessment, ability to be funded through Virginia CFPF, and best practices. These ratings have not been through a scoring or ranking exercise by the Steering Committee. Localities are encouraged to confirm, adjust, or reprioritize ratings to reflect local conditions, capacity, and funding timelines before using them to sequence implementation or grant applications.

Hazards Addressed: The climate or hazard risks the action is intended to help mitigate or manage. These include the following:

- Flooding (pluvial/rainfall, fluvial/riverine, and/or storm surge)
- Extreme Heat
- Wildfires
- Extreme Storms and/or Winter Weather
- All hazards – *addresses each hazard group*

Estimated Timeline: A general timeframe for implementation (short, medium, or long term) from the action kickoff to end.

- Short-term: 1-2 years
- Medium-term: 2-4 years
- Long-term: 5 or more years

Source: The origin of the action, such as stakeholder input, workshop activities, existing plans, or best practices.

Type of Action: The general action type, or means of implementation that fall under the following:

- Policy and Planning
- Programs and Implementation
- Capital Projects and Infrastructure
- Data, Tools, and Decision Support
- Technical Assistance and Capacity Building
- Regional Coordination and Partnerships
- Public Education and Engagement
- Emergency Preparedness and Response
- Nature-Based Solutions
- Expand Recreational Access to Foster Stewardship
- Residential Adaptation Tool

Responsible Entity: The primary organization or jurisdiction responsible for leading the action.

Potential Partners: Additional agencies, organizations, or stakeholders that could support or collaborate on implementation.

Partner Action: Actions either the PDC, localities, or other listed stakeholders should engage in during or after the action is completed to further maintain or manage desired outcomes.

Potential Funding Sources: Possible state, federal, regional, or local funding mechanisms that could support action implementation, management, or maintenance. Common funding sources for these actions are Virginia Community Flood Preparedness Fund (CFPF) and FEMA Hazard Mitigation Grant (HMG). Identification of a funding source does not guarantee project eligibility, funding availability, award selection, or future program continuity. Funding requirements, priorities, and availability may change over time and should be verified during project development and grant application.

Estimated Cost: A high level cost range (low, medium, high). For capacity building / studies versus project actions, there are two different ranges used depending on the project type.

Cost	Studies / Capacity Building	Projects
Low	Less than $100 k	Less than $750 k
Medium	$100 k to $250 k	$750 k to $1.5 M
High	Greater than $250 k	Greater than $1.5 M

Greensville Action 1 (GV-1): Elevate Septic Systems in Flood-Prone Areas

Require elevation or other climate resilient siting measures for onsite septic systems in coastal and flood prone areas, prioritizing high exposure locations such as areas near the John Tyler Memorial Highway. Appropriate siting measures may include elevating system components, increasing separation distances from seasonal high groundwater tables, avoiding placement within high-risk flood hazard areas where feasible, and incorporating system designs that maintain functionality during and after flood events. This action aligns with recent Virginia legislation directing the Department of Health to incorporate climate change considerations into onsite septic regulations, including flooding and groundwater conditions, as part of a comprehensive regulatory update.

Action Components:

Identify flood-prone and high-exposure areas with existing or planned onsite septic systems; update local requirements to require septic elevation; coordinate with the Virginia Department of Health (VDH) guidance.

Responsible Entity:

Greensville County Department of Public Works.

Primary Goals:

- Protect Public Health and Water Quality
- Improve Hazard Preparedness, Response, and Recovery.

Potential Partners:

Crater PDC; Virginia Department of Health (VDH); housing departments; onsite system installers; environmental health professionals.

Priority Rating:

Medium.

Hazards Addressed:

Flooding.

Partner Action:

Support regional coordination between coastal communities with flood-prone septic systems, provide technical guidance and best practices, and share vulnerability assessment results on flood-prone septic systems.

Estimated Cost:

Project: Medium ($750k - $1.5M).

Type of Action:

- Programs and Implementation
- Residential Adaptation

Source:

Vulnerability Assessment; Committee Engagement Results; Action Development Workshop

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for identification of systems; long-term for system replacement or upgrades.

Potential Funding Source:

Virginia Department of Health's Septic and Well Assistance Program (SWAP), EPA Clean Water State Revolving Fund (CWSRF), EPA Nonpoint Source Section 319 Grant.

Greensville Action 2 (GV-2): Increase Recreational Opportunities and Access.

Work with partner agencies, such as the Central Virginia Health Planning Agency and the Virginia Department of Conservation and Recreation, to pursue grants, donations, and conservation easements that support expanded recreation opportunities, trail development, and river access in Greensville County. Increase public access to the County's water bodies where environmental conditions, safety, and roadway access allow, while balancing resource protection and long term stewardship. These efforts will enhance outdoor recreation, promote public health, and strengthen connections to local waterways.

Action Components:

Identify existing and planned recreational trails; monitor flood prone areas and identify opportunities to strengthen; incorporate educational and interpretive signage opportunities.

Primary Goals:

- Expand Recreational Access to Foster Stewardship
- Protect Public Health and Water Quality

Priority Rating:

Medium.

Hazards Addressed:

Flooding.

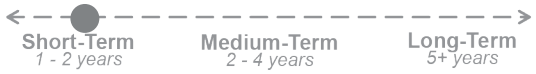
Estimated Cost:

Project: Medium ($750k - $1.5M).

Type of Action:

- Programs and Implementation
- Expand Recreational Access to Foster Stewardship

Timeline:



Short-term for planning and site evaluation; medium to long term for design, construction, and retrofits.

Responsible Entity:

Greensville County Department of Public Works.

Potential Partners:

Crater PDC; Public Works Department, Economic Development and Tourism Department, Virginia Department of Conservation and Recreation (DCR)

Partner Action:

Support regional coordination, share best practices for flood resilient recreational design, assist with site prioritization using vulnerability data, help develop educational signage content, and support alignment with funding and grant opportunities.

Source:

Comprehensive Plan; Action Development Workshop

Potential Funding Source:

Virginia CFPF – Project Grant, Land and Water Conservation Fund (LWCF), Virginia Recreation Trails (RTP).

Greensville Action 3 (GV-3): Restore Riparian Buffers and Floodplain Wetlands along the Meherrin River.

Expand riparian buffers and restore floodplain wetlands along the Meherrin River through targeted reforestation and wetland rehabilitation. These efforts will reduce flood velocities, stabilize streambanks, improve water quality, enhance habitat connectivity, and increase natural floodwater storage capacity during high-flow events. Implementation can be supported through programs such as Virginia's Conservation Reserve Enhancement Program (CREP), a state–federal partnership that provides financial incentives, cost-share, and rental payments to landowners who voluntarily install riparian forest buffers, grass and shrub buffers, and wetlands using approved best management practices.

Action Components:

Identify existing wetlands and delineate where needed; conduct an assessment to determine priority locations for interventions.

Responsible Entity:

Greensville Planning Department with the Chowan Basin Soil & Water Conservation District

Primary Goals:

- Expand Recreational Access to Foster Stewardship
- Protect Public Health and Water Quality

Potential Partners:

Crater PDC; Virginia Department of Conservation and Recreation (DCR) - Conservation Reserve Enhancement Program (CREP)

Priority Rating:

Medium.

Hazards Addressed:

Flooding.

Partner Action:

Support regional coordination, research best practices for riparian buffers and wetland restoration.

Estimated Cost:

Project: Medium ($750k - $1.5M).

Type of Action:

- Programs and Implementation
- Expand Recreational Access to Foster Stewardship

Source:

Comprehensive Plan; Action Development

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for planning and site evaluation; medium to long-term for streambank stabilization and planting efforts.

Potential Funding Source:

Virginia Department of Conservation and Recreation (DCR) - Conservation Reserve Enhancement Program (CREP) or Riparian Buffer Maintenance Grants.

Greensville Action 4 (GV-4): Install High Water Mark Signage in Flood-Prone Areas

Install high water mark signage at bridges and other critical structures along creeks and rivers in flood-prone areas to clearly indicate hazardous water levels. These markers will improve public awareness of flood risks, support safer decision-making during storm events, and help communicate the depth and extent of past flooding to residents and emergency responders. Utilize the High Water Mark Initiative guidance found on https://www.fema.gov/flood-maps/products-tools/high-water-mark-initiative.

Action Components:

Identify flood-prone bridges, road crossings, and stream access points; coordinate with local emergency management and public works to determine priority signage locations; design and install standardized high water mark signage; incorporate historical flood data and depth markers where available; establish maintenance and inspection protocols.

Primary Goals:

- Increase Public Awareness and Community Engagement
- Protect Public Health and Water Quality

Priority Rating:

High.

Hazards Addressed:

Flooding.

Estimated Cost:

Project: Low (Less than $750k).

Type of Action:

- Programs and Implementation
- Public Engagement and Education

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for planning and site evaluation; medium-term for installation and public outreach.

Responsible Entity:

Greensville Planning Department in coordination with Greensville County Public Works.

Potential Partners:

Crater PDC; Virginia Department of Transportation (VDOT); Virginia Department of Emergency Management (VDEM).

Partner Action:

Support installation and public awareness of high water mark signage by providing technical assistance with site selection, FEMA High Water Mark Initiative coordination, public education materials, and integration of signage data into regional resilience and hazard mitigation planning.

Source:

Comprehensive Plan; Action Development

Potential Funding Source: Virginia Department of Emergency Management (VDEM) Hazard Mitigation Grant Program (HMGP); Flood Mitigation Assistance (FMA); local capital improvement funds.

Greensville Action 5 (GV-5): Develop Agricultural and Forestal Districts

Expand collaboration with landowners to establish and strengthen Agricultural and Forestal Districts (AFDs) as a key tool for long-term land conservation and economic vitality. This includes conducting outreach and education to raise awareness of the benefits of AFD participation, such as tax advantages, protection from incompatible development, and preservation of working lands. Provide technical assistance to help landowners navigate the application process, coordinate district formation, and implement best management practices that support sustainable agriculture and forestry. Encourage partnerships with local, regional, and state agencies to align policies, leverage funding opportunities, and ensure consistent support for AFDs.

Action Components:

Conduct outreach to inform landowners about the benefits and requirements of AFD participation; identify and prioritize eligible farmland and forestland areas; provide technical assistance for application and district formation; coordinate with state partners to streamline designation and renewal processes; integrate AFDs into local planning and zoning policies.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Advance Regional Collaboration and Coordination

Priority Rating:

Medium.

Hazards Addressed:

All Hazards.

Type of Action:

- Programs and Implementation
- Public Engagement and Education

Timeline:



Short-term for identification of candidate areas; medium-term for district establishment and policy integration.

Responsible Entity:

Greensville Planning Department.

Potential Partners:

Crater PDC; Virginia Department of Agriculture and Consumer Services (VDACS); Virginia Cooperative Extension; Crater Planning District Commission; local farm bureaus and forestry associations.

Partner Action:

Provide technical guidance, assist with outreach and education, and support coordination with state programs and regional conservation efforts.

Estimated Cost:

Project: Low (Less than $750k).

Source:

Comprehensive Plan

Potential Funding Source:

State agricultural and conservation program funds; USDA conservation programs; local planning and economic development funds.

Greensville Action 6 (GV-6): Improve Drainage in Flood-Prone Areas

Implement land management, drainage, and post-flood recovery measures in flood-prone areas to reduce standing water, improve drainage, and limit mosquito breeding and other vector-related health risks. Expand flood recovery efforts through mold prevention education, debris management, and coordination with public health and emergency management agencies to address contamination, sewage overflows, and other flood-related hazards.

Action Components:

Incorporate post-flood recovery strategies; establish a debris management protocols.

Responsible Entity:

Greensville Planning Department in coordination with Public Works.

Potential Partners:

Crater PDC; Virginia Department of Health (VDH); Virginia Department of Emergency Management (VDEM); Virginia Department of Environmental Quality (DEQ); Virginia Cooperative Extension.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Protect Public Health and Water Quality

Priority Rating:

High.

Hazards Addressed:

Flooding.

Partner Action:

Support technical assessments of drainage and flood-prone areas, assist with public health outreach and education, provide guidance on best practices for mold remediation and debris management, and coordinate funding and implementation of drainage and resilience projects.

Estimated Cost:

Project: Medium ($750k to $1.5M)

Type of Action:

- Programs and Implementation
- Policy and Planning

Source:

Comprehensive Plan

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for assessment; medium-term for implementation of drainage improvements.

Potential Funding Source:	VDEM Hazard Mitigation Grant Program (HMGP); FEMA Flood Mitigation Assistance (FMA); Community Development Block Grant (CDBG) funds; Virginia Stormwater Local Assistance Fund (SLAF); local capital improvement funds.

Greensville Action 7 (GV-7): Improve and Develop Landscaping Requirements and Standards

Improve and expand landscaping requirements and standards to encourage the use of native plants and trees in public and private developments, as well as along major highway corridors. Emphasize low-impact, climate-adapted designs that support stormwater management, reduce runoff, and minimize long-term maintenance costs. Promote practices such as vegetated buffers, rain gardens, and pollinator-friendly plantings to enhance habitat value.

Action Components:

Update landscaping policies and standards to encourage native plantings, green infrastructure, and pollinator-friendly landscapes in public and private development, supported by incentives, agency coordination, and public education.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Promote Nature-Based Solutions

Priority Rating:

High.

Hazards Addressed:

Flooding & Extreme Heat

Estimated Cost:

Project: Low (Less than $750k)

Type of Action:

- Programs and Implementation
- Public Education and Engagement

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for assessment; medium-term for implementation of drainage improvements.

Responsible Entity:

Greensville Planning Department in coordination with Public Works.

Potential Partners:

Crater PDC; Virginia Department of Transportation (VDOT); Virginia Department of Environmental Quality (DEQ); Virginia Cooperative Extension; local environmental and conservation organizations.

Partner Action:

Provide technical guidance on native plant selection and green infrastructure design, assist with ordinance development and implementation, support outreach and demonstration projects, and coordinate integration into transportation and development projects.

Source:

Comprehensive Plan

Potential Funding Source:

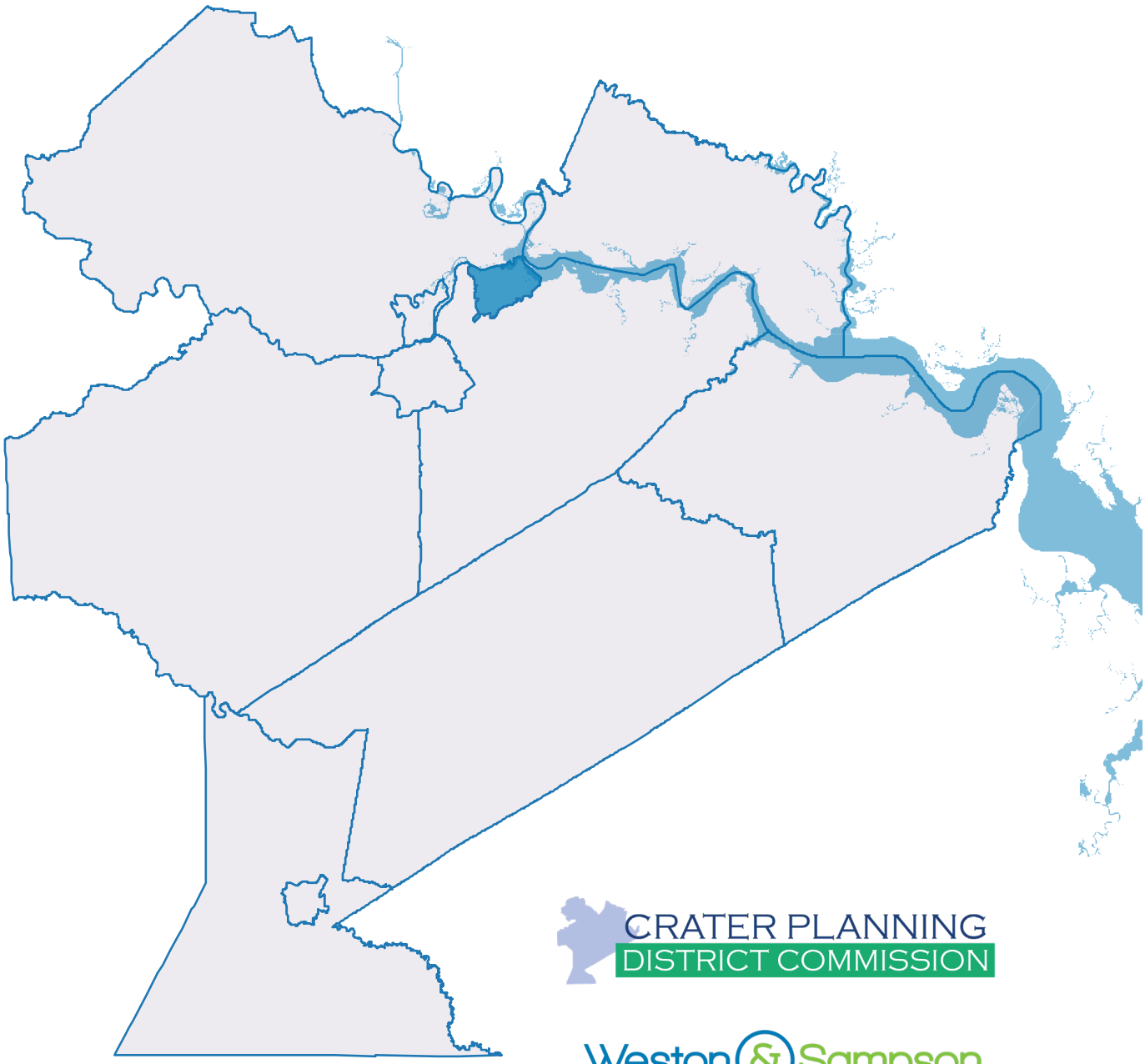
Virginia CFPF – Capacity Building and Planning; Virginia Stormwater Local Assistance Fund (SLAF); USDA conservation and urban forestry programs; state environmental grant programs; local capital improvement and beautification funds.

Hopewell

Resilience Plan

Version 1.0 | September 2026

Locality Chapter of the Crater PDC Regional Resilience Plan



CRATER PLANNING DISTRICT COMMISSION

Weston & Sampson

TABLE OF CONTENTS

This chapter presents the locality-specific resilience objectives for City of Hopewell as part of Chapter 8: Locality Resilience Plans of the Crater PDC Regional Resilience Plan. It provides a structured overview of local conditions, risks, and actions to support resilience planning and implementation.

8.7 HOPEWELL RESILIENCE PLAN

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HW.2. Demographics..... HW - 3

HW.3. Challenges and Strengths ..... HW - 5

HW.4. Capacity and Needs ..... HW - 6

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HW.8. Actions ..... HW - 14

For additional context on regional priorities, cross-jurisdictional strategies, and Crater PDC–wide resilience objectives, users should refer to the comprehensive Crater PDC Regional Resilience Plan, of which this chapter is one locally focused component. Other components of the plan include:

- Regional vision, goals, and a planning framework for resilience across the Crater Planning District.
- A regional profile describing environmental, economic, infrastructure, and community characteristics.
- An assessment of existing local and regional resilience plans and initiatives.
- A capacity-building roadmap identifying institutional, technical, and organizational needs.
- Results from regional steering committee engagement and workshops.
- A regional vulnerability assessment, including an asset inventory, methodology, and findings.
- Regional actions for implementation by Crater PDC and cross-jurisdictional actions applicable to all localities.
- A regional debris management strategy to support post-disaster response and recovery.
- A plan maintenance framework and supporting appendices.

HW.1. Introduction and Vision

Hopewell is a city in the Tri-Cities region of Virginia, located at the junction of the James River and the Appomattox River. The city covers approximately 10.4 square miles and includes the historic community of City Point, one of the earliest English settlements in the region (Hopewell Comprehensive Plan, 2018). This history, combined with its industrial waterfront and strategic location, has shaped the city's development and its role in regional transportation and economy. The 2018 Comprehensive Plan highlights the community's desire to build on its riverfront assets, strengthen local neighborhoods, and support a connected and vibrant small city environment (Hopewell Comprehensive Plan, 2018).

The local economy is centered on manufacturing, chemical production, advanced materials, warehousing, and distribution businesses that take advantage of river access and major highway connections. The community has a long legacy that dates to its early settlement at City Point in the seventeenth century and this heritage continues to shape its sense of place as reflected in the preservation of historic buildings and reinvestment in long-standing districts. This includes ongoing preservation efforts in the Downtown Hopewell Historic District and the City Point Historic District, where early twentieth century commercial buildings and historic residential structures help maintain the city's architectural character. Hopewell also contains important tourism assets in the downtown and City Point areas, along with riverfront natural features that provide both recreational value and opportunities for environmental restoration. The comprehensive plan identifies several areas, including the Health Care District and the Cavalier Square area, that offer potential for redevelopment, improved services, and stronger connections between residential areas, employment centers, and the waterfront. In addition, the City encourages the adaptive reuse of older commercial and industrial properties and emphasizes the importance of community identity reflected through the preservation of historic buildings and neighborhood character.

As a part of the visioning process for the Crater PDC Regional Resilience Plan, steering committee members from Hopewell developed the following vision statement:

> ***Hopewell is a thriving, healthy, and inclusive community that celebrates its strong neighborhoods, invests in resilient infrastructure, and fosters an outstanding quality of life for all residents.***

HW.2. Demographics

Hopewell has a population of 23,033 residents with a median age of 36.4 years. The community has a diverse population, with significant representation across multiple racial and ethnic groups. Median household income is about $48,681, which is significantly lower than the statewide median, and about 24% of residents live below the federal poverty level. Hopewell has about 10,400 housing units with approximately 9,400 households. The homeownership rate is about 55%, and the median gross rent is approximately $1,085, which indicates affordability challenges for lower income households. ((U.S. Census Bureau, Decennial Census, 2020).

Table HW.1 U.S. Census Bureau Statistics Comparison.

U.S. Census Bureau Statistic	Hopewell	Crater PDC	Virginia
Land area	10.4 square miles	2,487.5 square miles	39,481.4 square miles
Population and people			
Total Population	23,033	556,840	8,631,393
Median Age	36.4	40.9	39.4
Population that is 65 years and older	15.0%	18.6%	17.6%
Without Health Care Coverage	6.6%	6.4%	6.9%
Income and Poverty			
Median Household Income	$48,681	$69,698	$92,090
Poverty	23.8%	12.9%	9.7%
Education			
Bachelor's Degree or Higher	12.5%	22.3%	43.3%
School Enrolled Population in Kindergarten to 12th Grade	78.5%	70.7%	65.6%
Employment			
Local, State, and Federal Gov. Workers	16.7%	20.7%	20.6%
Avg. Travel Time to Work	26.6 min	29.3 min	28.3 min
Employment Rate	54.1%	53.6%	61.1%
Housing			
Median Gross Rent	$1,085	$1,177	$1,646
Homeownership Rate	55.5%	66.5%	67.1%
Total Housing Units	10,434	232,007	3,746,211
Total Households	9,418	217,220	3,449,307
Families and Living Arrangements			
Children under 18 years old	25.5%	20.6%	21.3%

U.S. Census Bureau Statistic	Hopewell	Crater PDC	Virginia
Race and Ethnicity			
American Indian and Alaska Native alone	111	2,822	40,007
Asian alone	254	15,795	615,436
African American	9,852	163,453	1,607,581
Hispanic or Latino (of any race)	1,889	52,020	908,749
Native Hawaiian and Other Pacific Islander alone	20	491	7,156
Not Hispanic or Latino	9,819	294,878	5,058,363
Some Other Race	968	28,897	446,650
Two or More Races	1,687	37,564	705,707
White	10,141	302,764	5,208,856

Source: U.S. Census Bureau 2020 Decennial Census.

HW.3. Challenges and Strengths

Hopewell experiences a range of challenges that influence its resilience needs. Its riverfront location exposes portions of the community to flooding and shoreline, and the comprehensive plan notes the need for improved stormwater management and better alignment between existing land uses and long-term water quality goals (Hopewell Comprehensive Plan, 2018). Further, community input gathered through the regional Resilience Adaptation Feasibility Tool (RAFT) process similarly identified recurring flooding concerns in both Hopewell and Petersburg, reinforcing the need for improved stormwater management and better alignment between existing land uses and long-term water quality goals (University of Virginia Institute for Engagement & Negotiation, 2022). The city also faces limitations in walkability and connectivity, which affect access to schools, jobs, and waterfront amenities. The 2018 Comprehensive Plan describes the community as having an older and mostly built out housing stock that requires ongoing reinvestment and rehabilitation, particularly in older residential neighborhoods and aging multifamily areas. Staffing and funding capacity, as noted in the regional capacity and needs assessment, can also limit the city's ability to advance specialized resilience initiatives.

Hopewell also has significant strengths that support future resilience planning. Its location on two major rivers, proximity to regional highways, and concentration of industrial employers create a strong economic foundation (Hopewell Economic Development). Historic districts, waterfront amenities, and designated redevelopment areas offer opportunities to improve quality of life and support mixed use growth. The city has been working with partners and regional organizations on

environmental stewardship and shoreline management, including coordination with the Virginia Institute of Marine Science for shoreline preservation work. The city has strong community identity, pride in neighborhoods, and a commitment to revitalizing priority districts such as the Health Care District and the Cavalier Square area (Hopewell Comprehensive Plan, 2018). These assets create momentum for developing actions that will support long term resilience and hazard preparedness in the region.

HW.4. Capacity and Needs

One of the first steps within the planning process for the Crater PDC Regional Resilience Plan was performing a capacity and needs assessment for resilience planning. The capacity strengths and challenges revealed within the capacity and needs assessment were integrated into actions for Crater PDC to initiate and next steps for localities. These actions can be found in Chapter 4. Capacity Building Roadmap and serve as foundational actions Crater PDC and localities should pursue in tandem with the other actions within this plan. This survey was directly informed by the capacity and needs assessment questionnaire provided during the beginning of the planning process, which gathered detailed input from local staff on existing roles, resource gaps, technical needs, and challenges related to climate resilience, funding, infrastructure, and intergovernmental coordination. This section provides a snapshot summary of Hopewell's identified challenges as they relate to resilience planning.

POLICY & PLANNING



Land Use, Zoning Ordinances, and Plans

- CBPA and Floodplain Ordinance
- Currently updating the CBPA ordinance to comply with state regulations.
- Urban Tree Canopy Master Plan.
- No land use or zoning policies currently address resilience directly.
- Would benefit from incorporating resilience strategies into the Comprehensive Plan to address state code requirements and provide model ordinances, policy guidance, and resilience best practices.

Identified Barriers for Resilience Efforts

- Lack of funding
- Technical expertise and staffing
- Need for approved resilience plan for grant eligibility

REGIONAL COORDINATION & SUPPORT



Resilience Coordination with Other Localities

CREST fulfill disaster response coordination and good relationships with Tri-Cities and Prince George, PlanRVA Hazard Mitigation and Resilience Hub planning

Identified Support Needs

- Infrastructure and engineering expertise
- Grant writing and funding support
- Data & mapping tools
- Training programs and capacity building.

INFRASTRUCTURE & OPERATIONS

Significant Climate-Related Impacts
Significant storms, Prolonged flooding, Tornadoes, Extreme temperatures

Primary Public Assets Impacted by Hazards
Roads and transportation systems, Water supply systems, Stormwater management infrastructure

Redundancy Plans
Some facilities have backup generators

FINANCIAL RESOURCES

Previous Funding for Relevant Projects
DOF/DEQ tree canopy grants, Stormwater or fire-related projects may have received other funding

Identified Financial Challenges
- Limited local funding
- Grant application

HUMAN & INSTITUTIONAL CAPACITY

Relevant Staff Positions
Floodplain Administrator, Stormwater Program Manager, Emergency Management Coordinator

Relevant Departments
Development – Zoning, Floodplain Management, Public Works – Stormwater, Fire Department – Emergency Management, Social Services

Identified Staff Capacity Needs
- Technical Support Staff
- Cross-training of existing staff
- Consultants / contracted services

TECHNICAL ASSISTANCE & TRAINING NEEDS

Climate Resilience Data / Tools Used
- FEMA Flood Insurance Rate Maps (FIRMs)
- Virginia Institute of Marine Science (VIMS) Wetland Condition Assessment Tool (WetCAT)

Identified Training & Technical Needs
- Certified Floodplain Manager (CFM)
- Nature-based solutions for flood mitigation
- Grant application and financial management for resilience projects
- Policy and ordinance development for resilience

DISASTER RESPONSE CAPACITY

Emergency Operations or Disaster Response

Regional Hazard Mitigation Plan (2024)

Responsible Agencies / Departments

Fire Department - Emergency Management; All Departments have assigned support role

Emergency Coordination

Emergency Management

Enrollment in FEMA Community Rating System

Not currently enrolled.

Identified Challenges for Disaster Response

- Staffing
- Lack of funding for emergency preparedness
- Emergency shelter capacity

HW.5. Overview of Environmental Conditions

Hopewell's terrain is generally flat with low relief, though several short, steep-gradient streams traverse the city. Predominant soils consist of sandy surface layers with clay subsoils formed from downstream Piedmont deposits. These conditions influence drainage patterns and increase flood susceptibility, particularly in low-lying, poorly drained areas. Major drainage features include Cabin Creek, which drains much of western Hopewell to the Appomattox River; Bailey Creek, which drains the southern portion of the city to the James River; and Cattail Creek, which serves central areas of the city (Plan RVA; Crater PDC, 2022).

Flooding is a recurring environmental concern for Hopewell, driven by its riverine setting and sluggish stream systems. The city has experienced flash flooding during intense rainfall events, including August 15, 2020, when heavy storms caused flooding across central and southeast Virginia. Hopewell contains one designated repetitive loss area, encompassing 51 structures located near Bailey Creek. Although this area lies outside the detailed study 100 year floodplain, Bailey Creek's flat watershed and swampy lower reaches result in slow drainage and backwater flooding conditions. As a historic city with aging infrastructure and constrained redevelopment areas, flood resilience and stormwater management remain significant considerations for ongoing planning and investment (Plan RVA; Crater PDC, 2022).

In addition to flooding, Hopewell faces exposure to severe weather hazards, particularly tornadoes. The most destructive tornado in the region's recorded history occurred on August 6, 1993, when a violent tornado impacted Petersburg, Prince George County, Colonial Heights, and Hopewell. In Hopewell, the storm caused extensive damage to residential areas, including severe impacts to the Riverside Park Apartment Complex, resulting in fatalities, injuries, and widespread structural damage. Wildfire risk is generally low, limited to one identified woodland community (Plan RVA; Crater PDC, 2022).



Hopewell experienced one of the most destructive tornadoes in the region's recorded history in 1993.

HW.6. Floodplain Management and Flood Risk Identification

As part of the Virginia Department of Conservation and Recreation (DCR) Resilience Plan requirements, localities must document administrative procedures for tracking and managing Substantial Improvement (SI) and Substantial Damage (SD) determinations for structures located within Special Flood Hazard Areas (SFHAs), as well as identify Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties. This section summarizes these requirements as they relate to Hopewell and highlights the relevant provisions contained within the City's floodplain ordinance, associated regulatory documents, and information documented in the PlanRVA–Crater PDC Multi-Regional Hazard Mitigation Plan (2024). The purpose of this review is to verify the City's existing administrative framework and identify opportunities to strengthen floodplain management and support long-term resilience planning efforts.



Why it matters: Identifying and tracking flood-prone properties helps communities better understand flood risk, prioritize mitigation investments, reduce future damages, strengthen resilience, and guide long-term land use and development decisions.

HW.6.1 Floodplain Ordinance and Regulatory Framework

Hopewell has adopted a floodplain management ordinance (Ordinance 2022-31, Article XV – Floodplain Management) that is compliant with the National Flood Insurance Program (NFIP), as it regulates development within FEMA-mapped Special Flood Hazard Areas (SFHAs), requires permits for all development activities, and designates a Floodplain Administrator (Zoning Administrator) to enforce compliance, review applications, and maintain required records. The ordinance was updated in 2022 and incorporates current FEMA Flood Insurance Rate Maps (FIRM dated December 15, 2022), as well as provisions for ongoing updates through Letters of Map Revision and use of preliminary FEMA data.

In the Coastal A Zone, new buildings and structures are required to incorporate one foot of freeboard above the Base Flood Elevation (BFE). In Coastal High Hazard Areas (Zones V and VE), all new construction and substantial improvements must be elevated on pilings or columns such that the bottom of the lowest horizontal structural member is at or above the BFE plus 18 inches (1.5 feet), with a minimum elevation of two feet above the BFE where required based on the location of horizontal structural members and applicable design standards. This higher

elevation standard helps reduce the risk of flood and wave damage during coastal storm events.

The ordinance includes clear and consistent provisions for substantial improvement and substantial damage, requiring that any structure meeting the 50 percent market value threshold be brought into full compliance with current floodplain regulations, including elevation or floodproofing requirements. The Floodplain Administrator is tasked with determining substantial damage following flood events and ensuring that noncompliant structures are not repaired without meeting ordinance standards.

Compared to many NFIP-compliant ordinances, Hopewell's floodplain ordinance is relatively strong because it includes higher regulatory standards such as two feet of freeboard in some areas, a rolling five-year substantial improvement threshold, provisions for using best available flood data, regulation of locally identified flood hazards, and enhanced coastal floodplain requirements. These measures provide greater protection against flooding and support long-term resilience. However, potential gaps include continued reliance on FEMA mapping as the primary regulatory baseline (despite allowances for supplemental data), possible limitations in staffing or technical capacity given the option to outsource administrative functions, and no explicit reference to participation in the Community Rating System (CRS) or integration with broader resilience or hazard mitigation planning frameworks.

HW.6.2 Flood Risk Identification SFHAs

Repetitive loss (RL) properties are structures that have experienced multiple instances of flood-related damage over time. Under the National Flood Insurance Program (NFIP), a repetitive loss property is defined as a property for which two or more flood insurance claims of at least $1,000 have been paid within any 10-year period.

Severe repetitive loss (SRL) properties represent a subset of these structures and indicate a higher level of risk and recurring damage. These properties are defined as those that have either:

- At least **four NFIP** claims exceeding $5,000 each, or
- At least **two claims** where the total payouts exceed the building's value.

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Repetitive loss (RL) properties are structures that have experienced multiple instances of flood-related damage over time.

While NFIP data tracks many RL and SRL properties, these designations may not capture all instances of recurring flood impacts. Repetitive flooding can and often does occur outside of mapped Special Flood Hazard Areas (SFHAs), particularly due to stormwater, drainage issues, or localized flooding. As a result, communities are encouraged to identify, track, and address all repetitive flood impacts, regardless of NFIP designation, to better understand risk patterns and inform mitigation strategies. According to the PlanRVA–Crater PDC Multi-Regional Hazard Mitigation Plan (2022), Hopewell has one RL property and no SRL properties as defined by the NFIP. There are no known RL or SRL properties outside of the Special Flood Hazard Areas (SFHAs).



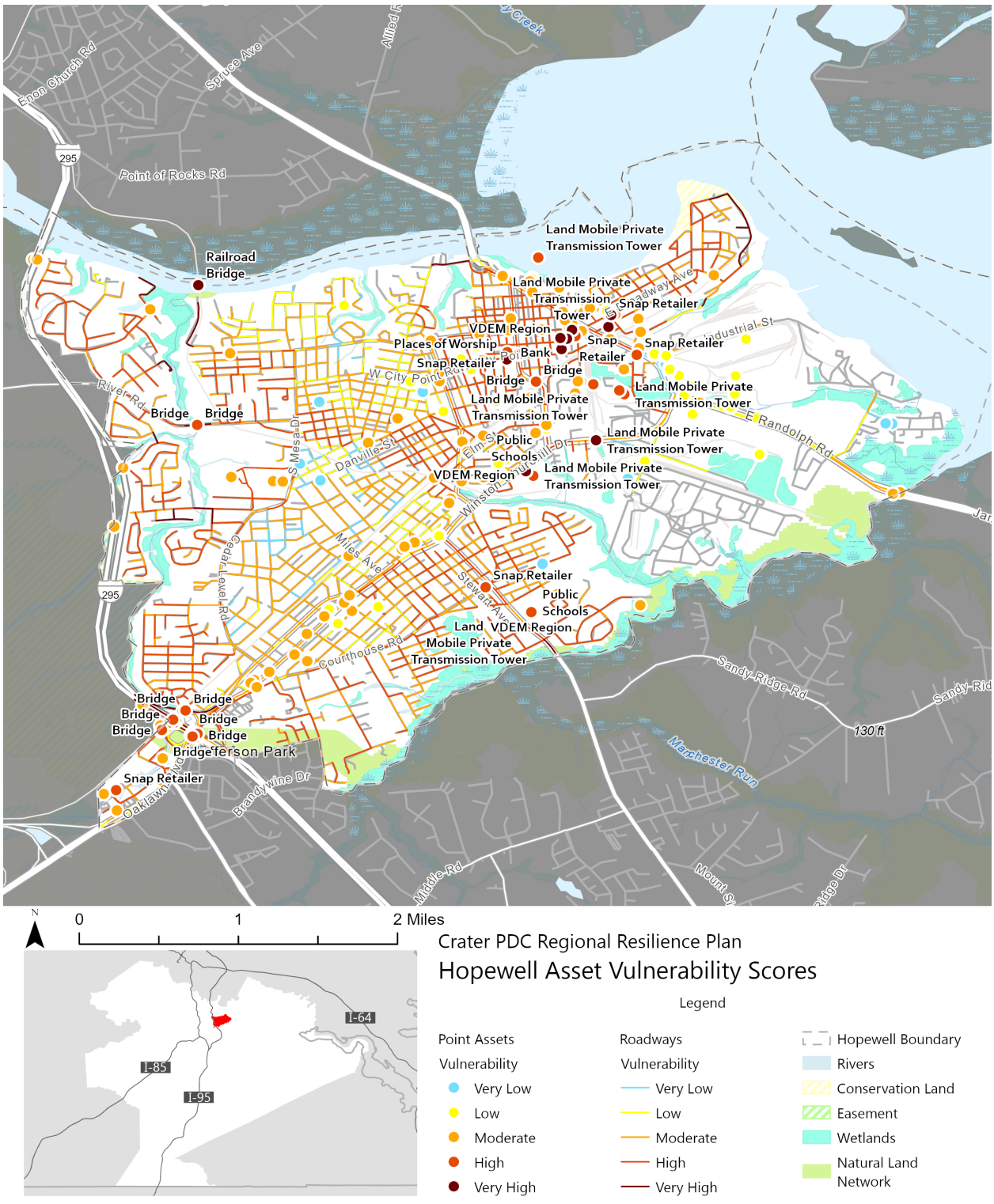
Photo HW.1. The Appomattox River borders the City of Hopewell before flowing into the James River. Kit Friedman

HW.7. Vulnerability Assessment Results

Another foundational element of the Crater PDC Regional Resilience Plan was a region-wide vulnerability assessment performed across the Crater region. The vulnerability assessment results in this section have been parsed out to only include findings relevant to Hopewell. The vulnerability assessment conducted for the Crater PDC Regional Resilience Plan evaluated how each locality is exposed to multiple hazards, including rainfall (pluvial) flooding, riverine (fluvial) flooding, storm surge, extreme heat, and wildfire risk. The vulnerability assessment also evaluated sensitivity through the social vulnerability index. The vulnerability assessment for Hopewell identified flooding, particularly from rainfall (pluvial), and wildfire as the primary risks to critical assets. Assets were also exposed to riverine flooding and extreme heat. There was minimal asset exposure to coastal flooding in Hopewell.

For the methodology of this vulnerability assessment, including data sources, indicator selection, and scoring, please refer to Appendix B. Vulnerability Assessment Methodology and Scoring Framework. For the region-wide assessment and hazard information, please refer to Chapter 6. Vulnerability Assessment.

Vulnerability in Hopewell is not evenly distributed across the city. The asset vulnerability map (Figure HW.1) shows higher concentrations of High and Very High vulnerability assets along the James River waterfront, the Appomattox River corridor, and throughout the industrial waterfront area surrounding the confluence of the two rivers. These areas contain concentrations of transportation infrastructure, industrial facilities, utilities, public facilities, and community assets exposed to one or more climate hazards. Additional vulnerable assets occur throughout developed portions of the city where critical infrastructure intersects flood-prone riverfront environments.



Vulnerability scores were developed as part of the vulnerability assessment for the Crater PDC Regional Resilience Plan. Only assets identified as having high or very high vulnerability are labeled on the map. Due to the sensitivity and quantity of these assets, septic systems, transmission towers, culverts, bridges, and roads were excluded from labeling.

Figure HW.1 Hopewell Asset Vulnerability Map

A total of 222 built infrastructure assets (excluding roadways) and 2038 roadway segments were evaluated. Non-roadway built assets in Hopewell are primarily concentrated in Communications (29.3%), Transportation (16.7%), Food and Agriculture (14.9%), Government Facilities (14%), Emergency Services / Community Assets (13.1%), Energy (4.5%), Healthcare and Public Health (4.5%), Financial Services (1.8%), and Water and Wastewater (1.4%). Because asset counts vary significantly by category, the analysis emphasizes the percentage of assets within each category that are ranked as having High or Very High vulnerability. Categories with the greatest proportions of highly vulnerable assets are discussed below. Figure HW.2 illustrates the distribution of vulnerability scores across all asset categories, including roadways.

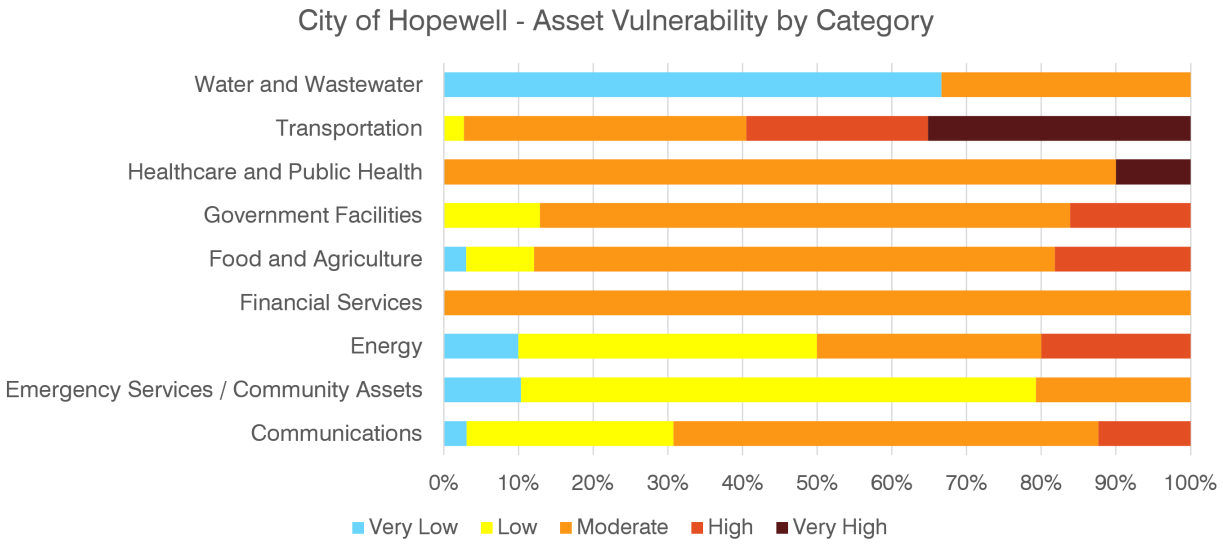


Figure HW.2 Vulnerability Score by Asset Category

HW.7.1 Transportation

Transportation infrastructure emerged as Hopewell's most significant vulnerability concern. Highly vulnerable assets included bridges, culverts, railroad bridges, and roadway segments throughout the City. Bridge 1252 and Bridge 788 on East Randolph Road, along with segments of River Road and Arlington Road, received some of the highest vulnerability scores. These assets are widely exposed to pluvial flooding, while some are also exposed to riverine flooding, coastal flooding, wildfire, and extreme heat. Because these corridors support daily travel, emergency response, and access to critical facilities, disruptions can have widespread impacts throughout the community. These findings support actions focused on improving drainage infrastructure, enhancing flood monitoring, reducing flood risk along the Appomattox River corridor, and incorporating resilience into future development decisions.

HW.7.2 Energy

Energy infrastructure also demonstrated elevated vulnerability within Hopewell. The Polyester PS Substation and the Virginia Electric & Power Company power plant were identified as highly vulnerable due to their exposure to pluvial flooding, wildfire, and elevated social vulnerability.

Although these two assets make up a smaller proportion of assets in Hopewell, these facilities are critical to maintaining reliable electric service for residents, businesses, schools, and industrial operations. Disruptions to these assets could affect multiple sectors simultaneously, highlighting the importance of infrastructure hardening, emergency preparedness, and business continuity planning. These findings support efforts to strengthen resilience in industrial areas and encourage hazard mitigation investments within critical facilities.

HW.7.3 Food and Agriculture

Food and Agriculture assets emerged as another key vulnerability concern. Highly vulnerable assets primarily consisted of SNAP retailers that provide access to food and essential goods for local residents. Son's Seafood received the highest vulnerability score within this category. Many of these facilities are exposed to pluvial flooding, wildfire, and extreme heat, while some are also vulnerable to riverine flooding and are located in areas with elevated social vulnerability. Because these businesses support daily food access and post-disaster recovery, disruptions could disproportionately affect vulnerable populations. These findings directly informed efforts to strengthen community food system resilience through expanded partnerships, food distribution networks, and emergency preparedness planning.

The vulnerability assessment findings directly informed Hopewell's resilience actions. Transportation and flood-related vulnerabilities support actions to improve drainage infrastructure and stormwater systems (HW-3 and HW-5), develop and implement a sanitary sewer inflow and infiltration reduction program (HW-6), and relocate Fire Station #1 to improve emergency response continuity (HW-8). Vulnerabilities affecting energy infrastructure and industrial facilities informed actions focused on industrial area resilience and hazard retrofits (HW-9 and HW-10). Risks to community-serving businesses and residents support the community resilience engagement and resilience hub initiative (HW-2), while exposure to extreme heat and flooding informed actions that expand tree canopy and green infrastructure (HW-7). Finally, the vulnerability assessment identified the importance of protecting critical community facilities, leading to the recommendation to implement multi-hazard resilience improvements at Carter G. Woodson Middle School (HW-4). Together, these actions address Hopewell's key vulnerabilities while improving flood resilience, protecting critical infrastructure, and strengthening long-term community resilience.

HW.8. Actions

The Crater PDC Regional Resilience Plan contains tailored resilience actions for each of the 11 localities within the Crater PDC, actions for Crater PDC to strengthen local and regional capacity, and consistent region-wide actions for each of the 11 localities. The following section only contains tailored actions for Hopewell. Actions that Crater PDC is tasked with pursuing, which may be useful for locality-level support and next steps, as well as region-wide actions Hopewell could pursue, are found in Chapter 7. Regional Actions within the Crater PDC Regional Resilience Plan.

Table HW.2 below summarizes the resilience actions developed for City of Hopewell through the regional resilience planning process. These actions were primarily identified during an Action Development Workshop held in spring 2026 and informed by stakeholder engagement, best practices, the Regional Hazard Mitigation Plan, and relevant comprehensive plans.

Table HW.2 Action Item Key for City of Hopewell

ID	Action Title	Responsible Entity	Estimated Cost	Priority
HW-1	Develop a Resilient Equipment Upgrade Program	Emergency Management Office	Medium	High
HW-2	Launch a Community Resilience Engagement and Resilience Hub Initiative	Emergency Management Office	Medium	Medium
HW-3	Develop a Roadway Drainage and Resilience Improvement Program	Public Works Department	Medium / High	High
HW-4	Develop and Implement a Multi-Hazard Resilience Plans for City Schools and Address Known Resilience Deficiencies & Flooding Issues	Hopewell Public Schools	Low / Medium	High
HW-5	Conduct a Comprehensive Stormwater and Sewer System Infrastructure Assessment and Retrofit Program	Public Works Department	Medium / High	High
HW-6	Develop and Implement a Sanitary Sewer Inflow and Infiltration (I&I) Reduction Program	Hopewell Water Renewal	High	Medium
HW-7	Expand Urban Tree Canopy and Green Infrastructure in Heat-Vulnerable Neighborhoods	Public Works Department; Development Department	Low / Medium	Low
HW-8	Relocate Fire Station #1 & #2 to Improve Emergency Response Continuity	Fire & EMS	Medium	Medium
HW-9	Enhance Industrial Area Resilience and Community Protection	Emergency Management Office	High	Medium
HW-10	Engage Industrial and Commercial Businesses on Hazard Retrofitting and Resilience Planning	Emergency Management Office	Medium	Low
HW-11	Expand Riverfront Access and Resilient Waterfront Connections	Economic Development & Tourism	High	Medium

Action Key

Below is the action key used to develop each of the tailored action descriptions presented in this section of the plan.

Action Components: Key considerations for action development and implementation.

Primary Goals: The broader resilience goal(s) or objective(s) that the action supports. These actions include the following:

- Strengthen Natural Systems and Land Use Resilience
- Improve Hazard Preparedness, Response, and Recovery
- Enhance Data, Tools, and Decision-Making Capacity
- Build Local and Regional Capacity
- Advance Regional Collaboration and Coordination
- Increase Public Awareness and Community Engagement
- Promote Equitable and Resilient Communities
- Strengthen Infrastructure and Built Environment Resilience
- Support Economic Resilience and Workforce Development

Priority Rating: An assessment of the relative importance or urgency of the action in relationship to the other actions in the plan. For these ratings, steering committee feedback throughout the planning process was prioritized. Actions were prioritized based off the capacity and needs assessment, ability to be funded through Virginia CFPF, and best practices. These ratings have not been through a scoring or ranking exercise by the Steering Committee. Localities are encouraged to confirm, adjust, or reprioritize ratings to reflect local conditions, capacity, and funding timelines before using them to sequence implementation or grant applications.

Hazards Addressed: The climate or hazard risks the action is intended to help mitigate or manage. These include the following:

- Flooding (pluvial/rainfall, fluvial/riverine, and/or storm surge)
- Extreme Heat
- Wildfires
- Extreme Storms and/or Winter Weather
- All hazards – *addresses each hazard group*

Estimated Timeline: A general timeframe for implementation (short, medium, or long term) from the action kickoff to end.

- Short-term: 1-2 years
- Medium-term: 2-4 years
- Long-term: 5 or more years

Source: The origin of the action, such as stakeholder input, workshop activities, existing plans, or best practices.

Type of Action: The general action type, or means of implementation that fall under the following:

- Policy and Planning
- Programs and Implementation
- Capital Projects and Infrastructure
- Data, Tools, and Decision Support
- Technical Assistance and Capacity Building
- Regional Coordination and Partnerships
- Public Education and Engagement
- Emergency Preparedness and Response
- Nature-Based Solutions
- Expand Recreational Access to Foster Stewardship
- Residential Adaptation Tool

Responsible Entity: The primary organization or jurisdiction responsible for leading the action.

Potential Partners: Additional agencies, organizations, or stakeholders that could support or collaborate on implementation.

Partner Action: Actions either the PDC, localities, or other listed stakeholders should engage in during or after the action is completed to further maintain or manage desired outcomes.

Potential Funding Sources: Possible state, federal, regional, or local funding mechanisms that could support action implementation, management, or maintenance. Common funding sources for these actions are Virginia Community Flood Preparedness Fund (CFPF) and FEMA Hazard Mitigation Grant (HMG). Identification of a funding source does not guarantee project eligibility, funding availability, award selection, or future program continuity. Funding requirements, priorities, and availability may change over time and should be verified during project development and grant application.

Estimated Cost: A high level cost range (low, medium, high). For capacity building / studies versus project actions, there are two different ranges used depending on the project type.

Cost	Studies / Capacity Building	Projects
Low	Less than $100 k	Less than $750 k
Medium	$100 k to $250 k	$750 k to $1.5 M
High	Greater than $250 k	Greater than $1.5 M

Hopewell Action 1 (HW-1): Develop a Resilient Equipment Upgrade Program

Develop a citywide program to inventory, prioritize, and fund critical emergency response and resilience equipment needed during storm events, flooding, power outages, and other hazards. Equipment may include backup generators, flood pumps, portable barriers, communications devices, emergency shelter supplies, food distribution equipment, and other resources needed to support response operations in flood-prone or underserved areas. This program would help Hopewell identify equipment gaps, establish replacement and maintenance schedules, and pursue financial resources to improve operational readiness.

Action Components:

Conduct an inventory of existing emergency response and shelter equipment; Develop a funding and replacement schedule; Coordinate with emergency management, public works, utilities, and community service providers.

Responsible Entity:

Emergency Management Office

Primary Goals:

- Improve Hazard Preparedness, Response, and Recovery
- Strengthen Infrastructure and Built Environment Resilience
- Build Local and Regional Capacity

Potential Partners:

Crater PDC, Public Works, Hopewell Redevelopment and Housing Authority; Virginia Department of Emergency Management

Partner Action:

Crater PDC may support grant identification, application development, regional equipment coordination, and integration of the program into broader regional resilience and emergency preparedness efforts.

Priority Rating:

High.

Hazards Addressed:

All Hazards.

Estimated Cost:

Studies/Capacity Building: Medium ($100k to $250k)

Source:

City of Hopewell; Action Development Workshop

Type of Action:

- Programs and Implementation
- Emergency Preparedness and Response

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Potential Funding Source: FEMA Hazard Mitigation Grant Program (HMGP)

Hopewell Action 2 (HW-2): Launch a Community Resilience Engagement and Resilience Hub Initiative

Launch a recurring community resilience engagement initiative focused on improving public awareness, household preparedness, food security, and neighborhood-level response capacity. The initiative may include preparedness fairs, resilience workshops, stormwater and flooding education, heat safety outreach, emergency supply demonstrations, and disaster-ready food distribution networks. As part of this effort, the City should evaluate opportunities to establish one or more resilience hubs at trusted community facilities that can provide information, cooling, charging, food distribution, sheltering support, and connection to services before, during, and after hazard events.

Action Components:

Identify priority neighborhoods for outreach based on hazard exposure and social vulnerability; Develop public-facing materials on hazard preparedness; Host pop-ups or recurring events; Identify potential resilience hub locations.

Primary Goals:

- Increase Public Awareness and Community Engagement
- Promote Equitable and Resilient Communities
- Improve Hazard Preparedness, Response, and Recovery

Priority Rating:

Medium.

Hazards Addressed:

All Hazards.

Estimated Cost:

Studies/Capacity Building: Medium ($100k to $250k)

Type of Action:

- Public Education and Engagement
- Emergency Preparedness and Response

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Responsible Entity:

Emergency Management Office

Potential Partners:

PlanRVA; Crater PDC; OneHopewell; local community organizations; emergency management partners; public health and social service providers; schools and trusted community facilities.

Partner Action:

Crater PDC can support outreach material development, resilience hub best practice research, funding strategy development, and coordination with regional public engagement efforts.

Source:

City of Hopewell; Action Development Workshop

Potential Funding Source:

Virginia CFPF – Capacity Building & Planning, Virginia Emergency Shelter Upgrade Assistance Fund; FEMA Hazard Mitigation Grant Program (HMGP); FEMA BRIC.

Hopewell Action 3 (HW-3): Implement a Roadway Drainage and Resilience Improvement Program

Implement a citywide roadway resilience program to reduce recurring roadway flooding, improve drainage capacity, lower long-term maintenance costs, and preserve emergency access during storm events. The program should prioritize the City's existing identified roadway and drainage projects (See Map), as well as identify additional road segments, undersized culverts, storm sewer deficiencies, and frequently flooded intersections for targeted improvements. Potential projects may include culvert replacements, storm sewer upgrades, roadside ditch improvements, nature-based solutions including bioswales, permeable surfaces, and other drainage enhancements that reduce flooding and support safer transportation access.

Action Components:

Identify and map roadways with recurring flooding, drainage issues, or emergency access concerns; Incorporate nature-based solutions where feasible.

Primary Goals:

- Strengthen Infrastructure and Built Environment Resilience
- Improve Hazard Preparedness, Response, and Recovery

Priority Rating:

High.

Hazards Addressed:

Flooding & Extreme Storms

Estimated Cost:

Studies/Capacity Building: Medium ($100k to $250k) - *for planning level actions such as identification.*

Projects: High (greater than $1.5M) - *for built infrastructure solutions*

Type of Action:

- Capital Projects and Infrastructure
- Nature-Based Solutions

Timeline:



Responsible Entity:

Public Works Department

Potential Partners:

Crater PDC; Virginia Department of Transportation (VDOT); Virginia Department of Environmental Quality

Partner Action:

Crater PDC can assist with regional transportation resilience coordination, data compilation, grant application support, and identifying roadway flooding issues that cross jurisdictional or watershed boundaries.

Source:

City of Hopewell; Action Development Workshop; Vulnerability Assessment Results

Potential Funding Source:

Virginia CFPF – Capacity Building & Planning / Project; National Highway Performance Program and Surface Transportation Block Grant Program.

Hopewell Action 4 (HW-4): Develop and Implement a Multi-Hazard Resilience Plans for City Schools and Address Known Deficiencies and Flooding Issues

Develop and implement a multi-hazard resilience plan for City Schools to address flood, heat, storm, and continuity-of-operations risks. Evaluate drainage, flood vulnerabilities, building systems, indoor air quality, heat exposure, evacuation routes, and backup power needs. Potential improvements include drainage upgrades, floodproofing, shade trees, HVAC and air quality enhancements, facility hardening, backup power, and continuity-of-learning measures. Prioritize known flooding and facility deficiencies at Dupont Elementary and Carter G. Woodson.

Action Components:

Conduct a facility vulnerability assessment; Identify floodproofing needs and equipment upgrades; Develop phase improvements and cost estimates; Incorporate upgrades into a community educational opportunity for students.

Responsible Entity:

Hopewell City Public Schools

Potential Partners:

Emergency Management Office; Crater PDC; Virginia Department of Emergency Management (VDEM)

Primary Goals:

- Promote Equitable and Resilient Communities
- Improve Hazard Preparedness, Response, and Recovery

Priority Rating:

High.

Hazards Addressed:

All Hazards.

Partner Action:

Crater PDC can support funding strategy development, resilience hub coordination if applicable, and alignment with regional resilience goals related to critical facilities and vulnerable populations.

Estimated Cost:

Studies/Capacity Building: Low (less than $100k) - *for the assessment of the schools*

Projects: Medium ($750k - $1.5M) - *for school upgrades and improvements*

Source:

City of Hopewell; Action Development Workshop; Vulnerability Assessment Results

Type of Action:

- Emergency Preparedness and Response
- Technical Assistance and Capacity Building.

Timeline:



Potential Funding Source:

Virginia CFPF – Capacity Building & Planning / Project, Virginia Emergency Shelter Upgrade Assistance Fund; FEMA Hazard Mitigation Grant Program (HMGP); FEMA BRIC.

Hopewell Action 5 (HW-5): Conduct a Comprehensive Stormwater and Sewer System Infrastructure Assessment and Retrofit Program

Conduct a comprehensive assessment of Hopewell's stormwater and sewer system infrastructure to identify system deficiencies, capacity constraints, maintenance needs, outfall issues, and areas vulnerable to recurring flooding. Based on the findings, develop and implement a phased retrofit program for existing developed areas using modern stormwater management practices. Improvements may include bioretention, storm sewer upsizing, culvert replacement, outfall stabilization, backflow prevention, pipe repairs, inlet improvements, and other drainage retrofits that reduce flooding and improve system performance during heavy rainfall events.

Action Components:

Inventory and map existing storm sewer infrastructure; Assess system condition and current capacity; Develop phased capital improvement projects and grant-ready scopes.

Primary Goals:

- Enhance Data, Tools, and Decision-Making Capacity
- Strengthen Infrastructure and Built Environment Resilience

Hazards Addressed:

Flooding, Extreme Storms, and Winter Weather

Estimated Cost:

Studies/Capacity Building: Medium ($100k to $250k) - *for the assessment of the system*

Projects: High (greater than $1.5M) - *for upgrading sewer system and stormwater improvements*

Type of Action:

- Data, Tools, and Decision Support
- Capital Projects and Infrastructure

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Responsible Entity:

Public Works Department

Potential Partners:

Crater PDC; Virginia Department of Conservation and Recreation, Virginia Department of Environmental Quality, Chesapeake Stormwater Network.

Partner Action:

Crater PDC can support regional stormwater data coordination, grant development, and integration of identified projects into regional resilience and capital planning efforts.

Source:

City of Hopewell; Action Development Workshop

Priority Rating:

High.

Potential Funding Source:

Virginia CFPF – Capacity Building & Planning / Project; FEMA Hazard Mitigation Grant Program (HMGP); FEMA BRIC; EPA - Water Infrastructure Finance and Innovation.

Hopewell Action 6 (HW-6): Develop and Implement a Sanitary Sewer Inflow and Infiltration (I&I) Reduction Program

Develop and implement a sanitary sewer inflow and infiltration reduction program to identify and reduce stormwater and groundwater entering Hopewell's sanitary sewer system during wet weather events. The program should include system inspections, flow monitoring, smoke testing, CCTV inspections, manhole assessments, private lateral evaluations where appropriate, and prioritized repairs. Reducing inflow and infiltration can help limit sanitary sewer overflows, improve system reliability, reduce treatment burden, protect public health, and improve wastewater system resilience during heavy rainfall and flooding events. Future rainfall projections would be incorporated into this action.

Action Components:

Compiled existing sanitary sewer data, maintenance records, and known overflow or wet-weather problem areas; Develop a phased repair and rehabilitation program; Coordinate public communication if private laterals or property access are involved.

Primary Goals:

- Enhance Data, Tools, and Decision-Making Capacity
- Strengthen Infrastructure and Built Environment Resilience

Hazards Addressed:

Flooding, Extreme Storms, and Winter Weather

Estimated Cost:

Projects: High (greater than $1.5M)

Type of Action:

- Data, Tools, and Decision Support
- Capital Projects and Infrastructure

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Responsible Entity:

Hopewell Water Renewal

Potential Partners:

Crater PDC; Virginia Department of Environmental Quality (DEQ).

Partner Action:

Crater PDC may assist with funding research, regional water infrastructure coordination, and connecting the program to broader watershed and resilience planning efforts.

Source:

City of Hopewell; Action Development Workshop

Priority Rating:

Medium.

Potential Funding Source: FEMA BRIC; EPA - Water Infrastructure Finance and Innovation

Hopewell Action 7 (HW-7): Expand Urban Tree Canopy and Green Infrastructure in Heat-Vulnerable Neighborhoods

Increase urban tree canopy in heat-vulnerable neighborhoods through targeted tree planting, preservation of mature trees, and green infrastructure improvements in streetscapes, parks, schools, public properties, and drainage corridors. Prioritize areas with high heat exposure, limited canopy, vulnerable populations, and opportunities to pair tree planting with stormwater or public space improvements.

Action Components:

Conduct or update tree canopy and urban heat assessment; Identify priority planting areas; Integrate tree planting with stormwater retrofits and street improvements; Establish maintenance plans and community stewardship programs.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Promote Equitable and Resilient Communities

Hazards Addressed:

Flooding, Extreme Storms, Extreme Heat

Estimated Cost:

Projects: *Varies given amount of trees and projects*

Capacity Building / Planning: Low (Less than $100k) - *for heat exposure and study of where to plant trees*

Type of Action:

- Nature-Based Solutions
- Programs and Implementation; Public Education

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Responsible Entity:

Department of Public Works and Department of Development

Potential Partners:

Department of Recreation and Parks; Crater PDC; Virginia Department of Forestry (VDOF); Virginia Cooperative Extension; local health department; community organizations; local schools; regional transit providers

Partner Action:

Crater PDC may assist with canopy and heat data analysis best practices, grant development and strategic partnership, and public outreach materials.

Source:

City of Hopewell; Action Development Workshop; Vulnerability Assessment Results

Priority Rating:

Low.

Potential Funding Source:

Virginia Department of Forestry urban forestry grants (including DOF arborist position grants); USDA Urban and Community Forestry Program; Virginia Community Flood Preparedness Fund (CFPF) – Project.

Hopewell Action 8 (HW-8): Relocate Fire Station #1 & #2 to Improve Emergency Response Continuity

Relocate Fire Stations #1 and #2 to a more resilient and strategically located site to maintain emergency response operations, reduce hazard exposure, and improve response times. Conduct a site suitability, hazard exposure, and facility needs assessment to inform design and capital planning. New facilities should incorporate resilient features such as backup power, hardened systems, stormwater management, emergency coordination space, and appropriate design flood elevations.

Action Components:

Evaluate current and future hazard exposure; Identify potential relocation sites with adequate access and service area coverage; Incorporate resilient design standards into facility design.

Primary Goals:

- Improve Hazard Preparedness, Response, and Recovery
- Strengthen Infrastructure and Built Environment Resilience

Hazards Addressed:

All Hazards.

Estimated Cost:

Projects: Medium ($750k to $1.5M)

Type of Action:

- Capital Projects and Infrastructure
- Emergency Preparedness and Response

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Responsible Entity:

Fire & EMS

Potential Partners:

Crater PDC; Department of Development

Partner Action:

Crater PDC may support grant research, hazard data review, regional emergency service coordination, and development of a phased funding strategy for planning, design, and construction.

Source:

City of Hopewell; Action Development Workshop; Vulnerability Assessment Results

Priority Rating:

Medium.

Potential Funding Source:

Virginia CFPF – Capacity Building & Planning / Project; FEMA Hazard Mitigation Grant Program (HMGP); FEMA BRIC; EPA - Water Infrastructure Finance and Innovation.

Hopewell Action 9 (HW-9): Enhance Industrial Area Resilience and Community Protection

Improve resilience in and around industrial areas by addressing multiple hazards through upgraded drainage infrastructure, flood pumps, and site protection measures, while providing safe evacuation routes for workers and nearby residents. Coordinate with industry operators to reduce flood impacts, protect surrounding neighborhoods from hazard spillover, and improve emergency preparedness and response capabilities in and around industrial zones.

Action Components:

Identify industrial areas with elevated flood and multi-hazard risk and work with facility operators to assess drainage, site protection, evacuation routes, and emergency preparedness needs. Develop coordinated response protocols among the City, industry partners, and emergency management agencies.

Primary Goals:

- Improve Hazard Preparedness, Response, and Recovery
- Strengthen Infrastructure and Built Environment Resilience

Hazards Addressed:

All Hazards.

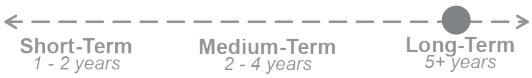
Estimated Cost:

Projects: High (Greater than $1.5M)

Type of Action:

- Capital Projects and Infrastructure
- Emergency Preparedness and Response

Timeline:



Short-term for coordination and assessment; medium- to long-term for drainage upgrades and site improvements

Responsible Entity:

Emergency Management Office

Potential Partners:

Hopewell Local Emergency Planning Committee; Hopewell Manufacturers Association; Crater PDC; Public Works Department; local industrial operators and facility managers; VDEM; Virginia DEQ; VDOT; local emergency responders.

Partner Action:

Provide regional vulnerability data, share industrial resilience best practices, and support coordination between the City, industry operators, and emergency management partners.

Source:

Action Development Workshop; Vulnerability Assessment Results

Priority Rating:

Medium.

Potential Funding Source:

Virginia CFPF - Project; FEMA Hazard Mitigation Grant Program (HMGP); FEMA Building Resilience Infrastructure and Communities (BRIC); EPA Environmental Justice grants; industry operator contributions.

Hopewell Action 10 (HW-10): Engage Industrial and Commercial Businesses on Hazard Retrofitting and Resilience Planning

Engage owners of the City's industrial and commercial businesses to discuss opportunities for retrofitting and hardening their facilities against flooding and severe weather, and to support the development of business resilience plans. Provide technical assistance, resources, and connections to funding opportunities to encourage voluntary participation and improve the overall resilience of Hopewell's commercial and industrial sector.

Action Components:

Develop an outreach program to help industrial and commercial businesses pursue flood and severe weather retrofits, access funding and technical assistance, strengthen continuity planning, and share resilience best practices. Support the development of business resilience and continuity plans.

Primary Goals:

- Improve Hazard Preparedness, Response, and Recovery
- Support Economic Resilience and Workforce Development

Hazards Addressed:

All Hazards.

Estimated Cost:

Study/Capacity Building: Medium ($100k to $250k)

Type of Action:

- Technical Assistance and Capacity Building
- Public Education and Engagement

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for outreach strategy development and initial engagement; ongoing for technical assistance.

Responsible Entity:

Emergency Management Office

Potential Partners:

Hopewell Local Emergency Planning Committee; Hopewell Manufacturers Association; local Chamber of Commerce; Crater PDC; Public Works Department; VDEM; Virginia DEQ; VDOT; local industrial operators and business associations.

Partner Action:

Provide regional hazard data and best practices, develop outreach and technical guidance materials, and support coordination on business resilience funding opportunities.

Source:

Crater PDC-PlanRVA Hazard Mitigation Plan; Action Development Workshop

Priority Rating:

Low.

Potential Funding Source:

Virginia Community Flood Preparedness Fund (CFPF); FEMA Hazard Mitigation Grant Program (HMGP); FEMA Building Resilience Infrastructure and Communities (BRIC).

Hopewell Action 11 (HW-11): Expand Riverfront Access and Resilient Waterfront Connections

Expand public access to the Appomattox River by extending the Hopewell Riverwalk and connecting existing and planned waterfront parks, trails, and public spaces. Prioritize resilient, accessible infrastructure that can withstand flooding and storm events while providing opportunities for recreation, walking, biking, and community access to the riverfront. Coordinate future Riverwalk extensions with waterfront redevelopment, habitat protection, and shoreline resilience efforts to create a connected and publicly accessible riverfront for residents and visitors.

Action Components:

Conduct preliminary engineering and design for Riverwalk Phase 4; acquire easements; acquire funding; construct the river walk

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience.
- Promote Nature-Based Solutions

Priority Rating:

Medium.

Hazards Addressed:

All Hazards.

Estimated Cost:

Study/Capacity Building: Medium ($750k to $1.5M)

Project: High ($1.5M or higher)

Type of Action:

- Expand Recreational Access to Foster Stewardship
- Policy and Planning

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Medium-term for study and engineering; long-term for construction.

Responsible Entity:

Economic Development & Tourism

Potential Partners:

Recreation & Parks; Crater PDC; Public Works Department; Friends of the Lower Appomattox River (FOLAR)

Partner Action:

Support coordination with state and federal partners on funding opportunities; support outreach, engagement, and programming.

Source:

City of Hopewell

Potential Funding Source:

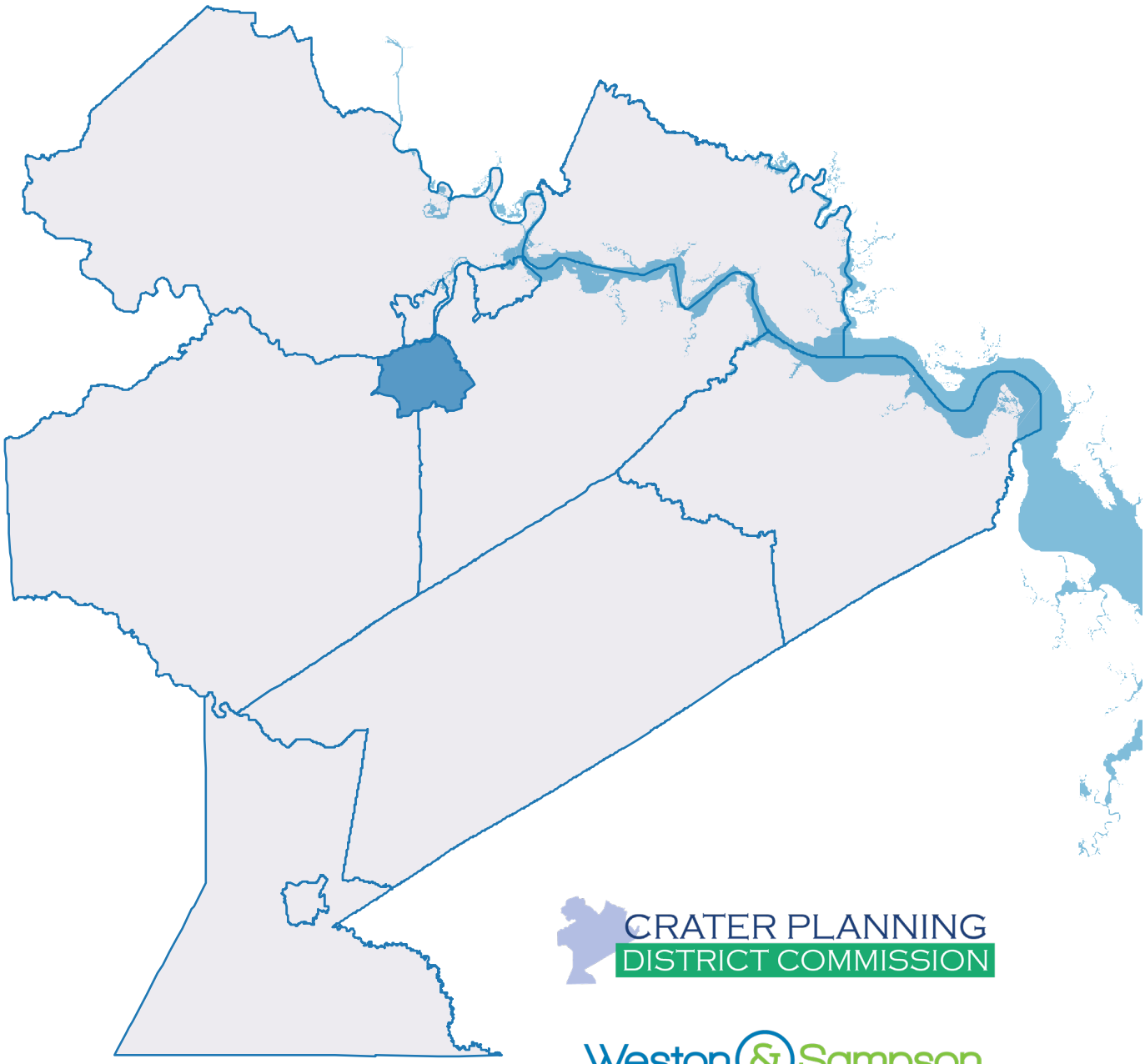
Virginia Community Flood Preparedness Fund (CFPF); Coastal Zone Management (CZM); Virginia Department of Conservation and Recreation

Petersburg

Resilience Plan

Version 1.0 | September 2026

Locality Chapter of the Crater PDC Regional Resilience Plan



CRATER PLANNING DISTRICT COMMISSION

Weston & Sampson

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This chapter presents the locality-specific resilience objectives for City of Petersburg as part of Chapter 8: Locality Resilience Plans of the Crater PDC Regional Resilience Plan. It provides a structured overview of local conditions, risks, and actions to support resilience planning and implementation.

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For additional context on regional priorities, cross-jurisdictional strategies, and Crater PDC–wide resilience objectives, users should refer to the comprehensive Crater PDC Regional Resilience Plan, of which this chapter is one locally focused component. Other components of the plan include:

- Regional vision, goals, and a planning framework for resilience across the Crater Planning District.
- A regional profile describing environmental, economic, infrastructure, and community characteristics.
- An assessment of existing local and regional resilience plans and initiatives.
- A capacity-building roadmap identifying institutional, technical, and organizational needs.
- Results from regional steering committee engagement and workshops.
- A regional vulnerability assessment, including an asset inventory, methodology, and findings.
- Regional actions for implementation by Crater PDC and cross-jurisdictional actions applicable to all localities.
- A regional debris management strategy to support post-disaster response and recovery.
- A plan maintenance framework and supporting appendices.

PB.1. Introduction and Vision

Petersburg is a city in the Tri-Cities region of Virginia located along the Appomattox River. The city covers approximately 22.7 square miles and contains a diverse mix of historic neighborhoods, commercial corridors, and industrial areas that reflect its evolution from a colonial trading center to an important transportation hub and manufacturing center in the region (U.S. Census Bureau; City of Petersburg, 2024). Petersburg's historic districts, including Old Towne, Blandford, and Pocahontas Island, contribute to a strong sense of cultural identity and continue to influence redevelopment strategies and tourism activity. Community pride is closely connected to the greater Richmond region, located just 23 miles south of the City of Richmond. It has experienced significant in-migration from Richmond, which represents its largest source of new residents. Many of Petersburg's commuters travel to Henrico and Chesterfield Counties, as well as the City of Richmond, for employment opportunities (City of Petersburg, 2024).

These assets highlight the city's longstanding connection to the riverfront, its role in regional history, and the opportunities associated with its preserved architectural and heritage resources.

Petersburg's planning framework emphasizes the importance of strengthening neighborhood cohesion, improving multimodal mobility, and expanding access to services across the city. The Appomattox River, several regional rail lines, and proximity to Interstates 85 and 95 position Petersburg as a strategic crossroads for freight, and workforce commuting within the Crater Region (City of Petersburg, 2024). The city's designated redevelopment areas, commercial revitalization corridors, and historic main streets offer opportunities for reinvestment in housing, economic development, and the adaptive reuse of older commercial and industrial structures. Community-driven resilience planning conducted through The RAFT program further identifies priorities such as expanding green spaces, improving stormwater and drainage systems, supporting equitable access to community services, and enhancing neighborhood level connectivity, illustrating Petersburg's commitment to advancing resilience and long-term quality of life for residents (RAFT Resilience Action Checklist, 2023).

As a part of the visioning process for the Crater PDC Regional Resilience Plan, steering committee members from Petersburg developed the following vision statement:

> ***We envision a resilient Petersburg where green spaces, strong infrastructure, and growing capacity empower residents to maximize their quality of life, creating a healthy place that is well equipped to manage and respond to environmental challenges.***

PB.2. Demographics

Petersburg has a population of approximately 33,458 residents, with a median age of 35.8 years. The population includes 24,811 Black residents, 5,418 White residents, and smaller Asian, Native American, and Hispanic or Latino groups that contribute to the city's diversity. Median household income is $50,741, and 21.1 percent of residents live below the poverty level, indicating socioeconomic conditions that may impact resilience considerations. Homeownership is 38.3 percent, and the city has a large share of rental units with a median gross rent of $1,132 (U.S. Census Bureau, Decennial Census, 2020).

Petersburg has approximately 33,458 residents, making it the largest city by population in the region.

Homeownership reaches 38.3% of the population, reflecting a lower rate than the state average.



Photo PB.1 Aerial view of Virginia State University in Petersburg, Virginia Hall, Tamas (Adobe Stock)

Table PB.1 U.S. Census Bureau Statistics Comparison.

U.S. Census Bureau Statistic	Petersburg	Crater PDC	Virginia
Land area	22.7 square miles	2,487.5 square miles	39,481.4 square miles
Population and people			
Total Population	33,458	556,840	8,631,393
Median Age	35.8	40.9	39.4
Population that is 65 years and older	17.0%	18.6%	17.6%
Without Health Care Coverage	8.2%	6.4%	6.9%
Income and Poverty			
Median Household Income	$50,741	$69,698	$92,090
Poverty	21.1%	12.9%	9.7%
Education			
Bachelor's Degree or Higher	25.0%	22.3%	43.3%
School Enrolled Population in Kindergarten to 12th Grade	63.8%	70.7%	65.6%
Employment			
Local, State, and Federal Gov. Workers	24.2%	20.7%	20.6%
Avg. Travel Time to Work	26.7 min	29.3 min	28.3 min
Employment Rate	53.8%	53.6%	61.1%
Housing			
Median Gross Rent	$1,132	$1,177	$1,646
Homeownership Rate	38.3%	66.5%	67.1%
Total Housing Units	18,026	232,007	3,746,211
Total Households	14,854	217,220	3,449,307
Families and Living Arrangements			
Children under 18 years old	23.0%	20.6%	21.3%

U.S. Census Bureau Statistic	Petersburg	Crater PDC	Virginia
Race and Ethnicity			
American Indian and Alaska Native alone	141	2,822	40,007
Asian alone	339	15,795	615,436
African American	24,811	163,453	1,607,581
Hispanic or Latino (of any race)	1,970	52,020	908,749
Native Hawaiian and Other Pacific Islander alone	32	491	7,156
Not Hispanic or Latino	5,178	294,878	5,058,363
Some Other Race	1,142	28,897	446,650
Two or More Races	1,575	37,564	705,707
White	5,418	302,764	5,208,856

Source: U.S. Census Bureau 2020 Decennial Census.

PB.3. Challenges and Strengths

Petersburg faces a range of environmental, social, and infrastructural challenges that influence its resilience priorities. Flooding and drainage issues remain at the forefront, particularly in areas such as those surrounding Bolingbrook Street and Banks Street where aging stormwater and wastewater systems are frequently overwhelmed during heavy rainfall (Building Resilience in Virginia's Crater Region Report, 2022). Community engagement conducted through the Resilience Adaptation Feasibility Tool (RAFT) process identified these neighborhoods as recurring flooding hotspots (University of Virginia Institute for Engagement & Negotiation, 2022). Several neighborhoods experience heat island effects due to limited tree canopy, which raises public health and livability concerns during extreme heat events (Building Resilience in Virginia's Crater Region Report, 2022). Social and economic challenges include high eviction rates, limited access to high-wage jobs, transportation barriers, food insecurity, and gaps in youth programming and mental health services (RAFT Resilience Action Checklist, 2023; Building Resilience Report, 2022). Broadband access also remains inconsistent for many households, creating disparities in education, employment, and emergency communication (Building Resilience Report, 2022). Regional assessments identify staffing and funding limitations that affect the city's ability to apply for grants, manage capital projects, and sustain long-term resilience initiatives (Capacity Building Roadmap, 2025).

Petersburg also has notable strengths that support future resilience planning. The city's strategic location near Interstates 85 and 95, its historic downtown, and its riverfront assets provide

opportunities for economic development, heritage tourism, and reinvestment in key corridors (City of Petersburg, 2024). Community organizations involved in the RAFT process highlighted strong local networks of nonprofits, churches, health providers, and civic groups that collaborate to address food access, youth needs, and community safety (RAFT Resilience Action Checklist, 2023). The Building Resilience Report notes the city's extensive green spaces, ongoing efforts to upgrade stormwater systems, and interest in expanding urban agriculture programs at schools to enhance food access and community engagement (Building Resilience in Virginia's Crater Region Report, 2022). Petersburg also demonstrates deep community pride and cultural resilience, particularly within historically significant neighborhoods such as Pocahontas Island, which continue to be focal points of identity and heritage preservation (Building Resilience Report, 2022). These assets create strong momentum for coordinated regional action and long-term hazard preparedness.

PB.4. Capacity and Needs

One of the first steps within the planning process for the Crater PDC Regional Resilience Plan was performing a capacity and needs assessment for resilience planning. The capacity strengths and challenges revealed within the capacity and needs assessment were integrated into actions for Crater PDC to initiate and next steps for localities. These actions can be found in Chapter 4. Capacity Building Roadmap and serve as foundational actions Crater PDC and localities should pursue in tandem with the other actions within this plan. This survey was directly informed by the capacity and needs assessment questionnaire provided during the beginning of the planning process, which gathered detailed input from local staff on existing roles, resource gaps, technical needs, and challenges related to climate resilience, funding, infrastructure, and intergovernmental coordination. This section provides a snapshot summary of Petersburg's identified challenges as they relate to resilience planning.

REGIONAL COORDINATION & SUPPORT



Has coordinated with others and Virginia DCR in the past / present.

Identifies Support Needs

- Grant writing and funding support
- Training programs and capacity building
- Infrastructure and engineering expertise
- Resilience planning and policy guidance

FINANCIAL RESOURCES

Previous Funding for Relevant Projects

- Local budget allocation
- Multiple VA DCR CFPF grants
- DCR grants for flood resilience and dam safety
- NFWF SWG for Lakemont Community, City-wide drainage study, other drainage improvement

Identified Financial Challenges

- Limited local funding
- Lack of matching funds
- Difficulty accessing state / federal grants
- Grant application capacity constraints

DISASTER RESPONSE CAPACITY

Emergency Operations or Disaster Response
Regional Hazard Mitigation Plan (2022)

Emergency Coordination
Informal coordination as needed

Responsible Agencies / Departments
- Emergency Management
- Fire / Rescue
- Public Works
- Police / Sheriff's Department

Identified Disaster Response Needs
- Additional response resources
- Increased funding for emergency preparedness
- Post-disaster recovery planning and support

HUMAN & INSTITUTIONAL CAPACITY

Relevant Staff Positions
- Floodplain Administrator
- Stormwater Program Manager
- Stormwater Inspector
- Water Engineer
- Emergency Management Coordinator (EMC)
- Director of Planning / Community Development

Relevant Department
Planning / Zoning, Public Works / Stormwater, Emergency Management

Identified Staff Capacity Needs
- Additional full-time staff
- Technical Support
- Consultant / Contracted Services

INFRASTRUCTURE & OPERATIONS

Significant Climate-Related Impacts
- Record breaking flooding and heavy rain, tornadoes, extreme heat
- Primary public assets impacted by hazards
- Roads and transportation systems
- Water supply systems
- Stormwater management infrastructure
- Public buildings and critical facilities

Redundancy Plans
- Emergency Management, Fire, and Police have EoC's and plans for their assets.
- Road closure and citizen rescue procedures.

TECHNICAL ASSISTANCE & TRAINING NEEDS

Climate Resilience Data / Tools Used
FEMA Flood Insurance Rate Maps (FIRMS)

Identified Training Needs
- Grant writing and funding support
- Training programs and capacity building
- Infrastructure and engineering expertise
- Resilience planning and policy guidance
- Certified Floodplain Manager (CFM)
- Nature-based solutions for flood mitigation
- Emergency response planning
- Grant application
- Community engagement strategies for resilience

POLICY & PLANNING

Land Use, Zoning Ordinances, and Plans
CBPA & Floodplain ordinance, Currently updating CBPA per state regulations, Urban tree canopy master plan, No land use or zoning policies that specifically address resilience, Would benefit from comprehensive plan resilience strategies to address state code requirements and model ordinances or policy recommendations related to resilience.

Identified Barriers for Resilience Efforts
- Political will or support
- Lack of funding
- Technical expertise or staff constraints

PB.5. Overview of Environmental Conditions

Petersburg is located at the Fall Line, where the Piedmont transitions to the Coastal Plain. The Appomattox River has resulted in dense industrial and commercial development within Petersburg's floodplain and along the lower reaches of several tributary streams. South of the historic core, land use transitions to a mix of industrial, commercial, and residential development, often following stream corridors that penetrate the city from the uplands (Plan RVA; Crater PDC, 2022).

Flooding is a significant and recurring environmental challenge for Petersburg due to its riverine setting, constrained drainage, and legacy development patterns. The City contains nine repetitive loss areas and approximately 295 structures with flood loss history, concentrated primarily along Brickhouse Run, Lieutenant Run, and in areas affected by poor drainage near Blackwater Swamp. Lieutenant Run, in particular, includes a large backwater floodplain and designated floodway south of Washington Street, while other repetitive loss areas occur in locations not directly associated with major water bodies, such as near Walnut Hill. Petersburg has experienced flooding during major regional rainfall events, including May 2018 and August 2020, underscoring the City's vulnerability to prolonged and intense precipitation combined with limited conveyance capacity (Plan RVA; Crater PDC, 2022).

In addition to flooding, Petersburg is exposed to a range of severe weather and geologic hazards.

The City has experienced multiple damaging tornadoes, most notably the August 6, 1993 tornado, which caused extensive damage to homes and businesses in the historic commercial district, injured 40 people, and resulted in an estimated $15 million in damages. A more recent tornado in June 2012 caused damage across several neighborhoods, particularly from fallen trees and



Petersburg contains approximately 295 structures with a history of flood losses, particularly from major rainfall events.

power lines. Winter storms periodically impact the City, with significant snowfall recorded in December 2010. Petersburg is also located in a region of low magnitude but persistent seismic activity, including one of Virginia's earliest recorded earthquakes in 1774, which caused structural damage in the City (Plan RVA; Crater PDC, 2022).

PB.6. Floodplain Management and Flood Risk Identification

As part of the Virginia Department of Conservation and Recreation (DCR) Resilience Plan requirements, localities must document administrative procedures for tracking and managing Substantial Improvement (SI) and Substantial Damage (SD) determinations for structures located within Special Flood Hazard Areas (SFHAs), as well as identify Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties. This section summarizes these requirements as they relate to Petersburg and highlights the relevant provisions contained within the City's floodplain ordinance, associated regulatory documents, and information documented in the PlanRVA–Crater PDC Multi-Regional Hazard Mitigation Plan (2022). The purpose of this review is to verify the City's existing administrative framework and identify opportunities to strengthen floodplain management and support long-term resilience planning efforts.



Why it matters: Identifying and tracking flood-prone properties helps communities better understand flood risk, prioritize mitigation investments, reduce future damages, strengthen resilience, and guide long-term land use and development decisions.

PB.6.1 Floodplain Ordinance and Regulatory Framework

Petersburg has adopted a comprehensive floodplain management ordinance (Chapter 58 – Floods, Article II – Floodplain Management) that is consistent with the requirements of the National Flood Insurance Program (NFIP). The ordinance regulates development within FEMA-mapped Special Flood Hazard Areas (SFHAs), requires building permits and associated documentation

for all development activities in floodplain districts, and designates a Floodplain Administrator (Director of Public Works or designee) responsible for administering and enforcing the regulations, reviewing permits, maintaining records, and ensuring compliance with federal, state, and local requirements.

The ordinance was most recently updated in November 2022 and adopts the FEMA Flood Insurance Rate Maps (FIRMs) and Flood Insurance Study (FIS) dated December 15, 2022, as the basis for delineating floodplain districts. It explicitly incorporates future revisions, including Letters of Map Revision and updated engineering data, and requires submission of new hydrologic and hydraulic data to FEMA when flood conditions change.

Petersburg's ordinance meets and in some areas exceeds NFIP minimum standards. Notably, it requires a minimum of one foot of freeboard above the base flood elevation for both residential and non-residential structures, which provides an additional margin of safety above the regulatory flood level. The ordinance also mandates hydrologic and hydraulic (H&H) analyses for development within floodways and approximated floodplain districts, with a strict requirement prohibiting any increase in base flood elevations unless FEMA approval is obtained. In areas where base flood elevations are not provided (Zone A), applicants are required to develop site-specific flood elevations using accepted engineering practices, making decisions based on the best available technical data.

Clear provisions are included for substantial improvement and substantial damage, using the standard 50 percent market value threshold. Any structure meeting or exceeding this threshold must be brought into full compliance with current floodplain requirements, including elevation or floodproofing. The Floodplain Administrator is responsible for making substantial damage determinations following flood events and prohibiting non-compliant repairs, ensuring long-term risk reduction and alignment with NFIP standards.

Strengths of the ordinance include strong alignment with the Virginia Uniform Statewide Building Code, incorporation of the latest FEMA mapping and technical data, detailed administrative and enforcement procedures, and rigorous engineering requirements for floodway and floodplain development. The ordinance also requires use of best available data in unmapped or approximated flood zones and establishes clear performance standards to minimize flood impacts on structures and infrastructure. While the ordinance allows for use of supplemental engineering data, it still relies primarily on FEMA FIRMs as the regulatory baseline. The freeboard requirement of one foot, while exceeding NFIP minimums, is less protective than the two-foot standard or higher adopted by some peer localities. Additionally, while administrative duties are clearly defined, the ordinance does not explicitly address staffing capacity or participation in the Community Rating System (CRS).

PB.6.2 Flood Risk Identification SFHAs

Repetitive loss (RL) properties are structures that have experienced multiple instances of flood-related damage over time. Under the National Flood Insurance Program (NFIP), a repetitive loss property is defined as a property for which two or more flood insurance claims of at least $1,000 have been paid within any 10-year period.

Severe repetitive loss (SRL) properties represent a subset of these structures and indicate a higher level of risk and recurring damage. These properties are defined as those that have either:

- At least **four NFIP** claims exceeding $5,000 each, or
- At least **two claims** where the total payouts exceed the building's value.

While NFIP data tracks many RL and SRL properties, these designations may not capture all instances of recurring flood impacts. Repetitive flooding can and often does occur outside of mapped Special Flood Hazard Areas (SFHAs), particularly due to stormwater, drainage issues, or localized flooding. As a result, communities are encouraged to identify, track, and address all repetitive flood impacts, regardless of NFIP designation, to better understand risk patterns and inform mitigation strategies. According to the Richmond-Crater Hazard Mitigation Plan (2022), Petersburg has 11 RL properties and 2 SRL properties as defined by the NFIP. There are no known RL and SRL properties outside of the Special Flood Hazard Areas (SFHA) as well.

i

Repetitive loss (RL) properties are structures that have experienced multiple instances of flood-related damage over time.

PB.7. Vulnerability Assessment Results

Another foundational element of the Crater PDC Regional Resilience Plan was a region-wide vulnerability assessment performed across the Crater region. The vulnerability assessment results in this section have been parsed out to only include findings relevant to Petersburg. The vulnerability assessment conducted for the Crater PDC Regional Resilience Plan evaluated how each locality is exposed to multiple hazards, including rainfall (pluvial) flooding, riverine (fluvial) flooding, storm surge, extreme heat, and wildfire risk. The vulnerability assessment also evaluated sensitivity through the social vulnerability index. The vulnerability assessment for Petersburg identified flooding, particularly from rainfall (pluvial), wildfire, and heat as the primary risks to critical assets. Assets were also exposed to riverine flooding. There was no exposure to coastal flooding in Petersburg.

For the methodology of this vulnerability assessment, including data sources, indicator selection, and scoring, please refer to Appendix B. Vulnerability Assessment Methodology and Scoring Framework. For the region-wide assessment and hazard information, please refer to Chapter 6. Vulnerability Assessment.

Vulnerability in Petersburg is not evenly distributed across the city. The asset vulnerability map (Figure PB.1) shows higher concentrations of High and Very High vulnerability assets along the Appomattox River corridor, within the downtown Petersburg area, and along the Washington Street and Crater Road transportation corridors. These areas contain concentrations of transportation infrastructure, public facilities, utilities, healthcare facilities, schools, and other community-serving assets exposed to one or more climate hazards. Additional vulnerable assets occur where developed areas intersect flood-prone drainage systems and transportation networks.

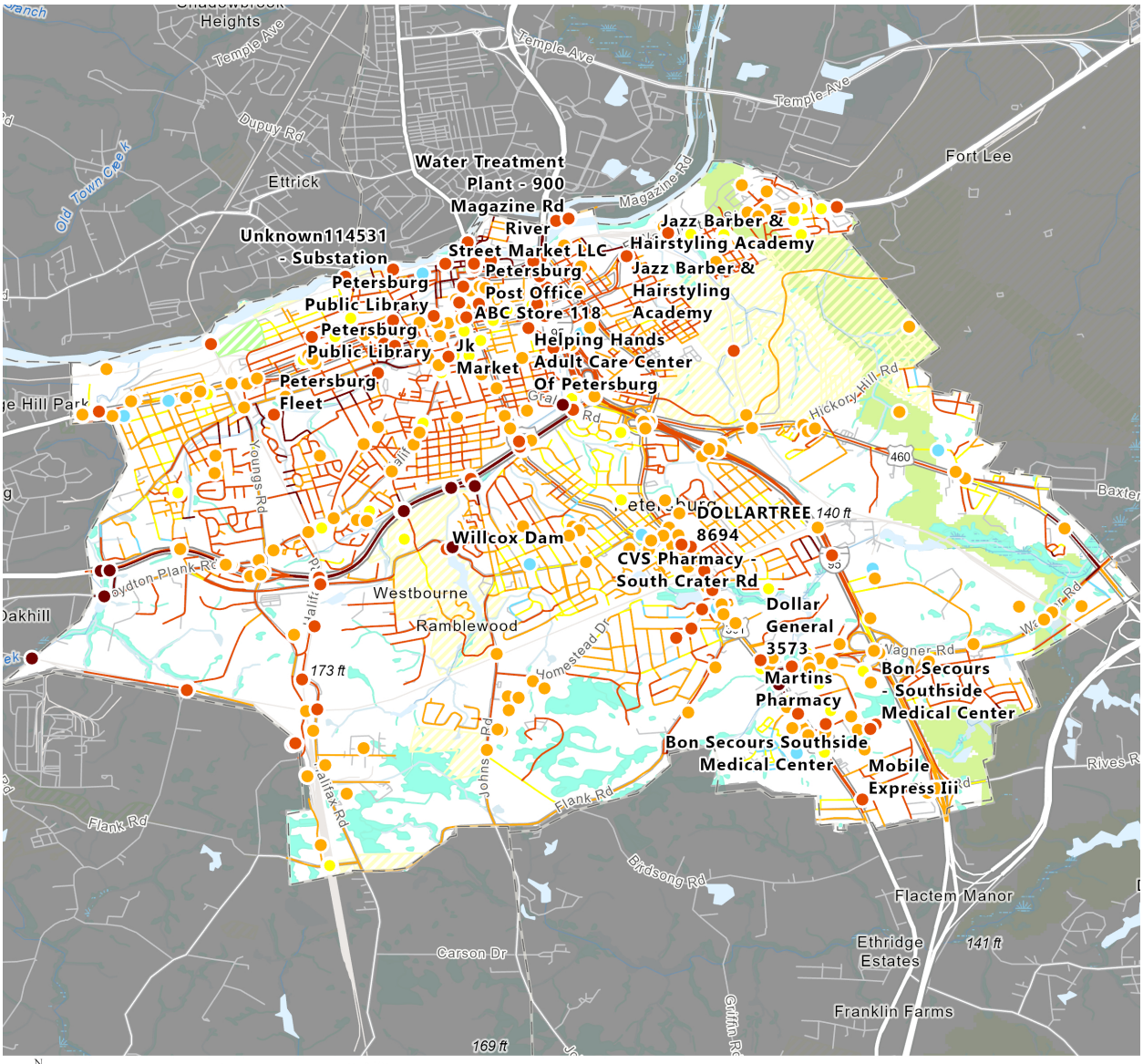


Figure PB.1 Petersburg Asset Vulnerability Map

A total of 499 built infrastructure assets (excluding roadways) and 2913 roadway segments were evaluated. Non-roadway built assets in Petersburg are primarily concentrated in Transportation category (37.1%), followed by Communications (16.2%), Government Facilities (12.2%), Emergency Services / Community Assets (11.0%), Food and Agriculture (10.6%), Healthcare and Public Health (6.0%), Water and Wastewater (2.6%), Energy (2.4%), and Financial Services (1.8%). Because asset counts vary significantly by category, the analysis emphasizes the percentage of assets within each category that are ranked as having High or Very High vulnerability. Categories with the greatest proportions of highly vulnerable assets are discussed below. Figure PB.2 illustrates the distribution of vulnerability scores across all asset categories, including roadways.

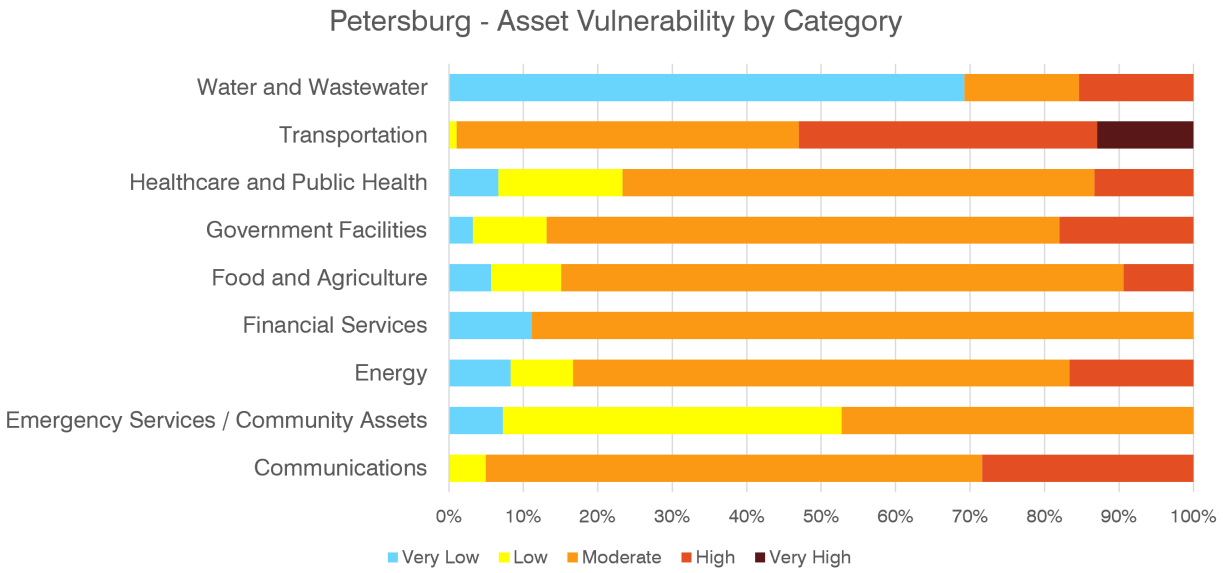


Figure PB.2 Vulnerability Score by Asset Category

PB.7.1 Transportation

Transportation infrastructure emerged as Petersburg's most significant vulnerability concern. Highly vulnerable assets included bridges, culverts, railroad bridges, and roadway segments throughout the city. Segments of East Washington Street, Interstate 85 Northbound, East Bank Street, and Boydton Plank Road received some of the highest vulnerability scores due to their exposure to pluvial flooding, riverine flooding, wildfire, and extreme heat. Because these corridors provide critical connections for residents, businesses, emergency services, and regional travel, disruptions can affect mobility, economic activity, and access to essential services. These findings directly support actions focused on improving stormwater infrastructure, strengthening emergency access routes, and guiding development away from flood-prone areas.

PB.7.2 Communications

Communications infrastructure also demonstrated elevated vulnerability within Petersburg. Highly vulnerable assets included land mobile private transmission towers, microwave service towers, and paging transmission towers. Private Towers 0539, 0880, 0785, 0780, 0781, and 0879 were among the highest-scoring assets in this category. Many were exposed to pluvial flooding

and located in areas of elevated social vulnerability, while some were also vulnerable to riverine flooding, wildfire, and extreme heat. Because communications infrastructure supports emergency response, public safety, and daily operations, service disruptions could have widespread impacts during hazard events. These findings reinforce the importance of emergency preparedness, continuity planning, and investments that strengthen critical infrastructure resilience.

PB.7.3 Government Facilities

Government Facilities emerged as another key vulnerability concern. Highly vulnerable assets included public schools, libraries, government offices, healthcare facilities, and community-serving institutions. Assets such as the Petersburg Post Office, Petersburg Public Library, Jazz Barber & Hairstyling Academy, and Bon Secours Southside Medical Center received high vulnerability scores due to their exposure to pluvial flooding, extreme heat, and elevated social vulnerability. Because these facilities provide essential public services and community resources, disruptions could affect residents' access to government functions, healthcare, education, and emergency assistance. These findings directly informed actions focused on assessing and improving resilience at vulnerable critical facilities.

The vulnerability assessment findings directly informed Petersburg's resilience actions. Transportation vulnerabilities support actions to implement citywide stormwater improvements (PB-3) and identify and strengthen emergency ingress and egress routes (PB-10). Vulnerabilities affecting communications systems and critical facilities informed actions to improve flood resilience at vulnerable facilities (PB-4) and strengthen emergency preparedness and public outreach through floodplain management education (PB-6). The concentration of vulnerable assets in flood-prone areas also supports actions to direct development away from current and future flood risk areas (PB-2), preserve floodplain open space along the Appomattox River (PB-5), strengthen water infrastructure resilience (PB-7), and develop voluntary buyout and managed retreat strategies for the most vulnerable locations (PB-8). Finally, widespread exposure to extreme heat and flooding informed the recommendation to expand tree canopy and green infrastructure throughout the city (PB-1). Together, these actions address Petersburg's key vulnerabilities while reducing flood risk, protecting critical infrastructure, and strengthening long-term community resilience.

PB.8. Actions

The Crater PDC Regional Resilience Plan contains tailored resilience actions for each of the 11 localities within the Crater PDC, actions for Crater PDC to strengthen local and regional capacity, and consistent region-wide actions each of the 11 localities. The following section only contains tailored actions for Petersburg. Actions that Crater PDC is tasked with pursuing, that may be useful for locality-level support and next steps, as well as, region-wide actions Petersburg could pursue are found in Chapter 7. Regional Actions within the Crater PDC Regional Resilience Plan.

Table PB.2 below summarizes the resilience actions developed for City of Petersburg through the regional resilience planning process. These actions were primarily identified during an Action Development Workshop held in spring 2026 and informed by stakeholder engagement, best practices, the Regional Hazard Mitigation Plan, and relevant comprehensive plans.

Table PB.2 Action Item Key for Petersburg

ID	Action Title	Responsible Entity	Estimated Cost	Priority
PB-1	Reduce Urban Heat Island Effects Through Strategic Tree Canopy Expansion	Public Works and/or Parks and Recreation	Medium (Project)	Medium
PB-2	Direct Development Away from Flood-Prone and Future Risk Areas	Planning Department and/or Public Works	Medium (Study/ Capacity Building)	High
PB-3	Implement Citywide Stormwater System Improvements	Public Works	High (Project)	High
PB-4	Improve Flood Resilience at Vulnerable Critical Facilities	Public Works and/or Emergency Manage-ment	High (Project)	High
PB-5	Preserve Open Space and Enhance Resilience Along the Appomattox River	Planning, Parks and Recreation, and/or Public Works	High (Project)	Medium
PB-6	Implement a Floodplain Management Outreach and Grant Engagement Campaign	Floodplain Management and/or Planning Department	Low (Study/ Capacity Building)	Medium
PB-7	Conduct a Water Infrastructure Vulnerability Assessment and Implement Phased Upgrades	Public Works and/or Utilities	High (Project)	High
PB-8	Develop a Managed Retreat and Voluntary Buyout Strategy with Coordinated Housing Support	Planning, Emergency Management, and/or Housing and Community Development	High (Project)	Medium
PB-9	Strengthen Maintenance and Oversight of Private Stormwater BMPs	Public Works and/ or Stormwater Management Program	High (Study/ Capacity Building)	Medium
PB-10	Identify and Strengthen Emergency Egress and Ingress Routes	Emergency Management and/or Public Works	Medium (Study/ Capacity Building)	High

Action Key

Below is the action key used to develop each of the tailored action descriptions presented in this section of the plan.

Action Components: Key considerations for action development and implementation.

Primary Goals: The broader resilience goal(s) or objective(s) that the action supports. These actions include the following:

- Strengthen Natural Systems and Land Use Resilience
- Improve Hazard Preparedness, Response, and Recovery
- Enhance Data, Tools, and Decision-Making Capacity
- Build Local and Regional Capacity
- Advance Regional Collaboration and Coordination
- Increase Public Awareness and Community Engagement
- Promote Equitable and Resilient Communities
- Strengthen Infrastructure and Built Environment Resilience
- Support Economic Resilience and Workforce Development

Priority Rating: An assessment of the relative importance or urgency of the action in relationship to the other actions in the plan. For these ratings, steering committee feedback throughout the planning process was prioritized. Actions were prioritized based off the capacity and needs assessment, ability to be funded through Virginia CFPF, and best practices. These ratings have not been through a scoring or ranking exercise by the Steering Committee. Localities are encouraged to confirm, adjust, or reprioritize ratings to reflect local conditions, capacity, and funding timelines before using them to sequence implementation or grant applications.

Hazards Addressed: The climate or hazard risks the action is intended to help mitigate or manage. These include the following:

- Flooding (pluvial/rainfall, fluvial/riverine, and/or storm surge)
- Extreme Heat
- Wildfires
- Extreme Storms and/or Winter Weather
- All hazards – *addresses each hazard group*

Estimated Timeline: A general timeframe for implementation (short, medium, or long term) from the action kickoff to end.

- Short-term: 1-2 years
- Medium-term: 2-4 years
- Long-term: 5 or more years

Source: The origin of the action, such as stakeholder input, workshop activities, existing plans, or best practices.

Type of Action: The general action type, or means of implementation that fall under the following:

- Policy and Planning
- Programs and Implementation
- Capital Projects and Infrastructure
- Data, Tools, and Decision Support
- Technical Assistance and Capacity Building
- Regional Coordination and Partnerships
- Public Education and Engagement
- Emergency Preparedness and Response
- Nature-Based Solutions
- Expand Recreational Access to Foster Stewardship
- Residential Adaptation Tool

Responsible Entity: The primary organization or jurisdiction responsible for leading the action.

Potential Partners: Additional agencies, organizations, or stakeholders that could support or collaborate on implementation.

Partner Action: Actions either the PDC, localities, or other listed stakeholders should engage in during or after the action is completed to further maintain or manage desired outcomes.

Potential Funding Sources: Possible state, federal, regional, or local funding mechanisms that could support action implementation, management, or maintenance. Common funding sources for these actions are Virginia Community Flood Preparedness Fund (CFPF) and FEMA Hazard Mitigation Grant (HMG). Identification of a funding source does not guarantee project eligibility, funding availability, award selection, or future program continuity. Funding requirements, priorities, and availability may change over time and should be verified during project development and grant application.

Estimated Cost: A high level cost range (low, medium, high). For capacity building / studies versus project actions, there are two different ranges used depending on the project type.

Cost	Studies / Capacity Building	Projects
Low	Less than $100 k	Less than $750 k
Medium	$100 k to $250 k	$750 k to $1.5 M
High	Greater than $250 k	Greater than $1.5 M

Petersburg Action 1 (PB-1): Reduce Urban Heat Island Effects Through Strategic Tree Canopy Expansion

Reduce urban heat island impacts by planting new native trees in priority areas identified through Virginia State University (VSU) and Heat Watch temperature data. Make all new tree plantings fully documented and credited toward Chesapeake Bay Total Maximum Daily Load (TMDL) compliance requirements by incorporating approved nutrient-reduction accounting methods. Develop and maintain a comprehensive tree canopy and tree area plan to guide planting, preservation, maintenance, and long-term canopy goals, and consider pursuing Tree City USA designation to support implementation, funding, and public engagement.

Action Components:

Use VSU and Heat Watch data to target tree planting in heat-vulnerable areas; document plantings for Chesapeake Bay TMDL crediting; develop a citywide tree canopy plan emphasizing resilient species; and pursue Tree City USA designation to support implementation, funding, and community engagement.

Primary Goals:

- Protect Public Health and Water Quality
- Promote Nature-Based Solutions

Priority Rating:

Medium.

Hazards Addressed:

Flooding & Extreme Heat.

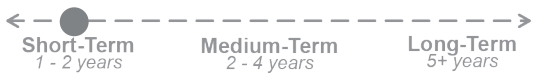
Estimated Cost:

Project: Medium ($750k - $1.5M).

Type of Action:

- Policy and Planning
- Nature-Based Solutions

Timeline:



Short-term for data analysis, priority area identification, and Tree City USA designation pursuit; long-term for planting.

Responsible Entity:

City of Petersburg Department of Public Works and/or Parks and Recreation.

Potential Partners:

Crater PDC; Virginia State University (VSU); Virginia Department of Forestry (VDOF); Virginia Cooperative Extension; local health department; Chesapeake Bay Program partners; community organizations; local schools.

Partner Action:

Share regional heat vulnerability and canopy coverage data; provide guidance on TMDL nutrient-reduction accounting methods; assist with identification of funding opportunities and coordination with state forestry and Chesapeake Bay programs.

Source:

Comprehensive Plan; Action Development Workshop

Potential Funding Source:

Virginia Department of Forestry urban forestry grants; USDA Urban and Community Forestry Program; Virginia Community Flood Preparedness Fund (CFPF); EPA Chesapeake Bay Program grants; EPA Environmental Justice grants.

Petersburg Action 2 (PB-2): Direct Development Away from Flood-Prone and Future Risk Areas

Reinforce existing floodplain development restrictions by guiding new development, critical facilities, and infrastructure away from areas currently within the floodplain and locations projected to be affected by future flooding and sea-level rise. Establish or strengthen floodplain overlay districts to further discourage inappropriate development, limit increases in density or intensity, and promote resilient land uses in high-risk areas beyond minimum regulatory requirements. Coordinate with state and regional partners to ensure overlay language and floodplain management standards reflect current and projected flood risk conditions.

Action Components:

Review and strengthen floodplain regulations beyond minimum standards; evaluate a floodplain overlay district to guide development away from high-risk areas; incorporate future flood risk and sea-level rise into land use decisions; and coordinate with Crater PDC and state partners to advance regional resilience goals.

Primary Goals:

- Protect Public Health and Water Quality
- Promote Nature-Based Solutions

Priority Rating:

High.

Hazards Addressed:

Flooding, Wind, Extreme Heat

Estimated Cost:

Study / Capacity Building: Medium ($100k to $250k)

Type of Action:

- Policy and Planning
- Regional Coordination and Partnerships

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for ordinance review and gap analysis; medium-term for overlay district development and adoption.

Responsible Entity:

City of Petersburg Planning Department and/or Department of Public Works.

Potential Partners:

Crater PDC; Virginia DCR; Virginia DEQ; Virginia Department of Emergency Management (VDEM); FEMA; regional land trusts; watershed organizations; local planning commission.

Partner Action:

Provide model floodplain overlay language and technical guidance; share best practices from peer localities; assist with integration of regional vulnerability and sea-level rise data into local ordinance development.

Source:

Comprehensive Plan; Action Development Workshop

Potential Funding Source:

Virginia Community Flood Preparedness Fund (CFPF); FEMA Building Resilience Infrastructure and Communities (BRIC); FEMA Hazard Mitigation Grant Program (HMGP); Virginia Outdoors Foundation (VOF).

Petersburg Action 3 (PB-3): Implement Citywide Stormwater System Improvement

Implement the recommendations of the storm sewer system plan and study prepared by Timmons to reduce localized flooding, improve drainage performance, and address capacity deficiencies. Prioritize capital improvements identified in the study, coordinate implementation with road and utility projects, and use the plan to guide maintenance, asset management, and future stormwater investments with attention to changing rainfall patterns and flood risk. Develop a phased capital investment strategy to secure approximately $100 million through a combination of local funding, state and federal grants, and financing mechanisms to support full implementation over time.

Action Components:

Implement priority drainage and storm sewer improvements from the Timmons study; coordinate with roadway and utility projects; pursue funding for phased implementation; and integrate recommendations into stormwater planning and maintenance.

Primary Goals:

- Strengthen Infrastructure
- Improve Hazard Preparedness, Response, and Recovery

Priority Rating:

High.

Hazards Addressed:

Flooding, Winter Weather, Storms

Estimated Cost:

Project: High (Greater than $1.5M)

Type of Action:

- Capital Projects and Infrastructure
- Policy and Planning

Timeline:

Short-Term
1 - 2 years

Medium-Term
2 - 4 years

Long-Term
5+ years

Short-term for priority project implementation and funding pursuit; medium- to long- term for phased investment.

Responsible Entity:

City of Petersburg Department of Public Works.

Potential Partners:

Crater PDC; Timmons Group; Virginia DEQ; Virginia DCR; Virginia DOT; Virginia Department of Emergency Management (VDEM).

Partner Action:

Assist with grant identification and application support; provide regional coordination on stormwater data and vulnerability information; help align project priorities with regional resilience goals and funding opportunities.

Source:

Action Development Workshop

Potential Funding Source:

Virginia CFPF; FEMA Building Resilience Infrastructure and Communities (BRIC); FEMA Hazard Mitigation Grant Program (HMGP); Virginia DEQ Stormwater Local Assistance Fund (SLAF); EPA Clean Water State Revolving Fund (CWSRF); local capital improvement bonds.

Petersburg Action 4 (PB-4): Improve Flood Resilience at Vulnerable Critical Facilities

Improve flood resilience at critical facilities citywide by implementing site-specific drainage upgrades, protecting essential equipment, and applying appropriate floodproofing measures. Conduct a comprehensive inventory and vulnerability assessment of critical facilities exposed to flood risk, including public safety, health, education, and community support infrastructure. Prioritize facilities based on risk level, service importance, and feasibility, and develop a phased funding and implementation strategy that leverages state and federal hazard mitigation programs, including opportunities through VDEM and FEMA.

Action Components:

Conduct a flood vulnerability assessment of critical facilities; identify and prioritize drainage, floodproofing, and equipment protection needs; pursue VDEM and FEMA funding for phased improvements; and integrate findings into capital and emergency planning.

Primary Goals:

- Strengthen Infrastructure
- Improve Hazard Preparedness, Response, and Recovery

Priority Rating:

High.

Hazards Addressed:

Flooding

Estimated Cost:

Project: High (Greater than $1.5M)

Type of Action:

- Capital Projects and Infrastructure
- Emergency Preparedness and Response

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for inventory and vulnerability assessment; medium- to long- term for phase implementation.

Responsible Entity:

City of Petersburg Department of Public Works and/or Emergency Management.

Potential Partners:

Crater PDC; Virginia Department of Emergency Management (VDEM); FEMA; Department of Public Works; local public safety, health, and school division partners; engineering consultants.

Partner Action:

Provide regional vulnerability data to support facility prioritization; share best practices for critical facility floodproofing; assist with identification and pursuit of VDEM and FEMA hazard mitigation funding opportunities.

Source:

Vulnerability Assessment; Action Development Workshop

Potential Funding Source:

FEMA Hazard Mitigation Grant Program (HMGP); FEMA Building Resilience Infrastructure and Communities (BRIC); Virginia Community Flood Preparedness Fund (CFPF); FEMA Emergency Management Performance Grant (EMPG) Program.

Petersburg Action 5 (PB-5): Preserve Open Space and Enhance Resilience Along the Appomattox River

Preserve and enhance floodplain open space along the Appomattox River and Blackwater Swamp through conservation tools and restoration activities that support flood mitigation, habitat protection, and Chesapeake Bay TMDL goals; and improve resilience along the Appomattox River Trail through flood monitoring, warning systems, signage, and closure protocols. Develop a flood resilience strategy for the Appomattox River Trail.

Action Components:

Conserve priority floodplain lands along the Appomattox River and Blackwater Swamp, support Chesapeake Bay TMDL goals, and improve Appomattox River Trail resilience through flood monitoring, alerts, and closure protocols.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience.
- Promote Nature-Based Solutions

Priority Rating:

Medium.

Hazards Addressed:

Flooding.

Estimated Cost:

Project: High (Greater than $1.5M)

Type of Action:

- Expand Recreational Access to Foster Stewardship
- Policy and Planning

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for trail signage, protocols, and conservation; medium- to long- term for easment execution.

Responsible Entity:

City of Petersburg Planning Department; Department of Parks and Recreation; and/or Department

Potential Partners:

Crater PDC; DCR; DEQ; Chesapeake Bay Foundation; FOLAR; Appomattox River Trail partners; NWS; local land trusts and watershed organizations.

Partner Action:

Provide regional coordination on floodplain conservation and TMDL credit documentation; assist with trail safety best practices and flood monitoring system guidance; support grant identification and alignment with regional open space and watershed initiatives.

Source:

Vulnerability Assessment; Committee Engagement Results; Action Development Workshop

Potential Funding Source:

Virginia Community Flood Preparedness Fund (CFPF); Virginia Outdoors Foundation (VOF); National Fish and Wildlife Foundation (NFWF) National Coastal Resilience Fund (NCRF); EPA Chesapeake Bay Program grants; Land and Water Conservation Fund (LWCF); Virginia Recreation Trails

Petersburg Action 6 (PB-6): Implement a Floodplain Management Outreach and Grant Engagement Campaign

Launch a targeted floodplain management outreach and education campaign to improve public and business understanding of flood risks, floodplain regulations, and mitigation options. Use workshops, interactive floodplain and risk-mapping tools, digital communications, and school-based programming to explain flood insurance requirements, permitted land uses, mitigation best practices, and property-level flood protection measures.

Action Components:

Develop outreach on floodplain regulations, flood insurance, and property-level protection; use interactive flood-risk mapping tools to engage residents; coordinate messaging with grant outreach efforts; and support floodplain management and CRS goals.

Primary Goals:

- Increase Public Awareness and Community Engagement
- Improve Hazard Preparedness, Response, and Recovery

Priority Rating:

Medium.

Hazards Addressed:

Flooding.

Estimated Cost:

Study/Capacity Building: Low

Type of Action:

- Public Education and Engagement
- Technical Assistance and Capacity Building

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for campaign development and initial outreach; ongoing updates and engagement as flood risk evolves.

Responsible Entity:

City of Petersburg Floodplain Management and/or Planning Department.

Potential Partners:

Crater PDC; Virginia Department of Emergency Management (VDEM); local emergency management; floodplain management offices; watershed organizations; local emergency management; floodplain management offices; watershed organizations.

Partner Action:

Support regional campaign coordination and provide shared messaging and mapping tools; assist with alignment between local outreach and regional flood risk education efforts; help connect the City with state and federal grant engagement resources.

Source:

Committee Engagement Results; Action Development Workshop

Potential Funding Source:

Virginia Community Flood Preparedness Fund (CFPF); FEMA Emergency Management Performance Grant (EMPG) Program; FEMA National Flood Insurance Program (NFIP) outreach funds.

Petersburg Action 7 (PB-7): Conduct a Water Infrastructure Vulnerability Assessment and Implement Phased Upgrades

Conduct a water infrastructure vulnerability assessment to evaluate the flood and climate resilience of stormwater best management practices (BMPs), pump stations, treatment plants, and distribution networks. Use assessment findings to prioritize and implement phased infrastructure upgrades that address flooding, sea-level rise, and extreme precipitation risks. Coordinate upgrades with existing capital improvement planning and stormwater management programs to maximize efficiency and long-term system performance.

Action Components:

Conduct a vulnerability assessment of stormwater BMPs, pump stations, treatment plants, and distribution networks; identify priority upgrades based on flood exposure, sea-level rise, and extreme precipitation risks; develop a phased implementation plan aligned with capital improvement programming; pursue funding.

Primary Goals:

- Promote Equitable and Resilient Communities
- Strengthen Infrastructure and Built Environment Resilience

Priority Rating:

High.

Hazards Addressed:

Flooding, Winter Weather, Storms

Estimated Cost:

Project: High (Greater than $1.5 M)

Type of Action:

- Capital Projects and Infrastructure
- Data, Tools, and Decision Support

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Shor-term for vulnerability assessment; medium- to long- term for phased infrastructure upgrades.

Responsible Entity:

City of Petersburg Department of Public Works and/or Utilities.

Potential Partners:

Crater PDC; Virginia Department of Environmental Quality (DEQ); Virginia Department of Emergency Management (VDEM); Virginia Department of Health (VDH); engineering professionals; utility partners.

Partner Action:

Provide regional vulnerability data to support asset prioritization; share best practices for climate-resilient water infrastructure; assist with grant identification and alignment with regional infrastructure resilience priorities.

Source:

Committee Engagement Results; Action Development Workshop

Potential Funding Source:

Virginia CFPF; FEMA Building Resilience Infrastructure and Communities (BRIC); FEMA Hazard Mitigation Grant Program (HMGP); EPA Clean Water State Revolving Fund (CWSRF); EPA Drinking Water State Revolving Fund (DWSRF).

Petersburg Action 8 (PB-8): Develop a Managed Retreat and Voluntary Buyout Strategy with Coordinated Housing Support

Establish a voluntary buyout and managed retreat program, including funding, administration, property owner engagement, and post-buyout land management; develop housing support options for flood-displaced residents; align efforts with hazard mitigation and disaster recovery funding; and identify key partners responsible for implementation.

Action Components:

Identify key partners and develop a voluntary buyout and managed retreat program, including funding, administration, property owner engagement, and post-buyout land management; establish housing support options for displaced residents; and align efforts with FEMA, state, and local funding programs.

Primary Goals:

- Promote Equitable and Resilient Communities
- Improve Hazard Preparedness, Response, and Recovery

Priority Rating:

Medium.

Hazards Addressed:

Flooding

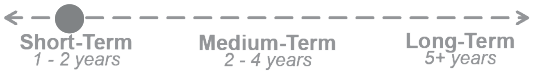
Estimated Cost:

Project: High (Greater than $1.5 M)

Type of Action:

- Residential Adaptation
- Policy and Planning

Timeline:



Short-term for stakeholder identification and program framework; medium- to long- term for buyout implementation.

Responsible Entity:

City of Petersburg Planning Department; Emergency Management; and/or Housing and Community Development.

Potential Partners:

Crater PDC; Virginia Department of Emergency Management (VDEM); FEMA; Department of Housing and Urban Development (HUD); Virginia Housing; local nonprofits and social service organizations; community development organizations.

Partner Action:

Provide technical assistance on managed retreat program design and best practices; assist with identification of buyout and housing funding opportunities; support regional coordination on post-buyout land management and cross-jurisdictional planning.

Source:

Committee Engagement Results; Action Development Workshop

Potential Funding Source:

FEMA Hazard Mitigation Grant Program (HMGP); FEMA Building Resilience Infrastructure and Communities (BRIC); HUD Community Development Block Grant – Disaster Recovery (CDBG-DR); Virginia Community Flood Preparedness Fund (CFPF); Virginia Housing programs.

Petersburg Action 9 (PB-9): Strengthen Maintenance and Oversight of Private Stormwater BMPs

Enforce routine inspection and maintenance requirements for privately owned stormwater best management practices (BMPs) to ensure long-term functionality and performance. Update and track maintenance agreements, improve compliance monitoring, and integrate enforcement efforts with the City's stormwater and MS4 programs to reduce the risk of BMP failures that contribute to localized flooding and water quality degradation.

Action Components:

Review and update maintenance agreement requirements and tracking systems for privately owned stormwater BMPs; develop or strengthen inspection and compliance monitoring protocols; integrate private BMP oversight into the City's MS4 stormwater program and reporting; and identify priority projects.

Responsible Entity:

City of Petersburg Department of Public Works and/or Stormwater Management Program.

Primary Goals:

- Strengthen Infrastructure and Built Environment Resilience
- Protect Public Health and Water Quality

Potential Partners:

Crater PDC; Virginia Department of Environmental Quality (DEQ); Virginia Department of Emergency Management (VDEM);local development community; engineering consultants; property owners and homeowners associations.

Priority Rating:

Medium.

Hazards Addressed:

Flooding; Winter Weather; Storms

Partner Action:

Share model maintenance agreement language and inspection protocols; provide technical assistance on MS4 program integration; assist with benchmarking against peer localities with established private BMP oversight programs.

Estimated Cost:

Study / Capacity Building: Medium ($100k to $250k)

Type of Action:

- Data, Tools, and Decision Making
- Policy and Planning

Timeline:



Short-term for agreement review and protocol development; ongoing for compliance monitoring and enforcement

Source:

Action Development Workshop

Potential Funding Source:

Virginia Community Flood Preparedness Fund (CFPF); Virginia DEQ Stormwater Local Assistance Fund (SLAF); MS4 program funds.

Petersburg Action 10 (PB-10): Identify and Strengthen Emergency Egress and Ingress Routes

Identify critical emergency ingress and egress checkpoints throughout the City at the neighborhood level to support evacuation, emergency response, and disaster recovery operations. Assess vulnerability of key access routes to flooding and other hazard events, and coordinate with public safety agencies to address deficiencies and improve access reliability during emergencies. Integrate findings into the City's emergency operations plans and capital improvement programming.

Action Components:

Map and assess neighborhood-level emergency ingress and egress checkpoints and access routes citywide; identify vulnerabilities including flood-prone roads, bridge crossings, and access points that may be compromised during hazard events; coordinate with public safety agencies; and integrated into EOP.

Primary Goals:

- Improve Hazard Preparedness, Response, and Recovery
- Strengthen Infrastructure and Built Environment Resilience

Priority Rating:

High.

Hazards Addressed:

All Hazards.

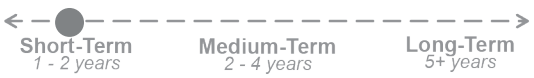
Estimated Cost:

Study / Capacity Building: Medium ($100k to $250k)

Type of Action:

- Emergency Preparedness and Response
- Data, Tools, and Decision Support

Timeline:



Short-term for mapping and assessment; medium-term for implementation of priority access improvements.

Responsible Entity:

City of Petersburg Emergency Management and/or Department of Public Works.

Potential Partners:

Crater PDC; Virginia Department of Emergency Management (VDEM); Virginia Department of Transportation (VDOT); Department of Public Works; local public safety agencies; neighboring jurisdictions.

Partner Action:

Provide regional GIS and vulnerability data for route assessments; support coordination of shared access corridors; and share best practices for emergency access planning and integration into local emergency operations plans.

Source:

Action Development Workshop

Potential Funding Source:

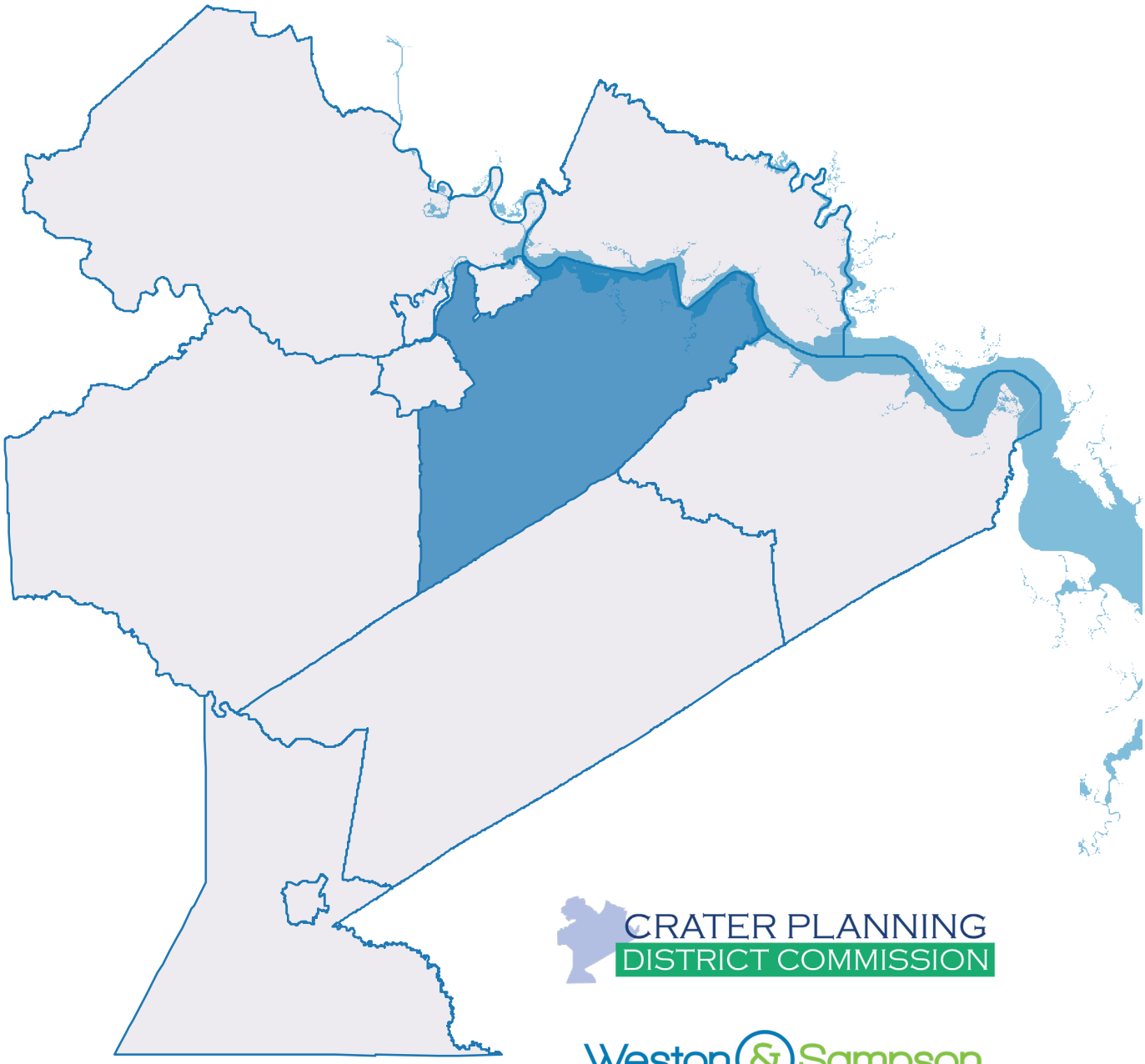
FEMA Emergency Management Performance Grant (EMPG) Program; Virginia Community Flood Preparedness Fund (CFPF); FEMA Hazard Mitigation Grant Program (HMGP); FEMA Building Resilience Infrastructure and Communities (BRIC).

Prince George County

Resilience Plan

Version 1.0 | September 2026

Locality Chapter of the Crater PDC Regional Resilience Plan



CRATER PLANNING DISTRICT COMMISSION

Weston & Sampson

TABLE OF CONTENTS

This chapter presents the locality-specific resilience objectives for Prince George County as part of Chapter 8: Locality Resilience Plans of the Crater PDC Regional Resilience Plan. It provides a structured overview of local conditions, risks, and actions to support resilience planning and implementation.

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For additional context on regional priorities, cross-jurisdictional strategies, and Crater PDC–wide resilience objectives, users should refer to the comprehensive Crater PDC Regional Resilience Plan, of which this chapter is one locally focused component. Other components of the plan include:

- Regional vision, goals, and a planning framework for resilience across the Crater Planning District.
- A regional profile describing environmental, economic, infrastructure, and community characteristics.
- An assessment of existing local and regional resilience plans and initiatives.
- A capacity-building roadmap identifying institutional, technical, and organizational needs.
- Results from regional steering committee engagement and workshops.
- A regional vulnerability assessment, including an asset inventory, methodology, and findings.
- Regional actions for implementation by Crater PDC and cross-jurisdictional actions applicable to all localities.
- A regional debris management strategy to support post-disaster response and recovery.
- A plan maintenance framework and supporting appendices.

PG.1. Introduction and Vision

Prince George County is a predominantly rural county characterized by extensive forested lands, agricultural areas, river systems, and low-density residential development. The county's landscape is strongly influenced by the James, Appomattox, and Blackwater Rivers, as well as large wetland complexes and swamp systems that shape land use patterns and limit where development can safely occur (Prince George County Comprehensive Plan, 2022). Unlike the more urbanized localities in the Tri-Cities area, Prince George County retains significant open space and environmentally sensitive lands that function as both natural habitat and critical stormwater and flood storage areas.

The county's planning framework emphasizes balancing future growth with protection of natural and historic resources while maintaining its rural character and sense of community. Vision and goal statements in the comprehensive plan prioritize orderly growth, coordination with neighboring jurisdictions, and protection of environmentally sensitive areas, including wetlands, floodplains, and river corridors (Prince George County Comprehensive Plan, 2022). The county also contains several historic and cultural resources that are considered in land use decisions, reinforcing the importance of managing development in a way that preserves long-standing community identity while accommodating changing economic and population needs (Prince George County Comprehensive Plan, 2022).

As a part of the visioning process for the Crater PDC Regional Resilience Plan, steering committee members from Prince George County developed the following vision statement:

> ***We envision Prince George County as a thriving and resilient community, prepared for environmental challenges and dedicated to protecting the health, safety, and overall quality of life of every resident.***

PG.2. Demographics

Prince George County has an estimated population of 43,010 residents with a median age of 33.4 years, which is younger than the statewide median of 39.4 years . Approximately 12.9 percent of residents are age 65 or older, reflecting a smaller proportion of senior population than many other localities in the Crater region. Median household income is $88,225, slightly below the Virginia median of $92,090, and about 8.0 percent of residents live below the poverty level, outperforming the statewide rate of 9.7 percent (U.S. Census Bureau, Decennial Census, 2020).

Approximately 13% of Prince George County residents are age 65 or older, representing a smaller senior population than many other localities in the region.

Educational attainment data show that 24 percent of residents hold a bachelor's degree or higher, well below the statewide rate of 43.3 percent. Roughly 66.2 percent of enrolled students are in kindergarten through twelfth grade, indicating a strong presence of families with school-aged children. Housing characteristics reflect stable residential conditions, with a 73.9 percent homeownership rate and more than 13,400 housing units distributed across suburban and rural neighborhoods. These demographic patterns suggest that future planning must consider family services across a geographically dispersed population (U.S. Census Bureau, Decennial Census, 2020).



Photo PG.4. The Appomattox River runs through Prince George County, Kit Friedman.

Table PG.1 Census Bureau Statistics Comparison.

U.S. Census Bureau Statistic	Prince George County	Crater PDC	Virginia
Land area	265.3 square miles	2,487.5 square miles	39,481.4 square miles
Population and people			
Total Population	43,010	556,840	8,631,393
Median Age	33.4	40.9	39.4
Population that is 65 years and older	12.9%	18.6%	17.6%
Without Health Care Coverage	11.5%	6.4%	6.9%
Income and Poverty			
Median Household Income	$88,225	$69,698	$92,090
Poverty	8.0%	12.9%	9.7%
Education			
Bachelor's Degree or Higher	24.0%	22.3%	43.3%
School Enrolled Population in Kindergarten to 12th Grade	66.2%	70.7%	65.6%
Employment			
Local, State, and Federal Gov. Workers	20.4%	20.7%	20.6%
Avg. Travel Time to Work	24.8 min	29.3 min	28.3 min
Employment Rate	46.0%	53.6%	61.1%
Housing			
Median Gross Rent	$1,563	$1,177	$1,646
Homeownership Rate	73.9%	66.5%	67.1%
Total Housing Units	13,444	232,007	3,746,211
Total Households	12,718	217,220	3,449,307
Families and Living Arrangements			
Children under 18 years old	19.7%	20.6%	21.3%

U.S. Census Bureau Statistic	Prince George County	Crater PDC	Virginia
Race and Ethnicity			
American Indian and Alaska Native alone	276	2,822	40,007
Asian alone	862	15,795	615,436
African American	12,968	163,453	1,607,581
Hispanic or Latino (of any race)	4,344	52,020	908,749
Native Hawaiian and Other Pacific Islander alone	144	491	7,156
Not Hispanic or Latino	22,662	294,878	5,058,363
Some Other Race	1,891	28,897	446,650
Two or More Races	3,042	37,564	705,707
White	23,827	302,764	5,208,856

Source: U.S. Census Bureau 2020 Decennial Census.

PG.3. Challenges and Strengths

Prince George County faces environmental and infrastructure challenges related to its extensive river systems, wetlands, and flood-prone areas. Floodplains are present along the James, Appomattox, and Blackwater Rivers, as well as in swamp systems including Warwick Swamp, Indian Swamp, and Rowanty Creek, which restrict development and increase vulnerability to flooding during heavy rainfall events (Prince George County Comprehensive Plan). Portions of the county are designated as Critical Environmental Areas by the Commonwealth, including the James River corridor and Cypress Swamp, where development is limited due to ecological sensitivity and flood risk (Prince George County Comprehensive Plan). Managing growth while protecting these areas remains a long-term challenge, particularly as new residential development places pressure on rural road networks, schools, and stormwater systems.

At the same time, the county has several strengths that support resilience planning. Prince George County has adopted floodplain ordinances consistent with the National Flood Insurance Program and updated FEMA Flood Insurance Rate Maps, which are fully integrated into the county's GIS system to improve flood risk identification and development review (Prince George County Comprehensive Plan). The county also participates in regional coordination efforts, including the Fort Lee Joint Land Use Study, which formalizes land use compatibility planning between military operations and surrounding development and promotes communication across jurisdictions (Prince George County Comprehensive Plan, 2022). Additionally, partnerships with the Crater PDC and participation in regional transportation planning through the Tri-Cities Metropolitan

Planning Organization support coordinated infrastructure and emergency response planning.

These environmental protections, policy frameworks, and regional partnerships provide a strong foundation for integrating future resilience strategies, particularly related to flood mitigation, land conservation, and infrastructure planning in environmentally sensitive areas.

PG.4. Capacity and Needs

One of the first steps within the planning process for the Crater PDC Regional Resilience Plan was performing a capacity and needs assessment for resilience planning. The capacity strengths and challenges revealed within the capacity and needs assessment were integrated into actions for Crater PDC to initiate and next steps for localities. These actions can be found in Chapter 4. Capacity Building Roadmap and serve as foundational actions Crater PDC and localities should pursue in tandem with the other actions within this plan. This survey was directly informed by the capacity and needs assessment questionnaire provided during the beginning of the planning process, which gathered detailed input from local staff on existing roles, resource gaps, technical needs, and challenges related to climate resilience, funding, infrastructure, and intergovernmental coordination. This section provides a snapshot summary of Prince George County's identified challenges as they relate to resilience planning.

REGIONAL COORDINATION & SUPPORT



Coordinates with Crater PDC and DEQ.

Identified Support Needs

- Grant writing and funding support
- Data & mapping tools
- Training programs and capacity building
- Infrastructure and engineering expertise
- Resilience planning and policy guidance

FINANCIAL RESOURCES

Identified Financial Challenges

- Limited local funding
- Lack of matching funds
- Staff capacity to carry out projects
- Financial constraints of property owners undertaking development

HUMAN & INSTITUTIONAL CAPACITY



Relevant Staff Positions

- Planning staff
- Environmental Specialist
- Fire / Emergency Services

Relevant Department

Planning / Zoning, Environmental / Conservation

Identified Staff Capacity Needs

- Additional full-time staff
- Consultant / Contracted Services

POLICY & PLANNING

The County has a wetland floodplain ordinance, RPA, stormwater measures. They noted that they would benefit from a comprehensive plan resilience strategy.

Identified Barriers for Resilience Planning

- Technical expertise or staff constraints

DISASTER RESPONSE CAPACITY

Emergency Operations or Disaster Response
Regional Hazard Mitigation Plan (2022)

Responsible Agencies / Departments
Emergency Management, Fire/Rescue

Identified Challenges for Disaster Response
Staffing shortages, Need for improved coordination with neighboring localities

Identified Disaster Response Needs

- Additional response resources
- Increased funding for emergency preparedness
- Improved coordination with regional and state agencies
- Post-disaster recovery planning support

Enrollment in the FEMA CRS
Not currently enrolled with current staff capacity for reporting / coordinator vote.

INFRASTRUCTURE & OPERATIONS

Participates in FEMA emergency response training.

TECHNICAL ASSISTANCE & TRAINING NEEDS

Climate Resilience Data / Tools Used
FEMA Flood Maps - FIRMS, RPA, RMA, CBRA Wetland Inventory

Identified Support Needs

- GIS mapping and data analysis for flood risk assessment
- Assessment of critical asset vulnerabilities
- Grant writing and funding support
- Training programs and capacity building
- Infrastructure and engineering expertise
- Resilience planning and policy guidance

Identified Training Needs

- Emergency Response Planning

PG.5. Overview of Environmental Conditions

Prince George County lies entirely within the Coastal Plain, east of the Fall Line. The County is bordered by the James River and the City of Hopewell to the north, the Appomattox River and the

City of Petersburg to the west, and extends eastward toward Surry County. Its hydrology is shaped by two primary drainage patterns: the northern half of the County drains into the Appomattox and James Rivers and ultimately the Chesapeake Bay, while the southern half drains into the Nottoway and Blackwater River watersheds, which flow to the Chowan River and the Albemarle Pamlico Sound. The Blackwater River, which originates in Prince George County as a coastal plain swamp, is a defining environmental feature, particularly in low lying and poorly drained areas (Plan RVA; Crater PDC, 2022).

Flooding represents a recurring environmental challenge due to flat topography, swampy conditions, and sluggish waterways. Prince George County has two identified repetitive loss areas encompassing 36 structures, primarily within the 100 year floodplain of Blackwater Swamp near its confluence with Dicks Branch and along Wards Creek downstream of Route 10. The County has experienced flooding during major regional rainfall events, including May 2018 and August 2020, resulting in road closures and impacts to low lying areas. These conditions require careful consideration of environmental constraints when evaluating future development, and residents have expressed a strong desire to protect agricultural land and environmentally sensitive areas, particularly wetlands and floodplain systems (Plan RVA; Crater PDC, 2022).

Prince George County is also vulnerable to severe weather hazards, including hurricanes, high wind events, tornadoes, winter storms, and lightning. The County reports some of the highest hurricane related damages in the region and is considered highly vulnerable to wind impacts from a 100 year wind event. Tornadoes, while relatively infrequent, have caused localized damage, including impacts from the historic August 6, 1993 tornado, one of the most destructive in Virginia's recorded history, which caused fatalities and property losses in the County. Winter storms are another notable hazard, with Prince George experiencing some of the highest average annual damages in the region due to snow and ice. While shoreline erosion along the James River has generally been classified as very low, continued exposure to storms and sea level rise could impact riparian buffers over time (Plan RVA; Crater PDC, 2022).

PG.6. Floodplain Management and Flood Risk Identification

As part of the Virginia Department of Conservation and Recreation (DCR) Resilience Plan requirements, localities must document administrative procedures for tracking and managing Substantial Improvement (SI) and Substantial Damage (SD) determinations for structures located within Special Flood Hazard Areas (SFHAs), as well as identify Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties. This section summarizes these requirements as they relate to Prince George County and highlights the relevant provisions contained within the County's floodplain ordinance, associated regulatory documents, and information documented in the PlanRVA–Crater PDC Multi-Regional Hazard Mitigation Plan (2022). The purpose of this review is to verify the County's existing administrative framework and identify opportunities to strengthen floodplain management and support long-term resilience planning efforts.

Why it matters: Identifying and tracking flood-prone properties helps communities better understand flood risk, prioritize mitigation investments, reduce future damages, strengthen resilience, and guide long-term land use and development decisions.

PG.6.1 Floodplain Ordinance and Regulatory Framework

Prince George County has adopted a comprehensive floodplain management ordinance (Chapter 90 – Zoning, Article XV – Floodplain) that is compliant with the requirements of the National Flood Insurance Program (NFIP). The ordinance regulates development within FEMA-mapped Special Flood Hazard Areas (SFHAs), requires zoning permits and detailed application materials for all development activities in floodplain districts, and designates a Floodplain Administrator to administer and enforce the regulations, review applications, and maintain required records.

The ordinance was most recently updated in December 2022 (Ordinance O 22 38) and incorporates the most current FEMA Flood Insurance Rate Maps (FIRMs) and Flood Insurance Study (FIS) dated January 12, 2023. It explicitly adopts these maps as the basis for floodplain regulation while allowing for ongoing updates through Letters of Map Revision (LOMR/CLOMR) and requiring submission of new technical data to FEMA when flood conditions change.

Prince George County's ordinance meets NFIP standards and includes several enhanced provisions, including one foot of freeboard, required hydrologic and hydraulic analyses for floodway and Zone A development, use of best available flood data, and regulation of locally identified flood hazards. The Floodplain Administrator is responsible for permit review, floodplain interpretation, recordkeeping, interagency coordination, and ordinance enforcement.

Clear provisions are established for substantial improvement and substantial damage, using the standard 50 percent market value threshold. Structures meeting or exceeding this threshold must be brought into full compliance with current floodplain standards, including elevation or floodproofing requirements. The ordinance further limits non-compliant repairs and requires permits and review for post-damage reconstruction, reinforcing long-term risk reduction and avoiding repetitive loss conditions.

Compared to many NFIP-compliant ordinances, Prince George's floodplain ordinance is relatively strong, with higher standards such as one feet of freeboard in most flood hazard areas, use of best available flood data, and comprehensive requirements for coastal areas, floodways, floodproofing, subdivision design, and flood-resistant construction. The ordinance is also well aligned with the Virginia Uniform Statewide Building Code and provides a robust framework for floodplain administration. However, it still relies primarily on FEMA FIRMs as the regulatory baseline, does not explicitly address future climate-related flood risks such as sea level rise or increased precipitation, and does not reference participation in FEMA's Community Rating System (CRS).

PG.6.2 Flood Risk Identification SFHAs

Repetitive loss (RL) properties are structures that have experienced multiple instances of flood-related damage over time. Under the National Flood Insurance Program (NFIP), a repetitive loss property is defined as a property for which two or more flood insurance claims of at least $1,000 have been paid within any 10-year period.

Severe repetitive loss (SRL) properties represent a subset of these structures and indicate a higher level of risk and recurring damage. These properties are defined as those that have either:

- At least **four NFIP** claims exceeding $5,000 each, or
- At least **two claims** where the total payouts exceed the building's value.

While NFIP designations do not capture all recurring flood impacts, repetitive flooding can occur outside mapped SFHAs due to stormwater, drainage issues, or localized flooding. According to the Richmond-Crater Hazard Mitigation Plan (2022), Prince George County has three RL properties and two SRL properties, with no known RL or SRL properties outside Special Flood Hazard Areas.

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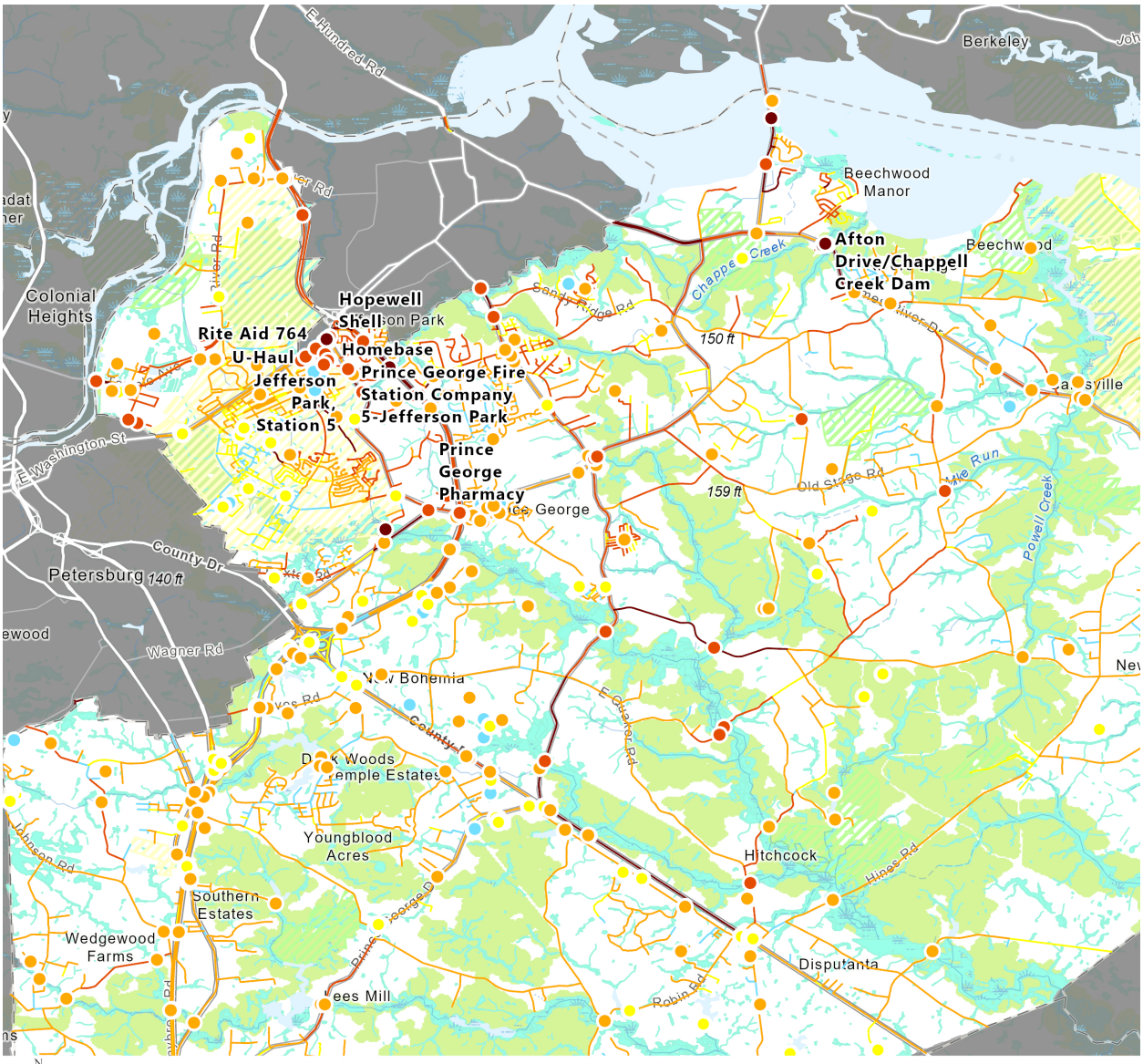
Repetitive loss (RL) properties are structures that have experienced multiple instances of flood-related damage over time.

PG.7. Vulnerability Assessment Results

Another foundational element of the Crater PDC Regional Resilience Plan was a region-wide vulnerability assessment performed across the Crater region. The vulnerability assessment results in this section have been parsed out to only include findings relevant to Prince George County. The vulnerability assessment conducted for the Crater PDC Regional Resilience Plan evaluated how each locality is exposed to multiple hazards, including rainfall (pluvial) flooding, riverine (fluvial) flooding, storm surge, extreme heat, and wildfire risk. The vulnerability assessment also evaluated sensitivity through the social vulnerability index. The vulnerability assessment for Prince George County identified pluvial flooding, riverine flooding, and wildfire as the primary risks to critical assets. Assets were also exposed to heat. There was minimal exposure to coastal flooding in Prince George County.

For the methodology of this vulnerability assessment, including data sources, indicator selection, and scoring, please refer to Appendix B. Vulnerability Assessment Methodology and Scoring Framework. For the region-wide assessment and hazard information, please refer to Chapter 6. Vulnerability Assessment.

The asset vulnerability maps (Figures PG.1-3) show higher concentrations of High and Very High vulnerability assets near Fort Gregg-Adams, the James River corridor near Jordan Point and Flowerdew Hundred, and the Prince George Courthouse and Route 10 corridor, where transportation infrastructure, utilities, and public facilities face elevated climate risks. Additional vulnerable assets occur where transportation corridors and public infrastructure intersect flood-prone streams and low-lying areas.



Vulnerability scores were developed as part of the vulnerability assessment for the Crater PDC Regional Resilience Plan. Only assets identified as having high or very high vulnerability are labeled on the map. Due to the sensitivity and quantity of these assets, septic systems, transmission towers, culverts, bridges, and roads were excluded from labeling.

Figure PG.1 Prince George County Asset Vulnerability Map

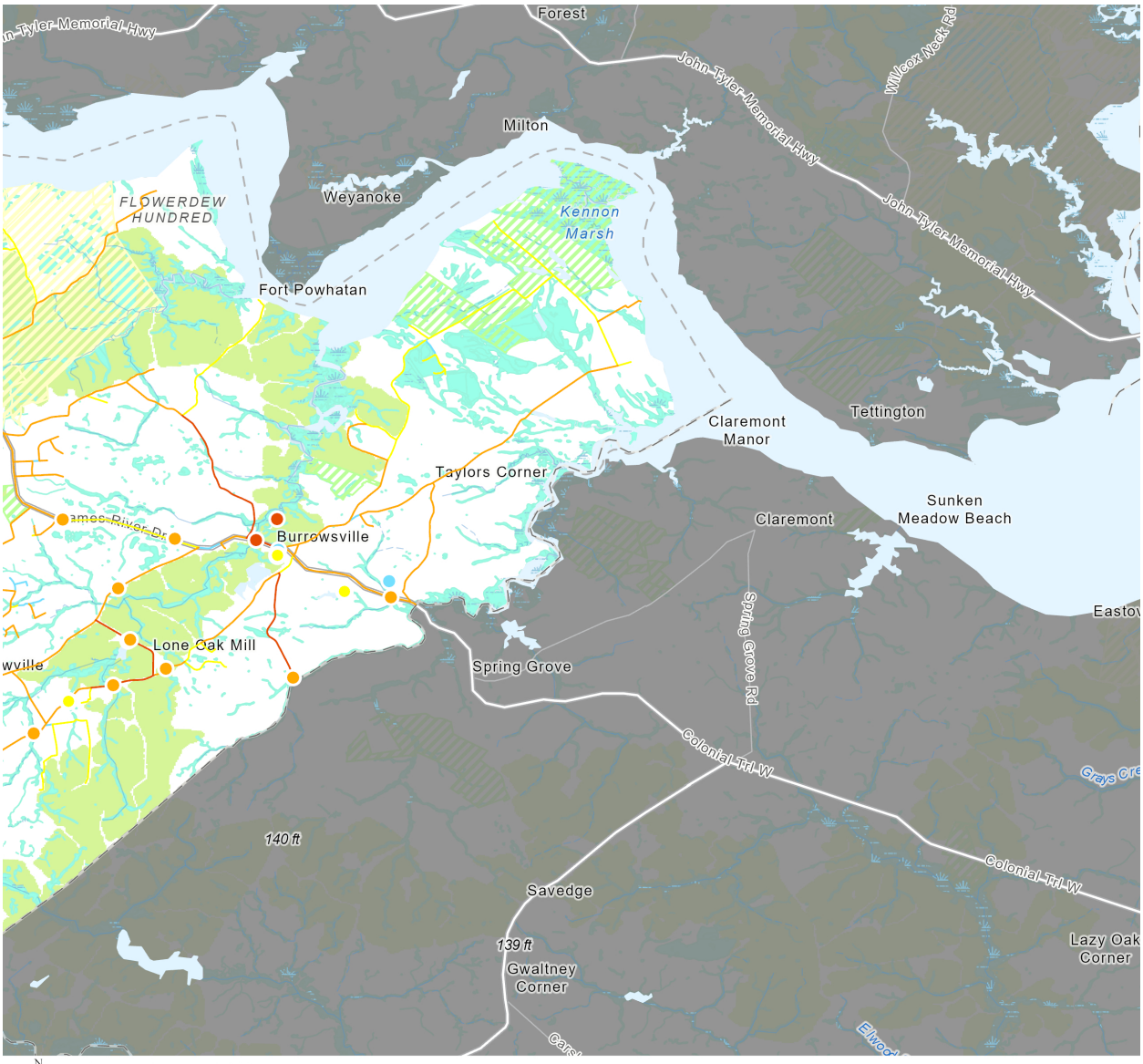


Figure PG.2 Prince George County Asset Vulnerability Map

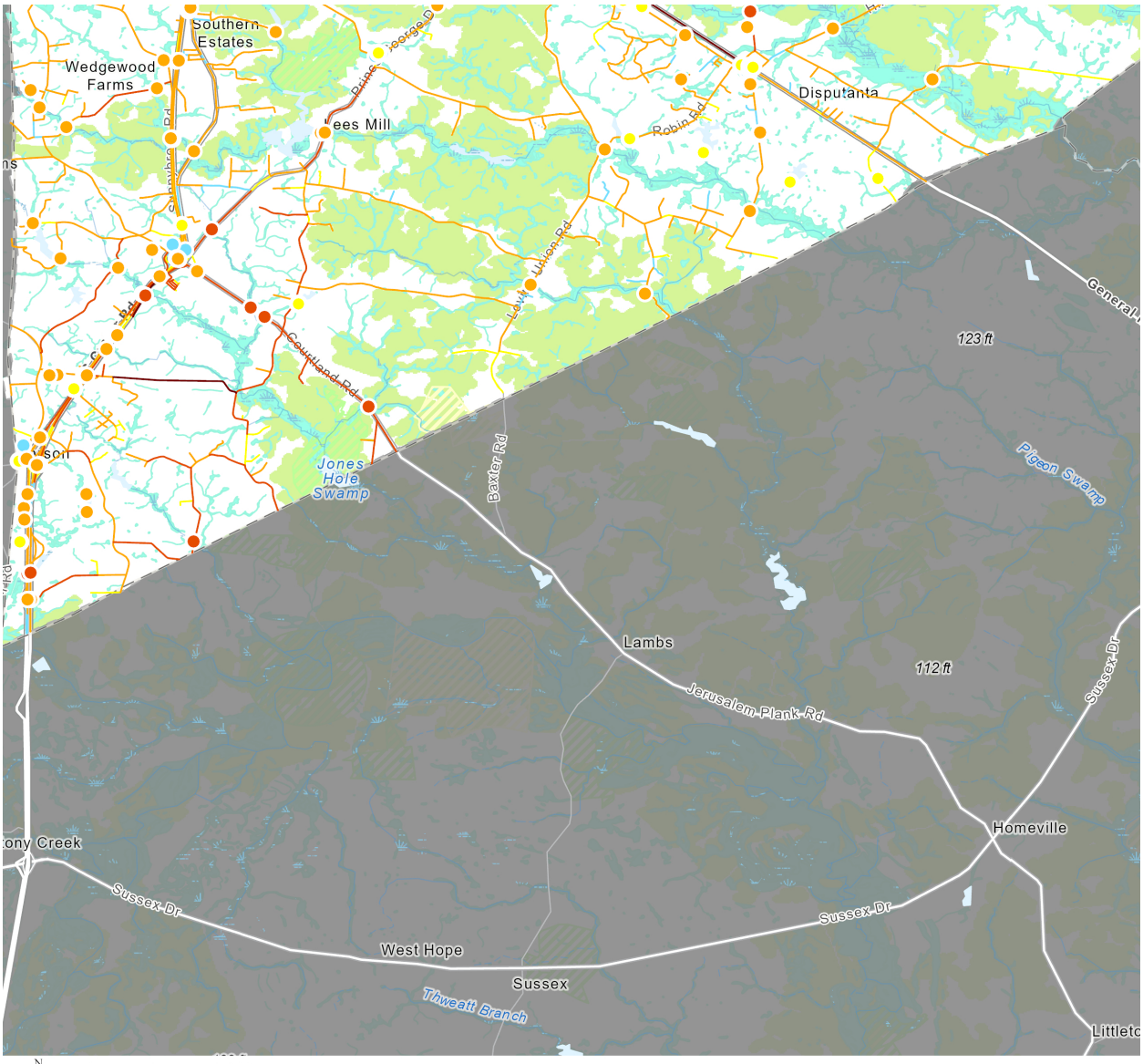


Figure PG.3 Prince George County Asset Vulnerability Map

A total of 583 built infrastructure assets (excluding roadways) and 2640 roadway segments were evaluated. Non-roadway built assets in Prince George County are primarily concentrated in Transportation (39.6%), followed by Communications (25.6%), Government Facilities (13.2%), Emergency Services / Community Assets (6.9%), Food and Agriculture (5.0%), Water and Wastewater (4.5%), Energy (3.4%), Financial Services (1.0%), and Healthcare and Public Health (0.9%). Because asset counts vary significantly by category, the analysis emphasizes the percentage of assets within each category that are ranked as having High or Very High vulnerability. Categories with the greatest proportions of highly vulnerable assets are discussed below. Figure PG.4 illustrates the distribution of vulnerability scores across all asset categories, including roadways.

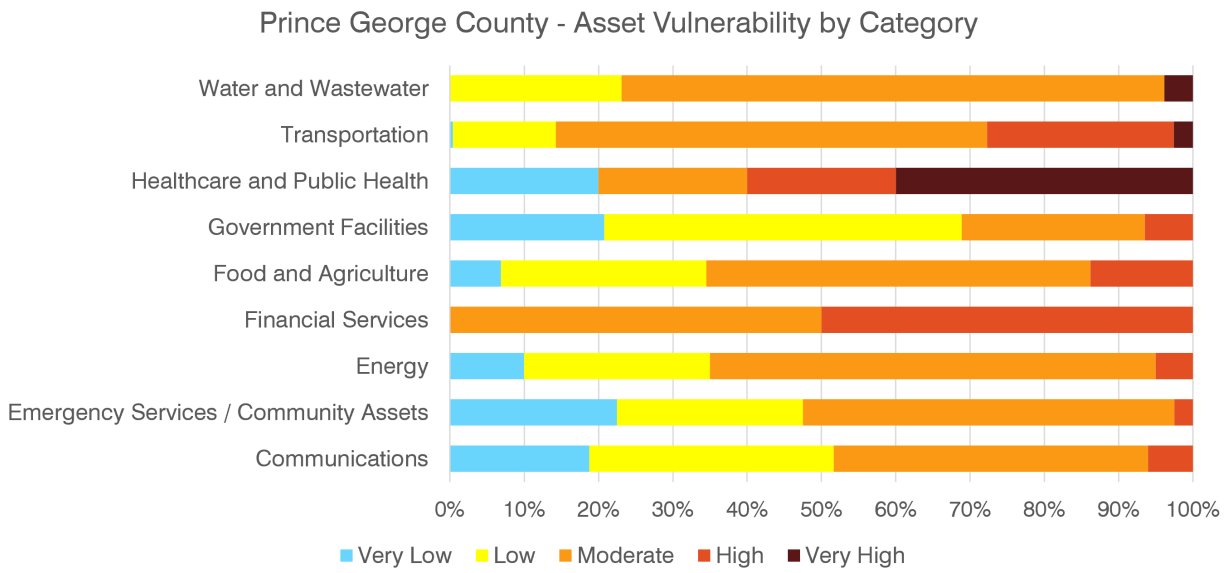


Figure PG.4 Vulnerability Score by Asset Category

PG.7.1 Healthcare and Public Health

Healthcare and Public Health emerged as one of the County's most significant vulnerability concerns. The highest scoring assets in this category included Hometown Drug, Rite Aid Pharmacy 03705, and Prince George Pharmacy. Hometown Drug and Rite Aid Pharmacy, both located on Oaklawn Boulevard, received Very High vulnerability scores due to their exposure to pluvial flooding, riverine flooding, wildfire risk, and elevated social vulnerability. Because pharmacies provide access to medications and essential healthcare services, disruptions during hazard events could have significant impacts on community health and recovery. These findings support actions focused on improving water supply reliability, strengthening utility resilience, and ensuring continuity of critical services during emergencies.

PG.7.2 Financial Services

Financial Services assets also demonstrated elevated vulnerability within Prince George County. Highly vulnerable assets included Truist Bank, Homebase, and CALL (Credit Union), all of which were exposed to pluvial flooding, wildfire, and elevated social vulnerability. Although the category contains relatively few assets, these facilities play an important role in supporting residents, businesses, and post-disaster recovery efforts. Service disruptions could limit access to financial resources and delay recovery activities following hazard events. These findings reinforce the importance of reducing flood risk and improving resilience in developed areas where critical services are concentrated.

PG.7.3 Transportation

Transportation infrastructure emerged as another key vulnerability concern. Highly vulnerable assets included bridges, culverts, and roadway segments throughout the County. Segments of Courthouse Road, Interstate 295 Northbound, Interstate 295 Southbound, and Jefferson Park Boulevard received some of the highest vulnerability scores due to their exposure to pluvial flooding, riverine flooding, wildfire, and extreme heat. A small number of assets were also exposed to coastal flooding. Because these roadways support daily travel, emergency response, freight movement, and access to essential services, disruptions can have cascading impacts across the County. These findings directly informed actions focused on improving roadway connectivity, strengthening emergency access, and addressing stormwater and drainage capacity issues.

The vulnerability assessment findings directly informed Prince George County's resilience actions. Vulnerabilities affecting transportation infrastructure support actions to improve roadway connectivity and emergency access on private roads (PG-3) and assess stormwater capacity while implementing drainage and infrastructure improvements (PG-7). Flood-related risks to healthcare facilities, businesses, and developed areas support efforts to modernize zoning and floodplain ordinances (PG-1) and reduce hazardous materials risks in flood-prone locations (PG-4). Vulnerabilities associated with water infrastructure and public health informed actions to assess water supply resilience (PG-2) and improve water and wastewater treatment system resilience (PG-6). Finally, the County's exposure to flooding and extreme heat supports efforts to incentivize green building practices and expand tree planting countywide (PG-5). Together, these actions address the key vulnerabilities identified through the assessment while improving infrastructure resilience, protecting public health, and supporting Prince George County's long-term resilience goals.

PG.8. Actions

The Crater PDC Regional Resilience Plan contains tailored resilience actions for each of the 11 localities within the Crater PDC, actions for Crater PDC to strengthen local and regional capacity, and consistent region-wide actions each of the 11 localities. The following section only contains tailored actions for Prince George County. Actions that Crater PDC is tasked with pursuing, that may be useful for locality-level support and next steps, as well as, region-wide actions Prince George could pursue are found in Chapter 7. Regional Actions within the Crater PDC Regional Resilience Plan.

Table PG.2 below summarizes the resilience actions developed for Prince George County through the regional resilience planning process. These actions were primarily identified during an Action Development Workshop held in spring 2026 and informed by stakeholder engagement, best practices, the Regional Hazard Mitigation Plan, and relevant comprehensive plans.

Table PG.2 Action Item Key for Prince George County

ID	Action Title	Responsible Entity	Estimated Cost	Priority
PG-1	Modernize Zoning and Floodplain Ordinances to Support Resilient Development	Planning & Zoning Department	Medium (Study/ Capacity Building)	Medium
PG-2	Assess and Strengthen Water Supply Resilience for Private Water Systems	Engineering and Utilities Department	Medium (Project)	Medium
PG-3	Improve Roadway Connectivity and Emergency Access on Private Roads	Planning & Zoning	Medium (Study/ Capacity Building)	Medium
PG-4	Reduce Flood-Related Hazardous Materials Risks	Planning & Zoning	High (Project)	Medium
PG-5	Incentivize Green Building and Tree Planting Countywide	Planning & Zoning	Medium (Study/ Capacity Building)	Medium
PG-6	Improve Water / Wastewater Treatment System Resilience	Engineering & Utilities Department	High (Project)	High
PG-7	Conduct a Stormwater Inventory, Assess System Capacity, and Better Understand Future Impacts + Make Drainage and Stormwater System Improvements Through Grey Infrastructure Upgrades and Green Infrastructure Projects	Environmental Division	High (Project)	High

Action Key

Below is the action key used to develop each of the tailored action descriptions presented in this section of the plan.

Action Components: Key considerations for action development and implementation.

Primary Goals: The broader resilience goal(s) or objective(s) that the action supports. These actions include the following:

- Strengthen Natural Systems and Land Use Resilience
- Improve Hazard Preparedness, Response, and Recovery
- Enhance Data, Tools, and Decision-Making Capacity
- Build Local and Regional Capacity
- Advance Regional Collaboration and Coordination
- Increase Public Awareness and Community Engagement
- Promote Equitable and Resilient Communities
- Strengthen Infrastructure and Built Environment Resilience
- Support Economic Resilience and Workforce Development

Priority Rating: An assessment of the relative importance or urgency of the action in relationship to the other actions in the plan. For these ratings, steering committee feedback throughout the planning process was prioritized. Actions were prioritized based off the capacity and needs assessment, ability to be funded through Virginia CFPF, and best practices. These ratings have not been through a scoring or ranking exercise by the Steering Committee. Localities are encouraged to confirm, adjust, or reprioritize ratings to reflect local conditions, capacity, and funding timelines before using them to sequence implementation or grant applications.

Hazards Addressed: The climate or hazard risks the action is intended to help mitigate or manage. These include the following:

- Flooding (pluvial/rainfall, fluvial/riverine, and/or storm surge)
- Extreme Heat
- Wildfires
- Extreme Storms and/or Winter Weather
- All hazards – *addresses each hazard group*

Estimated Timeline: A general timeframe for implementation (short, medium, or long term) from the action kickoff to end.

- Short-term: 1-2 years
- Medium-term: 2-4 years
- Long-term: 5 or more years

Source: The origin of the action, such as stakeholder input, workshop activities, existing plans, or best practices.

Type of Action: The general action type, or means of implementation that fall under the following:

- Policy and Planning
- Programs and Implementation
- Capital Projects and Infrastructure
- Data, Tools, and Decision Support
- Technical Assistance and Capacity Building
- Regional Coordination and Partnerships
- Public Education and Engagement
- Emergency Preparedness and Response
- Nature-Based Solutions
- Expand Recreational Access to Foster Stewardship
- Residential Adaptation Tool

Responsible Entity: The primary organization or jurisdiction responsible for leading the action.

Potential Partners: Additional agencies, organizations, or stakeholders that could support or collaborate on implementation.

Partner Action: Actions either the PDC, localities, or other listed stakeholders should engage in during or after the action is completed to further maintain or manage desired outcomes.

Potential Funding Sources: Possible state, federal, regional, or local funding mechanisms that could support action implementation, management, or maintenance. Common funding sources for these actions are Virginia Community Flood Preparedness Fund (CFPF) and FEMA Hazard Mitigation Grant (HMG). Identification of a funding source does not guarantee project eligibility, funding availability, award selection, or future program continuity. Funding requirements, priorities, and availability may change over time and should be verified during project development and grant application.

Estimated Cost: A high level cost range (low, medium, high). For capacity building / studies versus project actions, there are two different ranges used depending on the project type.

Cost	Studies / Capacity Building	Projects
Low	Less than $100 k	Less than $750 k
Medium	$100 k to $250 k	$750 k to $1.5 M
High	Greater than $250 k	Greater than $1.5 M

Prince George Action 1 (PG-1): Modernize Zoning and Floodplain Ordinance to Support Resilient Development

Update zoning and floodplain ordinances to align with current flood maps, evolving flood risk, and modern stormwater and resilience best practices. Revise standards related to parking, site design, and construction to allow and incentivize permeable surfaces, green infrastructure, and low impact development techniques. Prioritize protective yet flexible standards within the Chesapeake Bay Preservation Area (CBPA) to reduce runoff, improve water quality, support TMDL compliance, and better safeguard development and critical infrastructure from current and future flood risks.

Action Components:

Review of existing zoning and floodplain ordinance language; integration of FEMA Flood Insurance Maps (FIRMs); revised parking, landscaping, and site layout standards; incentives or requirements for low impact development, green infrastructure, and nature-based solutions.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Promote Nature-Based Solutions
- Protect Public Health and Water Quality

Priority Rating:

Medium.

Hazards Addressed:

Flooding.

Estimated Cost:

Studies/Capacity Building: Medium ($100k to $250k)

Type of Action:

- Policy and Planning
- Nature-Based Solutions

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Responsible Entity:

Prince George Planning & Zoning Department.

Potential Partners:

Crater PDC; Virginia Department of Conservation and Recreation (DCR); Virginia Department of Environmental Quality (DEQ); Chesapeake Bay Foundation.

Partner Action:

Provide ordinance benchmarking, technical review support, and coordination with regional zoning updates.

Source:

Comprehensive Plan; Action Development Workshop

Potential Funding Source:

Virginia Community Flood Preparedness Fund (CFPF); Virginia DEQ Stormwater Local Assistance Fund (SLAF); NFWF Small Watershed Grants Program

Prince George Action 2 (PG-2): Assess and Strengthen Water Supply Resilience for Private Water Systems

Conduct a comprehensive water supply resilience assessment focused on publicly owned water utilities to identify vulnerabilities in reservoirs, treatment facilities, storage, and distribution systems. Use the assessment to guide investments in backup water sources, additional storage, and emergency distribution capabilities to prevent service disruptions during extreme events. For private water supplies, including individual wells, coordinate with the Virginia Department of Health (VDH) and the local Health Department to clarify roles, support monitoring and response, and ensure public health protections during water supply emergencies.

Action Components:

System-wide vulnerability and risk assessment; evaluation of backup water sources; emergency water distribution and response planning; coordination with health officials and well owners.

Responsible Entity:

Prince George Engineering and Utilities Department

Primary Goals:

- Strengthen Infrastructure and Built Environment Resilience
- Protect Public Health and Water Quality
- Improve Hazard Preparedness, Response, and Recovery

Potential Partners:

Crater PDC; Virginia Department of Environmental Quality (DEQ); Virginia Department of Health (VDH).

Priority Rating:

Medium.

Hazards Addressed:

Flooding.

Partner Action:

Assist with vulnerability assessment frameworks and coordinated grant applications.

Estimated Cost:

Project: Medium ($750k to $1.5M)

Source:

Committee Engagement Results, Actions Development Workshop

Type of Action:

- Data, Tools, and Decision Support
- Capital Projects and Infrastructure

Timeline:



Potential Funding Source: Virginia Community Flood Preparedness Fund (CFPF); USDA Rural Development; Drinking Water State Revolving Fund (DWSRF); FEMA BRIC.

Prince George Action 3 (PG-3): Improve Roadway Connectivity and Emergency Access on Private Roads

Develop a roadway connectivity plan to identify priority private roads that require improved access for emergency response, school transportation, and storm recovery. Evaluate options to transition selected roads into public ownership and maintenance or establish shared maintenance agreements where full public acquisition is not feasible. Implementation actions and policy changes would require coordination among departments and formal consideration and approval by the Board of Supervisors.

Action Components:

Inventory of private roads and access constraints; emergency and service priority ranking, evaluation of acquisition and maintenance models; policy recommendations for Board consideration.

Responsible Entity:

Prince George Planning & Zoning

Primary Goals:

- Improve Hazard Preparedness, Response, and Recovery
- Strengthen Infrastructure and Built Environment Resilience
- Advance Regional Collaboration and Coordination

Potential Partners:

Crater PDC; Virginia Department of Transportation (VDOT); Prince George County Engineering and Utilities Department and Planning & Zoning Department.

Priority Rating:

Medium.

Hazards Addressed:

All Hazards.

Partner Action:

Assist with vulnerability assessment frameworks and coordinated grant applications.

Estimated Cost:

Study / Capacity Building: Medium ($100k to $250k)

Source:

Provide planning support, case studies, and funding alignment.

Type of Action:

- Policy and Planning
- Capital Projects and Infrastructure

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Potential Funding Source:

FEMA Hazard Mitigation Grant Program (HMGP); local capital funds.

Prince George Action 4 (PG-4): Reduce Flood-Related Hazardous Materials Risks

Encourage the underground installation, elevation, or flood proofing of hazardous material storage, including fuel tanks, chemical containers, and related infrastructure, in areas subject to flooding. Use zoning standards, floodplain management requirements, and site plan review to minimize the risk of releases during flood events, protect public health and the environment, and reduce post disaster cleanup and recovery costs.

Action Components:

Zoning and floodplain standards updates; enhanced site plan and permit review criteria; facility operator outreach and guidance.

Responsible Entity:

Prince George Planning & Zoning

Primary Goals:

- Protect Public Health and Water Quality
- Strengthen Infrastructure and Built Environment Resilience
- Improve Hazard Preparedness, Response, and Recovery

Potential Partners:

Crater PDC; Virginia Department of Environmental Quality (DEQ)

Priority Rating:

Medium.

Hazards Addressed:

Flooding.

Partner Action:

Provide ordinance language examples and regulatory coordination support.

Estimated Cost:

Project: High (Greater than $1.5M)

Type of Action:

- Policy and Planning
- Capital Projects and Infrastructure; Programs and Implementation

Source:

Action Development Workshop

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Potential Funding Source:

Virginia CFPF; FEMA Flood Mitigation Assistance (FMA) and Mitigation Grant Program (HMGP).

Prince George Action 5 (PG-5): Incentivize Green Building and Tree Planting Countywide

Establish countywide incentives to encourage green building practices and expanded tree planting on public and private properties. Incentives may include expedited permitting, fee reductions, density or parking flexibility, tax abatements, or grant programs for projects that incorporate energy efficient design, low impact development practices, and increased tree canopy. Prioritize incentives that support native tree planting, urban canopy expansion, stormwater management, and heat mitigation, particularly in underserved and heat vulnerable areas, to advance environmental performance and long term community resilience.

Action Components:

Incentive framework development; tree canopy and native planting guidelines; outreach and participation tracking.

Responsible Entity:

Prince George Planning & Zoning

Primary Goals:

- Promote Nature-Based Solutions
- Promote Equitable and Resilient Communities
- Strengthen Natural Systems and Land Use Resilience

Potential Partners:

Crater PDC; Virginia Department of Forestry (VDOF); Virginia Cooperative Extension; local health department; community organizations.

Priority Rating:

Medium.

Hazards Addressed:

Flooding & Extreme Heat

Partner Action:

Share regional heat vulnerability and canopy coverage data; provide guidance on species selection and urban forestry best practices; assist with identification of funding opportunities and coordination with state forestry.

Estimated Cost:

Study / Capacity Building: Medium ($100k to $250k)

Type of Action:

- Policy and Planning
- Nature-Based Solutions
- Programs and Implementation

Source:

Action Development Workshop

Timeline:



Potential Funding Source: Virginia Department of Forestry urban forestry grants (including DOF arborist position grants); USDA Urban and Community Forestry Program; Virginia Community Flood Preparedness Fund (CFPF); EPA Environmental Justice grants.

Prince George Action 6 (PG-6): Improve Water / Wastewater Treatment System Resilience

Enhance the resilience of water and wastewater treatment systems serving the County, the Town of McKenney, and select private subdivisions to provide reliable operation during power outages, flooding, and extreme weather events. This action will focus on strengthening system redundancy and operational continuity through the installation of permanent backup generators, development of additional or backup wells, and targeted upgrades to critical system components. Improvements will reduce the risk of service interruptions, protect public health, and support rapid recovery following hazard events.

Action Components:

Backup power systems; redundant wells and infrastructure; emergency operations planning.

Responsible Entity:

Prince George County Engineering & Utilities Department.

Primary Goals:

- Strengthen Infrastructure and Built Environment Resilience
- Protect Public Health and Water Quality
- Improve Hazard Preparedness, Response, and

Potential Partners:

Crater PDC; Town of McKenney; private subdivision utility operators.

Priority Rating:

High.

Hazards Addressed:

Flooding & Extreme Weather

Partner Action:

Assist Prince George County and partner systems with identifying funding opportunities, coordinating regional infrastructure strategies, and supporting grant applications and interjurisdictional planning efforts.

Estimated Cost:

Project: High (Greater than $1.5M)

Type of Action:

- Capital Projects and Infrastructure
- Emergency Preparedness and Response
- Programs and Implementation

Source:

Action Development Workshop

Timeline:



Potential Funding Source: USDA Rural Development Water and Waste Disposal Programs; FEMA BRIC; Drinking Water State Revolving Fund (DWSRF).

Prince George Action 7 (PG-7): Conduct a Stormwater Inventory, Assess System Capacity, and Better Understand Future Impacts + Make Drainage and Stormwater System Improvements Through Grey Infrastructure Upgrades and Green Infrastructure Projects

Study capacity of existing stormwater system components, including culverts and other structures, to determine if sizing is sufficient for current and future flooding and precipitation conditions. Identify and replace vulnerable or undersized structures with bridges, larger culverts or other measures to reduce flood hazards. Implement program for regular inspections and maintenance of roadside ditches and stream channels. Encourage green infrastructure / nature-based solutions where possible.

Action Components:

Complete an infrastructure capacity study. Identify deficiencies, aging infrastructure, and high-priority areas for maintenance or replacement. Incorporate findings into the capital improvement plan.

Primary Goals:

- Strengthen Infrastructure and Built Environment Resilience.
- Improve Hazard Preparedness, Response, and Recovery

Priority Rating:

High.

Hazards Addressed:

Flooding.

Estimated Cost:

Project: Medium ($750k - $1.5M).

Type of Action:

- Programs and Implementation
- Data, Tools, And Decision Support

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Responsible Entity:

Prince George County Environmental Division.

Potential Partners:

Crater PDC; Virginia Department of Transportation (VDOT); Virginia Department of Environmental Quality (DEQ).

Partner Action:

Assist with data analysis; prioritization, and funding alignment.

Source:

Action Development Workshop.

Potential Funding Source:

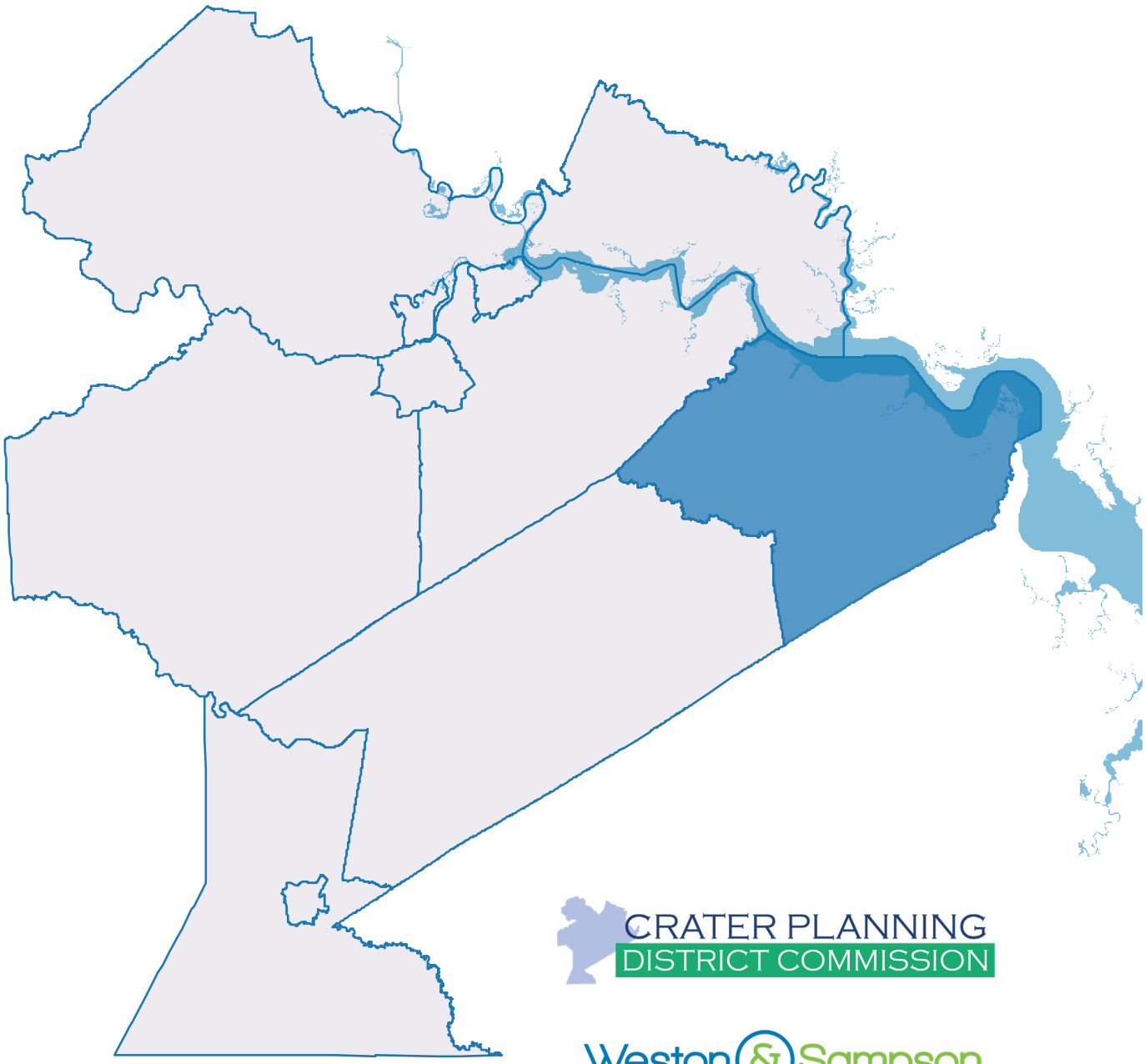
Virginia Community Flood Preparedness Fund (CFPF) - Study / Project Funding

Surry County

Resilience Plan

Version 1.0 | September 2026

Locality Chapter of the Crater PDC Regional Resilience Plan



CRATER PLANNING DISTRICT COMMISSION

Weston & Sampson

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This chapter presents the locality-specific resilience objectives for Surry County as part of Chapter 8: Locality Resilience Plans of the Crater PDC Regional Resilience Plan. It provides a structured overview of local conditions, risks, and actions to support resilience planning and implementation.

8.10 SURRY COUNTY RESILIENCE PLAN

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For additional context on regional priorities, cross-jurisdictional strategies, and Crater PDC–wide resilience objectives, users should refer to the comprehensive Crater PDC Regional Resilience Plan, of which this chapter is one locally focused component. Other components of the plan include:

- Regional vision, goals, and a planning framework for resilience across the Crater Planning District.
- A regional profile describing environmental, economic, infrastructure, and community characteristics.
- An assessment of existing local and regional resilience plans and initiatives.
- A capacity-building roadmap identifying institutional, technical, and organizational needs.
- Results from regional steering committee engagement and workshops.
- A regional vulnerability assessment, including an asset inventory, methodology, and findings.
- Regional actions for implementation by Crater PDC and cross-jurisdictional actions applicable to all localities.
- A regional debris management strategy to support post-disaster response and recovery.
- A plan maintenance framework and supporting appendices.

SR.1. Introduction and Vision

Surry County's development has been shaped by its long relationship with the James River and its role as a working landscape that has supported agriculture, forestry, and river-based commerce since the seventeenth century. The county was established in 1652, separating from James City County, and evolved around plantation agriculture and timber production that relied on river access for transportation and trade (Virginia Department of Historic Resources). The James River functioned as a primary corridor for early settlement and economic activity, influencing where farms, landings, and communities developed and reinforcing dispersed land use patterns that remain evident today (National Park Service).

County planning priorities focus on preserving rural character, protecting natural resources, and directing limited growth to areas that can be supported by existing infrastructure and services. The Surry County Comprehensive Plan emphasizes farmland preservation, environmental protection, and coordination with regional partners to address infrastructure needs, hazard mitigation, and long-term resilience (Surry County, 2026).

As a part of the visioning process for the Crater PDC Regional Resilience Plan, steering committee members from Surry County developed the following vision statement:

> ***We envision a sustainable Surry County that values its natural resources, its people, and a local government rooted in connection, collaboration, and community pride.***

SR.2. Demographics

Surry County has a population of approximately 6,561 residents. The county's median age is 50.4 and about 25.5 percent of residents are age 65 or older, indicating an older population compared to the state average (ACS 5-Year Estimates). The median household income in the county is approximately $78,041, which is substantially lower than the statewide median of $92,090, and 10.5 percent of residents live below the poverty line. Homeownership is relatively high at 79.5 percent, while median gross rent remains comparatively low at $983 per month, reflecting a housing market dominated by owner-occupied single-family homes and limited rental supply (U.S. Census Bureau, Decennial Census, 2020).



Nearly 80% of homes in the county are owner-occupied, reflecting a housing market dominated by single-family homeownership.

Table SR.1 U.S. Census Bureau Statistics Comparison.

U.S. Census Bureau Statistic	Surry County	Crater PDC	Virginia
Land area	278.9 square miles	2,487.5 square miles	39,481.4 square miles
Population and people			
Total Population	6,561	556,840	8,631,393
Median Age	50.4	40.9	39.4
Population that is 65 years and older	25.5%	18.6%	17.6%
Without Health Care Coverage	3.1%	6.4%	6.9%
Income and Poverty			
Median Household Income	$78,041	$69,698	$92,090
Poverty	10.5%	12.9%	9.7%
Education			
Bachelor's Degree or Higher	27.1%	22.3%	43.3%
School Enrolled Population in Kindergarten to 12th Grade	65.6%	70.7%	65.6%
Employment			
Local, State, and Federal Gov. Workers	22.8%	20.7%	20.6%
Avg. Travel Time to Work	41.8 min	29.3 min	28.3 min
Employment Rate	57.2%	53.6%	61.1%
Housing			
Median Gross Rent	$983	$1,177	$1,646
Homeownership Rate	79.5%	66.5%	67.1%
Total Housing Units	3,451	232,007	3,746,211
Total Households	2,830	217,220	3,449,307
Families and Living Arrangements			
Children under 18 years old	17.0%	20.6%	21.3%

U.S. Census Bureau Statistic	Surry County	Crater PDC	Virginia
Race and Ethnicity			
American Indian and Alaska Native alone	19	2,822	40,007
Asian alone	14	15,795	615,436
African American	2,694	163,453	1,607,581
Hispanic or Latino (of any race)	149	52,020	908,749
Native Hawaiian and Other Pacific Islander alone	10	491	7,156
Not Hispanic or Latino	3,459	294,878	5,058,363
Some Other Race	54	28,897	446,650
Two or More Races	287	37,564	705,707
White	3,483	302,764	5,208,856

Source: U.S. Census Bureau 2020 Decennial Census.

SR.3. Challenges and Strengths

Surry County faces several challenges that influence its long-term resilience planning. Its low-density development pattern and limited infrastructure increase the cost and complexity of maintaining roads, utilities, and emergency services across a large geographic area. An aging population and higher poverty rate compared to the statewide average may further increase vulnerability during extreme weather events and limit household capacity to prepare for and recover from disruptions. The regional capacity and needs assessment also identified staffing constraints common to smaller localities, which can limit the county's ability to pursue specialized resilience initiatives and competitive grant opportunities (Surry County, 2026).

At the same time, Surry County has significant strengths that support resilience planning. Extensive agricultural and forested lands provide natural stormwater absorption, flood mitigation benefits, and ecosystem services that reduce exposure to flooding and extreme heat. The county's location along the James River, combined with large areas of undeveloped land, presents opportunities to integrate conservation-based and nature-based resilience strategies. Participation in regional coordination through Crater PDC strengthens access to technical assistance, shared planning resources, and funding opportunities that can support long-term infrastructure and hazard mitigation efforts (Surry County, 2026).

SR.4. Capacity and Needs

One of the first steps within the planning process for the Crater PDC Regional Resilience Plan was performing a capacity and needs assessment for resilience planning. The capacity strengths and challenges revealed within the capacity and needs assessment were integrated into actions for Crater PDC to initiate and next steps for localities. These actions can be found in Chapter 4. Capacity Building Roadmap and serve as foundational actions Crater PDC and localities should pursue in tandem with the other actions within this plan. This survey was directly informed by the capacity and needs assessment questionnaire provided during the beginning of the planning process, which gathered detailed input from local staff on existing roles, resource gaps, technical needs, and challenges related to climate resilience, funding, infrastructure, and intergovernmental coordination. This section provides a snapshot summary of Surry County's identified challenges as they relate to resilience planning.

POLICY & PLANNING



Land Use, Zoning Ordinances, and Plans

- Wetland Floodplain Ordinance
- RPA
- Stormwater Measures

Would benefit from comprehensive plan resilience strategies.

Identified Barriers for Resilience Efforts

- Technical expertise and staffing

REGIONAL COORDINATION & SUPPORT



Coordinates with Crater PDC and DEQ.

Identified Support Needs

- Infrastructure and engineering expertise
- Grant writing and funding support
- Data & mapping tools
- Training programs and capacity building
- Resilience planning and policy guidance

INFRASTRUCTURE & OPERATIONS



Participates in FEMA emergency response training.

FINANCIAL RESOURCES

Identified Financial Challenges

- Limited local funding
- Lack of matching funds
- Staff capacity to carry out projects
- Financial constraints of property owners undertaking development

HUMAN & INSTITUTIONAL CAPACITY

Relevant Staff Positions
Planning Staff, Environmental Specialist, Fire / Emergency Services

Relevant Departments
Development – Zoning, Environmental / Conservation

Identified Staff Capacity Needs
- Additional full-time staff
- Consultants / contracted services

TECHNICAL ASSISTANCE & TRAINING NEEDS

Climate Resilience Data / Tools Used
- FEMA Flood Insurance Rate Maps (FIRMs)
- RPA
- RMA
- CBRA Wetland Inventory

Identified Training & Technical Needs
- GIS mapping and data analysis for flood risk assessment
- Assessment of critical asset vulnerabilities
- Grant writing and funding strategy support
- Development of local resilience planning recommendations
- Policy and ordinance development for resilience
- Emergency response planning

DISASTER RESPONSE CAPACITY

Emergency Operations or Disaster Response
Regional Hazard Mitigation Plan (2022)

Responsible Agencies / Departments
Emergency Management; Fire / Rescue

Enrollment in FEMA Community Rating System
Not currently enrolled.

Identified Challenges for Disaster Response
- Staffing shortages
- Need for improved coordination with neighboring localities

Identified Disaster Response Needs
- Additional response resources (e.g., shelters, backup power, rescue vehicles)
- Increased funding for emergency preparedness
- Improved coordination with regional and state agencies
- Post-disaster recovery planning support

SR.5. Overview of Environmental Conditions

Surry County is a predominantly rural jurisdiction characterized by gently rolling terrain that becomes increasingly flat toward the eastern portions of the County. Approximately 75 percent of the County is forested, and forestry and agriculture have historically supported much of the local economy. Land use throughout Surry County reflects its rural character, with extensive agricultural areas and limited urban development (Plan RVA; Crater PDC, 2022).

Flooding is a recurring environmental concern due to the County's location within the Coastal Plain, where flat terrain and limited drainage capacity allow rainfall to accumulate during prolonged or intense storm events. Much of the land within mapped floodplains is designated for agricultural use, though some residential development also occurs in these areas. Between



Surry County experienced 22 flood events between 1993 and 2020, resulting in approximately $1.5M in property damage.

1993 and October 2020, Surry County experienced 22 flood events, resulting in approximately $1.46 million in property damage and $750,000 in crop damage. Flood risk is exacerbated during tropical systems, which can produce heavy rainfall over short periods and contribute to both riverine flooding and storm surge impacts. During Hurricane Isabel, storm surge pushed inland and flooded areas such as Claremont and Sunset Beach, illustrating the County's exposure to both coastal and inland flood hazards (Plan RVA; Crater PDC, 2022).

Surry County is also vulnerable to severe weather events, including tropical storms and tornadoes. Tropical Storm Isaias (August 2020) caused power outages, road closures, and approximately $100,000 in property damage within the County. Tornadoes, while relatively infrequent, present a high impact risk, particularly in rural areas with mobile homes. Since 1950, Surry County has experienced nine documented tornado events, including a destructive EF 1 tornado in February 2016 that damaged homes and destroyed mobile homes near Waverly. Regional analyses indicate an increasing trend in tornado occurrences in areas with a high concentration of mobile homes, including Surry County, underscoring the importance of resilience strategies that address rural housing vulnerability, emergency access, and severe weather preparedness (Plan RVA; Crater PDC, 2022).



Tornadoes present a high impact risk in rural areas with mobile homes.

SR.6. Floodplain Management and Flood Risk Identification

As part of the Virginia Department of Conservation and Recreation (DCR) Resilience Plan requirements, localities must document administrative procedures for tracking and managing Substantial Improvement (SI) and Substantial Damage (SD) determinations for structures located within Special Flood Hazard Areas (SFHAs), as well as identify Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties. This section summarizes these requirements as they relate to Surry County and highlights the relevant provisions contained within the County's floodplain ordinance, associated regulatory documents, and information documented in the PlanRVA–Crater PDC Multi-Regional Hazard Mitigation Plan (2022). The purpose of this review is to verify the County's existing administrative framework and identify opportunities to strengthen floodplain management and support long-term resilience planning efforts.

Why it matters: Identifying and tracking flood-prone properties helps communities better understand flood risk, prioritize mitigation investments, reduce future damages, strengthen resilience, and guide long-term land use and development decisions.

SR.6.1 Floodplain Ordinance and Regulatory Framework

Surry County has adopted a comprehensive floodplain management ordinance through Appendix A – Zoning, Article III, Section 3 1500 – Floodplain District, which is aligned with the requirements of the National Flood Insurance Program (NFIP) and authorized under Virginia Code § 15.2 2280. The ordinance regulates development within FEMA mapped Special Flood Hazard Areas (SFHAs) using the Flood Insurance Rate Maps (FIRMs) and Flood Insurance Study (FIS) dated April 6, 2022, along with subsequent revisions, which are formally incorporated as the regulatory basis for floodplain management within the County.

The ordinance designates the Planning and Community Development Director, or designee, as the Floodplain Administrator responsible for administering and enforcing floodplain regulations. Responsibilities include permit review, interpretation of floodplain boundaries, coordination with federal and state agencies, inspection and enforcement activities, recordkeeping, and maintaining compliance with NFIP requirements. The ordinance explicitly allows the use of best available federal, state, and local data where FEMA data is limited and requires submission of updated hydrologic and hydraulic data to FEMA within six months of any physical changes affecting flood conditions.

Surry County's ordinance meets NFIP minimum standards and incorporates several strengthened provisions for floodplain management. A minimum of 18 inches (1.5 feet) of freeboard above the base flood elevation is required for residential and nonresidential structures in most flood zones, providing an added margin of safety. The ordinance applies a "no rise" standard within floodways, requiring that development demonstrate through hydrologic and hydraulic analysis that no increase in base flood elevation will occur unless FEMA approval is obtained through a Conditional Letter of Map Revision (CLOMR). For areas with base flood elevations but no

designated floodway, cumulative development impacts must not increase flood elevations by more than one foot. It also requires detailed analysis for development in approximated floodplain areas (Zone A), including determination of base flood elevations using accepted engineering methods when not otherwise provided.

The ordinance establishes comprehensive construction and design standards, including requirements for anchoring structures, use of flood resistant materials, protection of utilities, and elevation or floodproofing of structures. It provides detailed regulatory criteria across multiple floodplain districts, including floodway areas, AE and AH zones, approximated A zones, shallow flooding areas (AO), Coastal A Zones, and high hazard V and VE zones, each with tailored elevation, design, and use restrictions. Additionally, the ordinance includes standards for subdivision design, manufactured homes, accessory structures, and infrastructure placement to minimize flood risk and damage.

Clear thresholds are established for substantial improvement and substantial damage, defined as 50 percent of a structure's market value, requiring structures meeting this threshold to be brought into full compliance with current floodplain standards. The ordinance emphasizes long term risk reduction by restricting noncompliant repairs, requiring permits for post damage reconstruction, and enforcing compliance through inspections and penalties for violations. Variance procedures are included but are limited and require demonstration that flood risk will not increase, that no additional threats to public safety will occur, and that the variance represents the minimum necessary relief.

The ordinance provides a comprehensive and technically robust framework for regulating floodplain development in Surry County. It incorporates FEMA mapping, best available data, engineering analyses, and detailed administrative oversight to reduce flood risk. While the ordinance exceeds NFIP minimum standards in several areas, including enhanced freeboard and technical review requirements, it continues to rely primarily on FEMA FIRMs as the baseline regulatory tool and does not explicitly reference participation in the Community Rating System (CRS).

SR.6.2 Flood Risk Identification SFHAs

Repetitive loss (RL) properties are structures that have experienced multiple instances of flood-related damage over time. Under the National Flood Insurance Program (NFIP), a repetitive loss property is defined as a property for which two or more flood insurance claims of at least $1,000 have been paid within any 10-year period.

Severe repetitive loss (SRL) properties represent a subset of these structures and indicate a higher level of risk and recurring damage. These properties are defined as those that have either:

- At least **four NFIP** claims exceeding $5,000 each, or
- At least **two claims** where the total payouts exceed the building's value.

i

Repetitive loss (RL) properties are structures that have experienced multiple instances of flood-related damage over time.

While NFIP data tracks many RL and SRL properties, these designations may not capture all instances of recurring flood impacts. Repetitive flooding can and often does occur outside of mapped Special Flood Hazard Areas (SFHAs), particularly due to stormwater, drainage issues, or localized flooding. As a result, communities are encouraged to identify, track, and address all repetitive flood impacts, regardless of NFIP designation, to better understand risk patterns and inform mitigation strategies. According to the Richmond-Crater Hazard Mitigation Plan (2022), Surry County has no RL and SRL as defined by the NFIP. There are no known RL and SRL properties outside of the Special Flood Hazard Areas (SFHA) as well.

SR.7. Vulnerability Assessment Results

Another foundational element of the Crater PDC Regional Resilience Plan was a region-wide vulnerability assessment performed across the Crater region. The vulnerability assessment results in this section have been parsed out to only include findings relevant to Surry County. The vulnerability assessment conducted for the Crater PDC Regional Resilience Plan evaluated how each locality is exposed to multiple hazards, including rainfall (pluvial) flooding, riverine (fluvial) flooding, storm surge, extreme heat, and wildfire risk. The vulnerability assessment also evaluated sensitivity through the social vulnerability index. The vulnerability assessment for Surry County identified pluvial flooding, riverine flooding, and wildfire as the primary risks to critical assets. Assets were also exposed to heat. There was minimal exposure to coastal flooding in Surry County.

For the methodology of this vulnerability assessment, including data sources, indicator selection, and scoring, please refer to Appendix B. Vulnerability Assessment Methodology and Scoring Framework. For the region-wide assessment and hazard information, please refer to Chapter 6. Vulnerability Assessment.

Vulnerability in Surry County is not evenly distributed across the county. The asset vulnerability maps (Figures SR.1 - 4) show higher concentrations of High and Very High vulnerability assets along the James River corridor (Cobham Bay, Sunken Meadow Beach, Pleasant Point), near the Town of Surry, and along the Route 10 transportation corridor. These areas contain concentrations of transportation infrastructure, utilities, community facilities, and public assets exposed to one or more climate hazards. Additional vulnerable assets occur where shoreline environments,

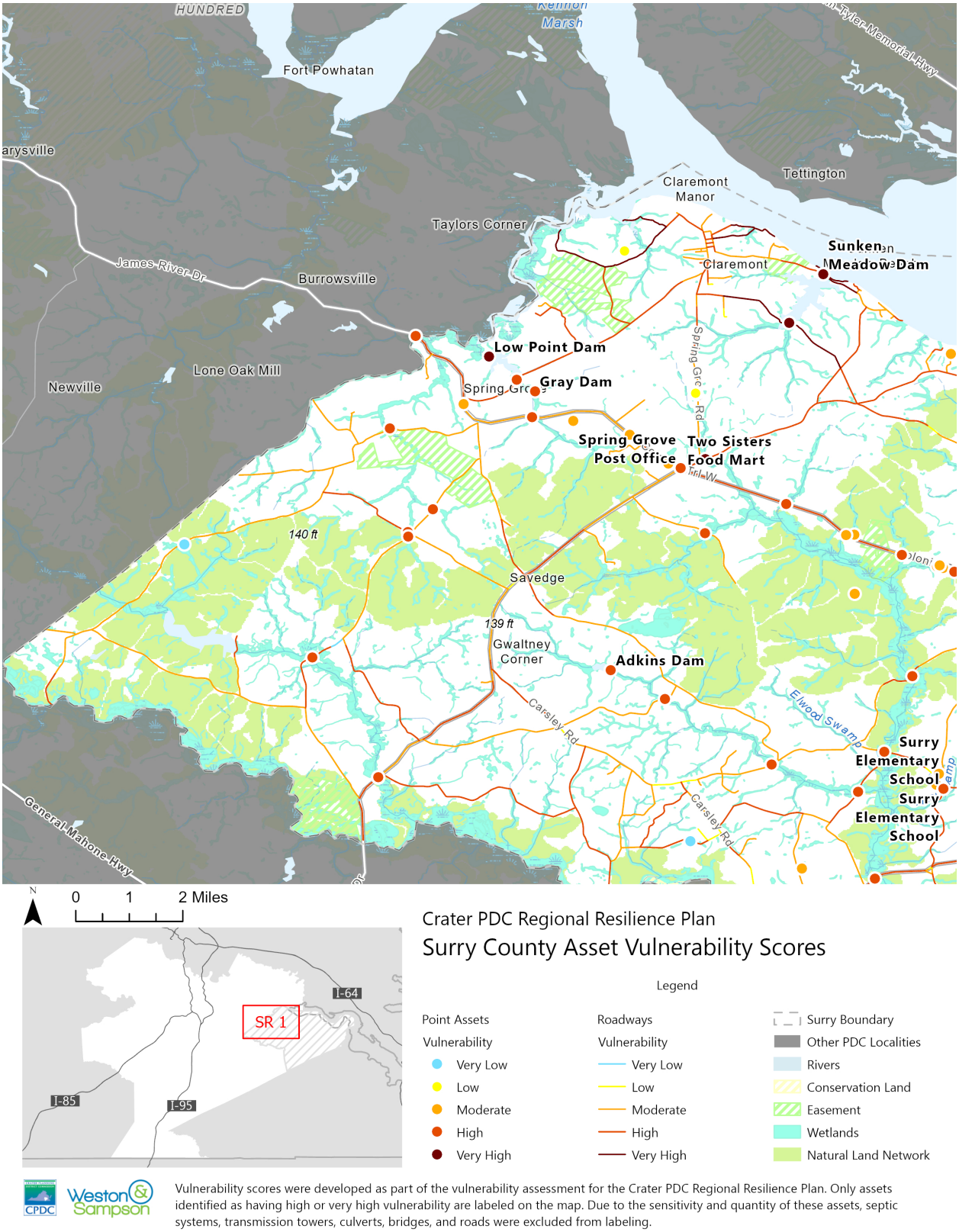


Figure SR.1 Surry County Asset Vulnerability Map



Vulnerability scores were developed as part of the vulnerability assessment for the Crater PDC Regional Resilience Plan. Only assets identified as having high or very high vulnerability are labeled on the map. Due to the sensitivity and quantity of these assets, septic systems, transmission towers, culverts, bridges, and roads were excluded from labeling.

Figure SR.2 Surry County Asset Vulnerability Map

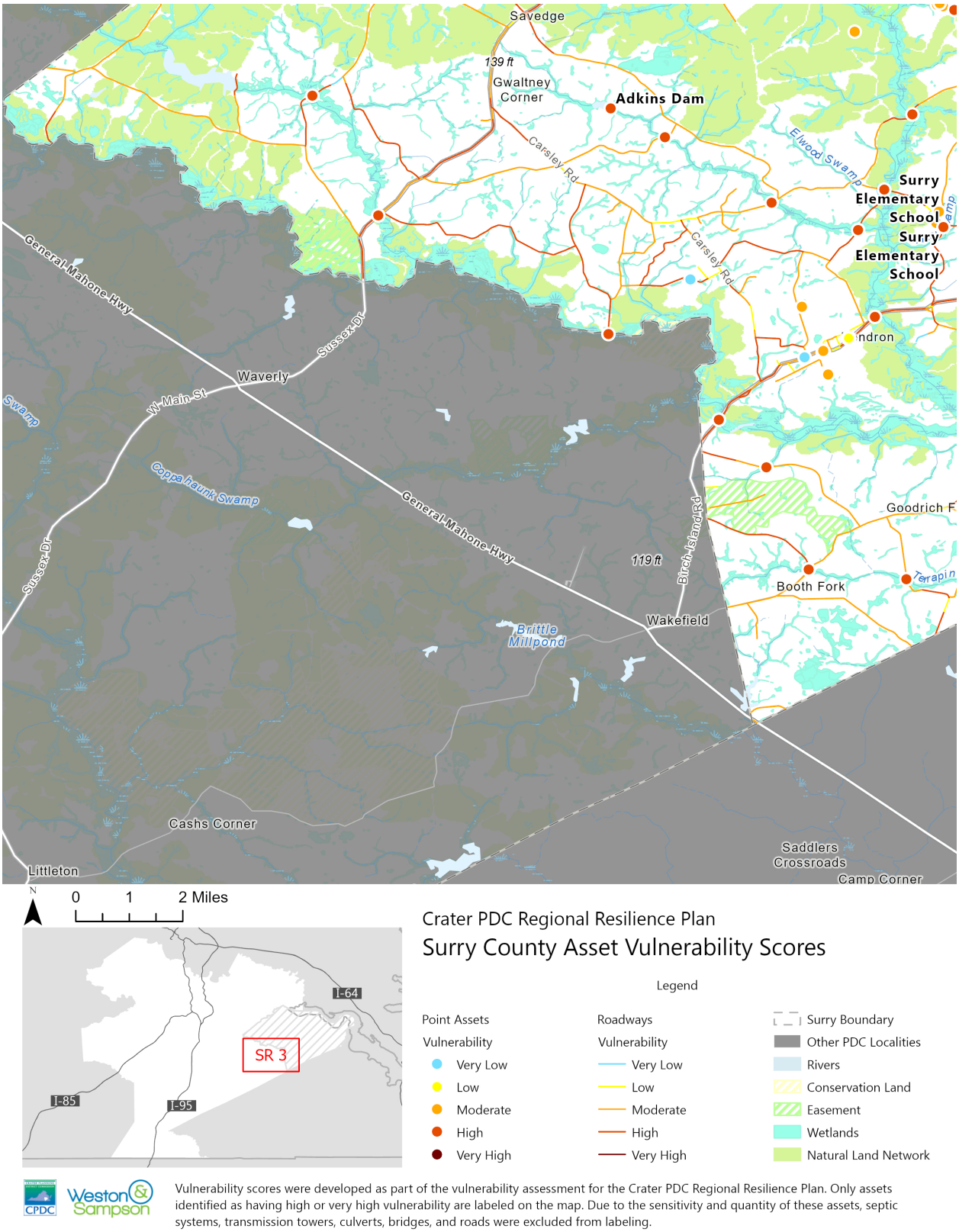
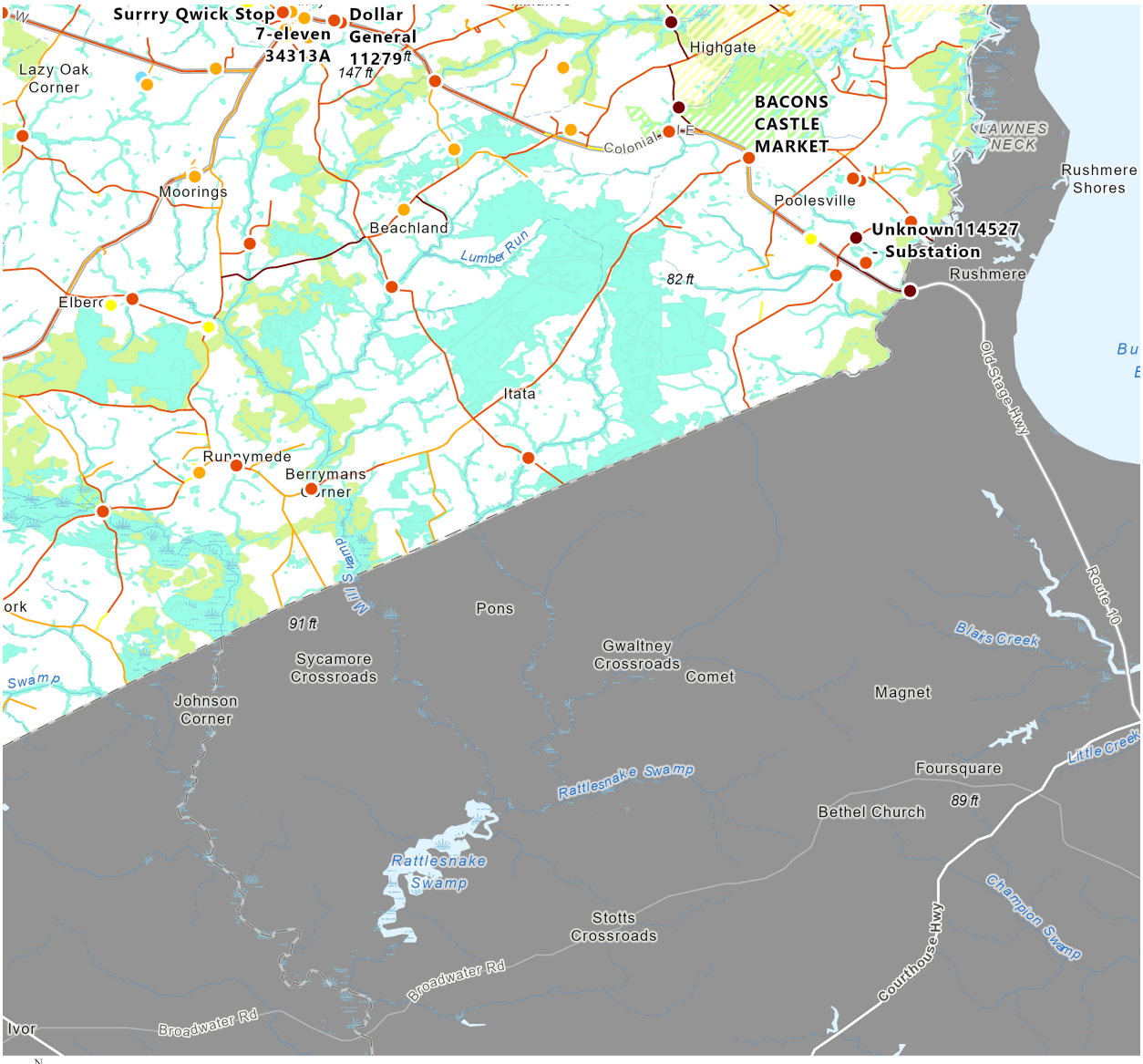


Figure SR.3 Surry County Asset Vulnerability Map



Vulnerability scores were developed as part of the vulnerability assessment for the Crater PDC Regional Resilience Plan. Only assets identified as having high or very high vulnerability are labeled on the map. Due to the sensitivity and quantity of these assets, septic systems, transmission towers, culverts, bridges, and roads were excluded from labeling.

Figure SR.4 Surry County Asset Vulnerability Map

A total of 964 built infrastructure assets (excluding roadways) and 763 roadway segments were evaluated. Non-roadway built assets in Surry County are primarily concentrated in Transportation category (48.3%), followed by Communications (24.4%), Government Facilities (11.4%), Emergency Services / Community Assets (6.5%), Food and Agriculture (5.0%), Water and Wastewater (2.0%), Energy (1.0%), Healthcare and Public Health (1.0%), and Financial Services (0.5%). Because asset counts vary significantly by category, the analysis emphasizes the percentage of assets within each category that are ranked as having High or Very High vulnerability. Categories with the greatest proportions of highly and very highly vulnerable assets are discussed below. Figure SR.5 illustrates the distribution of vulnerability scores across all asset categories, including roadways.

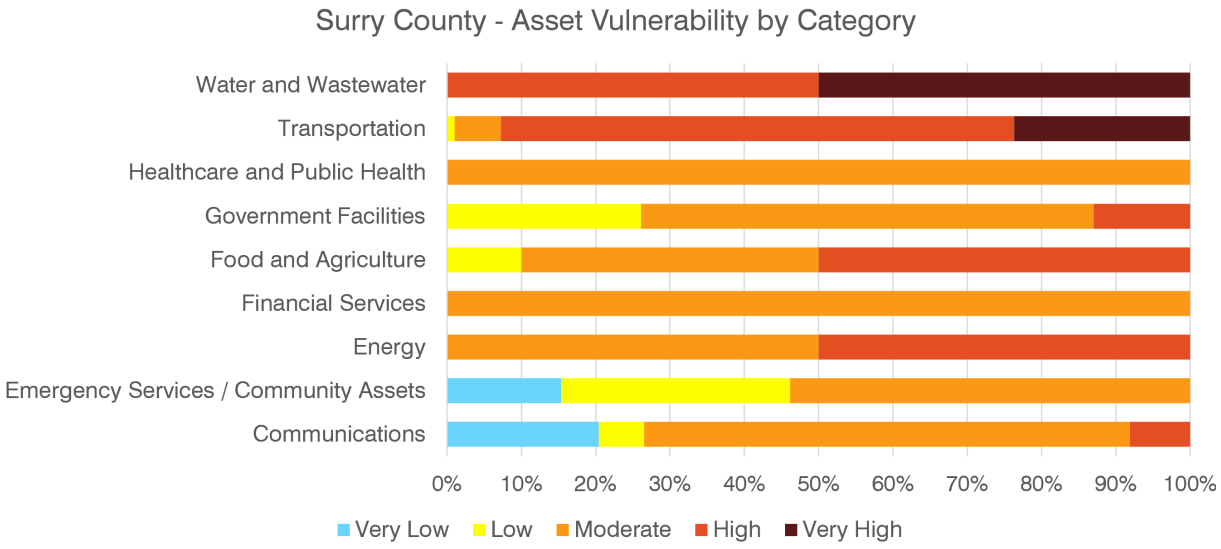


Figure SR.5 Vulnerability Score by Asset Category

SR.7.1 Water and Wastewater

Water and wastewater infrastructure emerged as Surry County's most significant vulnerability concern. The highest scoring assets in this category were dams, including Sunken Meadow Dam and Low Point Dam, which received Very High vulnerability scores, as well as Gray Dam and Adkins Dam, which scored High vulnerability. These assets are exposed to pluvial and riverine flooding, while the highest-scoring dams are also vulnerable to coastal flooding. Because these facilities play an important role in water management and public safety, disruptions or failures could have widespread impacts on surrounding communities and environmental resources. These findings support actions focused on protecting water quality, improving septic system resilience, and reducing shoreline and flood-related risks.

SR.7.2 Food and Agriculture

Food and Agriculture assets also demonstrated elevated vulnerability within Surry County. Highly vulnerable assets included SNAP retailers such as Bacons Castle Market, Two Sisters Food Mart, Surry Qwick Stop, Dollar General 11279, and 7-Eleven 34313A. These facilities were exposed to pluvial flooding and wildfire and were located in areas with elevated social vulnerability.

Because these businesses provide access to food and essential goods for residents, disruptions during hazard events could affect food security and community recovery. These findings support actions focused on climate-smart agriculture, farmland preservation, and strengthening local food systems.

SR.7.3 Energy

Energy infrastructure emerged as another key vulnerability concern, despite having a small share of Surry County's assets. The highest scoring asset in this category was the Unknown 114527 Substation, which was exposed to pluvial flooding, wildfire, and elevated social vulnerability. Although the category contains relatively few assets, energy facilities are critical to maintaining reliable electric service for residents, businesses, and emergency operations. Service disruptions could have cascading impacts across multiple sectors during hazard events. These findings highlight the importance of land use planning, infrastructure resilience, and natural resource protection efforts that reduce future hazard exposure.

The vulnerability assessment findings directly informed Surry County's resilience actions. Vulnerabilities affecting water infrastructure and flood-prone areas support actions focused on nature-based shoreline protection (S-1), septic system education and replacement in flood-prone areas (S-2), and Chesapeake Bay water quality improvements (S-8). Risks to food systems and agricultural lands informed actions supporting climate-smart agriculture (S-5) and expanded Agricultural and Forestal District participation (S-6). The County's vulnerability to flooding and erosion also supports updates to zoning and development standards that promote low-impact development and tree canopy protection (S-3), while transportation-related flood risks informed the recommendation to evaluate and upgrade priority culvert structures (S-7). Finally, the importance of critical facilities and emergency readiness informed actions to prepare schools and community facilities for emergency planning zone activities associated with the Surry Power Station (S-4). Together, these actions address Surry County's key vulnerabilities while protecting natural resources, improving infrastructure resilience, and strengthening long-term community resilience.

SR.8. Actions

The Crater PDC Regional Resilience Plan contains tailored resilience actions for each of the 11 localities within the Crater PDC, actions for Crater PDC to strengthen local and regional capacity, and consistent region-wide actions each of the 11 localities. The following section only contains tailored actions for Surry County. Actions that Crater PDC is tasked with pursuing, that may be useful for locality-level support and next steps, as well as, region-wide actions Surry County could pursue are found in Chapter 7. Regional Actions within the Crater PDC Regional Resilience Plan.

Table SR.2 below summarizes the resilience actions developed for Surry County through the regional resilience planning process. These actions were primarily identified during an Action Development Workshop held in spring 2026 and informed by stakeholder engagement, best practices, the Regional Hazard Mitigation Plan, and relevant comprehensive plans.

Table SR.2 Action Item Key for Surry County

ID	Action Title	Responsible Entity	Estimated Cost	Priority
SR-1	Promote Nature-Based Shoreline Protection and Reduce Shoreline Risk to Development	Planning & Community Development	Medium (Project)	Low
SR-2	Support Septic System Maintenance Education and Replacement in Flood-Prone and Groundwater-Sensitive Areas	Planning & Community Development	Medium (Study/ Capacity Building)	High
SR-3	Align Zoning Standards to Support Farmland Preservation, Tree Canopy Protection, and Low-Impact Development	Planning & Community Development	Medium (Study/ Capacity Building)	Medium
SR-4	Prepare Schools and Community Facilities for Surry Nuclear Power Plant Emergency Planning Zone Activities	Emergency Management	Medium (Study/ Capacity Building)	High
SR-5	Support Climate-Smart Agriculture	Economic Development and Planning & Community Development	Low (Study/ Capacity Building)	Low
SR-6	Expand Agricultural and Forestal District Participation and Private Land Stewardship	Planning & Community Development	Medium (Study/ Capacity Building)	Low
SR-7	Evaluate, Maintain, and Upgrade Priority Culvert Structures	County Administration	High (Project)	High
SR-8	Collaborate to Improve Local Water Quality and Implement Chesapeake Bay TMDL Requirements	Planning & Community Development	Medium (Project)	Medium

Action Key

Below is the action key used to develop each of the tailored action descriptions presented in this section of the plan.

Action Components: Key considerations for action development and implementation.

Primary Goals: The broader resilience goal(s) or objective(s) that the action supports. These actions include the following:

- Strengthen Natural Systems and Land Use Resilience
- Improve Hazard Preparedness, Response, and Recovery
- Enhance Data, Tools, and Decision-Making Capacity
- Build Local and Regional Capacity
- Advance Regional Collaboration and Coordination
- Increase Public Awareness and Community Engagement
- Promote Equitable and Resilient Communities
- Strengthen Infrastructure and Built Environment Resilience
- Support Economic Resilience and Workforce Development

Priority Rating: An assessment of the relative importance or urgency of the action in relationship to the other actions in the plan. For these ratings, steering committee feedback throughout the planning process was prioritized. Actions were prioritized based off the capacity and needs assessment, ability to be funded through Virginia CFPF, and best practices. These ratings have not been through a scoring or ranking exercise by the Steering Committee. Localities are encouraged to confirm, adjust, or reprioritize ratings to reflect local conditions, capacity, and funding timelines before using them to sequence implementation or grant applications.

Hazards Addressed: The climate or hazard risks the action is intended to help mitigate or manage. These include the following:

- Flooding (pluvial/rainfall, fluvial/riverine, and/or storm surge)
- Extreme Heat
- Wildfires
- Extreme Storms and/or Winter Weather
- All hazards – *addresses each hazard group*

Estimated Timeline: A general timeframe for implementation (short, medium, or long term) from the action kickoff to end.

- Short-term: 1-2 years
- Medium-term: 2-4 years
- Long-term: 5 or more years

Source: The origin of the action, such as stakeholder input, workshop activities, existing plans, or best practices.

Type of Action: The general action type, or means of implementation that fall under the following:

- Policy and Planning
- Programs and Implementation
- Capital Projects and Infrastructure
- Data, Tools, and Decision Support
- Technical Assistance and Capacity Building
- Regional Coordination and Partnerships
- Public Education and Engagement
- Emergency Preparedness and Response
- Nature-Based Solutions
- Expand Recreational Access to Foster Stewardship
- Residential Adaptation Tool

Responsible Entity: The primary organization or jurisdiction responsible for leading the action.

Potential Partners: Additional agencies, organizations, or stakeholders that could support or collaborate on implementation.

Partner Action: Actions either the PDC, localities, or other listed stakeholders should engage in during or after the action is completed to further maintain or manage desired outcomes.

Potential Funding Sources: Possible state, federal, regional, or local funding mechanisms that could support action implementation, management, or maintenance. Common funding sources for these actions are Virginia Community Flood Preparedness Fund (CFPF) and FEMA Hazard Mitigation Grant (HMG). Identification of a funding source does not guarantee project eligibility, funding availability, award selection, or future program continuity. Funding requirements, priorities, and availability may change over time and should be verified during project development and grant application.

Estimated Cost: A high level cost range (low, medium, high). For capacity building / studies versus project actions, there are two different ranges used depending on the project type.

Cost	Studies / Capacity Building	Projects
Low	Less than $100 k	Less than $750 k
Medium	$100 k to $250 k	$750 k to $1.5 M
High	Greater than $250 k	Greater than $1.5 M

Surry Action 1 (SR-1): Promote Nature-Based Shoreline Protection and Reduce Shoreline Risk to Development

Prioritize nature-based shoreline protection strategies, such as living shorelines, restored wetlands, oyster reefs, and vegetated buffers, over hardened structures where feasible. Advance this approach through updates to shoreline management policies, zoning and overlay districts, and site-plan review standards, and use planning tools such as coastal setbacks and conservation easements to reduce property and infrastructure exposure to erosion and flooding. Direct critical facilities away from erosion-prone areas and pursue new public water access sites along the Blackwater and James Rivers in coordination with DCR and regional partners.

Action Components:

Update shoreline policies and zoning to promote nature-based protection, strengthen setbacks and hazard overlays, incentivize living shorelines and wetland restoration, address at-risk critical facilities, and coordinate resilient water access planning along the Blackwater and James Rivers.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Promote Nature-Based Solutions

Priority Rating:

Low.

Hazards Addressed:

Flooding & Erosion

Estimated Cost:

Project: Medium ($750k - $1.5M).

Type of Action:

- Policy and Planning
- Nature-Based Solutions

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for policy and ordinance review; medium-term for overlay adoption and incentive program.

Responsible Entity:

Surry County Planning & Community Development

Potential Partners:

Crater PDC; Virginia DCR; Virginia DEQ; Virginia Marine Resources Commission (VMRC); Chesapeake Bay Foundation; local land trusts; watershed organizations; HRPDC; Virginia Institute of Marine Science (VIMS).

Partner Action:

Provide regional coordination and technical guidance on nature-based shoreline protection approaches; share vulnerability assessment data on erosion-prone areas; assist with identification of funding opportunities and alignment with regional coastal resilience goals.

Source:

Comprehensive Plan; Action Development Workshop

Potential Funding Source:

CFPF - Project; VOF; NFWF National Coastal Resilience Fund (NCRF); Land and Water Conservation Fund (LWCF); DEQ Nonpoint Source CWA Section 319 Funding; Virginia Conservation Assistance Program; FEMA HMGP / BRIC

Surry Action 2 (SR-2): Support Septic System Maintenance Education and Replacement in Flood-Prone and Groundwater-Sensitive Areas

Work with VDH to educate residents on septic system maintenance and replacement, promote flood-resilient siting standards for septic systems in coastal and flood-prone areas, align local requirements with evolving state regulations, and prioritize assistance to low- and moderate-income households in high-risk shoreline and riverine areas.

Action Components:

Develop and distribute outreach materials on septic system maintenance and the importance of timely replacement for systems in flood-prone or groundwater-sensitive areas; coordinate with VDH to incorporate climate change considerations, including flooding and groundwater conditions, into local septic siting and upgrade requirements; identify high-exposure properties with aging or at-risk systems in priority areas; and connect residents with available funding assistance programs for system replacement or upgrades.

Primary Goals:

- Protect Public Health and Water Quality
- Promote Equitable and Resilient Communities

Priority Rating:

High.

Hazards Addressed:

Flooding; Infectious Diseases

Estimated Cost:

Study / Capacity Building: Medium ($100k to $250k)

Type of Action:

- Public Education and Engagement
- Policy and Planning

Timeline:

Short-Term *1 - 2 years*; Medium-Term *2 - 4 years*; Long-Term *5+ years*

Short-term for outreach program development and identification; long-term for system replacement.

Responsible Entity:

Surry County Planning & Community Development

Potential Partners:

Crater PDC; Virginia Department of Health (VDH); Peanut Soil and Water Conservation District; housing departments; onsite system installers; environmental health professionals; local nonprofits.

Partner Action:

Support regional coordination between coastal communities with flood-prone septic systems; provide technical guidance and best practices; share vulnerability assessment results on flood-prone septic systems.

Source:

Vulnerability Assessment; Action Development Workshop

Potential Funding Source:

Virginia Department of Health's Septic and Well Assistance Program (SWAP); EPA Clean Water State Revolving Fund (CWSRF); EPA Nonpoint Source Section 319 Grant; Virginia Community Flood Preparedness Fund (CFPF).

Surry Action 3 (SR-3): Align Zoning standards to Support Farmland Preservation, Tree Canopy Protection, and Low-Impact Development

Revise zoning ordinances to reduce unnecessary tree clearing, support canopy preservation and agricultural use, and incorporate low-impact development standards that preserve open space, natural drainage features, forests, and floodplain buffers while directing development to less sensitive areas.

Action Components:

Audit zoning provisions that encourage tree clearing, revise standards to support clustered development, conservation design, and canopy preservation, incorporate LID requirements into review standards, and coordinate with Crater PDC on model ordinance language and best practices.

Responsible Entity:

Surry County Planning & Community Development

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Promote Nature-Based Solutions; Protect Public Health and Water Quality

Potential Partners:

Crater PDC; Virginia Department of Forestry (VDOF); Virginia Department of Conservation and Recreation (DCR); Colonial Soil and Water Conservation District; Peanut Soil and Water Conservation District; Virginia

Priority Rating:

Medium.

Hazards Addressed:

Flooding; Droughts; Extreme Heat

Partner Action:

Provide model ordinance language for conservation design, LID standards, and canopy preservation; share best practices from peer localities; assist with integration of regional vulnerability and land cover data into local ordinance development

Estimated Cost:

Study / Capacity Building: Medium ($100k to $250k)

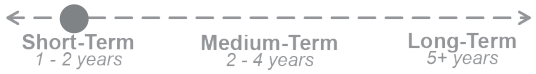
Type of Action:

- Nature-Based Solutions
- Policy and Planning

Source:

Action Development Workshop; Existing Conditions and Comprehensive Plan

Timeline:



Short-term for ordinance audit and gap analysis; medium-term for revised standard development and adoption.

Potential Funding Source:

Virginia Community Flood Preparedness Fund (CFPF); Virginia Department of Forestry (VDOF) technical assistance programs; Virginia Outdoors Foundation (VOF).

Surry Action 4 (SR-4): Prepare Schools and Community Facilities for Surry Nuclear Power Plant Emergency Planning Zone Activities

In preparation for the Surry Power Plant 50-mile emergency planning zone exercise, coordinate with emergency management, schools, and state partners to evaluate facility roles in evacuation and sheltering, identify staffing, communication, and infrastructure needs, and incorporate findings into the County's emergency operations plan and capital improvement program.

Action Components:

Coordinate with emergency management, schools, and state partners to assess EPZ sheltering and evacuation roles, identify facility and communication needs, update operating procedures, and integrate findings into the County's emergency operations and capital improvement plans.

Primary Goals:

- Improve Hazard Preparedness, Response, and Recovery
- Strengthen Infrastructure and Built Environment Resilience

Priority Rating:

High.

Hazards Addressed:

All Hazards.

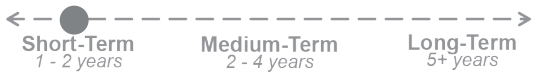
Estimated Cost:

Study / Capacity Building: Medium ($100k to $250k)

Type of Action:

- Emergency Preparedness and Response
- Policy and Planning

Timeline:



Short-term for coordination, facility assessment, and protocol development; medium-term for plan integration.

Responsible Entity:

Surry County Emergency Management

Potential Partners:

Crater PDC; Virginia Department of Emergency Management (VDEM); Surry County Public Schools; Dominion Energy; Virginia Department of Education; local public safety agencies; neighboring jurisdictions within the EPZ.

Partner Action:

Support regional emergency preparedness coordination; provide technical assistance on facility readiness assessment and emergency operations plan integration; assist with identification of funding opportunities for facility improvements.

Source:

Action Development Workshop

Potential Funding Source:

FEMA Emergency Management Performance Grant (EMPG) Program; Virginia Community Flood Preparedness Fund (CFPF); FEMA Building Resilience Infrastructure and Communities (BRIC); Nuclear Regulatory Commission (NRC) emergency preparedness program funding.

Surry Action 5 (SR-5): Support Climate-Smart Agriculture

Encourage County farmers to adopt technologies and practices that address changing seasons, rainfall variability, drought risk, and nutrient runoff. Promote efficient irrigation, weather- and soil-based decision tools, and precision nutrient management to reduce fertilizer and water use while maintaining productivity. Support strategies such as cover crops, soil moisture monitoring, and adaptive cropping practices to improve yields, lower costs, and strengthen resilience to climate stressors. Connect farmers with technical assistance, funding opportunities, and peer networks that support long-term farm viability and adaptation.

Action Components:

Promote precision nutrient management, efficient irrigation, cover crops, and soil moisture monitoring; connect farmers with technical assistance and funding opportunities; and support agricultural diversification and resilient local food systems.

Responsible Entity:

Surry County Economic Development and Planning & Community Development

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Support Economic Resilience and Workforce Development

Potential Partners:

Crater PDC; Alliance to Advance Climate-Smart Agriculture; Peanut Soil and Water Conservation District; Colonial Soil and Water Conservation District; Virginia Cooperative Extension; USDA Natural Resources Conservation Service (NRCS); local farmers and producers.

Priority Rating:

Low.

Hazards Addressed:

All Hazards.

Partner Action:

Provide regional coordination and share best practices and resources for climate-smart agriculture; assist with identifying funding opportunities; support partnership across jurisdictions in the Peanut and Colonial Soil and Water Conservation Districts.

Estimated Cost:

Study / Capacity Building: Low (Less than $100k)

Type of Action:

- Programs and Implementation
- Technical Assistance and Capacity Building

Timeline:



Short-term for program outreach and technical assistance connections; long-term for ongoing implementation.

Source:

Action Development Workshop

Potential Funding Source:

Alliance to Advance Climate-Smart Agriculture; USDA Natural Resources Conservation Service (NRCS) programs; Virginia Community Flood Preparedness Fund (CFPF).

Surry Action 6 (SR-6): Expand Agricultural and Forestal District Participation and Private Land Stewardship

Work with landowners to expand Agricultural and Forestal Districts (AFDs) that protect farmland and forestland, reduce development pressure, and support long-term economic resilience. Complement AFD participation with voluntary conservation tools, forest management plans, and landowner assistance programs that preserve flood mitigation, carbon storage, and wildlife habitat benefits.

Action Components:

Conduct outreach to promote Agricultural and Forestal District enrollment, provide technical assistance with farm and forest management planning, support conservation easements and stewardship programs, and encourage practices that maintain forest cover, reduce fragmentation, and preserve ecosystem services.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Support Economic Resilience and Workforce Development

Priority Rating:

Low.

Hazards Addressed:

All Hazards.

Estimated Cost:

Study / Capacity Building: Medium ($100k to $250k)

Type of Action:

- Programs and Implementation
- Technical Assistance and Capacity Building

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for program outreach, education, and landowner assistance; long-term for implementation.

Responsible Entity:

Surry County Planning & Community Development

Potential Partners:

Crater PDC; Virginia Department of Forestry (VDOF); Peanut Soil and Water Conservation District; Colonial Soil and Water Conservation District; Virginia Cooperative Extension; USDA Natural Resources Conservation Service (NRCS); local land trusts; conservation nonprofits; private forest landowners and farmers.

Partner Action:

Provide regional coordination and technical support; share best practices for private land stewardship and AFD program outreach; assist with mapping and identification of priority agricultural and forestlands; support grant and funding alignment.

Source:

Related Locality Actions; Action Development Workshop

Potential Funding Source:

Virginia Department of Forestry (VDOF) programs; USDA Natural Resources Conservation Service (NRCS) programs; Virginia Land Conservation Foundation (VLCF); National Fish and Wildlife Foundation (NFWF); Virginia CFPF

Surry Action 7 (SR-7): Evaluate, Maintain, and Upgrade Priority Culvert Structures

Evaluate culverts on flood-prone roads, prioritize maintenance and replacement to maintain resident and emergency access, coordinate with VDOT on state-owned facilities, and incorporate findings into capital improvement and emergency operations planning.

Action Components:

Inventory and map culverts on flood-prone roads and in at-risk neighborhoods; assess condition and performance, prioritize maintenance and replacement of critical access culverts, coordinate with VDOT on state-owned facilities, and incorporate findings into the County's capital improvement program and emergency operations plan.

Primary Goals:

- Strengthen Infrastructure and Built Environment Resilience
- Improve Hazard Preparedness, Response, and Recovery

Priority Rating:

High.

Hazards Addressed:

Flooding; Storms; Winter Weather

Estimated Cost:

Project: High (Greater than $1.5M)

Type of Action:

- Capital Projects and Infrastructure
- Regional Coordination and Partnerships

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for inventory and assessment; medium- to long-term for prioritized repair, replacement, and programming

Responsible Entity:

Surry County Administration

Potential Partners:

Crater PDC; Virginia Department of Transportation (VDOT); Virginia Department of Emergency Management (VDEM); U.S. Army Corps of Engineers; engineering consultants; regional GIS staff.

Partner Action:

Provide regional vulnerability data to support culvert prioritization; assist with coordination between the County and VDOT; share best practices for culvert assessment methodologies and capital improvement integration.

Source:

Committee Engagement Results; Existing Conditions

Potential Funding Source:

Virginia Community Flood Preparedness Fund (CFPF); FEMA Hazard Mitigation Grant Program (HMGP); FEMA Building Resilience Infrastructure and Communities (BRIC); FEMA Emergency Management Performance Grant (EMPG) Program.

Surry Action 8 (SR-8): Collaborate to Improve Local Water Quality and Implement Chesapeake Bay TMDL Requirements

Work with HRPDC, DEQ, the Peanut Soil and Water Conservation District, and nonprofit partners to implement BMPs that reduce nutrient, sediment, and stormwater runoff in support of Chesapeake Bay TMDL goals. Focus on riparian buffers, wetland restoration, and stormwater BMPs on public and willing private lands, track implementation for TMDL credit, and coordinate with regional partners to align local efforts with watershed priorities.

Action Components:

Coordinate with HRPDC, DEQ, and the Peanut Soil and Water Conservation District to identify priority water quality projects and BMP incentives; promote riparian buffers, wetland restoration, and stormwater BMPs on priority parcels; integrate nature-based solutions into local development standards; and track BMP implementation for TMDL credit and reporting.

Primary Goals:

- Protect Public Health and Water Quality
- Promote Nature-Based Solutions
- Advance Regional Collaboration and Coordination

Priority Rating:

Medium.

Hazards Addressed:

Flooding; Droughts; Extreme Heat

Estimated Cost:

Project: Medium ($750k to $1.5M)

Type of Action:

- Capital Projects and Infrastructure
- Regional Coordination and Partnerships

Timeline:



Short-term for coordination, priority site identification, and BMP outreach; ongoing for BMP implementation and tracking.

Responsible Entity:

Surry County Planning & Community Development

Potential Partners:

Crater PDC; HRPDC; Virginia Department of Environmental Quality (DEQ); Virginia Department of Conservation and Recreation (DCR); Peanut Soil and Water Conservation District; Chesapeake Bay Foundation; watershed organizations; local landowners; non-governmental conservation organizations.

Partner Action:

Provide regional coordination and data sharing on water quality and TMDL compliance; assist with identification of BMP funding opportunities; support partnership development with state and regional water quality agencies and conservation organizations.

Source:

Comprehensive Plan; Action Development Workshop

Potential Funding Source:

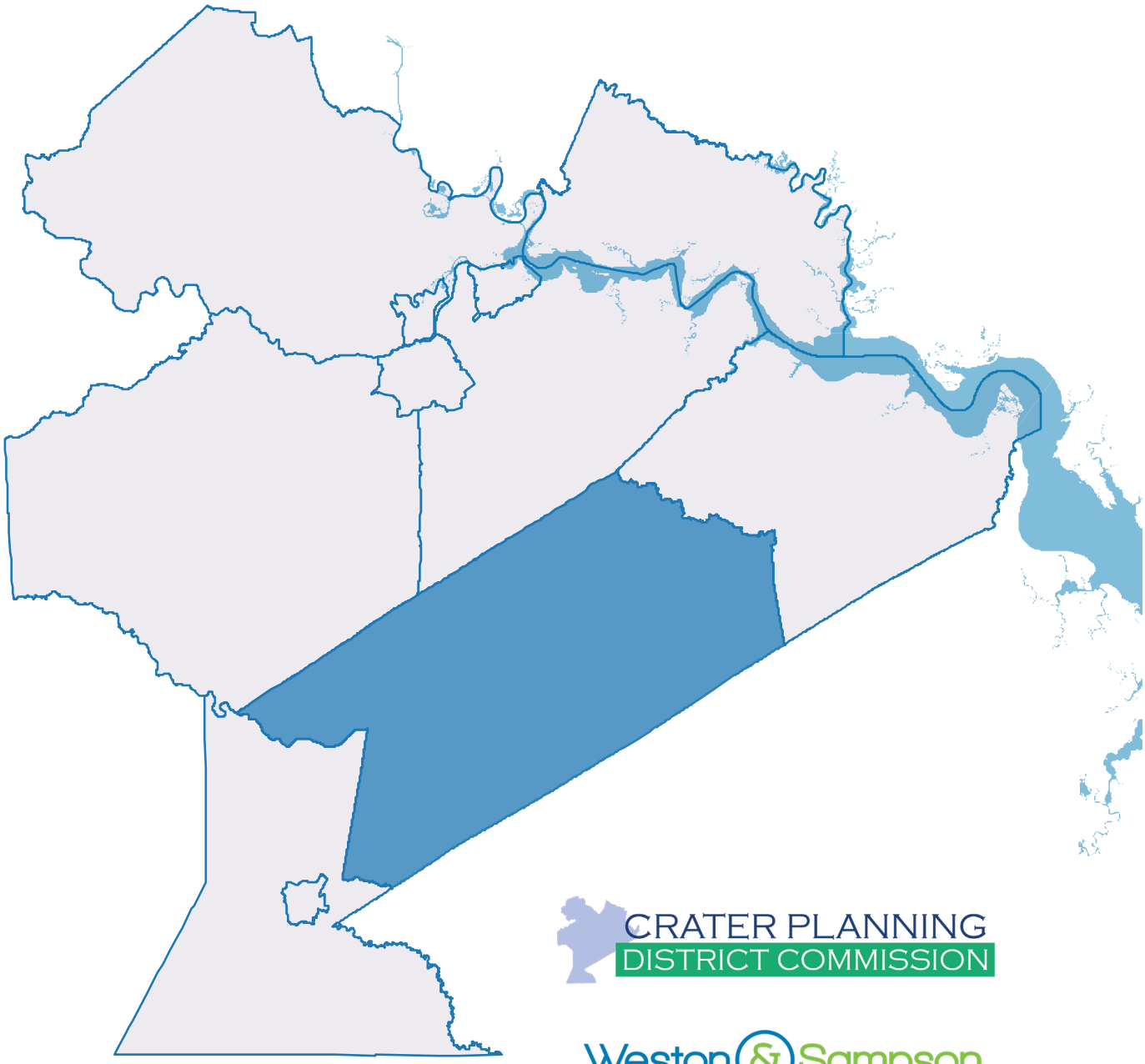
EPA Chesapeake Bay Program grants; EPA Nonpoint Source Section 319 Grant; EPA Clean Water State Revolving Fund (CWSRF); Virginia DEQ Stormwater Local Assistance Fund (SLAF); Virginia CFPF; USDA Natural Resources Conservation Service (NRCS) programs.

Sussex County

Resilience Plan

Version 1.0 | September 2026

Locality Chapter of the Crater PDC Regional Resilience Plan



CRATER PLANNING DISTRICT COMMISSION

Weston & Sampson

TABLE OF CONTENTS

This chapter presents the locality-specific resilience objectives for Sussex County as part of Chapter 8: Locality Resilience Plans of the Crater PDC Regional Resilience Plan. It provides a structured overview of local conditions, risks, and actions to support resilience planning and implementation.

8.11 SUSSEX COUNTY RESILIENCE PLAN

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For additional context on regional priorities, cross-jurisdictional strategies, and Crater PDC–wide resilience objectives, users should refer to the comprehensive Crater PDC Regional Resilience Plan, of which this chapter is one locally focused component. Other components of the plan include:

- Regional vision, goals, and a planning framework for resilience across the Crater Planning District.
- A regional profile describing environmental, economic, infrastructure, and community characteristics.
- An assessment of existing local and regional resilience plans and initiatives.
- A capacity-building roadmap identifying institutional, technical, and organizational needs.
- Results from regional steering committee engagement and workshops.
- A regional vulnerability assessment, including an asset inventory, methodology, and findings.
- Regional actions for implementation by Crater PDC and cross-jurisdictional actions applicable to all localities.
- A regional debris management strategy to support post-disaster response and recovery.
- A plan maintenance framework and supporting appendices.

SS.1. Introduction and Vision

Sussex County is a sparsely populated county where forestry, agriculture, and other land-based industries remain central to the local economy and community identity (Sussex County Comprehensive Plan). Rather than large residential subdivisions or commercial centers, development is concentrated in small towns, crossroads communities, and along rural highway corridors, reflecting long-standing settlement patterns and limited infrastructure capacity (Sussex County Comprehensive Plan). Much of the county's land area is actively managed for timber production, farming, and conservation, resulting in open and working landscapes rather than suburban growth (Sussex County Comprehensive Plan).

In recent years, Sussex County has become an important location for utility-scale solar development within the Crater region, prompting new land use considerations related to farmland preservation, environmental protection, and community character (Sussex County Solar Amendment). County planning efforts increasingly focus on balancing renewable energy investment with protection of rural landscapes, limited infrastructure capacity, and long-term economic stability (Sussex County Comprehensive Plan). This evolving development context places Sussex at the intersection of traditional land uses and emerging energy markets, making land stewardship and zoning policy central to the county's resilience strategy.

As a part of the visioning process for the Crater PDC Regional Resilience Plan, steering committee members from Sussex County developed the following vision statement:

> ***Sussex County will safeguard its rural character and natural resources while strengthening infrastructure, guiding growth to appropriate areas, and building a community that can adapt to environmental, economic, and social challenges.***

SS.2. Demographics

Sussex County has an estimated population of 10,829 residents and a median age of 41, which is slightly higher than the statewide median. Approximately 19.1 percent of residents are age 65 or older, indicating a relatively older population. The share of residents without health insurance is 5.1 percent, which is below the Virginia average.

Median household income in Sussex County is $62,821, and approximately 12.1 percent of residents live below the poverty level, exceeding the statewide rate. Educational attainment remains limited, with 15.8 percent of residents holding a bachelor's degree or higher. Housing is largely owner occupied, with a 69.3 percent homeownership rate, and median gross rent of $952, reflecting a predominantly rural housing market with lower costs but limited diversity in housing types (U.S. Census Bureau, Decennial Census, 2020).

Table SS.1 U.S. Census Bureau Statistics Comparison.

U.S. Census Bureau Statistic	Sussex County	Crater PDC	Virginia
Land area	490.2 square miles	2,487.5 square miles	39,481.4 square miles
Population and people			
Total Population	10,829	556,840	8,631,393
Median Age	41	40.9	39.4
Population that is 65 years and older	19.1%	18.6%	17.6%
Without Health Care Coverage	5.1%	6.4%	6.9%
Income and Poverty			
Median Household Income	$62,821	$69,698	$92,090
Poverty	12.1%	12.9%	9.7%
Education			
Bachelor's Degree or Higher	15.8%	22.3%	43.3%
School Enrolled Population in Kindergarten to 12th Grade	69.9%	70.7%	65.6%
Employment			
Local, State, and Federal Gov. Workers	18.6%	20.7%	20.6%
Avg. Travel Time to Work	35.8 min	29.3 min	28.3 min
Employment Rate	46.8%	53.6%	61.1%
Housing			
Median Gross Rent	$952	$1,177	$1,646
Homeownership Rate	69.3%	66.5%	67.1%
Total Housing Units	4,672	232,007	3,746,211
Total Households	3,705	217,220	3,449,307
Families and Living Arrangements			
Children under 18 years old	15.8%	20.6%	21.3%

U.S. Census Bureau Statistic	Sussex County	Crater PDC	Virginia
Race and Ethnicity			
American Indian and Alaska Native alone	18	2,822	40,007
Asian alone	12	15,795	615,436
African American	5,781	163,453	1,607,581
Hispanic or Latino (of any race)	306	52,020	908,749
Native Hawaiian and Other Pacific Islander alone	11	491	7,156
Not Hispanic or Latino	4,381	294,878	5,058,363
Some Other Race	93	28,897	446,650
Two or More Races	413	37,564	705,707
White	4,501	302,764	5,208,856

Source: U.S. Census Bureau 2020 Decennial Census.

SS.3. Challenges and Strengths

Sussex County faces several resilience challenges related to its rural scale, limited infrastructure, and staffing capacity. Planning documents note that many areas lack public utilities, stormwater infrastructure, and transportation connectivity, which can complicate emergency response and infrastructure investment during extreme weather events. County plans and the regional capacity and needs assessment also identify limited local staffing and technical resources as barriers to advancing resilience initiatives, particularly grant development and long-term project implementation (Sussex County Comprehensive Plan).

At the same time, Sussex County has notable strengths that support future resilience planning. Extensive agricultural and forested lands provide natural stormwater absorption, flood mitigation benefits, and ecosystem services. The county has taken a proactive role in managing utility-scale solar development through comprehensive plan and zoning amendments, demonstrating capacity to respond to emerging land use and energy challenges while protecting prime farmland and environmentally sensitive areas. Participation in regional coordination through Crater PDC further strengthens access to technical assistance, shared resources, and funding opportunities that can support long-term resilience efforts (Sussex County Solar Amendment).

SS.4. Capacity and Needs

One of the first steps within the planning process for the Crater PDC Regional Resilience Plan was performing a capacity and needs assessment for resilience planning. The capacity strengths and challenges revealed within the capacity and needs assessment were integrated into actions for Crater PDC to initiate and next steps for localities. These actions can be found in Chapter 4. Capacity Building Roadmap and serve as foundational actions Crater PDC and localities should pursue in tandem with the other actions within this plan. This survey was directly informed by the capacity and needs assessment questionnaire provided during the beginning of the planning process, which gathered detailed input from local staff on existing roles, resource gaps, technical needs, and challenges related to climate resilience, funding, infrastructure, and intergovernmental coordination. This section provides a snapshot summary of Sussex County's identified challenges as they relate to resilience planning.

REGIONAL COORDINATION & SUPPORT



Engage with Crater PDC on a somewhat regular basis

Identifies Support Needs

- Grant writing and funding support
- Data & mapping tools
- Training programs and capacity building
- Infrastructure and engineering expertise
- Resilience planning and policy guidance

FINANCIAL RESOURCES

Previous Funding for Relevant Projects

- FEMA grants (BRIC, FMA, HMGP, etc.)
- VDEM grant used to address recurrent flooding in the Town of Wakefield near the Virginia Diner

Identified Financial Challenges

- Limited local funding
- Lack of matching funds
- Grant application capacity constraints

HUMAN & INSTITUTIONAL CAPACITY



Relevant Staff Positions

- Public Safety Chief
- Director of Planning and Zoning
- County Planner

Relevant Department

Planning / Zoning, Emergency Management

Identified Staff Capacity Needs

- Additional full-time staff
- Technical Support
- Cross-training of existing staff
- Consultant / Contracted Services

DISASTER RESPONSE CAPACITY

Emergency Operations or Disaster Response
Regional Hazard Mitigation Plan (2022)

Emergency Coordination
Informal coordination as needed

Responsible Agencies / Departments
- Emergency Management
- Fire / Rescue
- Police / Sheriff's Department

Identified Challenges for Disaster Response
- Staffing shortages
- Lack of funding for emergency preparedness
- Insufficient emergency shelter capacity - shelters are in vulnerable areas that could be cut off by flooding

Identified Disaster Response Needs
- Additional response resources
- Increased funding for emergency preparedness
- Post-disaster recovery planning and support

INFRASTRUCTURE & OPERATIONS

Significant Climate-Related Impacts
Significant storms, Prolonged flooding, Tornadoes, Heat waves

Primary Public Assets Impacted by Hazards
- Roads and transportation systems
- Public buildings and critical facilities (e.g. emergency shelters, hospitals)

TECHNICAL ASSISTANCE & TRAINING NEEDS

Identified Training Needs
- Grant writing and funding support
- GIS mapping and data analysis for flood risk assessment
- Assessment of critical asset vulnerabilities
- Development of local resilience planning recommendations
- Policy and ordinance development for resilience

POLICY & PLANNING

Land Use, Zoning Ordinances, and Plans
No land use or zoning policies that address resilience.

Would benefit from model ordinances or policy recommendations related to resilience.

Identified Barriers for Resilience Efforts
- Political will or support
- Technical expertise or staff constraints

SS.5. Overview of Environmental Conditions

Sussex County lies entirely within the Coastal Plain, where topography ranges from gently rolling terrain to relatively flat and low lying areas, including marshy landscapes. Water resources shape much of the County's environmental character, with drainage flowing into Stony Creek as well as the Nottoway and Blackwater Rivers, which ultimately discharge south toward the Chowan River system. Land use is largely agricultural and forested, with approximately 80 percent of the County devoted to commercial forestry. Remaining agricultural lands support crops such as peanuts, cotton, corn, tobacco, soybeans, and small grains, making natural resources central to the local economy (Plan RVA; Crater PDC, 2022).

Flooding and storm related hazards are ongoing environmental challenges in Sussex County due to its flat terrain, extensive forest cover, and proximity to major river systems. Portions of the County experience periodic flooding from prolonged or intense rainfall events, with documented flood losses occurring between 1993 and 2020. Heavy precipitation associated with tropical systems and frontal storms can overwhelm natural drainage, leading to localized flooding of roads, agricultural lands, and low lying areas. Because agriculture and forestry dominate land use, flood impacts often include crop damage and access disruptions, in addition to structural impacts in rural residential areas (Plan RVA; Crater PDC, 2022).

Sussex County is also vulnerable to severe weather, including tornadoes, wildfires, hail, and damaging winds. Since 1950, the County has experienced multiple tornado events, including EF 0 tornadoes in 2014 and 2019, which caused tree damage, roadway blockages, and minor structural impacts near Waverly and eastern Sussex. Regional analyses indicate that Sussex County is among areas with an increasing trend in tornado activity, particularly in locations with higher concentrations of mobile homes. Wildfire risk is another significant concern; Sussex County has experienced the greatest acreage burned by wildfire in the region, reflecting its extensive forest cover and rural development pattern. Severe thunderstorms have also produced damaging hail and crop losses, as occurred in July 2016. Together, these environmental conditions highlight the importance of resilience strategies that address rural housing vulnerability, wildfire mitigation, agricultural protection, and emergency preparedness for severe weather events (Plan RVA; Crater PDC, 2022).

SS.6. Floodplain Management and Flood Risk Identification

As part of the Virginia Department of Conservation and Recreation (DCR) Resilience Plan requirements, localities must document administrative procedures for tracking and managing Substantial Improvement (SI) and Substantial Damage (SD) determinations for structures located within Special Flood Hazard Areas (SFHAs), as well as identify Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties. This section summarizes these requirements as they relate to Sussex County and highlights the relevant provisions contained within the County's floodplain ordinance, associated regulatory documents, and information documented in the PlanRVA–

Crater PDC Multi-Regional Hazard Mitigation Plan (2022). The purpose of this review is to verify the County's existing administrative framework and identify opportunities to strengthen floodplain management and support long-term resilience planning efforts.

Why it matters: Identifying and tracking flood-prone properties helps communities better understand flood risk, prioritize mitigation investments, reduce future damages, strengthen resilience, and guide long-term land use and development decisions.

SS.6.1 Floodplain Ordinance and Regulatory Framework

Sussex County has adopted a comprehensive floodplain management ordinance through Chapter 34 – Zoning, Article III, Division 13, Floodplain Overlay District. The ordinance is designed to meet and enforce the requirements of the National Flood Insurance Program (NFIP) and is authorized under the zoning powers granted by the Code of Virginia (§ 15.2-2280). The ordinance establishes regulations for development within flood hazard areas to reduce risks to life and property, maintain eligibility for participation in the NFIP, and promote sound floodplain management practices throughout the County.

The ordinance regulates development within FEMA mapped Special Flood Hazard Areas (SFHAs) using the Flood Insurance Rate Maps (FIRMs) and Flood Insurance Study (FIS), including the effective maps dated March 16, 2015, along with subsequent revisions, which are adopted by reference as the regulatory basis for floodplain management. The ordinance also allows the use of best available federal, state, and locally developed hydrologic and hydraulic data where FEMA data is limited, and it requires that updated technical data reflecting physical changes to flood conditions be submitted to FEMA within six months. The ordinance designates a Floodplain Administrator (the Environmental Manager or designee) responsible for administering and enforcing floodplain regulations.

Sussex County's ordinance meets NFIP minimum standards for floodplain management. Development in designated floodways is subject to a strict "no-rise" standard, requiring demonstration through hydrologic and hydraulic analysis that no increase in base flood elevation will occur unless approved by FEMA through a Conditional Letter of Map Revision (CLOMR). For areas with base flood elevations but no mapped floodway, development must demonstrate that cumulative impacts will not increase flood elevations by more than one foot. Additionally, in approximate floodplain areas (Zone A), the ordinance requires the determination of base flood elevations using accepted engineering methods when such data is not provided by FEMA.

Clear thresholds for substantial improvement and substantial damage, both defined as 50 percent of a structure's market value, require compliance with current floodplain standards. The ordinance supports long-term risk reduction through permit requirements, restrictions on noncompliant

repairs, and enforcement mechanisms. Variances are limited and require demonstration of hardship without increasing flood risks or public safety impacts.

Sussex County's ordinance provides a comprehensive and technically robust framework for regulating floodplain development in Sussex County. It integrates FEMA mapping, locally derived data, engineering analysis, and strong administrative oversight to manage flood risk. While the ordinance includes enhanced technical and regulatory requirements beyond minimum NFIP standards, particularly related to engineering review and floodway protection, it primarily relies on FEMA FIRMs as the baseline regulatory tool and does not explicitly reference participation in the Community Rating System (CRS).

SS.6.2 Flood Risk Identification SFHAs

Repetitive loss (RL) properties are structures that have experienced multiple instances of flood-related damage over time. Under the National Flood Insurance Program (NFIP), a repetitive loss property is defined as a property for which two or more flood insurance claims of at least $1,000 have been paid within any 10-year period.

Severe repetitive loss (SRL) properties represent a subset of these structures and indicate a higher level of risk and recurring damage. These properties are defined as those that have either:

- At least **four NFIP** claims exceeding $5,000 each, or
- At least **two claims** where the total payouts exceed the building's value.

i

Repetitive loss (RL) properties are structures that have experienced multiple instances of flood-related damage over time.

While NFIP designations do not capture all recurring flood impacts, repetitive flooding can occur outside mapped SFHAs due to stormwater, drainage issues, or localized flooding. Communities are encouraged to track all repetitive flood impacts to better understand risk and inform mitigation efforts. According to the Richmond-Crater Hazard Mitigation Plan (2022), Sussex County has no RL and SRL as defined by the NFIP. There are no known RL and SRL properties outside of the Special Flood Hazard Areas (SFHA) as well.

SS.7. Vulnerability Assessment Results

Another foundational element of the Crater PDC Regional Resilience Plan was a region-wide vulnerability assessment performed across the Crater region. The vulnerability assessment results in this section have been parsed out to only include findings relevant to Sussex County. The vulnerability assessment conducted for the Crater PDC Regional Resilience Plan evaluated how each locality is exposed to multiple hazards, including rainfall (pluvial) flooding, riverine (fluvial) flooding, storm surge, extreme heat, and wildfire risk. The vulnerability assessment also evaluated sensitivity through the social vulnerability index. The vulnerability assessment for Sussex identified pluvial flooding, riverine flooding, and wildfire as the primary risks to critical assets. Assets were also exposed to heat. There was no exposure to coastal flooding in Sussex.

For the methodology of this vulnerability assessment, including data sources, indicator selection, and scoring, please refer to Appendix B. Vulnerability Assessment Methodology and Scoring Framework. For the region-wide assessment and hazard information, please refer to Chapter 6. Vulnerability Assessment.

Vulnerability in Sussex County is not evenly distributed across the county. The asset vulnerability maps (Figures SS.1 - 6) show higher concentrations of High and Very High vulnerability assets near Jarratt, along the U.S. Route 460 corridor, and throughout the Waverly area. These areas contain concentrations of transportation infrastructure, utilities, public facilities, and community-serving assets exposed to one or more climate hazards. Additional vulnerable assets are distributed throughout the county where transportation networks intersect streams, wetlands, and flood-prone landscapes.



Photo SS.1 Airfield 4-H Center in Sussex County, Kit Friedman

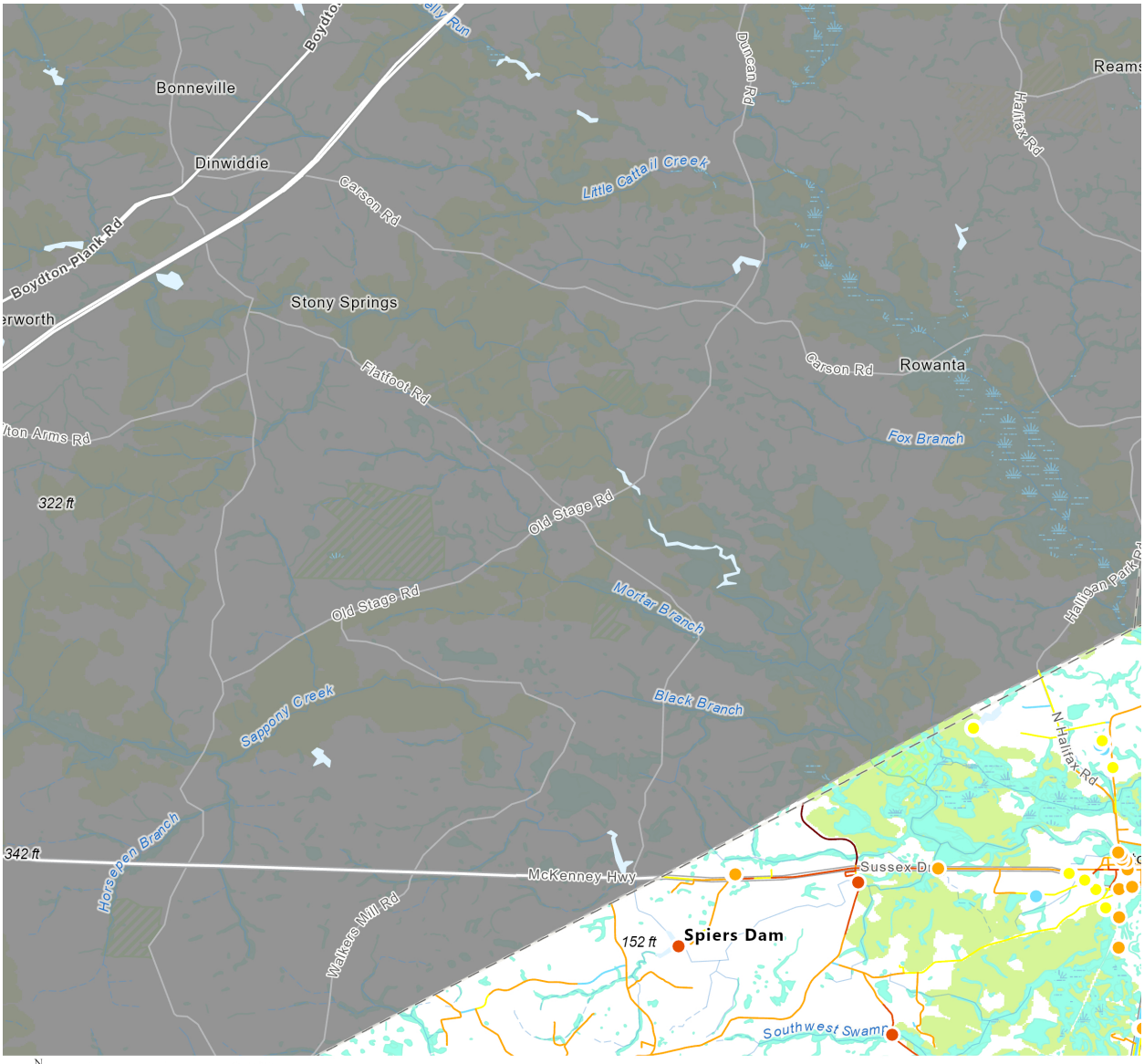


Figure SS.1 Sussex County Asset Vulnerability Map

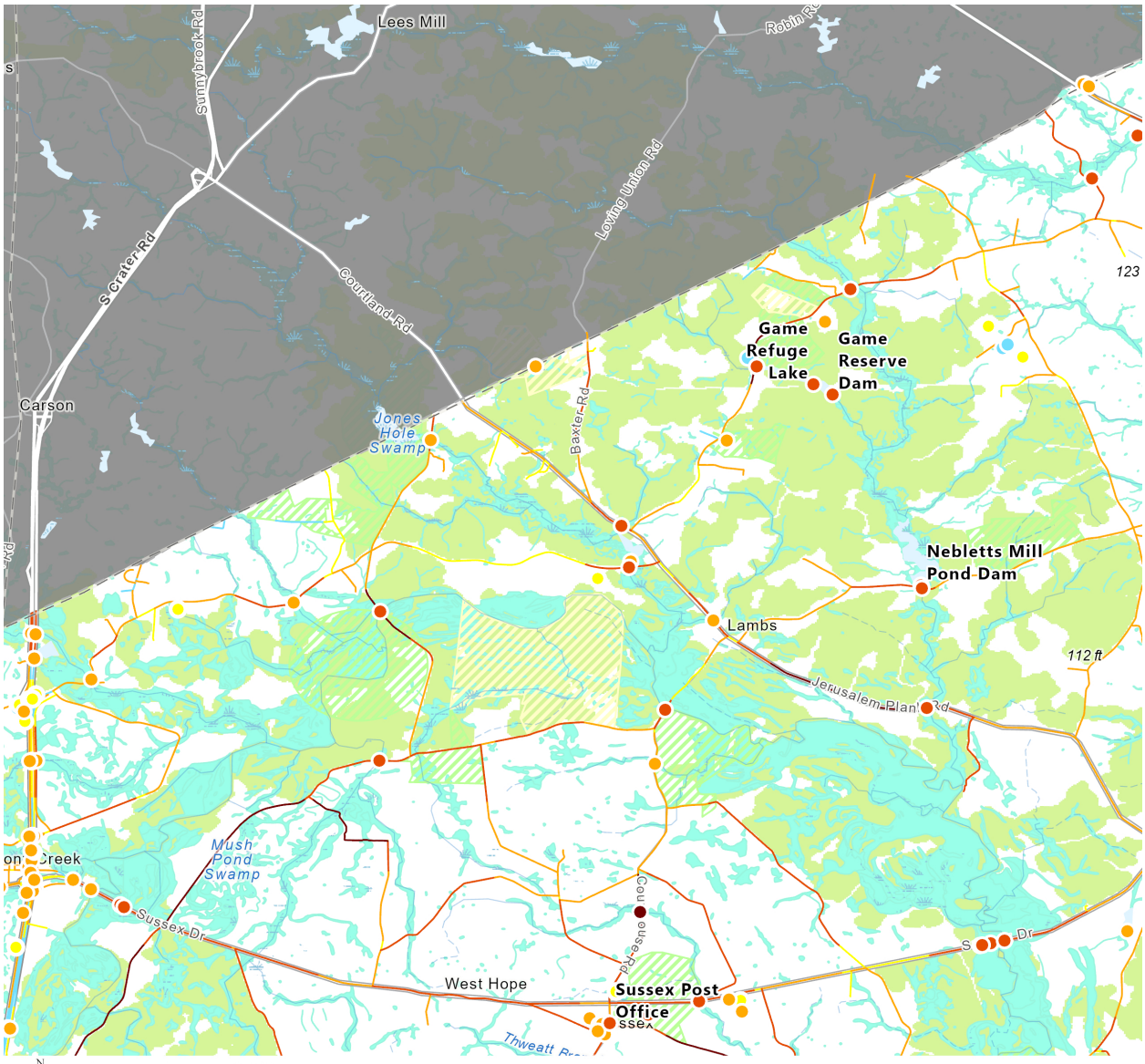
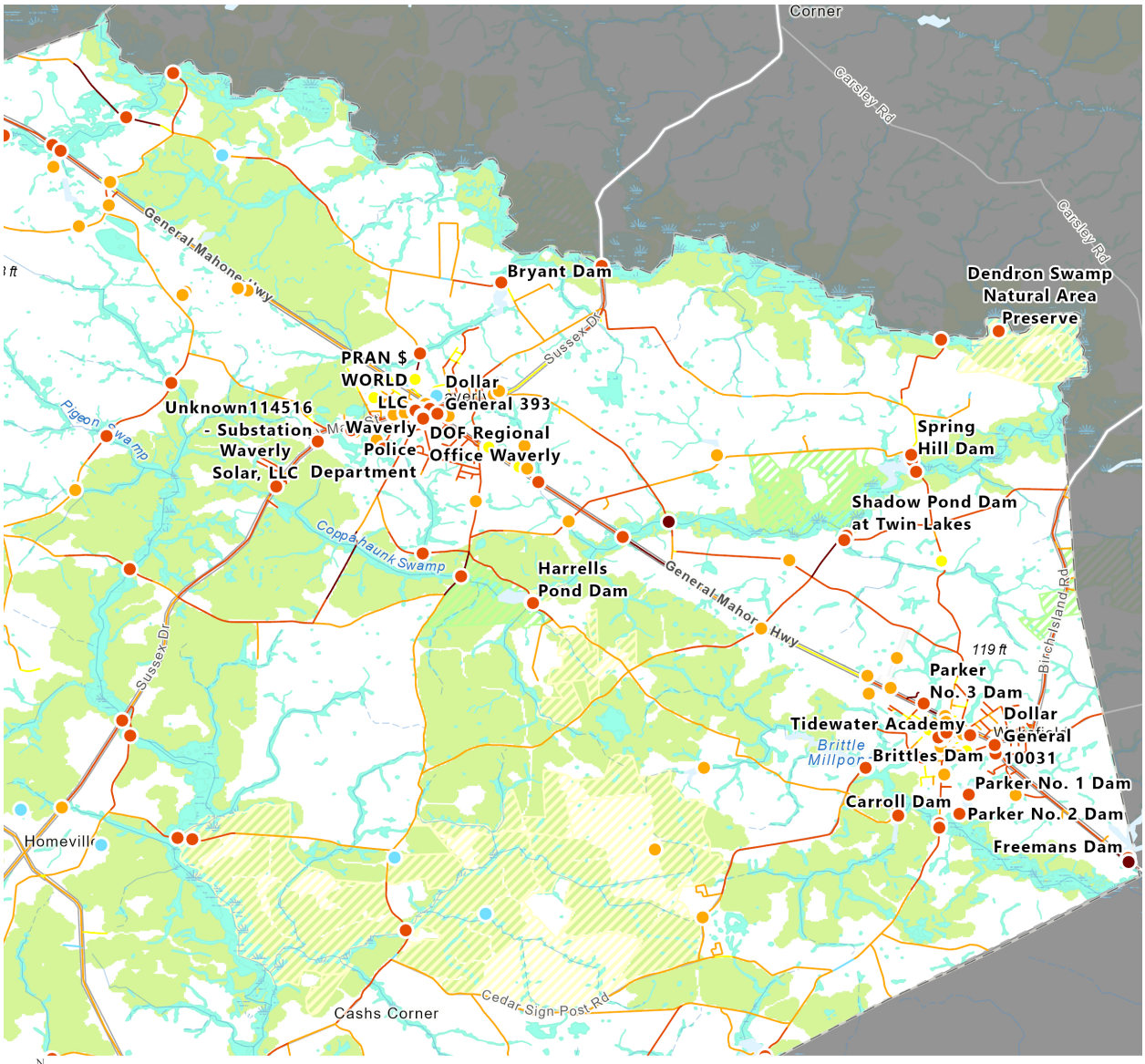


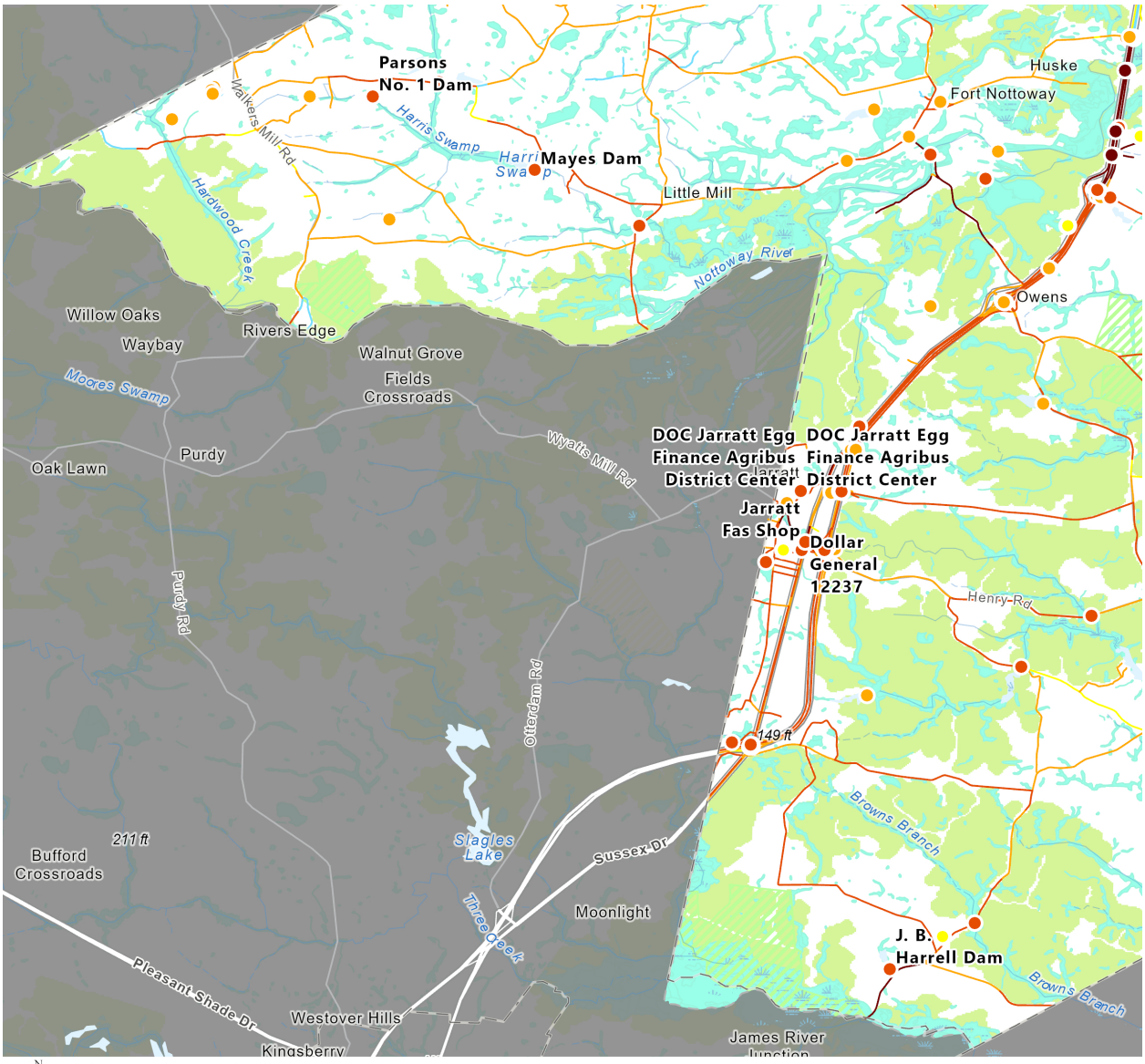
Figure SS.2 Sussex County Asset Vulnerability Map



CPDC Weston & Sampson

Vulnerability scores were developed as part of the vulnerability assessment for the Crater PDC Regional Resilience Plan. Only assets identified as having high or very high vulnerability are labeled on the map. Due to the sensitivity and quantity of these assets, septic systems, transmission towers, culverts, bridges, and roads were excluded from labeling.

Figure SS.3 Sussex County Asset Vulnerability Map



Crater PDC Regional Resilience Plan

Sussex County Asset Vulnerability Scores

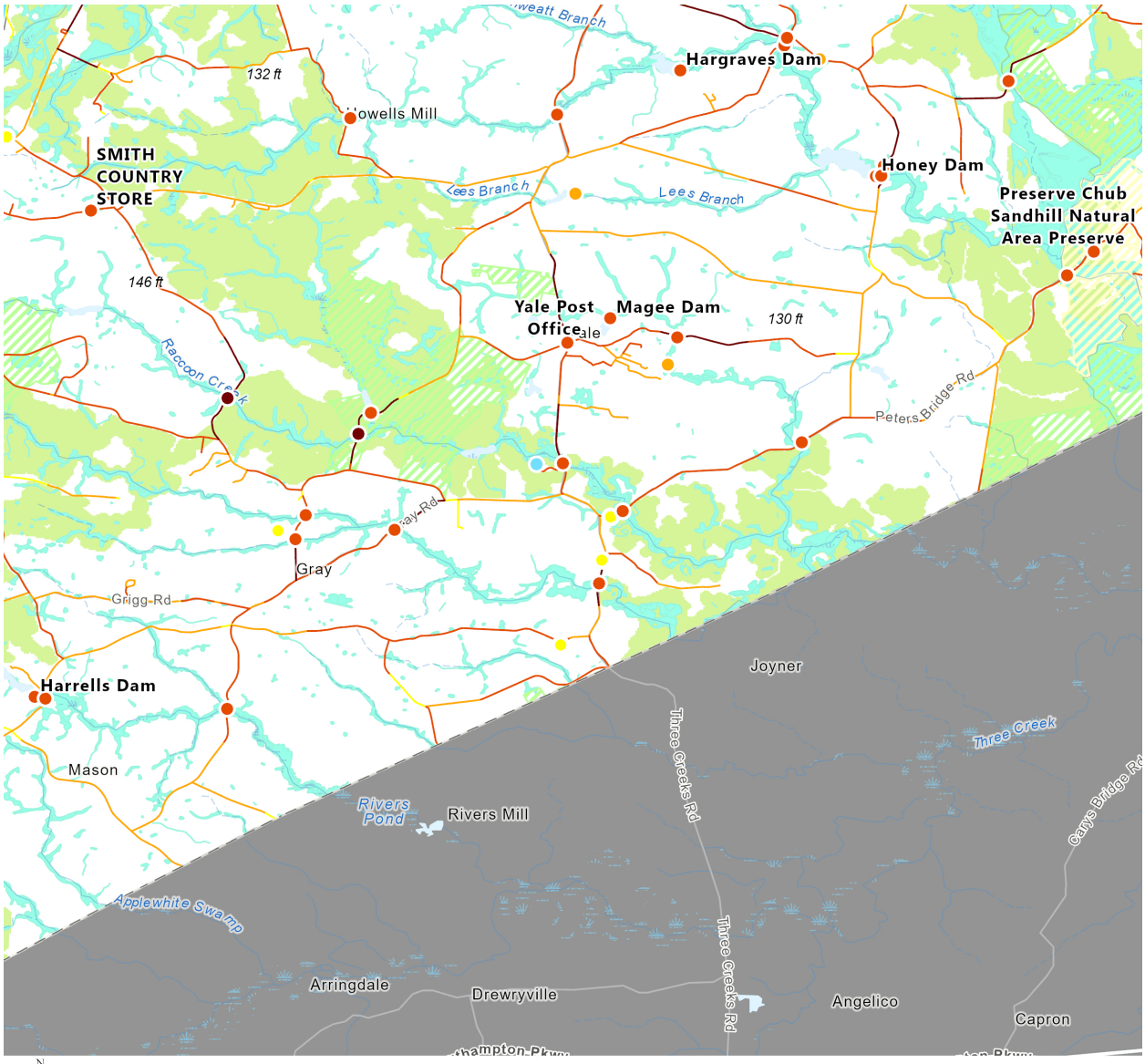
Legend

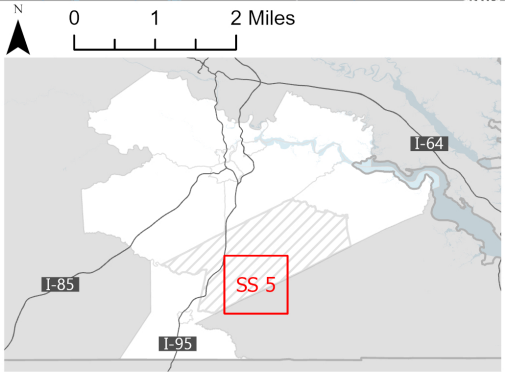
Scored Assets Vulnerability	Roadways Vulnerability	
Very Low	Very Low	Sussex Boundary
Low	Low	Rivers
Moderate	Moderate	Conservation Land
High	High	Easement
Very High	Very High	Wetlands
		Natural Land Network

CPDC Weston & Sampson

Vulnerability scores were developed as part of the vulnerability assessment for the Crater PDC Regional Resilience Plan. Only assets identified as having high or very high vulnerability are labeled on the map. Due to the sensitivity and quantity of these assets, septic systems, transmission towers, culverts, bridges, and roads were excluded from labeling.

Figure SS.4 Sussex County Asset Vulnerability Map





Crater PDC Regional Resilience Plan

Sussex County Asset Vulnerability Scores

Legend

Scored Assets Vulnerability	Roadways Vulnerability	
Very Low	Very Low	Sussex Boundary
Low	Low	Rivers
Moderate	Moderate	Conservation Land
High	High	Easement
Very High	Very High	Wetlands
		Natural Land Network

CPDC Weston & Sampson

Vulnerability scores were developed as part of the vulnerability assessment for the Crater PDC Regional Resilience Plan. Only assets identified as having high or very high vulnerability are labeled on the map. Due to the sensitivity and quantity of these assets, septic systems, transmission towers, culverts, bridges, and roads were excluded from labeling.

Figure SS.5 Sussex County Asset Vulnerability Map

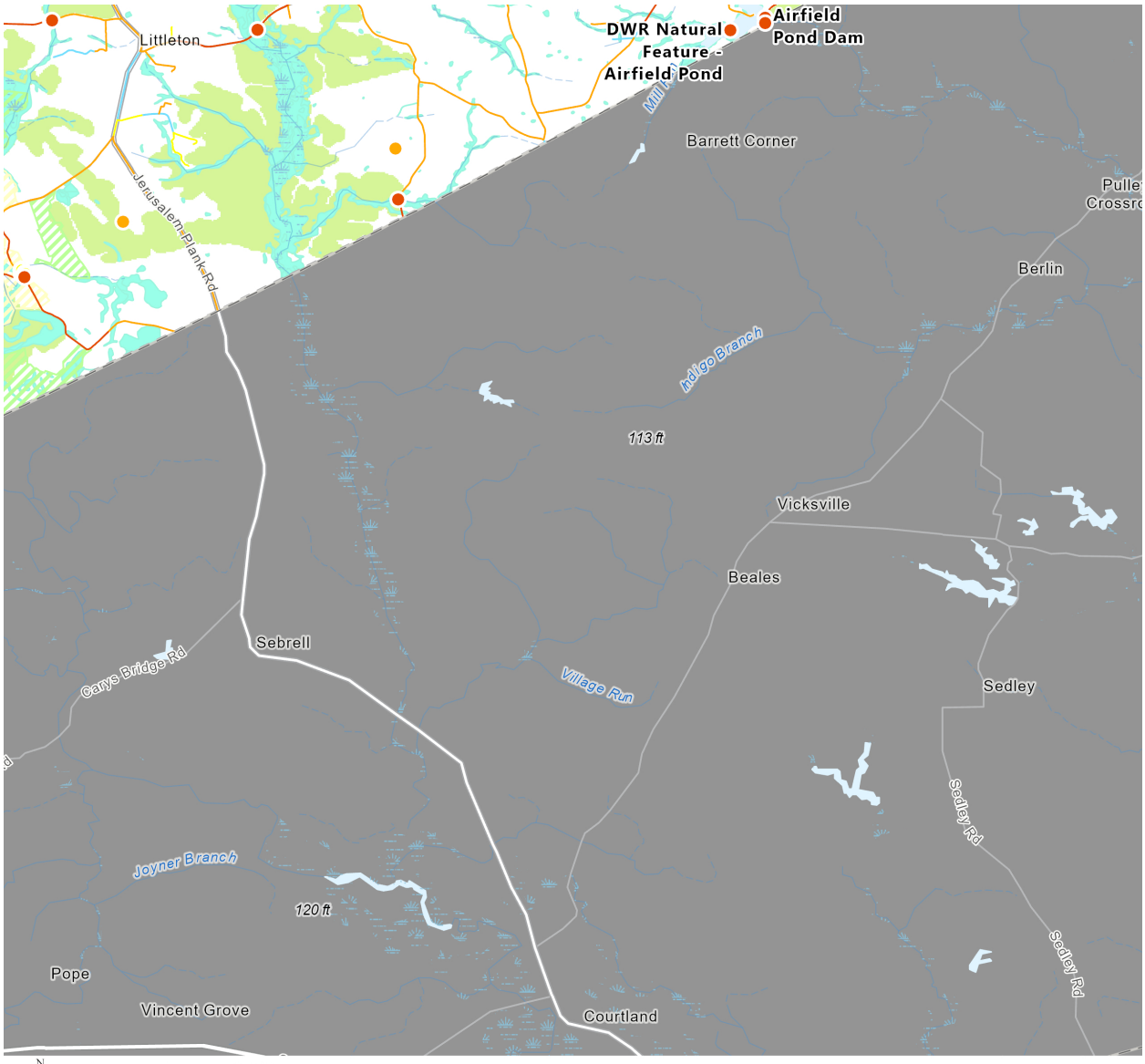


Figure SS.6 Sussex County Asset Vulnerability Map

A total of 611 built infrastructure assets (excluding roadways) and 1979 roadway segments were evaluated. Non-roadway built assets in Sussex County are primarily concentrated in Transportation (45.2%) and Communications (24.4%), followed by Government Facilities (12.6%), Water and Wastewater (6.4%), Emergency Services / Community Assets (4.7%), Food and Agriculture (2.9%), Energy (2.1%), Financial Services (0.8%), and Healthcare and Public Health (0.8%). Because asset counts vary significantly by category, the analysis emphasizes the percentage of assets within each category that are ranked as having High or Very High vulnerability. Categories with the greatest proportions of highly vulnerable assets are discussed below. Figure SS.7 illustrates the distribution of vulnerability scores across all asset categories, including roadways.

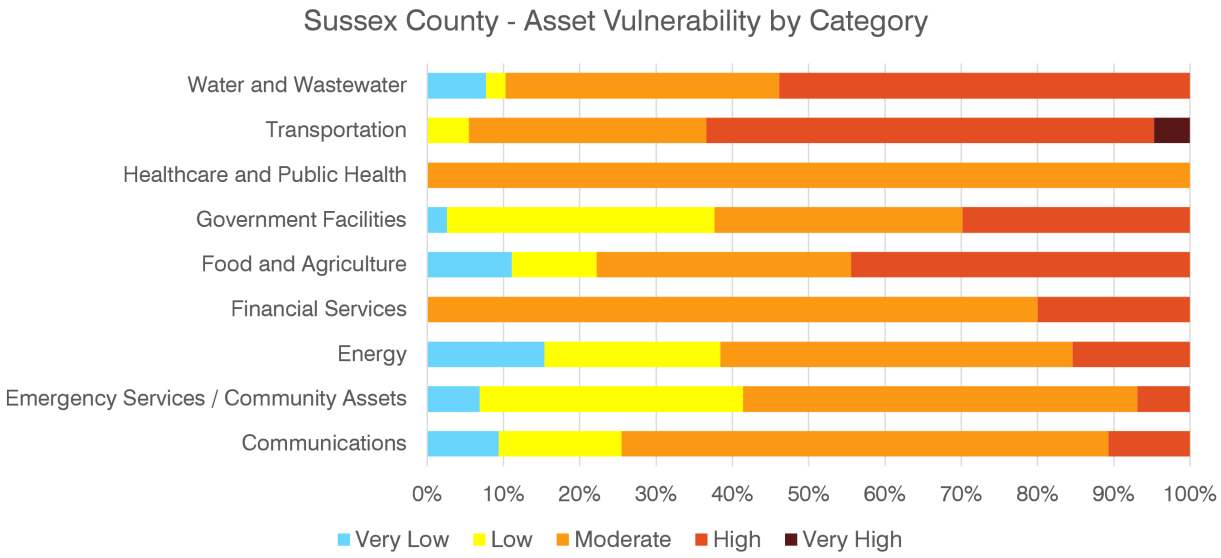


Figure SS.7 Sussex County Asset Vulnerability Map

SS.7.1 Water and Wastewater

Water and wastewater infrastructure emerged as Sussex County's most significant vulnerability concern. Highly vulnerable assets included dams such as Honey Dam, Freemans Dam, Magee Dam, and Hargraves Dam. These facilities are widely exposed to pluvial and riverine flooding and are located in areas of moderate to high social vulnerability, while several are also exposed to wildfire risk. Because these assets play an important role in water management, flood control, and public safety, disruptions could have cascading impacts on surrounding communities and natural systems. These findings support actions focused on improving drainage infrastructure, reducing flood risk, and addressing failing septic systems in vulnerable areas.

SS.7.2 Food and Agriculture

Food and Agriculture assets also demonstrated elevated vulnerability within Sussex County. Highly vulnerable assets included SNAP retailers such as Smith Country Store, Jarratt Fast Shop, and Dollar General 393. These facilities were exposed to pluvial flooding and wildfire and were located in areas with elevated social vulnerability. Because many residents rely on these businesses for access to food and essential goods, disruptions during hazard events could affect food access and community recovery. These findings support actions that strengthen agricultural resilience, preserve working lands, and expand participation in conservation programs that benefit both farmers and natural systems.

SS.7.3 Transportation

Transportation infrastructure emerged as another key vulnerability concern. Highly vulnerable assets included bridges, culverts, railroad bridges, and roadway segments throughout the County. Segments of Blue Star Highway, Cabin Stick Road, Courthouse Road, and Cappahaunk Road received some of the highest vulnerability scores due to their exposure to pluvial flooding, riverine flooding, wildfire, and extreme heat. Because these corridors provide critical access for residents, businesses, schools, and emergency services, disruptions can affect mobility, emergency response, and economic activity. These findings directly informed actions focused on improving drainage systems, maintaining roadway access, and strengthening emergency preparedness coordination.

The vulnerability assessment findings directly informed Sussex County's resilience actions. Flood risks affecting water infrastructure, dams, and vulnerable developed areas support actions to establish a systematic ditch and drainageway maintenance program (SS-7), coordinate regional stormwater solutions (SS-8), and expand sewer infrastructure in areas served by failing or high-risk septic systems (SS-9). Vulnerabilities affecting agricultural lands, food access, and natural resources informed actions to improve participation in conservation programs (SS-1), promote cluster development and resilient zoning practices (SS-2), and expand Agricultural and Forestal District participation and private land stewardship efforts (SS-3). The County's exposure to flooding and the importance of protecting community assets also support actions focused on historic building resilience (SS-5) and strengthening interlocal emergency preparedness and EMS coordination (SS-6). Sussex County's key vulnerabilities while improving infrastructure resilience, protecting natural systems, and supporting long-term community resilience.

SS.8. Actions

The Crater PDC Regional Resilience Plan contains tailored resilience actions for each of the 11 localities within the Crater PDC, actions for Crater PDC to strengthen local and regional capacity, and consistent region-wide actions each of the 11 localities. The following section only contains tailored actions for Sussex County. Actions that Crater PDC is tasked with pursuing, that may be useful for locality-level support and next steps, as well as, region-wide actions Sussex County could pursue are found in Chapter 7. Regional Actions within the Crater PDC Regional Resilience Plan.

Table SS.2 below summarizes the resilience actions developed for Sussex County through the regional resilience planning process. These actions were primarily identified during an Action Development Workshop held in spring 2026 and informed by stakeholder engagement, best practices, the Regional Hazard Mitigation Plan, and relevant comprehensive plans.

Table SS.2 Action Item Key for Sussex County

ID	Action Title	Responsible Entity	Estimated Cost	Priority
SS-1	Improve Farmer Participation in Conservation Programs and Maintain a GIS-Based Easement Inventory	Planning Department and/or Economic Development Department	Medium (Study/ Capacity Building)	Low
SS-2	Promote Cluster Development and Resilient Zoning to Protect Farmland and Natural Systems	Planning Department	Low (Study/ Capacity Building)	Medium
SS-3	Expand Agricultural and Forestal District Participation and Private Land Stewardship	Planning Department and/or Economic Development Department	Medium (Study/ Capacity Building)	Low
SS-4	Attract Resilience-Focused Industries to the Sussex Green Enterprise Park	Economic Development Department	Medium (Study/ Capacity Building)	Medium
SS-5	Implement a Historic Building Resilience Program	Planning Department and/or Economic Development Department	Medium (Project)	Low
SS-6	Formalize Interlocal Collaboration on Emergency Preparedness and EMS Coordination Among Towns	Emergency Management and/or County Administration	Medium (Study/ Capacity Building)	High
SS-7	Establish and Maintain a Systematic Ditch and Drainageway Maintenance Program	Public Works	Medium (Project)	High
SS-8	Coordinate with Towns on Shared Drainage Challenges and Stormwater Solutions	Public Works and/or Planning Department	Medium (Study/ Capacity Building)	Medium
SS-9	Expand Sewer Infrastructure to Replace Failing Septic Systems	Public Works and/or Utilities	High (Project)	High

Action Key

Below is the action key used to develop each of the tailored action descriptions presented in this section of the plan.

Action Components: Key considerations for action development and implementation.

Primary Goals: The broader resilience goal(s) or objective(s) that the action supports. These actions include the following:

- Strengthen Natural Systems and Land Use Resilience
- Improve Hazard Preparedness, Response, and Recovery
- Enhance Data, Tools, and Decision-Making Capacity
- Build Local and Regional Capacity
- Advance Regional Collaboration and Coordination
- Increase Public Awareness and Community Engagement
- Promote Equitable and Resilient Communities
- Strengthen Infrastructure and Built Environment Resilience
- Support Economic Resilience and Workforce Development

Priority Rating: An assessment of the relative importance or urgency of the action in relationship to the other actions in the plan. For these ratings, steering committee feedback throughout the planning process was prioritized. Actions were prioritized based off the capacity and needs assessment, ability to be funded through Virginia CFPF, and best practices. These ratings have not been through a scoring or ranking exercise by the Steering Committee. Localities are encouraged to confirm, adjust, or reprioritize ratings to reflect local conditions, capacity, and funding timelines before using them to sequence implementation or grant applications.

Hazards Addressed: The climate or hazard risks the action is intended to help mitigate or manage. These include the following:

- Flooding (pluvial/rainfall, fluvial/riverine, and/or storm surge)
- Extreme Heat
- Wildfires
- Extreme Storms and/or Winter Weather
- All hazards – *addresses each hazard group*

Estimated Timeline: A general timeframe for implementation (short, medium, or long term) from the action kickoff to end.

- Short-term: 1-2 years
- Medium-term: 2-4 years
- Long-term: 5 or more years

Source: The origin of the action, such as stakeholder input, workshop activities, existing plans, or best practices.

Type of Action: The general action type, or means of implementation that fall under the following:

- Policy and Planning
- Programs and Implementation
- Capital Projects and Infrastructure
- Data, Tools, and Decision Support
- Technical Assistance and Capacity Building
- Regional Coordination and Partnerships
- Public Education and Engagement
- Emergency Preparedness and Response
- Nature-Based Solutions
- Expand Recreational Access to Foster Stewardship
- Residential Adaptation Tool

Responsible Entity: The primary organization or jurisdiction responsible for leading the action.

Potential Partners: Additional agencies, organizations, or stakeholders that could support or collaborate on implementation.

Partner Action: Actions either the PDC, localities, or other listed stakeholders should engage in during or after the action is completed to further maintain or manage desired outcomes.

Potential Funding Sources: Possible state, federal, regional, or local funding mechanisms that could support action implementation, management, or maintenance. Common funding sources for these actions are Virginia Community Flood Preparedness Fund (CFPF) and FEMA Hazard Mitigation Grant (HMG). Identification of a funding source does not guarantee project eligibility, funding availability, award selection, or future program continuity. Funding requirements, priorities, and availability may change over time and should be verified during project development and grant application.

Estimated Cost: A high level cost range (low, medium, high). For capacity building / studies versus project actions, there are two different ranges used depending on the project type.

Cost	Studies / Capacity Building	Projects
Low	Less than $100 k	Less than $750 k
Medium	$100 k to $250 k	$750 k to $1.5 M
High	Greater than $250 k	Greater than $1.5 M

Sussex Action 1 (SS-1): Improve Farmer Participation in Conservation Programs and Maintain a GIS-Based Easement Inventory

Promote participation in VDACS, USDA, and other conservation programs while exploring agritourism and ecosystem service markets to diversify farm income. Support conservation easements that protect farmland, forests, waterways, and natural landscapes, and maintain a centralized GIS-based easement inventory to track protected lands, inform planning, and support grants, reporting, and long-term monitoring.

Action Components:

Promote VDACS, USDA, and other conservation programs through outreach; explore agritourism and ecosystem service markets to diversify farm income; support conservation easements on priority farmland, forests, and waterways; and maintain a GIS-based easement inventory to track protected lands and support planning, grants, and reporting.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Support Economic Resilience and Workforce Development

Priority Rating:

Low.

Hazards Addressed:

All Hazards.

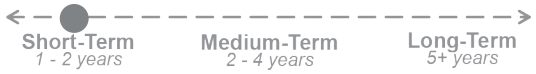
Estimated Cost:

Study/Capacity Building: Medium ($100k to $250k)

Type of Action:

- Programs and Implementation
- Data, Tools, and Decision Support

Timeline:



Short-term for outreach, program promotion, and easement inventory; ongoing for program participation.

Responsible Entity:

Sussex County Planning Department and/or Economic Development Department.

Potential Partners:

Crater PDC; Virginia Department of Agriculture and Consumer Services (VDACS); Blackwater Soil and Water Conservation District; Virginia Cooperative Extension; USDA NRCS; Virginia DOF; local land trusts; conservation nonprofits; Virginia Outdoors Foundation (VOF); local farmers and producers.

Partner Action:

Provide regional coordination and technical support; share best practices for outreach and easement inventories; assist with mapping priority conservation lands; support grant alignment; and facilitate collaboration among jurisdictions and partners.

Source:

Virginia Small Area Plans; Action Development Workshop

Potential Funding Source:

USDA; NRCS programs; Virginia Department of Agriculture and Consumer Services (VDACS) grants; Virginia Land Conservation Foundation (VLCF); NFWF; Virginia CFPF

Sussex Action 2 (SS-2): Promote Cluster Development and Resilient Zoning to Protect Farmland and Natural Systems

Update zoning regulations to encourage cluster development that concentrates growth while permanently preserving farmland, forests, and open space. Incorporate low-impact development standards into subdivision and site plan review to reduce impervious surfaces, protect natural drainage features, and direct development away from floodplains, wetlands, and other sensitive areas.

Action Components:

Review zoning provisions and develop cluster development standards that preserve open space, protect floodplains and wetlands, and direct development to lower-risk areas. Incorporate low-impact development requirements, including open-space minimums, natural drainage preservation, and impervious surface limits, and coordination on model ordinance language.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Strengthen Infrastructure and Built Environment Resilience

Priority Rating:

Medium.

Hazards Addressed:

All Hazards.

Estimated Cost:

Study/Capacity Building: Low (Less than $100k)

Type of Action:

- Programs and Implementation
- Policy and Planning

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for ordinance review and gap analysis; medium-term for revised standard development and adoption.

Responsible Entity:

Sussex County Planning Department

Potential Partners:

Crater PDC; Virginia Department of Conservation and Recreation (DCR); Virginia Department of Environmental Quality (DEQ); Blackwater Soil and Water Conservation District; Virginia Cooperative Extension; local planning commission.

Partner Action:

Provide model ordinance language for cluster development, conservation design, and low-impact development standards; share best practices from peer localities; assist with integration of regional vulnerability and land cover data in ordinance updates.

Source:

Virginia Small Area Plans; Action Development Workshop

Potential Funding Source:

Virginia Community Flood Preparedness Fund (CFPF); Virginia Department of Forestry (VDOF) technical assistance programs; Virginia Outdoors Foundation (VOF).

Sussex Action 3 (SS-3): Expand Agricultural and Forestal District Participation and Private Land Stewardship

Work with landowners to establish and expand Agricultural and Forestal Districts that protect farmland and forests, reduce development pressure, and support long-term resilience. Promote voluntary forest stewardship plans and USDA conservation programs to encourage sustainable land management and preserve ecosystem services such as flood mitigation, water quality protection, carbon storage, and wildlife habitat.

Action Components:

Conduct outreach to promote Agricultural and Forestal District enrollment and provide technical assistance with VDOF and the Blackwater SWCD. Encourage conservation easements, forest stewardship plans, and USDA NRCS programs that maintain forest cover, reduce fragmentation, and preserve ecosystem services.

Primary Goals:

- Strengthen Natural Systems and Land Use Resilience
- Promote Nature-Based Solutions

Priority Rating:

Low.

Hazards Addressed:

All Hazards.

Estimated Cost:

Study/Capacity Building: Medium ($100k to $250k)

Type of Action:

- Policy and Planning
- Technical Assistance and Capacity Building

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for outreach and landowner assistance; long-term for ongoing stewardship and conservation participation.

Responsible Entity:

Sussex County Planning Department and/or Economic Development Department.

Potential Partners:

Crater PDC; Virginia Department of Conservation and Recreation (DCR); Virginia Department of Environmental Quality (DEQ); Blackwater Soil and Water Conservation District; Virginia Cooperative Extension; local planning commission.

Partner Action:

Provide regional coordination and technical support; share best practices for AFD outreach and private land stewardship; assist with mapping and identification of priority agricultural and forestlands; support grant and funding alignment; facilitate collaboration across jurisdictions and conservation partners.

Source:

Virginia Small Area Plans; Action Development Workshop

Potential Funding Source:

Virginia Community Flood Preparedness Fund (CFPF); Virginia Department of Forestry (VDOF) technical assistance programs; Virginia Outdoors Foundation (VOF).

Sussex Action 4 (SS-4): Attract Resilience-Focused Industries to the Sussex Green Enterprise Park

Actively recruit resilience, sustainability, and environmental service businesses, including renewable energy, green infrastructure, and water management firms, to strengthen the local economy and community preparedness. Promote the Sussex Green Enterprise Park as a destination for these industries through coordination with state and regional economic development partners and alignment with the County's resilience and economic development goals.

Action Components:

Develop a targeted recruitment strategy for resilience-focused industries identifying the Sussex Green Enterprise Park as a priority location; identify infrastructure, permitting, and workforce development needs to support recruitment and business retention; and align Park recruitment messaging with County goals.

Primary Goals:

- Support Economic Resilience and Workforce Development
- Advance Regional Collaboration and Coordination

Priority Rating:

Medium.

Hazards Addressed:

All Hazards.

Estimated Cost:

Study/Capacity Building: Medium ($100k to $250k)

Type of Action:

- Programs and Implementation
- Regional Coordination and Partnerships

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for recruitment strategy development and partnership coordination; ongoing for business outreach.

Responsible Entity:

Sussex County Economic Development Department.

Potential Partners:

Crater PDC; Virginia Economic Development Partnership; Virginia Clean Energy Authority; local Chamber of Commerce; community colleges and workforce development organizations; state and regional business development partners.

Partner Action:

Support regional economic development coordination; share information on resilience-focused industry trends and recruitment strategies; assist with alignment between Park development goals and regional resilience planning priorities.

Source:

Virginia Small Area Plans; Action Development Workshop

Potential Funding Source:

Virginia Economic Development Incentive Grant programs; Virginia Clean Energy Authority programs; Virginia CFPF; EPA Environmental Justice grants; local economic development funds.

Sussex Action 5 (SS-5): Implement a Historic Building Resilience Program

Implement a historic building resilience program that helps property owners reduce flood, wind, and heat risks through preservation-compatible improvements. Provide technical assistance, incentives, and funding connections, prioritize outreach in high-risk areas, and coordinate with the Virginia Department of Historic Resources to ensure compliance with preservation standards.

Action Components:

Identify historic buildings and downtown properties at high flood and heat risk; develop preservation-compatible guidance on flood and heat resilience measures; connect property owners to incentives and funding; coordinate with the Virginia Department of Historic Resources; and conduct targeted outreach with property owners and preservation organizations.

Primary Goals:

- Strengthen Infrastructure and Built Environment Resilience
- Improve Hazard Preparedness, Response, and Recovery

Priority Rating:

Low.

Hazards Addressed:

All Hazards.

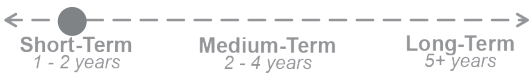
Estimated Cost:

Project: Medium ($750k to $1.5M)

Type of Action:

- Programs and Implementation
- Technical Assistance and Capacity Building

Timeline:



Short-term for technical guidance development and property outreach; medium-term for program development.

Responsible Entity:

Sussex County Planning Department and/or Economic Development Department.

Potential Partners:

Crater PDC; Virginia Department of Historic Resources (DHR); Virginia Department of Housing and Community Development (DHCD); local preservation organizations; property owners and business associations; FEMA; engineering consultants.

Partner Action:

Share regional vulnerability data on flood and heat risk to historic properties; provide technical assistance on resilience improvement approaches compatible with preservation standards; assist with identification of funding opportunities and coordination with state historic preservation programs.

Source:

Vulnerability Assessment; Action Development Workshop

Potential Funding Source:

FEMA HMGP and BRIC; Virginia CFPF; Virginia Department of Historic Resources preservation grants; EPA Environmental Justice grants; local foundation and nonprofit funding.

Sussex Action 6 (SS-6): Formalize Interlocal Collaboration on Emergency Preparedness and EMS Coordination Among Towns

Facilitate an interlocal MOU among Sussex County and its towns to formalize coordination on emergency preparedness, hazard mitigation, resource sharing, evacuation, recovery, training, and public communication. Concurrently update EMS plans to reflect current service demands, population trends, hazard risks, and transportation conditions to ensure reliable emergency response.

Action Components:

Facilitate adoption of an interlocal MOU among the County and towns for emergency preparedness, resource sharing, evacuation, and recovery coordination. Establish joint training and communication protocols, update EMS plans using current risks and service needs, and align both efforts with regional planning and VDEM guidance.

Primary Goals:

- Emergency Preparedness and Response
- Regional Coordination and Partnerships
- Policy and Planning

Priority Rating:

High.

Hazards Addressed:

All Hazards.

Estimated Cost:

Study/Capacity Building: Medium

Type of Action:

- Programs and Implementation
- Technical Assistance and Capacity Building

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for MOU development and EMS plan review initiation; medium-term for MOU / EMS plan updates.

Responsible Entity:

Sussex County Emergency Management and/or County Administration.

Potential Partners:

Crater PDC; Virginia Department of Emergency Management (VDEM); Sussex County towns; local public safety agencies; local emergency management offices; Virginia Department of Health (VDH) Office of Emergency Medical Services; neighboring jurisdictions.

Partner Action:

Support regional emergency preparedness through technical assistance on MOU development and EMS plan coordination; share best practices from peer localities; and help align local emergency plans with regional hazard mitigation and resilience frameworks.

Source:

Vulnerability Assessment; Action Development Workshop

Potential Funding Source:

FEMA Emergency Management Performance Grant (EMPG) Program; Virginia CFPF; FEMA HMGP and BRIC.

Sussex Action 7 (SS-7): Establish and Maintain a Systematic Ditch and Drainageway Maintenance Program

Establish and maintain a ditch and drainageway maintenance program to improve stormwater flow, reduce localized flooding, and protect infrastructure. Use vulnerability data to prioritize maintenance, coordinate efforts across departments and jurisdictions, and integrate inspections, vegetation management, and sediment removal into routine and post-storm operations.

Action Components:

Inventory and map County ditches and drainageways, identify priority maintenance areas using flood risk data, and establish a routine program for inspections, vegetation management, and sediment removal. Coordinate responsibilities across jurisdictions and integrate maintenance priorities into capital improvement planning and post-disaster recovery.

Primary Goals:

- Strengthen Infrastructure and Built Environment Resilience
- Improve Hazard Preparedness, Response, and

Priority Rating:

High.

Hazards Addressed:

Flooding; Storms; Winter Weather

Estimated Cost:

Project: Medium ($750k - $1.5M)

Type of Action:

- Programs and Implementation
- Capital Projects and Infrastructure

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for program development, infrastructure inventory, and initial priority identification; ongoing for maintenance.

Responsible Entity:

Sussex County Department of Public Works

Potential Partners:

Crater PDC; Virginia Department of Transportation (VDOT); Virginia Department of Environmental Quality (DEQ); Blackwater Soil and Water Conservation District; local towns; neighboring jurisdictions; engineering consultants.

Partner Action:

Provide regional vulnerability and drainage data to support maintenance prioritization; share best practices for systematic ditch and drainageway maintenance programs; assist with coordination between the County and VDOT and neighboring jurisdictions on shared infrastructure.

Source:

Vulnerability Assessment; Action Development Workshop

Potential Funding Source:

Virginia CFPF; FEMA HMGP and BRIC; Virginia DEQ Stormwater Local Assistance Fund (SLAF).

Sussex Action 8 (SS-8): Coordinate with Towns on Shared Drainage Challenges and Stormwater Solutions

Work with towns and neighboring jurisdictions to address shared drainage challenges, identify cross-boundary stormwater projects, and pursue joint funding opportunities. Align efforts with Crater PDC guidance and the County's ditch and drainageway maintenance program to maximize flood reduction and water-quality benefits.

Action Components:

Identify cross-boundary drainage issues and stormwater BMP opportunities through coordinated mapping with County towns; establish regular coordination to prioritize shared projects and maintenance responsibilities; pursue joint funding opportunities; and align efforts with Crater PDC stormwater guidance and nature-based solution best practices.

Primary Goals:

- Strengthen Infrastructure and Built Environment Resilience
- Advance Regional Collaboration and Coordination

Priority Rating:

High.

Hazards Addressed:

Flooding; Storms; Winter Weather

Estimated Cost:

Study / Capacity Building: Medium ($100k to $250k)

Type of Action:

- Programs and Implementation
- Regional Coordination and Partnerships

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for coordination framework development and identification; long-term for project implementation

Responsible Entity:

Sussex County Department of Public Works and/or Planning Department.

Potential Partners:

Crater PDC; Sussex County towns; Virginia Department of Environmental Quality (DEQ); Virginia Department of Transportation (VDOT); Blackwater Soil and Water Conservation District; Chesapeake Bay Foundation; watershed organizations; engineering consultants.

Partner Action:

Facilitate inter-jurisdictional coordination among the County and towns; provide regional stormwater data and best practice guidance; assist with identification and pursuit of joint funding opportunities; support alignment with regional stormwater management ordinance guidance.

Source:

Action Development Workshop

Potential Funding Source:

Virginia CFPF; Virginia DEQ Stormwater Local Assistance Fund (SLAF); EPA Clean Water State Revolving Fund (CWSRF); EPA Nonpoint Source Section 319 Grant; FEMA BRIC

Sussex Action 9 (SS-9): Expand Sewer Infrastructure to Replace Failing Septic Systems

Plan and implement targeted sewer system expansions to replace failing or high-risk septic systems, particularly in environmentally sensitive, flood-prone, or densely developed areas. Prioritize projects that protect public health, improve water quality, support sustainable growth, and reduce long-term infrastructure and environmental risks. Coordinate expansion planning with land use and capital improvement programming to ensure that new sewer capacity supports resilient growth patterns and does not inadvertently incentivize development in high-hazard areas.

Action Components:

Identify and map priority areas with failing or high-risk septic systems, particularly in flood-prone, environmentally sensitive, or densely developed locations; develop a phased sewer expansion plan coordinated with capital improvement programming, land use planning, and growth management goals; engage property owners and community stakeholders in project planning and design.

Primary Goals:

- Strengthen Infrastructure and Built Environment Resilience
- Protect Public Health and Water Quality

Priority Rating:

High.

Hazards Addressed:

Flooding, Infectious Disease

Estimated Cost:

Project: High (Greater than $1.5M)

Type of Action:

- Capital Projects and Infrastructure
- Policy and Planning

Timeline:

Short-Term *1 - 2 years* | Medium-Term *2 - 4 years* | Long-Term *5+ years*

Short-term for needs assessment and priority area identification; medium- to long- term for sewer expansion.

Responsible Entity:

Sussex County Department of Public Works and/or Utilities.

Potential Partners:

Crater PDC; Virginia Department of Environmental Quality (DEQ); Virginia Department of Health (VDH); Virginia Department of Housing and Community Development (DHCD); Blackwater Soil and Water Conservation District; engineering consultants; utility partners.

Partner Action:

Provide regional vulnerability data to support priority area identification; share best practices for coordinating sewer expansion with land use and resilience planning; assist with identification of state and federal funding opportunities for infrastructure improvements.

Source:

Action Development Workshop

Potential Funding Source:

EPA Clean Water State Revolving Fund (CWSRF); Virginia CFPF; FEMA HMGP and BRIC; USDA Rural Development programs.

9.0 DEBRIS MANAGEMENT STRATEGY

This chapter provides guidance for developing and maintaining locality-specific debris management plans (DMPs). Given the region's exposure to hazards such as flooding, severe winter weather, and high winds, advance planning is essential to debris being safely collected, managed, and disposed of following an event. The guidance in this chapter outlines key considerations for pre-disaster planning, plan development, debris management operations, public communication, and plan maintenance. It is intended to serve as a framework that localities within the Crater region can use to establish a comprehensive DMP that supports efficient recovery, protects public health and safety, and enhances long-term resilience.

9.1. Limitations

Because debris removal is carried out primarily by local governments, the strength of a coordinated regional disaster-related debris response relies on each locality developing and maintaining its own written DMP. Staffing, equipment, contractor arrangements, disposal site details, and local capacity may vary depending on the scale of an event.

To keep plans effective, a written DMP should be developed well in advance of disasters and treated as a living document. Localities are encouraged to review their plans at least annually, confirm and update points of contact and responsibilities, and make sure this information is clearly communicated to the public and regional partners, including Crater PDC.

9.2. Pre-Planning Activities

Effective debris management begins well before a disaster occurs. Localities should conduct pre-planning activities tailored to the types of disasters most likely to affect their communities. The Crater PDC Debris Management Plan builds on the existing FEMA-Approved Richmond-Crater Hazard Mitigation Plan (Plan RVA and Crater PDC, 2022), which operates at the regional risk identification and strategy level, by informing operational implementation. The Richmond-Crater Multi-Region Hazard Mitigation Plan identifies the following in Figure 9.1. as regional risks (see 5. Richmond-Crater Hazard Mitigation Plan for specific debris citations by hazard category):

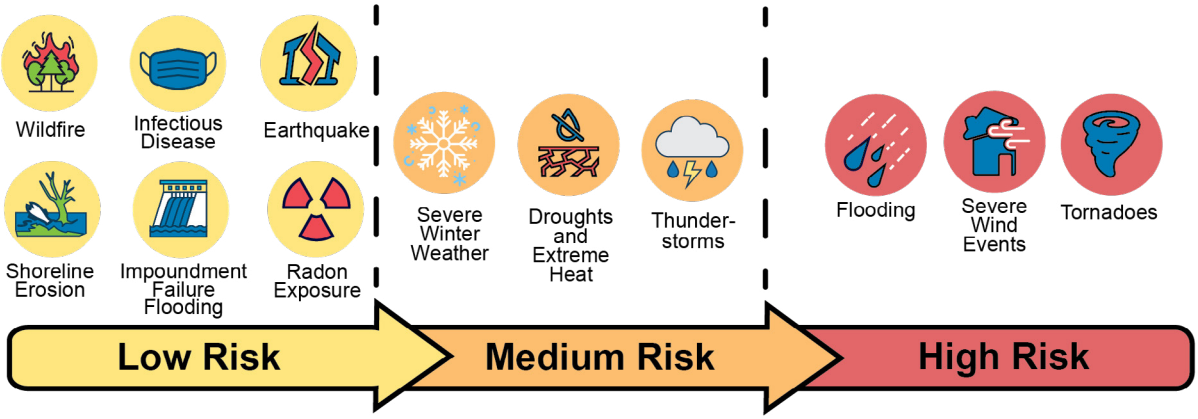


Figure 9.1. Hazard Risks in the Richmond-Crater Multi-Region HMP.

Pre-planning should consider these primary regional hazards when accounting for the full range of debris types that may result from such events, including vegetative debris, construction and demolition material, vehicles, household appliances, electronics, animal carcasses, marine and waterway debris, and sediment (for a more detailed list of debris types, see the section on "Materials and Waste Streams" below).

Pre-planning should also identify opportunities for source reduction, hazard mitigation, and material reuse. This includes assessing whether certain land uses or structures are likely to generate disproportionate debris loads and potentially exploring end markets for materials that could be recycled or repurposed rather than disposed.

Proactive debris management, such as regular removal of overgrown vegetation from drainageways and culverts, helps maintain water flow and reduces the risk of blockages that can cause localized flooding during storms. Carrying out these types of proactive activities before hazard events minimizes flood impacts, protects infrastructure, and reduces emergency response needs.



Photo 9.1. Trees can become hazardous debris during and after flood events, Photo Credit: Kit Friedman

9.3. Plan Components

A written debris management plan should be developed in advance and maintained as a living document. FEMA recommends that DMPs address the following components as outlined in Figure 9.2. The following sections provide additional details and outline further considerations localities should incorporate when developing their own DMPs.



Figure 9.2. Recommended Debris Management Plan Components (FEMA, 2007, pp. 167-171).

9.3.1 Staff Role & Responsibility

Effective debris management requires clearly defined staff roles, responsibilities, and coordination procedures before a disaster occurs. The DMP should identify personnel responsible for debris clearance, collection, processing, monitoring, disposal, public communications, and coordination with state and federal agencies. A notification list of key personnel, agencies, and partner organizations should also be included to facilitate rapid activation of debris management activities following an incident.

Localities should consider designating a debris project manager to oversee debris operations and serve as the primary point of contact for debris management planning, response, and recovery activities. The debris project manager should coordinate with local, regional, state, and federal partners and maintain information on potential debris management sites and resources that may be needed during an emergency (FEMA, 2007, p. 47).

Successful implementation of the DMP will require participation from multiple locality departments and partner agencies. GIS staff may provide mapping and data management support, while the Virginia Department of Emergency Management (VDEM) can assist with resource coordination, technical guidance, and disaster recovery operations. Additional staff should be identified to support plan maintenance, plan activation, and future updates. Emergency requests and resource needs

should be coordinated through the locality's dispatch system, with requests for state assistance routed through VDEM's resource management process.

9.3.2 Situation and Assumptions

The DMP should define the geographic extent of the planning area, likely disaster scenarios, and the populations and communities that may be affected by debris-generating events. The plan should document assumptions regarding terrain, land use, transportation access, and critical infrastructure that may influence debris operations. These assumptions provide the foundation for estimating debris quantities, identifying operational priorities, and coordinating response activities.

Several planning considerations require additional evaluation as the DMP is developed. Localities should identify the flood scenario, disaster event, or planning assumption that will be used as the basis for debris generation estimates and operational planning. Coordination with ongoing EPA Brownfields efforts may also provide valuable information regarding potential upstream and downstream impacts associated with flooding, contamination, and debris movement.

The DMP should also identify critical facilities, major transportation corridors, and alternate access routes that may be needed during debris clearance and removal operations. Special consideration should be given to facilities that store hazardous materials, biohazards, or other potentially dangerous substances, as these locations may require specialized response measures or prioritized debris removal efforts. Mapping of essential facilities and transportation routes should be maintained as part of the DMP to support decision-making during disaster response and recovery.

9.3.3 Debris Collection Plan

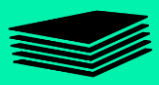
The DMP should establish procedures for the collection, segregation, handling, reduction, recycling, and disposal of disaster-generated debris. Because different debris types pose varying management and regulatory challenges, debris collection procedures should address hazardous materials, inorganic debris, organic debris, construction and demolition waste, household hazardous waste, electronic waste, and other specialized waste streams.

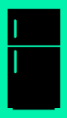
The plan should inventory anticipated waste streams and describe each in terms of regulatory status, associated hazards, and any special handling requirements. It is important to consider all potential sources of waste such as the following:

- Industrial facilities
- Sites that store hazardous chemicals or biomaterials
- Superfund or brownfield properties within the planning area

To aid in the planning process, Table 9.1 provides specific types of debris, developed with reference FEMA's 2021 Public Assistance Debris Monitoring Guide, as well as key considerations around potential management approaches. Localities should refer to the most current guidance issued by the Virginia Department of Environmental Quality (DEQ), VDEM, the EPA, and FEMA, as well as any applicable local ordinances, when developing or updating their debris management plans.

Table 9.1. Types of Debris to Consider for Debris Management Plan

Debris Type	Handling Considerations	Compliance	Management Approach
Vegetative debris, including trees, branches and stumps 	Highest-volume stream in most storms; grind or chip on-site to reduce volume.	May qualify for the clean-vegetative-debris exemption under 9VAC20-81-95.D.13, avoiding the need for a DEQ emergency permit if kept segregated and site operates within exemption terms.	Composting or mulching preferred over landfilling per EPA's waste management hierarchy; only hazard trees/limbs posing immediate threat are FEMA-eligible.
Construction and demolition (C&D) debris 	Bulky, mixed material (drywall, lumber, roofing, concrete); segregate at curb where possible.	Not classified as hazardous or municipal solid waste under federal law, so C&D landfills aren't subject to the same federal design/operating criteria; DEQ emergency permit required if managed at a Temporary Debris Management Site (TDMS).	Recycle metals/concrete where markets exist; landfill remainder.
Hazardous waste 	Never comingle with other debris streams: mixing can cause the whole load to be reclassified as hazardous, increasing disposal cost and liability.	Subject to RCRA Subtitle C management; DEQ emergency permit required for any TDMS handling it.	Route to a permitted hazardous waste facility; document chain of custody.
Putrescent (decomposing) debris 	Time-sensitive; must be managed quickly to prevent disease vectors.	Public health authority coordination typically required; some jurisdictions treat as an emergency protective measure (Category B) rather than standard debris removal.	Some waste in this category can be composted or rendered; otherwise expedited landfill disposal.
Infectious waste 	Requires specialized handling/PPE for crews; may originate from healthcare facilities or wastewater contamination.	Regulated separately from general medical waste rules; coordinate with local health department.	Autoclave, incineration, or licensed medical waste disposal — not standard landfill.

Debris Type	Handling Considerations	Compliance	Management Approach
Household hazardous waste (HHW) 	Common examples: paints, pesticides, batteries, propane cylinders, cleaning chemicals; collect at curb separately, don't mix with bulk debris.	Requires specially designed disposal facility; many jurisdictions stand up temporary HHW collection events post-storm if no permanent facility exists.	Route to a permitted HHW facility or recycler; consider pre-arranged contracts with HHW management vendors.
Electronic waste (e-waste) 	Contains lead, mercury, and other heavy metals; often banned from standard landfill disposal.	Check state-specific e-waste disposal law.	Recycle for recovery of copper, silver, gold, plastics, glass; separate from HHW/general debris stream.
Soil, mud, and sand 	Volume can be significant after flooding; test for contamination before reuse.	Testing recommended before beneficial reuse, in case of contamination.	Reuse where clean (fill, grading); landfill if contaminated.
White goods (major appliances) 	Contain refrigerants and regulated chemicals/oils; must be separated from general debris.	Must be delivered to a certified recycler permitted to drain refrigerants; frequently subject to state landfill bans.	Recycle for refrigerant recovery and scrap metal value.
Vehicle and vessel wreckage 	Fuel, motor oil, batteries, and tires must be removed and managed separately before scrapping.	Applicant must follow State, Local, Tribal, and Territorial ordinances for private vehicle/vessel removal and document handling to support FEMA eligibility (if eligible); unclaimed vehicles may need temporary storage while owner is identified.	Recycle hull/frame; manage fluids, batteries, tires separately.

Debris collection responsibilities should be coordinated among multiple agencies and organizations. Hazardous waste management may require coordination among the Virginia DEQ, regional hazardous materials teams, specialized environmental contractors, and VDEM. Inorganic debris collection may be managed through the public service authories, while local public works departments may play a role in collecting and managing vegetative debris and other organic materials. Collection procedures should encourage separation of debris streams at the point of pickup whenever feasible to improve efficiency and reduce disposal costs.

Although this strategy focuses on debris management in the context of emergency response, debris also affects local waterways and the natural environment. According to the 2021-2025 Virginia Marine Debris Reduction Plan (Virginia CZM), marine debris consists of persistent manufactured waste that enters aquatic environments, primarily from land-based sources transported through stormwater systems. Common debris includes cigarette butts, plastic bottles, bags, wrappers, cans, bottle caps, cups, and straws. An updated statewide marine debris reduction plan is expected in fall 2026. The updated plan may include new strategies and partnership opportunities that Crater PDC and localities can pursue to reduce marine debris and protect waterways.

Residential Debris Management

The DMP should include guidance for residential debris collection and staging. DEQ recommends that residents keep debris on their property and away from public rights-of-way until directed otherwise by local officials, as transportation agencies often need to prioritize roadway clearance immediately following a disaster. Residents on private roads may be permitted to move debris to designated curbside collection areas.

Residents should be encouraged to separate debris by category and follow locality-specific collection instructions. Public guidance should include information regarding debris segregation, staging locations, curbside placement requirements, safety precautions, and procedures for handling potentially contaminated materials. The DMP should include a residential debris collection checklist that outlines how residents will be notified, where debris should be placed, and how different debris types will be collected or disposed.

9.3.4 Debris Management Sites

A crucial element of effective debris management is pre-identifying potential Temporary Debris Management Sites (TDMS) that would remain accessible following a disaster, so that hazardous and large-volume materials can be handled safely and efficiently. The EPA's Planning for Natural Disaster Debris guidance, together with FEMA's Public Assistance Program and Policy Guide and Debris Monitoring Guide, provides current considerations for planning, establishing, and operating temporary debris management sites abridged below:

- **Ownership:** Prioritize public land to avoid lease costs; consider existing landfills/recycling centers close to the disaster area; look at parcels with low repair risk; explore state-to-state or county-to-county land-use agreements.
- **Size:** Site must be large enough for debris storage, processing, equipment, and truck maneuvering. Rule of thumb: allotting 100 acres per 1 million cubic yards of debris, with roughly 60% of that area typically being reserved for roads, buffers, burn pits, and HHW areas.
- **Location:** Avoid impeding traffic on major corridors; avoid residential areas, schools,

churches, and hospitals; needs strong ingress/egress for heavy trucks; account for public tolerance of noise, dust, smoke, and traffic (which drops as recovery progresses).

- **Environmental / Historic Concerns:** Avoid wetlands, critical habitats, sole-source aquifers, well fields, historic districts, archeological sites, Superfund sites, and 100-year floodplains. Must also assess disproportionate impacts on minority/low-income populations.

A general lifecycle of establishing, utilizing, and closing out a TDMS is as follows (U.S. Environmental Protection Agency, 2025, pp. 57-63):

- **Pre-identify sites in advance:** Debris Project Manager works with local/tribal/state officials to maintain a running list of potential sites before disaster strikes.
- **Screen candidate sites:** Using the four criteria of ownership, size, location, and environmental/historic status, determine a list of appropriate sites.
- **Negotiate land leases:** In the case that private land is needed, leases should cover the full period of use, including baseline and closeout environmental evaluations, with extension options.
- **Collect baseline data:** Before occupying the site, existing conditions should be documented through photos/video, written record of physical features, historic research, and soil/water sampling.
- **Secure permits:** Permits may include waste processing, temporary land-use, air/water quality, traffic, HHW, and fire department permits.
- **Design the site layout:** Define operational zones with clear boundaries and traffic patterns.
- **Operate the site:** Verify site can be staffed by a site manager, debris monitors at entry points, and safety personnel; track load quantities and continue environmental monitoring throughout the use of the site.
- **Close out the site:** Remove all equipment/structures, conduct final environmental testing against baseline data, complete any needed remediation, and return the site to the owner.

9.3.5 Contracted Services

The DMP should identify debris-related services that may require contractor support during large-scale disasters. Pre-event contracts can improve response efficiency by ensuring resources are available immediately following a disaster and by reducing delays associated with emergency procurement.

Potential contracted services may include debris removal, debris monitoring, hazardous waste management, household hazardous waste collection, infectious waste disposal, debris reduction operations, debris site management, recycling services, environmental monitoring, and emergency demolition activities. Crater PDC and localities should evaluate potential debris and material waste contractors in advance and maintain a list of qualified vendors that can support operations during disaster response and recovery.

9.3.6 Private Property Demolition and Debris Removal

Virginia DEQ recommends that residents keep debris on their property and away from the right of way until instructed, since VDOT needs to clear public roadways first, though residents on private roads can move debris to the curb. DEQ recommends that residents sort debris into categories and check with their locality about category-specific collection methods, and that they avoid placing debris near power lines, utility boxes, or fire hydrants.

A dedicated residential component within DMP should include a checklist covering how residents will be notified, how residential debris should be separated and staged for collection, rules for curbside placement, and safety guidance such as avoiding downed power lines and potentially contaminated materials.

9.3.7 Public Information Plan

Each DMP should include a public information plan, consisting of a community outreach component that identifies key stakeholder groups and contains pre-scripted public-facing materials such as fact sheets, public service announcements, and FAQs. Communications should be accessible to all residents, including translation into languages spoken by non-English-speaking populations in the planning area.

FEMA-325 recommends that the public information plan component identifies the communication channels a locality will use to reach residents (e.g., television, website, social media, printed materials), while accounting for the possibility that a disaster may disrupt some of these mediums.

As part of their DMPs, localities should develop, maintain, and distribute pre-scripted content covering, at minimum, the following topics:

- Debris pick-up schedules
- Disposal methods and compliance with regulations
- Disposal procedures for self-help and independent contractors
- Restrictions and penalties for illegal dumping
- Curbside debris segregation instructions
- Public drop-off locations for all debris types
- Processes for answering the public's questions.

9.3.8 Related Appendices

Supporting information that may require periodic updates should be maintained within appendices to the DMP. Potential appendices include:

- Debris Management Organization Chart
- Notification and Contact Lists
- Essential Facilities Inventory
- Transportation and Access Route Maps

- Debris Type Management Guidance
- Temporary Debris Management Site Inventory and Maps
- Contractor and Vendor Lists
- Residential Debris Collection Guidance
- Public Information Templates and Outreach Materials
- FEMA Documentation, Monitoring, and Reimbursement Forms

These appendices should be reviewed and updated regularly so information remains current and available when needed during disaster response and recovery operations.

9.4. FEMA-Declared Natural Disaster Implementation

FEMA Public Assistance reimbursement for debris removal (Category A) follows a documented grant process in which applicants identify and track eligible work, submit project information and cost documentation, and receive reimbursement for debris removal activities that are necessary to protect public health and safety, prevent further damage, or support community recovery.

Removal of debris from improved public property and public rights-of-way (ROWs), including federal-aid roads, is eligible for FEMA reimbursement under the Public Assistance program. Debris removal from private property is the responsibility of the property owner. In special cases where debris on private property is so widespread that it threatens public health and safety or the economic recovery of the community, FEMA may grant an exception and deem debris removal eligible for assistance. Large commercial areas such as shopping centers or industrial facilities generally remain the responsibility of the commercial entities, and FEMA will not reimburse that debris removal. Debris removal from waterways is eligible only when necessary to eliminate an immediate threat to life, public health and safety, and when it does not occur in federally maintained navigable waterways.

To maintain eligibility, debris operations must be properly monitored and documented, costs must be reasonable and directly tied to eligible work, and ineligible activities, such as debris removal that primarily benefits private individuals or work lacking adequate records, may be denied reimbursement. An overview of the process is as follows in Figure 9.3 below.



Figure 9.3. Recommended Debris Management Plan Components (FEMA, 2007, pp. 167-171).

9.5. Plan Maintenance

The debris management plan should be treated as a living document and reviewed 1) periodically to reflect changes in land use, population, infrastructure, or regulatory requirements and 2) after incidents that required debris management of some scale. Each action in the plan should identify a lead organization, estimated timeline, and cost range to allow for accountability.

Table 9.2. Debris Management Roles and Phases

	Actor	Primary Role	Phase
State	**Virginia Dept. of Emergency Management (VDEM)**	Provide state-level guidance; activate state resources when local capacity is exceeded; coordinate FEMA Public Assistance declarations; support training and exercises	Pre-planning; Response; Coordination
	Virginia Department of Transportation (VDOT)	Clearing and managing disaster debris from state-maintained roadways and rights-of-way; restoring transportation system access, providing traffic control and traveler information; coordinating with VDEM, local governments, and federal partners to support emergency response.	Coordination; Mitigation; Response

	Actor	Primary Role	Phase
Regional	**Crater PDC**	Coordinate regional plan development; provide technical assistance to member jurisdictions; facilitate inter-jurisdictional data sharing; apply for and administer regional grants; maintain regional hazard mitigation plan.	Pre-planning; Coordination; Mitigation
	Crater Health District	Monitor health risks from debris (like mold, contaminated water, hazardous materials exposure); issue public health guidance; advise on worker safety.	Mitigation; Response
	Planning Departments	Identify and select a Debris Project Manager. Identify hazardous materials sites, industrial facilities, and critical infrastructure in planning area; integrate debris considerations into comprehensive and hazard mitigation plans; update zoning to reduce future debris risk.	Preplanning; Response; Response
County	**DPW**	Deploy equipment and crews for debris removal; manage debris staging and storage sites; coordinate haulers and transportation routes; maintain roads and rights-of-way; execute debris contracts	Response; Mitigation; Coordination
	Emergency Management Coordinator	Maintain jurisdiction-level debris management plans; coordinate with state and federal agencies; issue public communications; track debris volumes and costs for FEMA reimbursement	Pre-planning; Response
	Planning Departments	Identify and select a Debris Project Manager. Identify hazardous materials sites, industrial facilities, and critical infrastructure in planning area; integrate debris considerations into comprehensive and hazard mitigation plans; update zoning to reduce future debris risk	Pre-planning; Mitigation
Private	**Utility Companies**	Clear debris from transmission corridors; restore power infrastructure; coordinate with DPW on downed line hazards during debris operations	Response
	Private Haulers / Contractors	Execute debris collection, transport, and disposal under contract with local governments; operate debris staging and reduction sites; provide specialized equipment	Response

9.6. Richmond-Crater Regional Hazard Mitigation Plan References to Debris

9.6.1 Locality-Specific Mitigation Actions

The HMP already begins to define locality-specific reference to debris management through the following mitigation actions.

- Dinwiddie County adopted a Debris Management Plan within the past several years, although the plan does not appear to be publicly available.
- Charles City County: Mitigation Action 3 addresses debris management through coordination with private utility providers to maintain clear rights-of-way, reducing debris that obstructs drainage systems and blocks roadways" (Plan RVA and Crater PDC, 2022, p. 332).
- Hopewell emphasizes debris management through multiple mitigation actions: Mitigation Action 4 which outlines routine inspection and clearing of debris from stormwater infrastructure, increasing drainage system capacity in flood-prone creeks through debris removal and channel improvements (Plan RVA and Crater PDC, 2022, p. 454); Mitigation Action 7 which calls for developing a formal debris removal plan; (Plan RVA and Crater PDC, 2022, p. 457) and Mitigation Action 12 which integrates debris management into marina retrofits to reduce flood and erosion impacts (Plan RVA and Crater PDC, 2022, p. 462).
- Petersburg identifies debris management as a key component of stormwater and transportation resilience through Mitigation Action 5 which calls for regular debris removal from drainage systems and collaboration with VDOT to address debris in non-City-owned rights-of-way (Plan RVA and Crater PDC, 2022, p. 486).

9.6.2 Hazard-Specific Reference to Debris

Debris is mentioned in the following hazard profiles, which are all regionally relevant to Crater PDC. These references can aid with developing region-wide standards or plan elements, or with discussing specific incidents and risks with Crater PDC localities.

5.4 Flooding: Debris is identified as a major concern during flood events because it can obstruct transportation routes, delay residents' ability to return to work, hinder regional economic recovery, and create hazards for drivers and pedestrians when vegetation and structural debris remain on roadways (Plan RVA and Crater PDC, 2022, p. 78).

5.5 Flooding Due to Impoundment Failure: Debris accumulation, including debris jams and seasonal factors such as melting snow, can contribute to delayed or progressive impoundment failures that unfold over extended periods rather than occurring suddenly (Plan RVA and Crater PDC, 2022, p. 119).

5.6 Severe Wind Events: Debris plays a significant role in wind-related hazards, as high winds can generate airborne debris and fallen trees that damage buildings, disrupt power and

communications, block roads, and pose serious injury or fatality risks during the hazard event. Post-storm cleanup and recovery efforts pose their own set of risks as well: a number of injuries and deaths are reported to occur when property owners do their own cleanup with chainsaws, or even utilize backup generators or grills to cook after power outages (Plan RVA and Crater PDC, 2022, pp. 135-136).

5.7 Tornadoes: Tornado damage is largely driven by extreme wind speeds and wind borne debris, which amplify structural damage and increase the risk of injury, often alongside other severe weather effects such as lightning or hail (Plan RVA and Crater PDC, 2022, p. 150).

5.8 Wildfires: Improper debris burning has directly caused wildfire incidents in the region, while inadequate management of vegetative debris can increase wildfire spread and intensity, highlighting the importance of routine vegetative debris management as a mitigation measure (Plan RVA and Crater PDC, 2022, p. 169).

5.9 Severe Winter Weather: Downed tree debris from winter storms can block roadways and limit emergency response, with debris removal complicated by shared responsibilities between the Virginia Department of Transportation (VDOT) and private utility providers (Plan RVA and Crater PDC, 2022, p. 179).

5.12 Earthquakes: Earthquake impacts may include injuries resulting from falling debris and structural damage, even when overall damage levels are relatively minor (Plan RVA and Crater PDC, 2022, p. 214).

5.13 Landslides: Debris flows associated with landslides present a high-risk hazard due to their speed and unpredictability, with past destructive events in multiple localities underscoring the danger posed by debris-driven slope failures (Plan RVA and Crater PDC, 2022, p. 221).

9.6.3 Locality-Specific Hazard-based Debris References

The Hazard Mitigation Plan notes that Colonial Heights initiated a debris cleanup in a creek following flooding in 2004, which reduced subsequent flooding, highlighting the importance of pre-incident debris planning as one effective mitigation strategy (Plan RVA and Crater PDC, 2022, p. 105). Post-storm debris and minor structural damage was noted in Petersburg, resulting from a June 1, 2012 tornado that tracked through the I 95/Route 460 area and into the Petersburg National Battlefield (Plan RVA and Crater PDC, 2022, p. 153).

10.0 PLAN MAINTENANCE

The Crater PDC Regional Resilience Plan is intended to serve as a living document. To be impactful over the next five years, there must be a systematic approach for tracking project progress and establishing protocols to keep both the Project Team and stakeholders regularly informed of the plan's advancement.

The three main components of plan maintenance are: monitoring, evaluating, and updating the plan. Included in this chapter is a multi-pronged strategy to keep the resilience plan as effective as possible. This process will be intertwined with public engagement, integration with other local, regional, and state planning mechanisms, and plan implementation. These processes will run on an ongoing basis with the expectation there is coordination and collaboration between monitoring, evaluating, and updating the plan.

Crater PDC will:

- Track the progress of actions developed in this Resilience Plan.
- Reconvene the Steering Committee bi-annually and around annual update periods to monitor, evaluate, update, and integrate the Resilience Plan.
- Share the Resilience Plan progress with the public once a year on Crater PDC's website.

10.1. Monitoring the Plan

Through the following components the Resilience Plan will track implementation over time:

- **Who:** The Environment & Resilience Planner at Crater PDC will be responsible for leading the annual updates with support from the technical consultant team and input from the Steering Committee. The environmental planner will conduct a reporting process with the localities.
- **How:** The Environment & Resilience Planner at Crater PDC will monitor the status of plan implementation and action development through an internal tracking system using an excel spreadsheet or dashboard. Alongside annual plan updates, localities will receive a questionnaire or survey to document any extreme weather or climate-related events, identify new data or information for integration into the vulnerability assessment, and report on the progress of plan actions.
- **When:** Monitoring will take place on an ongoing basis with annual meetings around the annual update period to formally update the status of the implementation plan and action development. In advance of this meeting, Crater PDC will send out notices to the steer-

ing committee that will include a shared document where all members can collaborate to review status of actions and identify any new actions that may be under consideration or in progress as part of ongoing Crater PDC efforts.

10.2. Evaluating the Plan

The Resilience Plan will assess its effectiveness at achieving its stated vision and goals listed in Chapter 1.

- **Who and When:** The Steering Committee will meet annually to evaluate the effectiveness of the Plan. The Core Team may also be called to meet after a major event or after an action is completed to evaluate the effectiveness of the plan.
- **How:** The Steering Committee will:
  - Review the Crater PDC Regional Resilience Plan goals; and
  - Discuss how actions are or are not meeting these listed goals and where improvements or adjustments may be needed (e.g., re-prioritization of projects, integrating with other planning processes more effectively, adding new data to climate projections, etc.).

10.3. Updating the Plan

The following section describes how the Crater PDC Regional Resilience Plan will be monitored, evaluated, and updated over time to remain relevant, implementation-focused, and responsive to changing conditions. Plan updates may occur under the following circumstances:

- Completion of resilience actions or projects;
- Significant flood, severe weather, or other hazard events that affect community priorities;
- New data, studies, regulations, funding opportunities, or changing community conditions; and
- Periodic plan updates required to maintain consistency with Virginia Department of Conservation and Recreation (DCR) program requirements.

10.3.1 Annual Monitoring and Evaluation

Because resilience planning is an ongoing process, Crater PDC should periodically review progress toward implementation of the actions identified in this Resilience Plan. During these reviews, Crater PDC and localities should evaluate action status, identify completed projects, document funding secured and partnerships established, assess barriers to implementation, and determine whether additional actions or modifications are needed. Monitoring results should be used to update action priorities and guide future resilience investments.

The active planning horizon for the Crater PDC Regional Resilience Plan is 5 years, aligning with DCR's requirements for plan validity and implementation. The actions in the plan are accompanied

by an estimated timeframe (short-term: 1-2 years, medium-term: 2-4 years, or long-term: 5 or more years). Short-term and medium-term actions are higher priority in alignment with the plan's planning horizon.

Each locality should designate a lead department, resilience coordinator, floodplain manager, or other responsible staff to coordinate plan monitoring efforts and convene implementation partners as needed. Annual or periodic progress reviews should include participation from departments, organizations, and stakeholders involved in implementing resilience actions. Since this plan qualifies as a "Resilience Plan", the Flood Preparedness Plan should be reviewed, updated, and resubmitted for Virginia Department of Conservation and Recreation (DCR) approval every five years under current expectations of useful plan life.

10.3.2 Updates Following Major Events

Crater PDC in correspondence with localities should revisit the Resilience Plan following significant flood events, severe storms, or other disasters that reveal new vulnerabilities, damages, or recovery needs. Plan updates may also be warranted when new flood studies, hazard mapping, climate information, development trends, regulatory requirements, or funding opportunities become available. These updates can help make sure that resilience actions remain aligned with current risks, community needs, and implementation priorities. Localities may complete future updates using internal staff resources or with support from regional partners, consultants, and technical assistance providers.

10.3.3 Integrating the Plan

To maximize the effectiveness of the Resilience Plan, resilience goals, strategies, and actions should be integrated into other local government planning, policy, and capital investment processes. Integrating resilience considerations into existing planning mechanisms helps ensure that resilience objectives are incorporated into everyday decision-making, creates opportunities to leverage funding across multiple initiatives, and increases the likelihood that resilience projects advance from planning to implementation.

Plan integration involves incorporating resilience priorities into planning documents, programs, policies, and investments that influence how communities grow, manage infrastructure, protect natural resources, prepare for hazards, and invest public funds. Examples of integration opportunities include:

- **Hazard Mitigation Planning:** Coordinate implementation of this Resilience Plan with the Richmond-Crater Regional Hazard Mitigation Plan (HMP) update to align risk reduction strategies, mitigation projects, public outreach efforts, flood warning initiatives, and funding opportunities.
- **Comprehensive Plans and Future Land Use Planning:** Incorporate resilience objectives, flood risk reduction strategies, conservation priorities, and climate adaptation considerations into future comprehensive plan updates and land use decisions.
- **Capital Improvement Programs (CIP):** Prioritize resilience projects and infrastructure investments identified in this Plan when developing and updating capital improvement programs and annual budgets.

- **Floodplain Management, Zoning, and Development Regulations:** Incorporate resilience goals into floodplain ordinances, zoning regulations, stormwater requirements, subdivision review processes, and development standards to reduce future risk and support resilient growth patterns.
- **Parks, Recreation, and Open Space Planning:** Coordinate implementation of nature-based solutions, floodplain restoration, trail networks, conservation projects, and recreational investments that provide resilience and community benefits.
- **Regional Partnerships:** Crater PDC and its localities should continue collaboration with Plan RVA, state agencies, utilities, community organizations, and other partners to advance shared resilience priorities and pursue funding opportunities.

Integration should be discussed as part of localities periodic resilience plan review process. Progress toward incorporating resilience actions into other planning initiatives should be documented, and opportunities for additional integration should be identified as new plans, studies, and projects are developed.

10.4. Public Participation

Public engagement is a critical component of maintaining and implementing the resilience plan. Community members, businesses, property owners, nonprofit organizations, and other stakeholders play an important role in identifying needs, refining priorities, and supporting implementation efforts. Public participation helps resilience investments reflect local concerns, address changing conditions, and provide meaningful community benefits.

10.4.1 Potential Engagement Activities

Crater PDC and localities should maintain opportunities for public involvement throughout the life of the Crater PDC Regional Resilience Plan through a combination of public meetings, stakeholder engagement activities, online resources, educational initiatives, and project-specific outreach efforts. Public participation should be incorporated into annual or periodic plan reviews, updates to resilience priorities, and the development of major resilience projects. Some of these ideas are detailed in the section below.

Public Information and Education

- Providing periodic updates on resilience projects, funding opportunities, and implementation progress through websites, newsletters, social media, and public meetings.
- Sharing educational materials related to flood risk, emergency preparedness, flood insurance, natural resource conservation, and resilience best practices.
- Hosting workshops and presentations or doing pop-ups at community events focused on resilience and hazard preparedness.

Public Input and Feedback

- Providing opportunities for residents and stakeholders to review and comment on resilience priorities and proposed projects.
- Soliciting feedback during annual or periodic implementation reviews.
- Conducting surveys, stakeholder interviews, public workshops, and community meetings to identify emerging needs and opportunities.
- Engaging neighborhood groups, community organizations, businesses, schools, and vulnerable populations in resilience planning discussions.

Project-Specific Engagement

- Conducting targeted outreach for major resilience initiatives, including flood mitigation projects, infrastructure improvements, voluntary property acquisition programs, conservation efforts, and community preparedness activities.
- Working directly with affected property owners, businesses, and community organizations during project development and implementation.

Ongoing engagement not only helps educate residents, businesses, and property owners about flood risks, emergency preparedness, available resources, and resilience strategies, but also provides valuable opportunities to gather local knowledge and feedback. Community input can help identify emerging concerns, validate local priorities, refine resilience actions, and improve understanding of how flood hazards affect different populations, neighborhoods, and sectors of the community.

Regular outreach and engagement activities also help provide that resilience investments remain aligned with community needs and priorities over time. Through public meetings, workshops, surveys, educational events, and project-specific engagement efforts, residents and stakeholders can provide feedback on implementation progress, identify barriers to action, suggest new opportunities, and help inform future updates to the Crater PDC Regional Resilience Plan. Maintaining strong communication with the community fosters transparency, builds support for resilience initiatives, and strengthens ability of localities to implement effective and equitable resilience solutions.

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12.0 APPENDICES

Several appendices and technical resources accompany this plan and provide additional information on the planning process, methodology, and supporting analyses.

Appendix A. Stakeholder Engagement Results documents the outreach and engagement activities conducted throughout the planning process, including steering committee workshops, stakeholder interviews, public participation efforts, and key themes identified by participants. This appendix provides additional detail on how stakeholder input informed the development of resilience priorities and recommended actions.

Appendix B. Vulnerability Assessment Methodology and Scoring Framework provides a detailed description of the technical approach used to identify, evaluate, and prioritize assets throughout the Crater region. The appendix describes the datasets, scoring criteria, risk evaluation process, and methodology used to assess asset vulnerability and support action prioritization.

In addition to the formal appendices included in this document, several supporting technical resources were developed during the planning process and are available upon request:

- Action Tracker containing the complete inventory of resilience actions developed and evaluated during the planning process.
- Interim Technical Memoranda (3) documenting key technical analyses, findings, and planning milestones completed throughout project development.
- Locality-Specific Vulnerability Assessment Map Packages and Asset Scoring Results providing detailed maps, datasets, and scoring information used to evaluate local assets and flood risk conditions within each jurisdiction.

Appendix A.
Stakeholder Engagement Results

Crater PDC Regional Resilience Plan

Version 1.0 | September 2026

CRATER PLANNING DISTRICT COMMISSION

Weston & Sampson

Appendix A – Crater PDC Regional Resilience Plan

Appendix A documents the stakeholder engagement process and results for the Crater PDC Regional Resilience Plan. It provides additional detail and supporting information beyond the overview presented in *Chapter 5: Steering Committee Workshops*, including stakeholder outreach, participation, and engagement activities conducted throughout the planning process.

A key foundation for grounding the plan in local realities and needs within the Crater PDC was engagement with a steering committee. This committee included representatives from all eleven localities, along with regional experts identified by the Crater PDC, to guide development of the Crater PDC Regional Resilience Plan.

The steering committee was engaged at multiple points throughout the resiliency planning process, with most meetings and workshops held virtually or in-person at the Crater PDC office during lunchtime or afternoon hours. Given the large geographic area served by the Crater PDC, Crater PDC's office located in Petersburg provided a convenient and centrally located meeting space for many participating members.

Kick-off Meeting: Plan Introduction

The first steering committee meeting was held in conjunction with the Crater Region Environment Stewardship (CREST) quarterly meeting, and members also actively participated in four workshops throughout the planning process. The first steering committee workshop was held in April 2025 to discuss knowledge sharing and strengthening. The second steering committee workshop was held in August 2025 to discuss objectives and goals for each locality. The steering committee met virtually for the third workshop in December 2025 to review the results of the vulnerability assessment and reconvened in person in March 2026 to further review and develop strategies for project identification. Committee member had the opportunity review materials pertaining to capacity building, the climate vulnerability assessment, and the identification of actions.

Workshop 1: Knowledge Sharing & Strengthening

The knowledge sharing and strengthening workshop was held on April 30, 2025, at the Crater PDC office. Designed to foster collaboration among local stakeholders, the workshop created a structured space for participants to reflect on community vulnerabilities, share experiences, and collectively shape a vision for a more resilient Crater region. Through facilitated discussions and interactive exercises, participants contributed visioning statements for both their localities and the region, while also identifying vulnerable areas using a mapping activity aimed at highlighting key local hazards.

The workshop was open to steering committee members and a total of 14 members actively participated in the workshop. Localities represented included Petersburg, Emporia, Colonial Heights, Hopewell, Surry County, Prince George County, and Chesterfield County. Other entities in attendance include PDC staff from PlanRVA and Crater PDC, a representative from VDH Crater Health District, and a consultant from Timmons Group.

This information is summarized in the section below. Overall, the workshop aimed to build capacity through peer learning, gather community-driven insights, and strengthen relationships among localities, all essential steps in shaping a coordinated and actionable Regional Resilience Plan.

Summary of Activities and Results

Activity 1

The questionnaire results played a key role in shaping the first interactive activity of the workshop. The questions asked in this survey are shared in Error! Reference source not found..

Locality Capacity & Needs Survey

The questions listed below were posed in the online and in-person questionnaire.

Human & Institutional Capacity

1. Does your locality have staff dedicated to planning activities related to climate resilience, such as floodplain management, stormwater management, environmental planning, emergency response, or social services?
2. Which departments currently have roles related to resilience planning?
3. What additional staff capacity would your locality need to improve resilience planning?

Financial Resources

4. Has your community received funding for projects related to flood protections, stormwater management, winter weatherization, emergency response, or extreme heat planning?
5. What financial challenges does your locality face in implementing resilience projects?

Technical Assistance & Training Needs

6. Does your locality currently use climate resilience data or tools in decision-making?
7. Do you have a local resilience plan?
8. Which types of technical assistance would benefit your locality most?
9. What training needs exist for local staff in the area of resilience planning?

Infrastructure & Operations

10. Has your locality experienced significant climate-related impacts in the past 10 years?
11. What public assets have been impacted by natural hazards or weather events?
12. Does your locality have backup power and redundancy plans for critical infrastructure during climate-related events?

Policy & Planning

13. Does your locality have land use or zoning policies that address climate resilience, flooding and/or stormwater management?
14. Would your locality benefit from model ordinances or policy recommendations related to resilience?
15. What major barriers exist for adopting resilience-focused policies in your locality?

Disaster Response Capacity

16. Does your locality have an emergency operations or disaster response plan?
17. Which agencies/departments are responsible for disaster response in your locality?
18. How does your locality coordinate with regional and state agencies for disaster response?
19. Is your community enrolled in the FEMA Community Rating System?
20. What major challenges does your locality face in disaster response?
21. What are your locality's biggest disaster response needs?

Regional Coordination & Support

22. Does your locality currently coordinate with other localities or regional/state agencies on resilience efforts?
23. What additional support would be beneficial from regional/state partners?

Final Thoughts

24. What are your locality's top priorities for improving resilience over the next five years?
25. Is there anything else your locality would like to share regarding climate resilience needs or challenges?

Figure A-1. Capacity Building Survey Questions

Participants worked in facilitated small groups to reflect on their survey responses and engage in a collaborative exercise to validate and prioritize critical needs. Each participant was given five sticky dots to place on laminated boards that categorized seven common need areas: human/institutional capacity, financial assistance, technical assistance and training, infrastructure and operations, policy and planning, disaster response capacity, and regional coordination and support. These boards served as visual tools to identify the most urgent and widely shared priorities within the group. The final boards displayed "hot spots," (areas with the most sticky dots) indicating where participants collectively saw the greatest needs, providing an immediate visual summary of regional capacity gaps. These insights, shared in Table A-1, laid the groundwork for more nuanced conversations during subsequent workshop activities.

Table A-1. Capacity Needs Exercise Results

Need Category	Votes
Human & Institutional Capacity	12
Technical Assistance & Training Needs	12
Financial Resources	11
Regional Coordination & Support	8
Infrastructure & Operations	7
Policy & Planning	4
Disaster Response Capacity	2

Localities reported key capacity gaps in human and institutional resources, technical assistance and training, and financial support. Many rely on limited staff who juggle multiple roles, leaving little time for focused resilience planning. Training needs were related to limited staff knowledge on resiliency planning as well as grant writing. Financially, localities struggle with limited local funding, lack of matching funds, and challenges navigating complex grant applications. These gaps hinder their ability to plan for and respond to climate impacts effectively.

Activity 2

The second activity of the workshop focused on visioning. Each participant was asked to draft two resilience vision statements, one representing the priorities of their own locality and another reflecting aspirations for the broader Crater region. These statements were posted on the walls, encouraging participants to view one another's contributions, spark new ideas, and identify shared themes across localities. Templates and guidance materials were provided at each table to support the development of thoughtful and forward-looking statements.



Figure A-2. Word Cloud of Themes from Locality Specific Vision Statements



Figure A-3. Word Cloud of Themes from Crater Region Vision Statements

Locality vision statements reflected the unique priorities and identities of each community, but several key themes emerged for these localities. Many visions emphasized a commitment to resilience, not only in terms of physical infrastructure, but also in community preparedness. Localities frequently referred to goals of being adaptable to environmental and climate-challenges. Infrastructure was another central focus, with many visions highlighting the need for well-maintained, climate-ready systems that can withstand future shocks while supporting continued growth. Additionally, public health and quality of life were often linked to resilience goals, with localities envisioning safe, thriving communities where environmental quality supports residents' well-being. For the regional vision, common language focused on unity, collaboration, and collective strength. Words such as "connected" and "collaborative" appeared frequently, along with themes of environmental stewardship and adaptive capacity. The emphasis was on building a future where localities work in concert to protect natural resources, reduce vulnerability, and strengthen both physical and social infrastructure across jurisdictional boundaries. These vision statements provide a foundation for aligning local and regional resilience planning.

Activity 3

In Activity 3, participants collaboratively marked printed maps of their localities to identify areas vulnerable to climate-related hazards, including recurrent flooding, extreme heat, storm damage, and winter weather. Participants used color-coded markers to differentiate between hazard types, allowing for the development of a nuanced understanding of regional climate vulnerabilities.

Table A-2 Mapping Exercise Results

Municipality	Instances of Natural Hazards

	Riverine Flooding	Stormwater Flooding	Extreme Heat	Wind Damage	Winter Storm / Ice
Petersburg	2	2	4	0	0
Emporia	3	0	0	0	0
Colonial Heights	7	3	0	0	0
Hopewell	0	0	1	0	0
Chesterfield	0	3	2	0	0
Prince George	3	3	1	0	0
Surry	4	3	0	3	0
Total	19	14	8	3	0

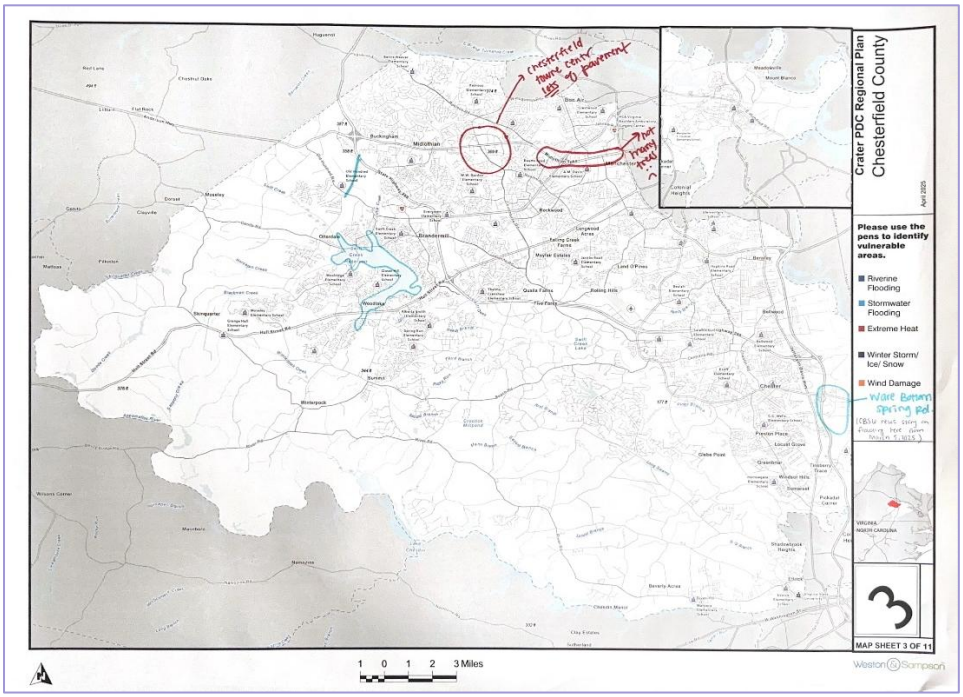


Figure A-4. Identified areas vulnerable to hazard events in Chesterfield County

Many participants identified areas impacted by flooding, with both riverine and stormwater hazards frequently marked during the mapping exercise. These flood-prone zones were typically outlined using closed or continuous lines, indicating locations of recurring concern based on local knowledge and experience. Extreme heat was also a commonly recognized hazard, with several localities highlighting vulnerable areas such as highly impervious surface areas or places lacking tree cover. Wind damage was identified only by Surry County, suggesting either localized exposure or underreporting elsewhere in the region. Notably, no localities marked areas vulnerable to winter storms or ice, which may reflect either a lower perceived risk or gaps in awareness. The size and scale of identified hazard areas varied significantly, ranging from specific sites, such as intersections or facilities, to broader stretches encompassing several city blocks or neighborhoods.

Workshop 2: Goals & Objectives Setting

The goal and objective setting workshop was held on August 20, 2025, at the Crater PDC office. The workshop structure aims to build off of the first workshop held in the spring and allow the participants to lay the groundwork for action development. Through facilitated discussions and interactive exercises, the goal of the workshop was to gain insight into each of the localities strengths, challenges, and goals for the next decade. The findings from the workshop will drive the types of actions developed during the action implementation portion of the plan for not only the localities, but the region as a whole.

The workshop was open to steering committee members and a total of 11 members participated in the workshop. Localities represented included Petersburg, Colonial Heights, Hopewell, Prince George County, and Chesterfield County. Other entities in attendance included representatives from DEQ - Virginia Coastal Zone Management (CZM), the Chickahominy Indian Tribe, the Appomattox River Soil and Water Conservation District (ARSWCD), and Timmons Group.

Summary of Activities and Results

Activity 1

The first activity took place during lunch and was designed to be light and engaging, featuring mostly multiple-choice questions with a few fun prompts. Conducted through Mentimeter, participants used their phones to respond to questions displayed on the screen. Most participants correctly answered questions regarding the primary goal and unique elements of the Crater PDC Regional Resilience Plan. Questions that appeared to challenge participants were related to hazards used within the vulnerability assessment and overall findings from regional vision statements. At the end of the activity, participants were asked two visioning exercise questions. This included responding in three words that encapsulate their vision for resilience within their locality and the region.

The following words were used to describe locality specific vision statements:

- Community
- Infrastructure
- Adaptive
- Equity / Equitable
- Education
- Engagement
- Flood Risk Reduction
- Excellence
- Unity
- Floodplain Management
- Planned
- Economic Recover
- Determination
- Safety
- Awareness
- Economic Recovery

For the Crater Region, the following words were used to region wide vision statements:

- Equitable
- Formalized
- Collaborative
- Connectedness
- Funding
- Tree Canopy
- Selflessness
- Together
- Tree Canopy
- Planning
- Data-driven
- Adaptive
- Selflessness
- Beauty
- Water Quality
- Economic

Locality vision statements reflected the priority of communities to prepare for and recover from hazards events. Additionally, words like "unity" and "equity" reflect a desire to consider ways to come together as a community. For regional vision statements, the desire to collaborate and be connected was evident. These vision statements provide a foundation for aligning local and regional resilience planning.

Activity 2

The second activity was a table exercise designed to gather input on key planning areas through sector-based goal stations. Participants were divided into two groups and were provided with a large board that represented six sectors: environment, transportation, housing, community, infrastructure, and economy and jobs. Using color-coded sticky notes, participants responded to three prompts related to their locality: green for what is working, red for what needs improvement, and blue for goals to achieve by 2035.

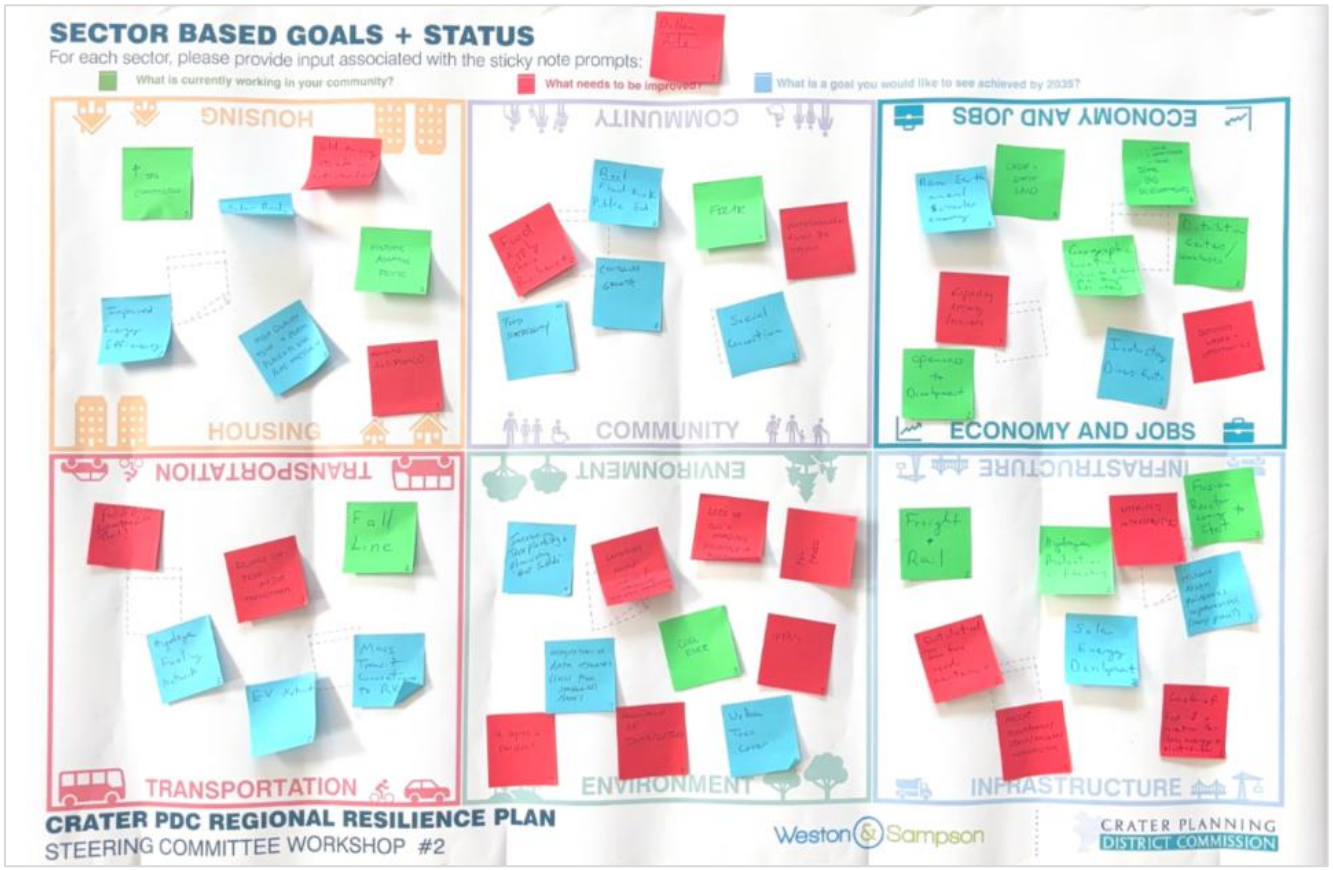


Figure A-5. Sector Based Goals + Status Board

Strengths

The first prompt asked, *"What is currently working in your community?"* Participants identified a range of assets and opportunities across the region. In Petersburg and Hopewell, housing development, particularly new single-family homes, was viewed as a community strength. Participants also

highlighted the presence of active community groups and organizations that contribute to the region's resilience and sense of connection. Economic development emerged as another key strength, with affordable land creating opportunities for growth. Notable examples included the casino project underway in Petersburg, expanding data center locations, solar energy projects, and pharmaceutical investments. Participants also recognized the potential of infrastructure-linked industries such as hydrogen production and nuclear fusion. Existing freight and rail infrastructure were cited as economic and logistical advantages, while the region's central geographic location was seen as supporting both growth and transportation opportunities. The formation of a new transportation authority by the Tri-Cities Area Metropolitan Planning Organization was noted as a step forward for coordinated regional planning. Finally, the Appomattox River and its associated trail network, including the Appomattox River Trail and the in-the-works Fall Line Trail, were celebrated as important environmental and recreational assets that enhance regional connectivity and linkage to City of Richmond.

Table A-3. Summarized Strengths of Localities

Housing	*Community*	*Economy and Jobs*
• New housing developments, especially single-family homes • Historic adaptive reuse • Local interest in affordable housing from NGOs	• Investment from community groups / watershed organization such as Friends of the Lower Appomattox River (FOLAR) • Strong community institutions such as churches, markets, and non-profits	• New job opportunities • Geographic location • Affordable land and willingness for development • Economic development efforts around distribution centers / warehouses, casino, data centers, solar, and pharmaceuticals • Crater Regional Workforce Development Board (CRWDB)
Transportation	*Environment*	*Infrastructure*
• Fall Line corridor • Public transportation access • Tri-Cities Area Metropolitan Planning Organization (MPO) and upcoming Transportation Authority	• Available environmental data and resilience planning • Appomattox River Trail • Riverwalk area	• Freight and rail • Hydrogen production in Petersburg • Nuclear fusion reactor coming to Chesterfield • Improved utility fee revenue • Good stormwater pipe infrastructure database

Opportunities

As part of the second prompt, *"What needs to be improved?"* participants highlighted several challenges facing their communities and the region. While housing development was viewed as a strength, participants noted that much of the existing housing stock is vulnerable to flooding and climate threats, and many renters need greater housing assistance. Concerns were also raised about the need for more schools, stronger communication and education, support for environmental justice communities and low income individuals ,and improved food supply chain resilience. In terms of the economy, participants valued growth tied to data centers and warehouses but worried about job losses from automation, plant closures, and the migration of knowledge and skills out of the region. Transportation challenges included reliance on a few major throughways and limited paved roads. Environmental concerns centered on poor stormwater management, invasive species, loss of open space, old structures in the floodplain, air and water quality issues, and weak connections to waterways. Infrastructure concerns included outdated sewer, water, and stormwater systems, clogged pipes and culverts, limited federal funding for clean energy and electrification, and a lack of Capital Improvement Plan (CIP) prioritization. Participants also discussed that under Dillon's Rule, local governments have limited authority to act independently, which can constrain efforts to address these issues.

Table A-4. Summarized Opportunities of Localities

Housing	*Community*	*Economy and Jobs*
• Housing stock is vulnerable and lacks resilience against flooding • Low home ownership • Housing assistance need	• More schools needed • Food supply chain resilience • Environmental justice poverty • Communication efforts across the region • Education and awareness around stormwater management and floodplain information	• Loss of jobs from data centers, automization, and plant closures • Loss of institutional knowledge from retiree turnover • The emigration of highly skilled or educated individuals (brain drain) from the region
Transportation	*Environment*	*Infrastructure*
• Reliance on few major throughways • Lack of paved roads • Unfinished Appomottox River Trail	• Lack of stormwater best management practices • Invasive species and struggling landscape • Maintenance of open space • Old and inhabited buildings in floodplain • Air quality • Lack of connection to river and waterways • Water quality concerns and potential violations due to data centers, solar, and timber	• Water outages • Outdated instrastructure, including sewer, water service, and stormwater, that needs maintenance and added capacity • Clogged pipes, culverts, and sedimentation • Lack of federal money for clean energy and electrification • Lacking Capital Improvement Plan (CIP) prioritization

**Dillion's Rule was another opportunity mentioned*

Goals

As part of the final prompt, *"What is a goal you would like to see achieved by 2035?"* participants painted a vision for more resilient communities. In housing, they imagined solar-ready and EV-ready buildings as the standard, with energy-efficient, affordable options available to all residents. Safe, high-quality housing, both temporary and permanent, would be supported by equitable floodplain management programs and stronger oversight. For community life, participants emphasized fostering social connection, engaging residents, and providing clear public education about flood risk. Additionally, participants encouraged controlled growth for their communities. Economically, participants envisioned a diversified economy with new industries, a circular economy approach, and a stronger local workforce backed by expanded training opportunities. Transportation goals included widespread EV infrastructure, reliable mass transit connecting Richmond and surrounding localities, upgraded resilient infrastructure, and innovative solutions such as hydrogen fueling. Environmental aspirations focused on expanding tree canopy, protecting open space through a regional land conservancy, and improving access to data by integrating local and state resources into user-friendly web platforms. Infrastructure goals built on these themes, with participants highlighting the need for expanded solar energy, upgraded water, wastewater, and stormwater systems, and the integration of resilient design standards into local comprehensive plans.

Table A-5. Summarized Opportunities of Goals

Housing	*Community*	*Economy and Jobs*
• Solar ready and EV ready buildings standards • Improved energy efficiency • High quality temporary and permanent places to live • Increased floodplain management oversight • Affordable housing • Equitable and robust floodplain management program	• Social connection and engaged members • Public outreach, education, and events, specially around flood risk • Food sovereignty and healthier food options • Controlled growth	• Circular economy, emphasis on local work and exploring industries like rare earth minerals • Industry diversification • Stronger local workforce training for environmental work
Transportation	*Environment*	*Infrastructure*
• Less private roads • Hydrogen fueling network • EV network • Mass transit connection to Richmond and between localities • Plan for upgrade to infrastructure connected to resiliency	• Improve urban tree cover and tree planting to eliminate "heat islands" • Integrate data resources from local to state scales. • Improve access to GIS asset data through a webviewer • Develop a Crater regional land conservancy	• Solar energy development • Install new equipment • Upgrade stormwater and water service and wastewater infrastructure • Implement resilient design guidelines, potentially through a comprehensive plan

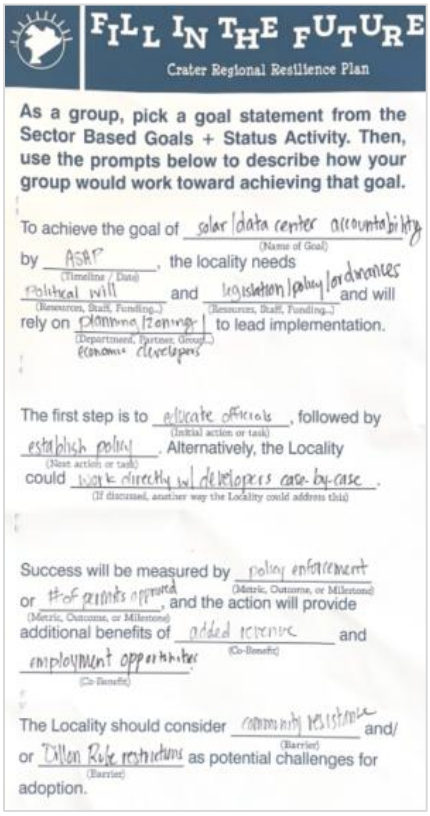
Activity 3

The last activity focused on goal implementation pathways. Attendees were each given two "Mad Lib" style activity sheets. Using the goals generated during the Sector-Based Goals and Status boards in Activity 2, each group worked to develop action steps for achieving two of those goals. Only the boards were moved to provide each group with a new set of goals with which to work. Unlike traditional Mad Libs, this activity was not random; participants could see the full goal statement, and facilitators guided them in thoughtfully completing each fill-in-the- blank to build practical, community-informed implementation step.

The two groups selected the following goals to create goal implementation pathways;

1. Improving public flood risk education
2. Solar and data center accountability
3. Managed retreat
4. Upgrading road infrastructure

Selected goals covered a range of topics across the different sectors in Activity 2. Goals 1 and 3 focus on hazard exposure and adaptive capacity, while Goals 2 and 4 contribute to resilience through supporting infrastructure, energy security, and systemic reliability rather than directly addressing climate or flood hazards. The answers to these goal implementation pathway prompts were diverse, with no singular entity or action steps that were the same answer between the four statements. First steps were consistent in either gathering advice and research from prior communities in regards to the goal or identifying the overall message. Many goals suggested utilizing government staff or planners for implementation. Additionally, goals required support from the community. Many actions require coordination between departments, state agencies, or developers. Some challenges for these goals that were identified related to digital literacy and media access, staff time and effort, funding sources, government capabilities with Dillion's Rule restrictions, coordination and ownership of infrastructure, and potential environmental degradation.


FILL IN THE FUTURE

Crater Regional Resilience Plan

As a group, pick a goal statement from the Sector Based Goals + Status Activity. Then, use the prompts below to describe how your group would work toward achieving that goal.

To achieve the goal of solar/data center accountability (Name of Goal)

by ASAP (Timeline / Date), the locality needs political will (Resources, Staff, Funding...) and legislation/policy/ordinances (Resources, Staff, Funding...) and will rely on planning/zoning/economic developers (Department, Partner, Group...) to lead implementation.

The first step is to educate officials (Initial action or task), followed by establish policy (Next action or task). Alternatively, the Locality could work directly w/ developers case-by-case (If discussed, another way the Locality could address this)

Success will be measured by policy enforcement (Metric, Outcome, or Milestone) or # of permits approved (Metric, Outcome, or Milestone), and the action will provide additional benefits of added revenue (Co-Benefit) and employment opportunities (Co-Benefit).

The Locality should consider community resistance (Barrier) and/or Dillon Rule restrictions (Barrier) as potential challenges for adoption.

Figure A-6. Workshop fill-in-the-blank activity for action development.

Table A-6. Fill in the Future Goal Statements

1	To achieve the goal of **improving public flood risk education** by **2028**, the locality needs to **meet people where they are** and **understand how they receive info** and will rely on **grant funding, public relations folks** to lead implementation. The first step is to **identify the message**, followed by **tailoring messaging to community**. Alternatively, the locality could **create a "due diligence" checklist for prospective buyers, existing homeowners, schools** / **youth education.** Success will be measured by **contact hours** or **number of people engaged**, and the action will provide additional benefits of **improved staff efficiency** and **culture of flood risk awareness in community to improve understanding of City responsibility.** The locality should consider **digital literacy** / **internet and media access** and/or **staff time/effort, funding** as potential challenges for adoption.
2	To achieve the goal of **solar** / **data center accountability** by **as soon as possible**, the locality needs **political will** and **legislation** / **policy** / **ordinances** and will rely on **planning** / **zoning** / **economic developers** to lead implementation. The first step is to **educate officials**, followed by **establishing policy**. Alternatively, the locality could **work directly with developers case-by-case.** Success will be measured by **policy enforcement** or **number of permits approved**, and the action will provide additional benefits of **added revenue** and **employment opportunities.** The locality should consider **community resistance** and/or **Dillion's Rule restrictions** as potential challenges for adoption.
3	To achieve the goal of **managed retreat** by **2035**, the locality needs to **incentives** and **comparable housing** and will rely on **local leadership** to lead implementation. The first step is to **learning from others**, followed by **inventory.** Alternatively, the Locality could **implement a pilot project.** Success will be measured by **number of people who sign up** or **properties bought and land areas managed**, and the action will provide additional benefits of **safety** and **save money.** The locality should consider **willingness of people** and/or **cultural connection to land and economic reality** as potential challenges for adoption.
4	To achieve the goal of **upgrading road infrastructure** by **2035**, the locality needs **funding** and **staff capacity and targeted planning** and will rely on **VDOT** to lead implementation. The first step is to **assess risk**, followed by **picking priorities.** Alternatively, the locality could **focus on current issues (triage).** Success will be measured by **decreased road closures caused by flooding** or **number of new roads** and the action will provide additional benefits of **safety** and **increased accessibility** / **connectivity.** The locality should consider **coordination and ownership of infrastructure** and/or **environmental degradation** as potential challenges for adoption.

Workshop 3: Vulnerability Assessment Primer

The Vulnerability Assessment Primer was held on December 3, 2025 via Microsoft Teams. The meeting was designed to orient the steering committee to the methodology and data underpinning the climate vulnerability assessment and to gather feedback before results are finalized. Through a presentation and facilitated discussion, the project team walked attendees through the purpose of the plan, the project schedule, the two-level vulnerability assessment framework, and an illustrative case study focused on the Hopewell.

Summary of Activities and Results

The meeting began with a brief recap of the project's progress to date, providing context for the primary focus of the session: an introduction to the climate vulnerability assessment methodology. The project team walked attendees through the two-level assessment framework, the asset inventory underpinning the analysis, and an illustrative case study for the Hopewell demonstrating how the vulnerability data could be applied to local planning and project prioritization. The session concluded with an open discussion, during which Steering Committee members asked questions and offered feedback on the methodology and its real-world application.

The vulnerability assessment methodology was presented to the Steering Committee, proceeding in three steps:

(1) a crosswalk of existing plans and climate data (complete);

(2) asset identification (complete); and

(3) the regional vulnerability assessment (in progress).

Asset Identification

The asset inventory draws from the PlanRVA-Crater PDC Hazard Mitigation Plan (2022) and encompasses approximately 22,000 community assets across the region. The Steering Committee was provided with an opportunity to review and supplement the asset list after Workshop #2, which is organized into ten categories, shown in the graphic below.



Figure A-7. Asset Categories

Vulnerability Assessment Framework

The project team presented the vulnerability assessment framework, which operates at two scales. At the regional (Level 1) scale, the project team described how each of the approximately 22,000 assets in the inventory would receive an exposure score based on its location relative to five hazards: sea level rise, riverine flooding, pluvial (stormwater) flooding, extreme heat, and wildfire. The project team explained that exposure is determined by whether an asset falls within or outside an area currently or projected to be impacted by a given hazard.

At the locality (Level 2) scale, the project team presented a composite vulnerability score, calculated by multiplying the composite exposure score by two additional factors: sensitivity and adaptive capacity. Sensitivity reflects whether an asset is located within a Commonwealth-designated vulnerable population area, identified by Census Tract. Adaptive capacity accounts for whether redundancy exists, meaning multiple assets of the same type are present, within a census tract. Table 4.1 summarizes the components of the vulnerability composite score.

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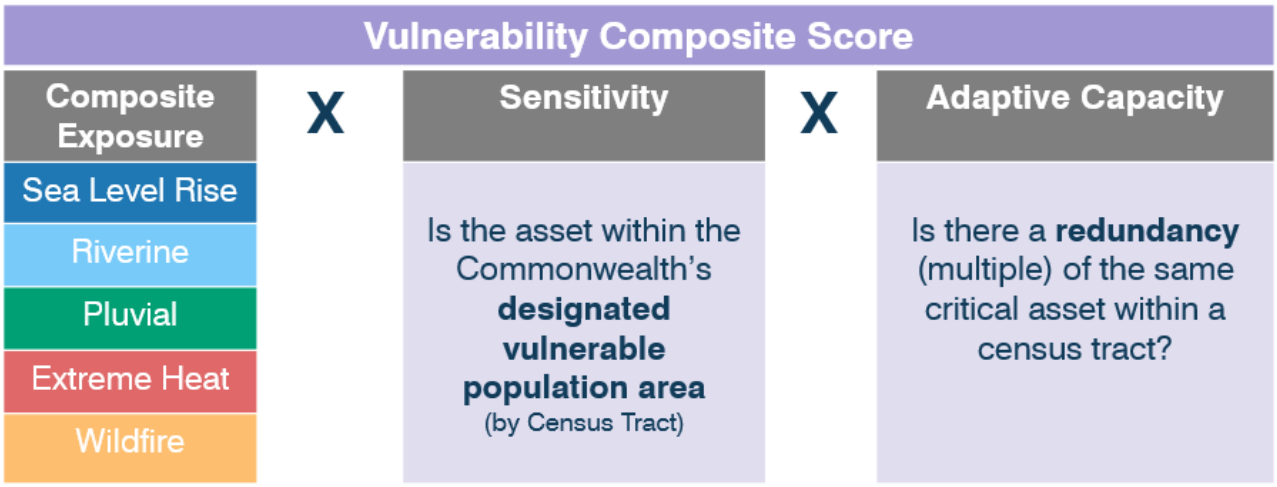


Figure A-8. Vulnerability Assessment Methodology

Case Study: Hopewell

Following the methodology presentation, the project team introduced an illustrative case study focused on the City of Hopewell to demonstrate how vulnerability assessment data could inform real planning and project development decisions. The case study walked through how assets identified through the assessment could be used to prioritize resilience strategies, directing investment toward high-risk locations. Example strategies highlighted included permeable pavement installation, tree canopy expansion along key corridors, priority paving and road maintenance, and stormwater drainage improvements. The team noted that the case study map was developed for illustrative purposes to help the Steering Committee understand how the data could be applied, rather than as a final planning product.

Committee Discussion

Following the presentation, the project team facilitated an open discussion with the Steering Committee. Participants asked questions and offered feedback across a range of topics related to the vulnerability assessment methodology and its application. Key themes from the discussion are summarized in Error! Reference source not found. below:

Table A-7 Summary of Key Discussion Points

Topic	Summary of Discussion
Planning Horizon	• Participants discussed what planning horizons are most commonly used in local plans and studies. • A 5-year horizon was noted as typical in Hazard Mitigation Plans (HMPs), as it arrives quickly enough to remain actionable while still allowing meaningful reflection on progress. Horizons beyond 5 years were noted as more difficult to evaluate against completed actions.
Flood Modeling Approach	• Participants asked about the differences between pluvial and riverine flood modeling and how coastal flooding was incorporated. • The team clarified that pluvial (stormwater) flooding occurs more frequently and is the primary driver of the model, while the coastal flood model captures worst-case coastal extents. Pluvial models also incorporate coastal flooding. • DCR data was selected over other datasets due to its greater geographic granularity.
Extreme Heat Methodology	• Questions were raised about the limitations of the surface temperature data used in the heat analysis. • The dataset analyzes land surface temperature at 100-meter resolution based on a single day of observation, which may not capture smaller, localized heat islands or account for humidity.
Scoring and Weighting	• Participants asked how scores were assigned and weighted across hazards. • Assets within the 100-year floodplain receive higher scores because that event is more frequent and therefore more likely to occur. Scores are weighted based on likelihood of occurrence and magnitude of impact.
Asset- vs. Community-Level Data	• Discussion arose around the relative usefulness of asset-level data versus community-level composite scores for planning purposes. • Participants noted that industrial or infrastructure-heavy areas with few residents can still contain highly sensitive assets with significant regional consequences, and raised the importance of accounting for this in planning. • The team noted that follow-up draft maps would be shared with localities to verify that the data reads accurately on the ground. • It was clarified that resilience strategies can address both public facilities directly and private property owners through policies and regulations.
High-Consequence, Low-Risk Assets	• Participants raised the question of whether assets that score as low-risk but carry high consequences if disrupted are adequately captured. • The team noted that the CDC Social Vulnerability Index (SVI) accounts for the locations of underserved populations, and that localities may be able to assign additional weight to assets they consider especially critical. Adaptive capacity scoring may also be refined in future iterations.
Overlaying CIPs with	• Participants suggested overlaying existing Capital Improvement Plans (CIPs) and already-identified projects with the vulnerability analysis as a way to classify those projects as resilience projects.

Topic	Summary of Discussion
Vulnerability Data	• The team expressed support for this approach, noting it was consistent with methods used in Hazard Mitigation Plans.
Community Lifelines	• A question was raised about whether libraries and similar community institutions should be included as community lifelines. • The team confirmed that libraries would qualify as lifelines if they serve an emergency services function, such as serving as a cooling center or shelter.
Pop-Up Public Engagement	• The group was asked to provide input on content and events for upcoming pop-up public engagement opportunities. • Suggestions centered on wintertime events already occurring in the community, including holiday parades, special First Friday events, and the openings of new community facilities. • Participants also recommended reaching out to HOAs, neighborhood associations, and interest groups to request time at their regularly scheduled meetings as an effective way to meet residents where they are.

Workshop 4: Action Development

The Action Development Workshop was held on March 4, 2026 at the Crater PDC office. Building on the findings from prior workshops and the completed Climate Vulnerability Assessment, the workshop was designed to move the planning process into its action development phase. Through a combination of facilitated group activities, participants reviewed and provided feedback on pre-developed resilience actions for both the region as a whole and for each individual locality, and had the opportunity to propose additional actions reflecting local priorities.

The workshop was open to Steering Committee members and a total of 14 individuals participated in person. Localities and entities represented included Colonial Heights, Petersburg, Prince George County, Surry County, Chesterfield County, Emporia/Sussex, VDH Crater Health District, VA DEQ/Coastal Zone Management, FOLAR/PlanRVA, and Timmons Group.

Vision Statement Presentation

The workshop began with a brief presentation of plan updates, including the presentation of draft locality and regional vision statements developed from input gathered during the first two workshops. These statements, reflected the collective priorities and aspirations contributed by Steering Committee members at the Knowledge Sharing and Strengthening Workshop in April 2025 and refined through subsequent engagement. Each statement was developed to represent the unique identity and resilience goals of its respective locality, while the regional statement reflects shared themes of collaboration, equity, and preparedness across the Crater region.

Summary of Activities and Results

The workshop was structured around three sequential activities, each building on the previous. Participants moved between a large-group format for the regional activity and small locality-based groups for the locality-level activities.

Activity 1: Regional Action Review and Development

The session opened with a large-group review of pre-developed regional resilience actions. The facilitator walked through each action displayed on a large board, inviting participants to vote using

color-coded paper cards: green to include without revision, yellow to include with revisions, and red to not include. Participants then had the opportunity to propose additional regional actions, with five new actions developed through open-floor discussion. Suggested additions and modifications were recorded in real time on the board. Key themes from the discussion included the importance of accessible data tools, integration of emergency and resilience planning, the need for precise and actionable language, and interest in integrating resilience planning with existing Capital Improvement Plans across localities.

Error! Reference source not found. summarizes the regional actions developed through the prioritization matrix, which draws from the Goal and Objective Setting Workshop held in August 2025. These actions are intended to apply across all localities in the Crater region and address shared priorities including data accessibility, urban heat mitigation, transportation, managed retreat, energy resilience, public education, and economic diversification.

Table A-8. Regional Resilience Actions

#	Action	Sector
1	Develop an accessible online resource for GIS data pertaining to assets, hazard information, and other useful tools.	Environment
2	Conduct a comprehensive tree canopy assessment to identify current coverage, gaps, and priority planting areas, then develop and implement a Tree Canopy Plan prioritizing underserved neighborhoods, flood-prone corridors, and heat-vulnerable areas.	Environment
3	Expand and coordinate public transit connections between localities to reduce reliance on single-occupancy vehicles, lower greenhouse gas emissions, and improve regional mobility during both daily use and emergency evacuations.	Transportation
4	Establish and fund a voluntary property buyout program in repeatedly flooded areas, converting acquired properties into open space, flood storage, or natural buffers, with robust community engagement and relocation assistance.	Housing
5	Require new construction and major renovations to incorporate solar-ready design and EV charging infrastructure to reduce future costs and support renewable energy adoption.	Infrastructure
6	Implement programs and incentives to retrofit public, residential, and commercial buildings with high-efficiency systems, insulation, and appliances to reduce energy demand and improve resilience during power disruptions.	Infrastructure
7	Develop and deliver accessible education campaigns, mapping tools, and outreach programs that clearly communicate local flood risks, insurance requirements, and protective actions to residents and businesses.	Community
8	Support businesses and industries that recover, recycle, and reuse critical minerals and materials to reduce supply chain vulnerability and environmental impacts.	Economics
9	Foster a diverse local economy by supporting emerging sectors, small businesses, and workforce training programs to reduce reliance on a single industry and enhance economic resilience to shocks.	Economics
10	Plan, fund, and install hydrogen fueling stations and EV charging infrastructure to support clean transportation, reduce dependence on fossil fuels, and improve energy security.	Transportation
11	Build and strengthen partnerships with established land-conservation organizations to coordinate cross-jurisdictional preservation efforts and	Environment

#	Action	Sector
	pursue designation as a Public Access Authority to enhance regional collaboration.	
12	Develop model resilient design guidelines for inclusion in comprehensive plans, addressing flooding, extreme heat, storm surge, and sea level rise.	Community
13	Promote the use of green building technologies, including weatherization and low impact development, to provide energy conservation benefits and increase community resilience.	Environment / Infrastructure

Activity 2: Locality Action Review

Following the regional activity, participants were asked to move to tables organized by locality. Each group was provided with a set of pre-developed locality-specific actions drawn from three sources: the locality's comprehensive plan, the Climate Vulnerability Assessment, and prior committee engagement results. Using color-coded sticky dots, participants voted on each action (green to include without revision, yellow to include with revisions, and red to not include) and were invited to provide written explanations for any actions they wished to revise or remove. Not all localities had representatives present at the workshop; in some cases, feedback was provided by attendees most familiar with those communities.

Across localities, the most commonly endorsed actions related to green infrastructure, stormwater management, urban tree cover, school resilience planning, and flood-risk education. Actions that received the most requests for revision were those perceived as too geographically specific, those that referenced named private facilities without broader applicability, and those where implementation authority or lead agency was unclear. A small number of actions were recommended for removal, typically where participants felt the action was already underway, was duplicative, or exceeded the locality's current regulatory authority. Error! Reference source not found. summarizes key feedback themes and participant-proposed actions by locality.

Table A-9. Summary of Locality Action Feedback

Locality	Key Themes from Feedback
Petersburg	• Most pre-developed actions were supported. Participants requested revisions to expand the scope of several actions, for example extending the Helping Hands Adult Care Center action to cover additional vulnerable care facilities. • Questions were raised about whether certain actions were already underway through existing programs, and some actions were flagged as needing stronger language around enforcement and funding. • One action was recommended for removal, citing duplication with efforts already in progress through DCR. • Participant-proposed actions focused on stormwater infrastructure, buyout/managed retreat strategies, CRS enrollment, emergency egress planning, and resilience-focused economic development.
Colonial Heights	• Most actions received broad support. Participants raised questions around funding for living shorelines and suggested broadening the grocery store flood-proofing action to apply to all businesses rather than a specific subset. • One action related to recreational amenity siting was flagged as a lower priority, with a preference for low-impact development framing.

Locality	Key Themes from Feedback
	• Participant-proposed actions included urban tree cover expansion, green building incentives, a home improvement grant program, riparian buffer assessment and restoration, stormwater BMP inventory, and investigation of cooling and heating hubs for extreme weather events.
Chesterfield County	• Participants requested revisions to broaden the scope of actions referencing specific facilities, such as expanding the nursing home action to cover all assisted living facilities and vulnerable populations rather than named providers. • The fire station action was flagged as too specific to one station and was noted as targeting a volunteer station that is not regularly operational. • Discussion around solar and building code actions raised concerns about the use of mandatory language and the need to consider public safety implications of electrification. • Participant-proposed actions included resilience hub planning, use of the vulnerability assessment for emergency planning, dam integration into resilience plans, and development of a regional weather station network.
Dinwiddie County	• Two actions received explicit endorsement: the Dinwiddie County Middle School resilience plan and the critical retail resilience program. • Participants noted the value of the middle school action given its role as an emergency shelter and the need to ensure VDH resources are available on-site. • The grocery store resilience program was supported, with participants noting the hardship caused when stores lose refrigeration during power outages. • Participant-proposed actions reinforced the importance of public safety assessments and riparian buffer restoration from a public health and disease vector perspective.
Greensville County	• Only one pre-developed action received explicit endorsement: expanding and restoring riparian buffers around the Meherrin River. • No explicit objections were raised to the remaining actions, though written feedback was limited for this locality. • Participant-proposed actions included public safety assessments integrated with health department response and expansion of riparian buffers to reduce flood-related disease vectors.
City of Emporia	• Participants recommended removing actions related to the park development plan and the historic district flood barrier feasibility study. • The recreational amenity siting action received split feedback, with one participant suggesting it be extended citywide rather than limited to areas near the Meherrin River. • The urban tree cover action was broadly supported, with participants emphasizing the need for a funded maintenance plan. • Participant-proposed actions were notably detailed, covering storm sewer inventory, stormwater utility development, drainage studies, EMS plan updates, identification of critical facilities and resilience hubs, and grant applications for hazard mitigation.
Surry County	• Participants supported most actions. Questions were raised about how to more effectively enforce the shoreline protection strategy, including whether an ordinance would be appropriate. • One action promoting development with minimal environmental impact was recommended for removal, as it was viewed as duplicative of other more specific actions.

Locality	Key Themes from Feedback
	• The school resilience plan received support, with one participant suggesting revisions. • Participant-proposed actions raised the intersection of farmland preservation and tree canopy ordinances, noting the current zoning structure creates a tension between clearing land for agriculture and protecting canopy cover.
City of Hopewell	• Engagement on the pre-developed locality actions was more limited, with only a few actions receiving written feedback. • The Carter G. Woodson Middle School resilience plan was supported without revision. • A suggestion was made to add the Appomattox River to the urban tree cover action. • The community food resilience program received endorsement from one reviewer. • Participant-proposed actions focused on industry resilience, including multi-hazard preparedness for industrial facilities and evacuation planning for nearby residents.
Prince George County	• Most actions were supported with requests for revisions to clarify lead agencies and implementation responsibilities. • The resilient housing development standards action was recommended for removal by multiple reviewers, citing the need for a zoning ordinance update as a prerequisite. • Actions related to water supply resilience, school facilities, roadway connectivity, and economic development were broadly endorsed with requests to specify coordination with relevant departments such as VDOT, the Board of Supervisors, and the Economic Development Department. • Participant-proposed actions included flood risk education, stormwater BMP encouragement, green building and tree planting incentives, a regional flood study, collection of anecdotal hazard data, hazardous material storage protections, and zoning updates to allow modern stormwater management practices.
Sussex County	• Most pre-developed actions were broadly supported. Participants asked for greater specificity around the types of enterprises to be attracted to the Sussex Green Enterprise Park. • The zoning ordinance cluster development action received feedback questioning its direct connection to resilience. • A suggestion was made to link approved conservation easements to GIS mapping. • Participant-proposed actions included regional BMP strategies, ditch maintenance, relocation of critical infrastructure out of the floodplain, collaboration with towns to address critical drainage issues, sewer expansion, and EMS plan updates.
Charles City County	• Feedback was provided on a smaller number of actions. One reviewer suggested that a general land conservation statement should be standard language across all plan chapters rather than a standalone action. • Actions related to septic system elevation and water monitoring stations received endorsement, with a suggestion to include flood gauges in the monitoring station action. • Stormwater ordinance and low-impact development actions were supported with a note that the existing ordinance references outdated code and should be updated.

Activity 3: Locality Action Building

In the final activity, participants remained in their locality-based groups and were given blank sheets to propose additional actions for their communities. Participants were encouraged to develop as few or as many new actions as they wished, and were welcome to collaborate within their groups. The activity generated a range of new proposals across localities, with themes including stormwater infrastructure investment, emergency planning integration, resilience hub identification, data collection tools for individual-level hazard reporting, and industry resilience. These participant-generated actions will be reviewed by the project team and incorporated into the action development process where appropriate.

Appendix B.

Vulnerability Assessment Methodology and Scoring Framework

Crater PDC Regional Resilience Plan

Version 1.0 | *September 2026*

CRATER PLANNING DISTRICT COMMISSION

Weston & Sampson

Appendix B – Crater PDC Regional Resilience Plan

Appendix B provides the technical methodology and scoring framework used in the vulnerability assessment conducted for the Crater PDC Regional Resilience Plan. Information on hazard selection, hazard analysis, and the overall vulnerability assessment results can be found in *Chapter 6: Regional Vulnerability Assessment*. Locality-specific assessment results are provided in the corresponding locality sections of *Chapter 8: Locality Resilience Plans*.

In climate vulnerability assessments, typical components of evaluation are exposure, sensitivity, and adaptive capacity. The definitions of each of these components according to the U.S. Climate Resilient Toolkit are the following:

- Vulnerability: The propensity or predisposition of assets to be adversely affected by hazards. Vulnerability encompasses exposure, sensitivity, potential impacts, and adaptive capacity.
- Exposure: is defined by the presence of people, assets, and ecosystems in places where they could be adversely affected by hazards.
- Sensitivity: The degree to which a system, population, or resource is or might be affected by hazards
- Adaptive Capacity: The ability of a person, asset, or system to adjust to a hazard, take advantage of new opportunities, or cope with change

Relevant components were evaluated in Crater PDC's climate vulnerability assessment using indicators drawn from reputable data sources. Central to the vulnerability assessment is the asset inventory described in *Chapter 6: Regional Vulnerability Assessment*, which serves as the foundation for applying vulnerability indicators. The following sections describe each of the components used in the climate vulnerability assessment.

Data Sources

Exposure

Exposure was defined as the presence of people, assets, and ecosystems in places where they could be adversely affected by hazards (U.S. Climate Resilient Toolkit). From the hazards described in the Hazard Selection and Profiles, those with geospatial information were selected to be exposure indicators for the climate vulnerability assessment; others are included as context/qualitative profiles. Five hazard layers from federal and state data sources were selected based on DCR's recommendations within the *Coastal Resilience Master Plan* and best practices. The hazard layers used and relevant descriptive information are described in Table B-1.

Table B-1. Hazard Data Sources and Associated Information

Hazard	Layer Name	Citation	Publication Date	Timeframe	Resolution
Coastal Flooding	**Category 2 Storm Surge Maximum of Maximum (MOMs)**	Zachry, B. C., W. J. Booth, J. R. Rhome, and T. M. Sharon, 2015: A National View of Storm Surge Risk and Inundation. *Weather, Climate, and Society*, **7**(2), 109–117. DOI:	April 2015	*Present-day (scenario-based)*	10 meter resolution

		http://dx.doi.org/10.1175/WCAS–D–14–00049.1			
Riverine (Fluvial) Flooding	**Flood Hazard Zones**	Federal Emergency Management Agency (FEMA). National Flood Hazard Layer (NFHL). https://www.fema.gov/flood-maps/national-flood-hazard-layer.	*Range of Effective Dates Based on Localities*	*Present-day regulatory (historically derived)*	~11.6 meter resolution
Rainfall (Pluvial) Flooding	**Depth Grid Mosaic Raster 100 year and 500 year Recurrence Intervals**	Virginia Department of Conservation and Recreation. *Virginia Coastal Resilience Master Plan Phase II Pluvial Flood Depth Grids*. Richmond, Virginia, USA. Produced using USACE HEC-RAS 6.1 with precipitation inputs from NOAA-MARISA. Complete modeling documentation archived in the Pluvial Modeling Technical Memorandum. https://vadcr-frp.s3.amazonaws.com/Pluvial_CRMP/VACRMP_PluvialModelingReport_Final_20240614.pdf. Flood-modeling data.	June 2024	*Future (projected)* 2030 - 2060	~10 feet resolution
Extreme Heat	**Thermal Infrared Sensor (TIRS) Landsat 8, Band 10**	U.S. Geological Survey. Landsat 8. Sioux Falls, South Dakota, USA. Archived by National Aeronautics and Space Administration, U.S. Government, U.S. Geological Survey. http://eros.usgs.gov. Remote-sensing image.	September 2025	*Historic / Observed (time-specific)* July 2025 (20th, 27th, and 30th)	100 meter resolution
Wildfire	**Wildland-Urban Interface (WUI)**	U.S. Geological Survey. *Wildland-Urban Interface Maps for the Conterminous United States Based on 125 Million Building Locations*. Reston, Virginia, USA. Archived by U.S. Geological Survey, U.S. Government. https://www.usgs.gov/publications/wildland-urban-interface-united-states-based-125-million-building-locations. Data release.	March 2022	*Present-day conditions (historically derived)* 2020	30 meter resolution

Sensitivity

Sensitivity represented the degree to which a system, population, or resource is or might be affected by hazards (U.S. Climate Resilient Toolkit). For this climate vulnerability assessment, sensitivity was based on two indicators: community lifelines and social vulnerability. Sensitivity scores were applied only to assets classified as community lifelines. This prioritization reflects the essential role these assets play in maintaining continuity during and after hazard events, as they support critical services such as emergency response, public health, infrastructure, and economic activity. Given the extensive base asset inventory, narrowing the sensitivity analysis to community lifelines allowed the assessment to focus on assets where disruptions would have the most immediate and widespread consequences for the community. FEMA defines community lifelines as assets that enable the continuous operation of critical government and business functions and are essential to human health and safety or economic security. In Crater PDC, community lifelines include wastewater treatment facilities, hospital systems, emergency response centers, septic systems, and more. Table B-2 showcases the types of lifelines as defined by FEMA.

Table B-2. FEMA Lifeline Descriptions

Icon	FEMA Lifeline	Lifeline Components
	**Safety and Security**	• Law Enforcement / Security • Fire Service • Search and Rescue • Government Service • Community Safety
	**Food, Hydration, Shelter**	• Food • Hydration • Shelter • Agriculture
	**Health and Medical**	• Medical Care • Public Health • Patient Movement • Medical Supply Chain • Fatality Management
	**Energy**	• Power Grid • Fuel

Communications	• Infrastructure • Responder Communications • Alert Warnings and Messages • Finance • 911 and Dispatch
Transportation	• Highway / Roadway / Motor Vehicle • Mass Transit • Railway • Aviation • Maritime
Hazardous Materials	• Facilities • HAZMAT • Pollutants • Contaminants
Water Systems	• Potable Water Infrastructure • Wastewater Management

Social vulnerability was the main sensitivity indicator utilized within this climate vulnerability assessment. Social vulnerability referred to the demographic and socioeconomic factors that adversely affect communities that encounter hazards and other community-level stressors. The Centers for Disease Control and Prevention (CDC) and Agency for Toxic Substances and Disease (ASTER) developed a social vulnerability index (SVI) that identifies and quantifies communities experiencing social vulnerability. The CDC/ATSDR SVI, developed in 2022, uses 16 U.S. Census variables from the 5-year American Community Survey (ACS) to identify communities that may need support before, during, or after disasters. These variables are grouped into four themes that cover four major areas of social vulnerability and then combined into a single measure of overall social vulnerability, shown in Figure B-1. For this assessment, the "RPL_Themes" percentile scores were applied, which rank each area's relative level of social vulnerability, with higher percentiles indicating higher vulnerability.

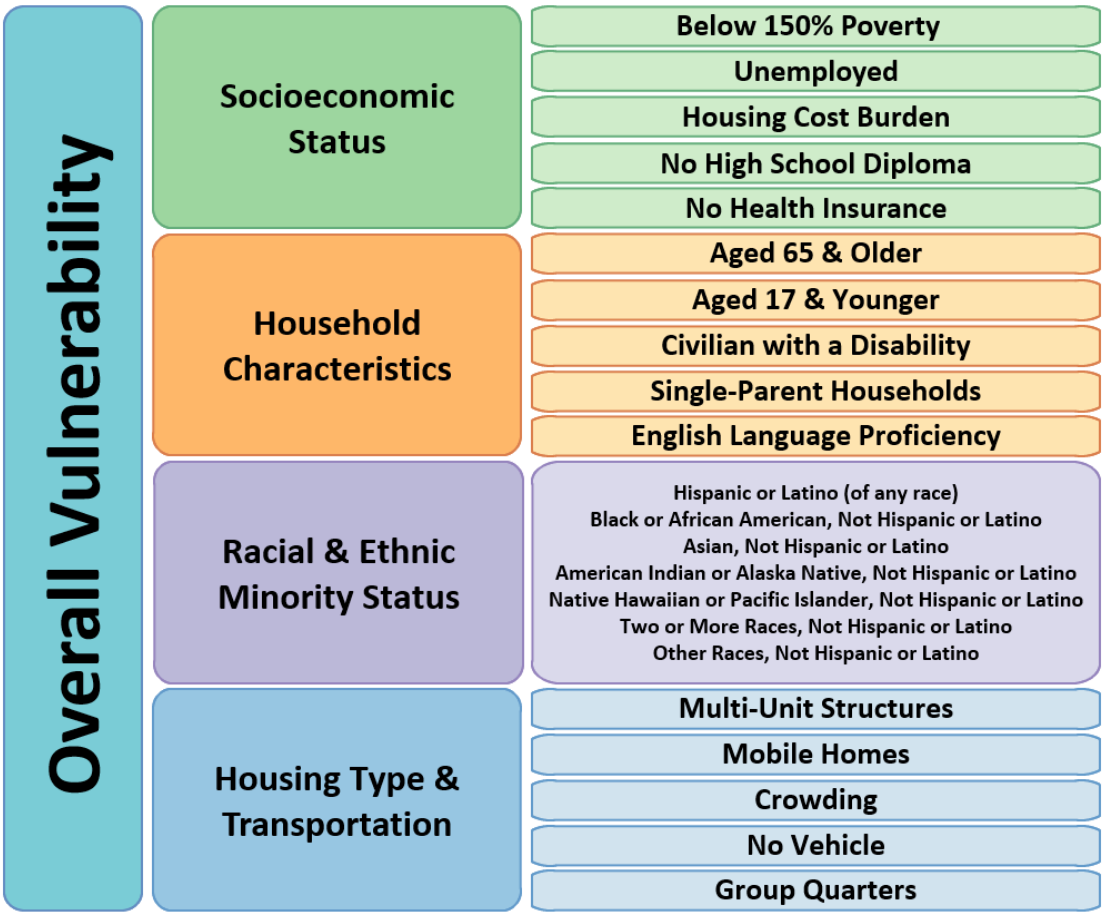


Figure B-1. Social Vulnerability Index U.S. Census Variables and Themes (Figure Source: ASTER/CDC https://www.atsdr.cdc.gov/place-health/php/svi/index.html).

Adaptive Capacity

Many climate vulnerability assessments incorporate adaptive capacity as a component that reflects the ability of systems, assets, or communities to anticipate, respond to, and recover from hazard impacts, thereby reducing overall vulnerability (U.S. Climate Resilient Toolkit). For this assessment, adaptive capacity was intentionally omitted and may be incorporated in future annual updates as data availability improves. A key limitation to including adaptive capacity was the lack of consistent, reliable, and up-to-date data describing the current condition, retrofits, operational readiness, and resilience features of buildings and infrastructure within Crater PDC localities. In the absence of standardized information on these attributes, inclusion of adaptive capacity could introduce uncertainty or bias into the results. As additional data are collected through inspections, capital improvement planning, and post-event assessments, adaptive capacity metrics may be developed and integrated to enhance future vulnerability analyses.

Scoring Framework

For this assessment, vulnerability was defined as the combined effect of exposure and sensitivity, calculated by adding the two components together, shown in Figure . By summing exposure and sensitivity, the assessment captured both the presence of a hazard and the inherent susceptibility of the

asset to damage or disruption. Assets with high exposure and high sensitivity therefore received higher vulnerability scores, indicating a greater likelihood of impact and potential consequences during hazard events.



Figure B-2. Vulnerability Equation

Exposure

The exposure component evaluated asset vulnerability by applying hazard-specific scores and weights based on spatial proximity and overlap. An asset point was considered exposed if it fell within 100 feet of a hazard layer. This buffer distance was applied because assets were represented as point features, which do not capture the full spatial extent of a property. Using a 100-foot buffer provided a more reasonable indication of whether the surrounding property area may be affected by nearby hazards. The 100-foot distance is also commonly used for riparian buffers and relevant for assessing proximity to flood-related hazards. Asset lines in this assessment were considered exposed if they directly overlapped with a hazard layer. Exposed assets were assigned a hazard-specific value, while assets outside defined hazard areas received a score of zero.

Additionally, for this climate vulnerability assessment, a basemap was scored for exposure using a weighted sum analysis in ArcGIS Pro. The Weighted Sum tool combined multiple raster hazard layers by applying predefined weights to each input, producing a single composite surface that reflected overall exposure. The same weighting scheme described in Table 5 was applied to the basemap. This approach allows exposure scores to be generated for any asset location, including those that may be added or modified in the future. It also enabled visualization of how flooding, extreme heat, and wildfire risk interact spatially, producing a composite exposure surface at a 5-meter resolution for the whole Crater region.

Asset exposure was first scored using a base value ranging from 0 to 1, with 0.5 representing partial exposure. Assets that experienced the hazard were assigned a score of 1, while those with partial exposure were assigned a score of 0.5. Assets located outside the defined hazard exposure area received a score of 0. These base exposure scores were then multiplied by weighting factors ranging from 2 to 8 to reflect meaningful differences in hazard importance, implementation priorities, and

expected frequency of occurrence. Crater PDC identified that certain hazards pose more immediate or severe risks to the community, such as riverine and pluvial flooding, while others may occur less frequently or have lower overall impact. Weighting allowed for a scoring system that captured these distinctions and does not treat all hazards as equally consequential or the same priority. Applying these multipliers expanded the possible score range from 0 to 1 for each hazard to a range of 0 to 8 points per hazard category depending on the weight multiplier, resulting in a maximum potential cumulative score of 24 points. The weighted methodology is shared in Table.

Coastal flooding exposure was assessed by identifying assets located within the Category 2 hurricane storm surge zone, and exposed assets were assigned a multiplier of 2. Because storm surge is less likely to occur than pluvial or riverine flooding in the Crater region and because many areas affected by storm surge are already captured within other flood hazard layers, it was assigned the lowest weighting of all hazards. Riverine flooding exposure was weighted based on flood potential, with assets in the 1 percent annual chance (100-year) or 0.2 percent annual chance (500-year) flood zones assigned a multiplier of 6. Pluvial flooding was given the highest priority weight by Crater PDC due to its frequency, local relevance, and model reliability. This model received a multiplier of 8 and serves as the primary flood-related driver in the exposure component scoring. Extreme heat and wildfire risk were weighted the same using a multiplier of 4 and treated as supplementary, compounding hazards. These hazards act to elevate exposure scores in areas already vulnerable to flooding rather than dominate overall results, reflecting their secondary, but still meaningful role in scoring vulnerability across the Crater region.

Table B-3. Scoring Methodology for Exposure

Hazard	Multiplier Assigned by CRATER PDC	Unlikely Exposure Base Value = 0	Partial Exposure Base Value = 0.5	Full Exposure Base Value = 1
Coastal Flooding	**x 2**	Not within Category 2 Hurricane Maximum of Maximums (MOM) SLOSH Extent		Within Category 2 Hurricane Maximum of Maximums (MOM) SLOSH Extent
Riverine (Fluvial) **Flooding**	**x 6**	Not within the 0.2% (500-year) or 1% (100-year) annual chance	Within the 0.2% (500-year) annual chance only	Within the 1% (100-year) annual chance only
Rainfall (Pluvial) **Flooding**	**x 8**	Not within the 0.2% (500-year) or 1% (100-year) annual chance	Within the 0.2% (500-year) annual chance only	Within the 1% (100-year) annual chance only
Extreme Heat	**x 4**	Below 100°F	100–120°F	Above 120°F

Wildfire	**x 4**	Not Classified as Interface or Intermix	Classified as Interface	Classified as Intermix

Sensitivity

As noted earlier, assets that were classified as FEMA Community Lifelines were evaluated only within the sensitivity component because they represent essential services that must remain operational during and after an event. The CDC/ASTR social vulnerability index was scored as an indicator for each asset as shown in Table . The "RPL_Themes" percentile scores, which rank each area's relative level of social vulnerability, were used to indicate vulnerability.

Similar to how exposure indicators were scored, a base value ranging from 0 to 1 was first assigned to each asset, with 0.5 representing partial sensitivity. Assets that were more sensitive, meaning they had a high social vulnerability score, were assigned a score of 1, while those with partial sensitivity were assigned a score of 0.5. Assets that fell outside areas classified as socially vulnerable or received a low social vulnerability score, were assigned a value of 0. These base scores were then multiplied by 10 to reflect the priority placed on social vulnerability by Crater PDC. Because exposure weights ranged from 2 to 8, applying a multiplier of 10 provided that vulnerable populations are appropriately elevated within the overall vulnerability framework, reinforcing their central importance in resilience planning.

Table B-4. Scoring Methodology for Sensitivity

Hazard	Multiplier Assigned by CRATER PDC	Unlikely Exposure Base Value = 0	Partial Exposure Base Value = 0.5	Full Exposure Base Value = 1
Social Vulnerability	**x 10**	RPL_THEMES Score Below 0.50	RPL_THEMES Score 0.50 -.75	RPL_THEMES Score 0.75 – 1.00

Data Limitations and Exclusions

Each indicator analyzed in this climate vulnerability assessment relies on datasets that offer valuable insights but also carry important limitations that influence how results should be interpreted. Differences in data resolution, methodological assumptions, model scope, and available inputs affect the precision and completeness of each hazard estimate. The following sections summarize key constraints and considerations associated with exposure and sensitivity indicators selected for the climate vulnerability assessment. As a result, the findings presented through the *CRATER PDC Regional Resiliency Plan* should be interpreted within the context of the specific datasets Crater modeling approaches used.

Flooding

The rainfall-driven (pluvial) flood model was developed using independent subbasins that were designed to simulate highly localized rainfall events and therefore do not account for upstream or downstream riverine influences. The model also does not incorporate the effects of engineered stormwater conveyance systems, such as pipes, ditches, or drainage infrastructure.

Sea level rise, a common factor considered in coastal flood assessments, was not analyzed separately in this study. The rainfall-driven (pluvial) flood model developed by Virginia DCR and Dewberry incorporated sea level rise within the near-future scenario. Excluding a separate sea level rise helped avoid double-counting coastal flooding exposure.

Fathom flood hazard data, which integrates coastal, riverine, and rainfall-driven flood types, was also not used. Although Fathom has been selected to support Virginia DCR in developing the *Virginia Flood Protection Master Plan*, this climate vulnerability assessment relied instead on combined data sources from NOAA, FEMA, and Virginia DCR to provide a more complete and consistent picture of flood hazards for the purposes of this plan.

Extreme Heat

Landsat 8 was used for the extreme heat exposure analysis. A key limitation of Landsat 8 for extreme heat analysis is its coarse spatial resolution (100 m for thermal data), which can miss small, localized heat islands and may not accurately capture temperatures within dense urban neighborhoods. Also, this data does not include humidity which can impact the way heat feels and can amplify current temperatures. For this analysis, only a range of dates in late July of 2025 were used. For a more comprehensive heat analysis, multiple years of data can be stitched together to better understand long-term trends and variability. Due to budget and project scope limitations, this level of analysis was not included.

Wildfire

The Wildland-Urban Interface (WUI) dataset is built from 125 million Microsoft-derived building footprint locations and 30-meter land cover data, which introduces several important limitations. Because the accuracy of WUI classification relies on the precision of the underlying building footprint dataset, any misclassified, missing, or non-housing structures may distort the mapped extent of the WUI. The modeling approach also depends on neighborhood-size thresholds that influence how building clusters and vegetation patterns are identified; larger neighborhoods tend to increase the mapped WUI area but may overlook isolated structures, while smaller neighborhoods may underrepresent more dispersed patterns of development. Although the maps achieve a high overall classification accuracy (98 percent), regional differences remain, particularly in rural areas where large numbers of non-housing structures can inflate WUI estimates. Finally, because the dataset is static, it does not capture ongoing development, vegetation change, or urban expansion that has occurred since the underlying data were produced.

Social Vulnerability

A primary limitation of the CDC/ATSDR Social Vulnerability Index (SVI) 2022 is that it relies entirely on American Community Survey (ACS) 5-year estimates, which can introduce uncertainty, especially for small or rural census tracts where sampling error is higher. Because the SVI uses 16 ACS demographic and socioeconomic variables to generate vulnerability rankings, any inaccuracies or year-to-year variability in ACS data directly affect the reliability of SVI scores.